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Prevention of Urinary and Fecal Incontinence in Adults

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Preface

The Agency for Healthcare Research and Quality (AHRQ), through its Evidence-Based Practice Centers (EPCs), sponsors the development of evidence reports and technology assessments to assist public- and private-sector organizations in their efforts to improve the quality of health care in the United States. This report was requested by the NIH Office of Medical Applications of Research as a background paper for the State-of-the-Science Conference on Prevention of Fecal and Urinary Incontinence in Adults. The reports and assessments provide organizations with comprehensive, science-based information on common, costly medical conditions, and new health care technologies. The EPCs systematically review the relevant scientific literature on topics assigned to them by AHRQ and conduct additional analyses when appropriate prior to developing their reports and assessments.

To bring the broadest range of experts into the development of evidence reports and health technology assessments, AHRQ encourages the EPCs to form partnerships and enter into collaborations with other medical and research organizations. The EPCs work with these partner organizations to ensure that the evidence reports and technology assessments they produce will become building blocks for health care quality improvement projects throughout the Nation. The reports undergo peer review prior to their release.

AHRQ expects that the EPC evidence reports and technology assessments will inform individual health plans, providers, and purchasers as well as the health care system as a whole by providing important information to help improve health care quality.

We welcome written comments on this evidence report. They may be sent to the Task Order Officer named below at: Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850, or by email to **epc@ahrq.gov.**

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Structured Abstract

Objectives: To assess the prevalence of and risk factors for urinary (UI) and fecal (FI) incontinence in adults in long-term care (LTC) settings and in the community, the effectiveness of diagnostic methods to identify adults at risk and patients with incontinence, and to review the effectiveness of clinical interventions to reduce the risk of incontinence.

Data Sources: MEDLINE® (PubMed), CINAHL, and Cochrane Databases.

Review Methods: Observational studies were reviewed to examine the prevalence and incidence of UI and FI and the association with risk factors. The effects of treatments on patient outcomes were analyzed from randomized controlled and multicenter clinical trials. The diagnostic values of the tests were compared from the original epidemiologic studies of different designs. Of the 6,097 articles identified, 1,077 articles were eligible for analysis.

Results: The prevalence of UI, FI, and combined incontinence increased with age and functional dependency. Cognitive impairment, limitations in daily activities, and prolonged institutionalization in nursing homes were associated with a higher risk of incontinence. Stroke, diabetes, obesity, poor general health, and comorbidities were associated with UI and FI in community dwelling adults. Parity, anal trauma, and vaginal prolapse in women and urological surgery and radiation for prostate cancer in men are risk factors for UI and FI. Intensive individualized management and rehabilitation programs improved continence status in nursing home residents and adults after stroke. Self-administered behavioral interventions including pelvic floor muscle training with biofeedback and bladder training resolved UI in incontinent women. Electrical stimulation and sacral neuromodulation improved urge UI, but improvement for FI was inconsistent. Tension-free vaginal tape procedures and modified surgical techniques for prolapse to support the bladder neck resolved stress UI in the majority of treated women. Behavioral treatments of FI resulted in small improvements in severity and quality of life related to incontinence. The effects on FI of surgical techniques for hemorrhoids, rectal prolapse, rectal cancer, and anal fissures are not consistent across studies. Surgical interventions in patients with ulcerative colitis resulted in the same rates of fecal continence when compared to each other. The few clinical interventions to treat FI that were tested in well-designed trials had no clear evidence of better effects of the compared treatments. Instrumental outcomes to evaluate the effectiveness of treatments did not correlate with patient outcomes. Epidemiologic surveys to detect persons at risk and patients with undiagnosed UI have the same diagnostic value and less cost compared to professional examinations and diagnostic tests. Self-reported questionnaires and scales have unsatisfactory validity to diagnose FI.

Conclusions: Epidemiologic surveys are cost-effective ways to estimate the prevalence of UI in large nationally representative population groups. Routine clinical evaluation should include an assessment of the risk factors, symptoms, and signs of incontinence. Pregnant or menopausal women, women with vaginal prolapse, males treated for prostate disease, patients with rectal prolapse, and frail elderly and nursing home residents are high risk groups. Individualized management programs can improve continence in LTC facilities but are hard to sustain. Regular monitoring and documentation of the continence status in relation to implemented continence

services should be quality of care indicators for nursing homes. Pelvic floor muscle trainings with biofeedback can resolve incontinence and improve quality of life. Surgery is effective in curing stress UI in females. Clinical interventions for UI in males and for FI in adults need future investigation. A list of research recommendations is offered.

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Appendixes cited in this report are available at http://www.ahrq.gov/downloads/pub/evidence/pdf/fuiad/fuiad.pdf.

Executive Summary

Introduction

The high prevalence of urinary (UI),[1,2] fecal (FI),[3] and combined[4,5] incontinence in long-term care (LTC) settings and in community dwelling adults[6-9] and the substantial impact of incontinence on quality of life[10-12 13,14] underscores the need for more and better research on effective strategies to identify patients at risk[15-17] and clinical interventions to reduce the risk of incontinence.[13,18-21] Prevalence and risk factors depend on baseline physiological mechanisms, including weakness of pelvic floor muscles important for both UI and FI, hyperactive bladder that may result in urge UI, poor urethral sphincter function associated with stress UI,[22,23] and impaired structural and functional integrity of pudendal nerve activity, rectal compliance and rectal sensation, and anal sphincter associated with FI.[17,20,23,24]

Updated evidence-based recommendations to detect high-risk subgroups and to diagnose and treat symptoms and baseline causes of incontinence could improve effective patient-centered health care.[25-27]

This systematic review was commissioned as background material for an NIH/OMAR State-of-the-Science Conference on the *Prevention of Fecal and Urinary Incontinence in Adults*. The aims of this review are to synthesize the published evidence of effective methods to identify individuals at risk and patients with undiagnosed UI and FI in the community and in LTC settings and to compare the effectiveness of different clinical interventions to prevent the occurrence and progression of UI and FI in adults.

The following questions were developed for this review:

1. What are the prevalence and incidence of urinary and fecal incontinence in the community and long-term care settings? How does prevalence differ in race, ethnicity, and gender groups?
2. What are the independent contributions of risk factors for urinary and fecal incontinence, including age, functional impairment, institutionalization, parity, childbirth, and postpartum state, menopause, dietary factors, smoking, obesity, genetic factors, prostate disorders, dementia, psychiatric disorders, specifically depression, diabetes, urinary tract infection, chronic gastrointestinal conditions, cardiovascular and pulmonary diseases, gastrointestinal, gynecologic, and urological procedures, neurological disorders, such as stroke and spinal cord problems?
3. What is the evidence to support specific clinical interventions to reduce the risk of urinary and fecal incontinence?
4. What are the strategies to improve the identification of persons at risk and patients who have urinary and fecal incontinence?
5. What are the research priorities for identifying effective strategies to reduce the burden of illness in these conditions?

For Question 1 we reviewed population-based surveys of prevalence and incidence of incontinence in LTC settings and in the community. We compared the diagnostic accuracy of different questionnaires, scales, and instrumental methods to the methods that are believed to be the "gold standard" to detect incontinence in adults. For Question 2 we evaluated the absolute risk of incontinence in subpopulations with risk factors, including surgical procedures and specific diseases, and adjusted relative risk or odds ratios of incontinence in adults with different levels of risk factors. For Question 3 we synthesized the results of the randomized controlled

clinical trials (RCTs) and large multicenter trials to determine which treatments resulted in better rates of cure and improvement in symptoms and quality of life. Severity (frequency and amount of involuntary leakage of urine and feces) and impact on quality of life of incontinence were analyzed from the published articles.

Methods

Original epidemiologic studies from 1990 to 2007 that examined the risk of incontinence in adults were identified from the National Library of Medicine, CINAHL, and Cochrane Databases. Randomized controlled clinical trials and nonrandomized large multicenter trials (for FI) were reviewed to compare the effects of different treatments.

We use the terminology of the International Continence Society (ICS) of urinary (stress, urge, mixed) (Chapter 3), anal (flatus and fecal: solid, and liquid feces), and combined incontinence (Chapter 5).[20,21,23] To facilitate the discussion of fecal incontinence, we use the term fecal incontinence in the text to encompass both fecal and anal incontinence and in the evidence tables we use the exact definitions from the original reports. These two terms are frequently used interchangeably in the literature and create a great deal of confusion.

Results

Of 6,097 potentially relevant articles, we found 1,077 articles eligible for analysis.

Prevalence of Incontinence in LTC Settings

The prevalence of UI in nursing homes varied from 30 to 77 percent.[2,28-31] More than half of the residents were incontinent at admission,[32] while the estimated annual incidence rate was 20 percent for occasional urge and 14.5 percent for occasional stress UI.[33] The majority of women in LTC (60-78 percent) reported UI.[28-30,32] The prevalence of UI in men ranged from 23 to 72 percent.[28-30,32] Prevalence rates increased with advancing age in both men and women of all races.[2,29,30,32] One of the largest cross-sectional studies of 10,215 older nursing home residents found that 40 percent of the residents suffer from combined UI and FI.[5] Involuntary loss of solid or liquid feces was experienced by 46 percent of nursing home residents[3] with an annual incidence of 14 percent.[4] Eighty-three percent of nursing home residents with severe cognitive impairment had FI.[34]

Prevalence of Incontinence in Community Dwelling Adults

Large population-based studies reported that 9-22 percent of adults had UI,[8,9,30,35-38] with even higher rates (37 percent) in a recent study of 145,765 men and women 65 years and over.[39] Pooled analysis of 117 epidemiological studies of UI prevalence in community dwelling women[7,8,30,35-148]suggested that the prevalence of ever having UI increased from 21 percent in 19-44 year old (17 studies) to 34 percent in 45-64 year old (45 studies), and to 39 percent among elderly women (11 studies). Younger females reported UI in the past year less frequently (two studies), the prevalence increased to 35-41 percent among women 45-64 years (11 studies) and older than 65 years (13 studies). Elderly women reported UI in the past month (four studies)

more often. Overall prevalence of monthly UI was the highest in elderly females (two studies)[111,133] and in women 45-64 years old (nine studies).[43,45,46,62,116,124,132,133,148] Weekly incontinence was experienced more often by women older than 65 years[42,94,97,148] and elderly women over 80.[42] Few studies reported daily UI, 5 percent of younger women (19-44 years old)[96] and 17 percent of women older than 65 years[79] reported having daily leakage. The prevalence of total UI increase in age categories from 19 percent in women 19-44 years (18 studies)[57,64,68,69,75,80,85,86,92,96,98-100,119,130,133,145,148] to 29 percent in those older than 45 years. Stress incontinence was the most prevalent type in women 19-44 years old (15 studies) [37,57,64,80,85,91,95,98,104,108,109,130,133,145,124] and in those 45-64 years of age (36 studies). [37,38,44,51,57,61,70,73-75,77,78,80,84,85,87,89,95,104,108,116,117,122,124,127,129,131,135-137,139,141,145,148,149] However, mixed UI was the most prevalent type of incontinence in older women; 16.8 percent of women older than 65 (19 studies)[30,35,59,66,71,72,74,80,85,90,104,106,108,110,121,128,142,143,145] and 16 percent of elderly women reported mixed UI (seven studies).[71,74,80,84,106,124,133] The prevalence of urge incontinence gradually increased from 5 percent in younger women[37,57,64,80,85,91,95,98,101,104, 108,130,133,145] to 10 percent in women 45-64 (32 studies),[37,44,51,57,61,70,73-75,77,78,80,84,85,87,89,95,102,104, 108,116,117,124,126,127,129,131,137,139,145,148,149] and to 12 percent in women older than 65 years (28 studies).[30,35,37,56,59,61,63,66,71,72,74,80,84,85,90,104,106,108,110,118,121,123,125,128,133,142,143,145]

Pooled annual incidence of UI (18 studies)[38,45,47,56,59,62,103,134,139,149-157] was 6.25 percent for all ages, with the highest in elderly women; 7 percent in those older than 65 years and 8.52 percent in women over 80. Overall, middle aged and elderly women developed stress UI more often (four studies). Annual incidence of mixed UI was close to stress UI (two studies). Less than 7 percent of women 45-79 years old developed urge UI (three studies).

Pooled analysis detected a clear pattern of increased prevalence of total UI in aging men from 5 percent in those 19-44 years old (11 studies) to 11 percent in those 45-64 years old (27 studies), to 21 percent in males over 65 years of age (41 studies). The highest prevalence of UI was reported in elderly males of 32 percent (17 studies). Urge UI was the most prevalent type of UI in males among all age categories, increasing from 3 percent in those 19-44 years old (7 studies) to 12 percent in those older than 65 years of age (20 studies) The prevalence estimations varied substantially depending on the definitions, with the higher prevalence of UI during the last year in American males 19-44 years old (18 percent) and 45-64 years old (25 percent) compared to UI during the last month. Older American males reported UI during the last month more frequently, from 29 percent among those older than 65 years of age to 42 percent in elderly males. Stress UI ever was experienced by 2 percent of American men 45-64 years old, 1 percent reported stress UI during the last month, and 1 percent during the last year. Urge UI was the more prevalent during the last year (7 percent of men 45-64 years old). Men over 65 years of age reported having urge UI during the last month (11 percent). Pooled analysis estimated that daily UI was experienced by 5 percent of males 45-64 years, 8 percent of men over 65 years old, and 9 percent of elderly men. Severe UI that required change of underwear was reported by 2 percent of those 45-64 years old and 4 percent of elderly men.

Combined UI and FI is experienced by 3 percent[111] to 6 percent[158] of older adults in the community. The prevalence of FI increased with age,[111,159] 3 percent of adults had daily leakage of feces;[159] weekly FI was reported by 4-5 percent[159,160] and monthly FI by 7 percent.[159] Pooled prevalence of FI in community dwelling men (22 studies) varied across the studies depending on definitions of incontinence and population characteristics. The lowest prevalence of anal incontinence (AI) of 2 percent was reported in two studies with median age of participants between 45 and 64 years. The prevalence of FI was less than 10 percent in all age groups and

increased from 6 percent in those 45-64 years old to 10 percent in elderly men. The prevalence of solid feces incontinence was reported by 1 percent of men 45-64 years of age and by 2 percent of elderly males. The most prevalent was combined incontinence in elderly, 16 percent of men over 80 years experienced UI and FI. Prevalence of AI was the highest in women compared to other definitions and increased from 22 to 45 percent with aging (38 studies). An inclusion of flatus incontinence in the definition may contribute to an increased prevalence estimates in females. Prevalence of FI was higher than in males and increased from 7 percent in those 45-64 to 10 percent among elderly women. UI and FI were experienced by 10-12 percent of women. Severity of FI in females increased with age.[161] The prevalence of monthly FI varied from 6 percent[162] to 25 percent;[125] 1 percent[162] to 5 percent[163] of women had more than one FI episode per month. The prevalence of weekly FI was less than 7 percent in the majority of the studies.[125,160,161,163] Less than 2 percent of community dwelling women reported daily FI.[125,161]

Risk Factors for Incontinence in LTC

The residents of LTC with cognitive impairment,[1,34] physical dependency,[4,29,34,164,165] prolonged institutionalization,[28] diabetes,[29,34] and FI[29] had higher prevalence of UI. The odds of UI increased by 24 percent with each 5 years of age among LTC residents,[4,165] by 20-40 percent after stroke,[4,165] by 300-400 percent in adults with impaired activities of daily living (ADL),[4,164] and by 700 percent among wheelchair users and bedridden residents.[29] Women in LTC experienced UI more often than males.[29,165] FI was associated with 10[29] to 20[165] times larger odds of UI. Dependence in daily activities was associated with 6-7 times higher odds of FI, and dependency in eating with four times higher odds of FI.[3] Increased length of stay in nursing homes from 2 weeks to 1 year was associated with a seven times higher prevalence of FI.[166] Limited evidence suggested that the prevalence of combined UI and FI was twice as high in non-White as White residents of nursing homes.[4,5]

Risk Factors for Incontinence in Community Dwelling Adults

The prevalence of UI in men with prostate cancer was less than 10 percent in the majority of the studies.[167-174] UI rates after radical prostatectomy in 12,079 Medicare beneficiaries decreased from 20 percent in 1991 to 4 percent in 1995, being the highest in older patients.[175] Age was an independent risk factor for male UI in two studies.[58,97] Non White men had the same rates of UI compared to Whites.[175] Two studies showed that sedentary life was associated with UI in males.[83,92] Alcohol intake[72,83,84,92] and smoking[72,83,92] did not show a significant association with male UI. Males with diabetes had significantly higher adjusted rates of UI[58,72,86,97,176] with a pooled odds ratio of 1.4. Co morbidities and poor general health were associated with UI in several studies.[81,84,92,97] Males with arthritis had higher adjusted odds of total[86] or urge UI.[176] Memory problems, epilepsy, and neurological diseases were associated with higher rates of UI.[4,58,72,86,97,114,176-178] Stroke was shown as a strong and independent risk factor for UI in nursing home residents[4] and in community dwelling males[58,86,97,176,177] with pooled odds ratio of 2. Restrictions in activities of daily living were associated with higher crude and adjusted odds of UI in males in all studies that examined the relationship.[4,81,92,97,106,114] Males with urologic symptoms[72,170,174,179] or urinary tract infections had higher adjusted rates of UI with a pooled odds ratio of 3.5.[72,74,92,97,106] Men with prostate diseases had higher rates of UI after adjustment for confounding factors in the majority of the studies.[72,83,92,170,176,180-183]

Age tends to be linearly associated with female UI prevalence and incidence rates.[7,41,53,55,56,62,65,80,81,83,85,99,105,133,138,143,184] Prevalent UI significantly increased with age in 20 [7,55,66,67,73,74,81,84,92,96,97,105,118,124,133,138,149,185-187] of 28 studies that reported the association.[7,55,62,66,67,73,74,81,84,92,93,95-97,105,118,124,132,133,138,140,144,149,185-189]

The evidence of the association between race and incident UI is limited to two studies[123,149] being higher in Whites. African American women had higher odds of incident urge but lower odds of incident stress UI. Hispanic women developed weekly UI more often compared to Caucasians. Prevalence of mild, moderate, and severe UI was lower among African American women than White women in all six studies that examined the association.[93,105,137,138,149,189] Prevalence of moderate UI was lower among Hispanic women compared to Caucasian women in four of five studies.[93,105,138,149,189]

Obesity was associated with higher incidence of UI in women in two studies.[103,149] Prevalent urge UI showed a positive dose response association in individual studies.[51,133] The strength of the association varied depending on definitions of UI. Adjusted odds of UI in the past month were higher in overweight and obese females.[83,92,133,143] Weekly UI was more prevalent in obese but not overweight women with a dose response increase per one unit of BMI.[66,90,92,96,138,189] With the definition of UI in the past year, the majority of the studies showed a significant increase in UI [7,51,59,68,72,144] and daily UI corresponding to an increase in BMI per one unit.[55,67,70,149,189] Obese women had greater odds of at least monthly UI compared to women with normal weight.[67,104,121,124,138,149,190] Daily and weekly stress UI were significantly associated with an increase in BMI in all studies that examined this association.[51,66,70,118,132,133,135,149,187]

One large prospective cohort, the Nurses' Health Study, reported that intensive physical activity in women 50-79 years of age was associated with a significant reduction in incident total UI and stress UI.[156] Higher education was associated with increased odds of prevalent UI in several studies.[67,70,72,83,93,149,189,191] Six studies[92,93,138,186,189,192] of 12[67,72,83,92,93,138,143,186,189,191,192] found a significant positive association between smoking and UI but the effect was not consistent in dose response models.

The studies of impaired cognitive function reported conflicting results about the association with incident[147,186] or prevalent UI.[97,114,132,186] Prevalence of UI was significantly higher in depressed women in five studies[90,124,149,189,191] of eight[90,97,106,118,124,149,189,191] that examined the association in multivariate analysis. Decreased physical function measured by self report and physical performance was significantly associated with UI in six studies[67,81,92,97,144,189] of eight[67,81,92,97,106,132,144,189] that examined this association.

The association between parity and UI in females was examined in 24 observational studies.[55,59,64,68,70,72,83,92,93,95,96,105,119,124,133,135,138,149,185,191,193-196] Incident UI was not associated with parity.[149,193] A positive significant association between prevalent UI and parity was reported in 13 studies,[68,72,83,93,96,105,119,124,138,185,191,193,195] while six studies did not find a significant increase in prevalent UI in relation to parity.[59,64,92,133,149,194] The number of births did not show a dose response association with prevalent UI but did with moderate severe UI and severe UI. All six studies that measured prevalent stress UI reported a significant positive association with parity.[72,95,133,149,195,196] Prevalent stress UI and severe stress UI did not show a significant dose response association with the number of births. Only one study[195] of four[72,133,195,196] found an increase in urge UI corresponding to parity. The role of parity is complex and decreases as a woman ages.[68,118,128,195] Evidence suggests that UI developing during pregnancy is a risk factor for UI in the immediate postpartum period[197] and in subsequent years[64,96] raising the odds of UI by two to 11 times.[96,198]

The association between UI and modes of delivery was conflicting. Cesarean section was associated with lower odds of UI in seven studies,[119,197,199-203] by 80 percent[201] to 41 percent[200] and did not show a significant association in five studies.[135,141,196,204,205] Two studies reported higher odds of UI when women after Cesarean section were compared with nulliparous females.[7,206] Few prospective studies reported protective effects of Cesarean section on UI compared to vaginal delivery.[119,197,202,205]

Individual studies suggested that menopausal status can be associated with UI, increasing the odds by 127 percent[93] to 144 percent.[191] Five[55,83,108,124,138] studies of eight[55,62,72,83,108,124,138,144,191] that examined the association between UI and hysterectomy reported significantly higher adjusted rates of total UI among women after hysterectomy. The increase was 160 percent for UI in the past month,[108] 130 percent for at least monthly UI,[124] 140 percent for daily UI (OR 1.4, 95 percent CI 1.1, 1.6),[55] and 160 percent for severe UI.[138] Several epidemiological studies have examined estrogen therapy as a risk factor for UI.[55,59,96,105,118,138,144,191]

Women with urinary tract infections had higher rates of UI in 11 studies[66,72,74,90,92,97,108,116,121,127,144] of 15[66,70,72,74,90,92,96,97,106,108,116,121,127,144,187] that examined the association.

Evidence from three studies,[7,86,118] suggested that women with arthritis had higher rates of UI by 80-88 percent.[7,86] Two studies[134,149] of three[134,149,186] reported that women with diabetes develop UI more often. Incidence of weekly UI was higher by 147 percent in women with duration of diabetes more than 10 years.[134] The same Nurses' Health Study cohort showed that incidence of severe UI was increased by 175 percent and very severe by 262 percent.[134] The Study of Women's Health Across the Nation found a 302 percent increase in developing monthly UI in women with diabetes independent of other risk factors.[149] Prevalence of stress UI was greater in women with diabetes in three studies[95,133,149] of six[66,95,108,133,135,149] that examined the association with pooled odds ratios that were not significant. However, the majority of the studies reported a significant increase in adjusted odds of total UI among women with diabetes[55,66,72,86,93,97,108,116,124,127,128,133,134,138,149,186] (16 studies). Four of five studies found a significant increase in adjusted odds of urge UI among women with diabetes[66,108,118,133,149] (five studies).

One prospective cohort, the Canadian Study of Health and Aging, found that elderly community dwelling women had a higher risk of developing UI after stroke.[207] Prevalence of UI was significantly higher among women after stroke in five[55,86,97,133,186] of six[55,67,86,97,133,186] studies that examined this association (pooled OR 1.7). Women with two or more comorbid diseases had higher adjusted rates of UI.[55,84,92,121,124,149,189] Three studies[68,121,144] reported a significant increase in adjusted odds of UI in women with constipation among six studies that examined this association.[68,74,97,121,144]

Consistent evidence showed that FI increased with age in women.[208-213] AI increased by 87 percent for every additional 10 years of age in Asians and by 36 percent in White females.[187] Maternal age older than 25 years was associated with greater odds of FI[214] and persistent FI.[215] The odds of FI increased by 271 percent after age 75.[58] Diabetes,[58,216,217] obesity,[218] and sedentary lifestyle were among risk factors for FI in community dwelling adults.[125] Adults with poor general health and comorbidities,[163,219] including kidney diseases,[186] transient ischemic attack,[219] and arterial hypertension[213] had higher odds of FI. Post stroke patients suffered from combined UI and FI five times more often[58] and from FI three[216] to five[58] times more often compared to adults without a stroke, with an increased risk in older adults,[220] diabetics,[220] and survivors with functional dependency after severe stroke.[220,221] Adults with functional limitations,[222,223] women with major depression,[163] older men with depression,[219] and adults with

impaired cognitive status[186,223,224] had higher prevalence of FI. Constipation,[187,212] irritable bowel syndrome,[187,211,212] and hemorrhoid surgery in women were associated with increased odds of FI.[211] The adjusted rates of FI were higher by 240 percent[225] to 450 percent[219] in women with diarrhea, by 190 percent in irritable bowel syndrome patients, by 250 percent in females with anal fistula, by 140 percent after cholecystectomy,[225] and by 400 percent in adults with incomplete bowel evacuation.[217 224] Women after previous gynecological surgery complained about AI 1.8 times more often.[213] Adjusted odds of FI increase by 4.6 times in females after perianal surgery.[217] The adjusted odds of FI in women with UI were two to six times higher compared to continent females.[162,163,219,226]

Delivery of heavy babies,[202] FI during pregnancy,[209] increased number of births,[215,226] and high degree of perineal injury[187,209,218,227-231] were significant risk factors for FI. A dose response association was found between FI and number of births[209,213,215,226] and with degree of birth related perineal damage.[228-230] The adjusted odds of persistent FI were 3.2 times greater among women after four or more deliveries.[215] Women with birth related sphincter tears after perianal trauma had 230 percent[209] to 280 percent[231,232] higher rates of FI.

Effects of Clinical Interventions on UI

Clinical interventions to reduce the progression of UI in adults in LTC settings. Conservative management programs improved UI in nursing home residents.[233-237] Individualized prompted voiding and intensive endurance and strength training exercises significantly improved the continence status of the residents.[234] A computerized quality management pathway would avoid progression of UI in 140 per 1,000 treated residents of nursing homes.[238] Limited evidence suggested that the number of patients continent at discharge after stroke was four times larger after active compared to conventional rehabilitation programs, which would result in 722 additional cases of continence per 1,000 treated adults with stroke.[239]

Community-based conservative management programs. Urinary continence service in the community that included lifestyle advice, bladder, and pelvic floor muscle training for 6 months[240] increased the proportion of continent patients by 50 percent and patients with improved UI by 20 percent. With this community-based continence service, UI was improved in an additional 100 subjects per 1,000 subjects treated; quality of life improved in 90 subjects and satisfaction with present urinary symptoms in 110.[240] Complex community-based intervention implemened by registered nurses, occupational therapist, and public health educators[241] and a continence management program implemented by nurse continence advisers with physician expertise[242] were effective to reduce the severity of UI in females.

Behavioral intervention for primary prevention of UI in women. Continence rates after behavioral modification programs, including pelvic floor muscle training, bladder training, and individualized test of knowledge and adherence implemented in 359 postmenopausal, continent women 55 years and older to prevent UI, were the same compared to usual care at 12 months of followup (continence rate 37 percent vs. 28 percent) but resulted in an improvement rate 136 percent higher than standard care in one RCT.[243,244] Intensive lifestyle therapy to lose and maintain at least 7 percent of initial body weight and to engage in moderate-intensity physical activity reduced stress UI by 15 percent after 2.9 years of followup in the Diabetes Prevention Program RCT among 2,191 overweight pre-diabetic women with BMI ±24 kg/m^2 (RR 0.85).[245]

Clinical interventions for primary prevention of UI in pregnant women were examined in eight large RCTs with more than 100 women[246-253] and one smaller trial;[254] three RCTs

reported continence rates with 3-10 months of followup.[249,250,253] Conservative advice about self-administered pelvic floor muscle training at 5, 7, and 9 months after delivery supplemented with bladder training did not change the risk of stress UI and tended to decrease the risk of severe UI at 12 months postpartum.[251,252] Continence rates after intensive exercise care[253] and self-administered perineal massage[250] were comparable to usual care. Pelvic floor muscle training with biofeedback and electrostimulation started at 9 weeks after vaginal delivery resulted in continence ten times more often compared to usual care at 10 months of followup.[249]

Clinical interventions for primary prevention of UI in males with urological diseases. The behavioral interventions on UI in males with prostate diseases were examined in 12 RCTs[255-266] but only two[257 ,261] of eight trials with continence outcomes[255,256,257 ,259,261,262,264,265] reported significant benefit after pelvic floor muscle training with biofeedback compared to usual care. The highest continence rate (99percent) was reported in a large, well designed RCT of early pelvic floor muscle training and biofeedback in participants who had radical retropubic prostatectomy for localized prostate cancer at 1 year of followup with a small significant relative benefit compared to usual care (RR 1.1).[257] The relative effect in the same RCT was larger when continence status was measured with the International Continence Society male questionnaire specific for UI (RR 1.3).[257] Continence rates in the control groups were more than 60 percent across other RCTs with no statistically significant differences compared to active treatments. The comparative effectiveness of pelvic floor muscle training compared to usual care in males after different treatment options for prostate cancer requires future confirmation in well-designed RCTs.

Pelvic floor muscle training for secondary prevention of UI. A large body of evidence suggested beneficial effects of behavioral interventions on UI in females.[267-287] Pelvic floor muscle training resulted in continence in females more often than usual care in four[275,280,288,289] of ten trials that compared usual care with active treatments.[275,280,281,288-292] Pooled results of relative benefits of pelvic floor muscle training (RR 7.1)[275,280,288,289] and pelvic floor muscle training combined with biofeedback (RR 11.2)[288,289] were sensitive to one small RCT[288] with a 2 month followup. Pelvic floor muscle training combined with bladder training increased continence rates by 175 percent compared to usual care (pooled RR 1.8).[243,280,290,291]

Electrical stimulation for secondary prevention of UI. Urinary continence 1-6 months after electrical stimulation in females was reported in seven RCTs.[293-298] Two RCTs that assessed continence at 6 months or more of followup failed to show significant benefit from electrical stimulation compared to continent services or medications.[293,299] Other RCTs also did not demonstrate significant relative benefit of electrical simulation compared biofeedback assisted training[297] or placebo.[295,296,300,301] Electrical stimulation would result in improvement in UI in 180 women per 1,000 treated.[302] Electrical stimulation would improve UI in more than 400 women per 1,000 treated compared to placebo.[303] Home-managed electrical stimulation with vaginal or anal stimulators would avoid 50 cases of UI per 1,000 treated women.[304] The rates of continence from urge UI were more than 70 percent in one RCT after functional magnetic stimulation[298] with significant relative benefit compared to sham stimulation in only one trial at 2 months of followup (RR 3.5).[298]

Neuromodulation for secondary prevention of UI. In community dwelling adults the implantation of a multiprogrammable neurostimulator cured 47 percent of participants with urge UI[305] with significant relative benefit compared to standard medical therapy.[305] Sacral root neuromodulation resulted in urge continence more than nine times more often than conservative

management with medications or pelvic floor muscle training (RR 9.86).[306] Sacral nerve stimulation would avoid 385[306] to 430[305] cases of urge UI per 1,000 treated adults.

Injectable bulking agents for secondary prevention of UI. The effects of different bulking agents for secondary prevention of female UI were examined in four RCTs with one study of more than 100 females[307] and several smaller trials[308-310] with 6[309] to 12 months[307,308,310] of followup. However, only one RCT reported significant relative benefit in 63 women with stress UI at 12 months of followup after transurethral ultrasonography-guided injections of autologous myoblasts and fibroblasts compared to conventional endoscopic injections of collagen (RR 9.5).[308]

Medical devices for secondary prevention of UI included Hodge pessary,[311] disposable intravaginal devices,[312,313] urethral plug,[314] and vaginal cones[299,315,316] in females and UroLume sphincteric stent[317]or penile compression devices in males.[318] Blocking urinary leakage using a urethral insert device with disposable applicator resulted in continence in 67 percent of women with mixed or stress UI but showed no relative benefit compared to a urethral insert with a sterile balloon device.[313] One RCT of 122 women with stress UI did not show differences in continence rates after vaginal cones compared to continence guard services at 6 months of followup.[299] Limited evidence suggested that medical devices resulted in modest improvement in UI, not better than other interventions in females[299,311-313,315] and in males.[317,318]

Surgical interventions for primary prevention of UI in women. Among examined gynecological surgeries, intrafascial total abdominal hysterectomy significantly reduced the risk of urge UI compared to the extrafascial approach.[319] Total or subtotal abdominal hysterectomy resulted in comparable continence rates 1 year after the surgery.[320] Prolapse surgeries in continent women (negative stress test at baseline) were examined in two RCTs.[321,322] Cystopexy alone compared to cystopexy with posterior pubourethral ligaments plication resulted in the same rates of UI at 1 year of follow up.[322] Incidence of stress UI was several times higher after Burch colposuspension. Compared to colposacropexy without prophylactic colposuspension at 3 years of followup.[321]

Surgical interventions for secondary prevention of UI in women. Tension-free vaginal tape and sling procedures resolved stress UI in more than 75 percent of treated women[323-342] with some evidence of greater relative benefit compared to Burch colposuspension.[343] Surgery with Burch colposuspension for stress UI resulted in continence in more than 75 percent of women in the majority of the studies[344-361] with inconsistent relative benefit when compared to other treatments. Few RCTs reported significant relative increase in objective cure at 1 year of followup after tension-free vaginal tape procedure compared to active treatment.[330,331] Burch retropubic urethropexy resulted in continence in more than 90 percent of women and provided the largest relative benefit compared to modified anterior colporrhaphy (RR 5.1)[353] and anterior colporrhaphy with Kelly plication (RR 1.4).[345] Burch colposuspension with abdominal hysterectomy compared to anterior colporrhaphy with vaginal hysterectomy resulted in higher continence rates (RR 1.6) in women undergoing surgery for primary stress incontinence and a concurrent grade 2 or 3 cystocele.[362]

The largest relative benefits with more than 300 excessive cases of stress UI per 1,000 treated females were reported after pelvic floor muscle training compared to regular care, and Burch colposuspensions, and tension-free vaginal tape compared to other surgical procedures. Hormone replacement therapy increased the risk and progression of UI in postmenopausal females. A few studies demonstrated relative benefits of local estrogen administration on stress UI by 64 percent[363] and urge by 55 percent.[364]

Hormone therapy for primary prevention of UI increased incident mixed UI by 50 percent (RR1.5) and incident stress UI in postmenopausal women by 80 percent (RR 1.8).[365] Incident urge UI increased by 30 percent and total UI by 40 percent (RR 1.4) after estrogen combined with progestin (RR 1.3).[366] Oral estrogen alone without progestin increased incident stress UI by 210 percent (RR 2.1)[365] and worsened UI by 530 percent (RR 5.3).[367]

Hormone therapy for secondary prevention of UI. Urinary continence was reported in four RCTs that examined the curative effects of local hormone therapy on secondary prevention among incontinent women.[364,368-370] The highest rates of continence were reported after transdermal administration of an estrogen patch (100 percent) and estrogen gel (90 percent) among postmenopausal women with self-reported urinary symptoms.[368] Topical estrogen in suppositories or creams combined with physiotherapy and electrostimulation cured 22 percent of women 50-74 years of age with regular mild incontinence (>2 leakage episodes per month) compared to 0 percent after no hormone treatment.[364]

Pharmacological agents for secondary prevention of UI. Clenbuterol was more effective to achieve continence in females with stress UI compared to placebo but not to pelvic floor muscle training. Extended release tolteradine for 2-12 weeks resulted in greater rates of cure or improvement compared to placebo in adults with overactive bladder syndrome. Duloxetin administered for 3-12 weeks in patients with predominantly stress UI improved UI, but the rates of continence did not differ from placebo. Long-term effects of medications combined with pelvic floor training on continence are unknown. Comparative effectiveness of combined treatments, including medication, requires future research.

Clinical Interventions to Reduce the Risk of FI

Conservative management programs for secondary prevention of FI in LTC settings. Consistent benefits of conservative management programs,[233-235] integrated FI care,[235] and functional individualized endurance and strength-training exercises[234] on FI in nursing homes were reported in several studies.

Pelvic floor muscle training for primary prevention of FI was examined in one RCT of 747 women with postnatal UI.[251,252] Assessment by nurses of incontinence with conservative advice on pelvic floor muscle training at five, seven, and nine months after delivery reduced the risk of any FI by 51 percent at 1 but not 6 years after index delivery.

Dietary intervention for secondary prevention of FI was reported in one RCT of 42 adult volunteers with incontinent loose or liquid stools at least weekly.[371] Usual diet supplemented with 25g of Metamucil did not reduce the proportion of incontinent stools at 1 month of followup.

Pelvic floor muscle training with biofeedback for secondary prevention of FI. Sensory biofeedback training with pelvic floor muscle training resulted in control of feces (fecal continence) twice as frequently in women with FI after obstetric and sphincter trauma as pelvic floor muscle training alone,[372] which would prevent 382 cases of FI per 1,000 treated. Studies of behavioral treatments of FI reported less than 40 percent improvement in severity and quality of life related to FI.[372-375] Limited evidence suggested a significant reduction in FI after complex behavioral interventions, including lifestyle changes and exercises augmented with biofeedback.[376]

Neuromodulation for secondary prevention of FI. Individualized sacral nerve continuous stimulation improved FI in 89 percent of patients with severe baseline FI compared to 17 percent

after sham stimulation in one study,[377] resulting in an improvement in symptoms in 720 additional patients among 1,000 treated.

Pharmacological agents for FI. Few pharmacological interventions[378-380] resulted in fecal continence in more than 50 percent of patients but were not statistically better than placebo[378,379] or surgery.[380]

Surgical interventions to repair external anal sphincter after acute obstetric trauma (primary prevention). Four RCTs compared end-to-end technique to overlapping repair of obstetric anal sphincter lacerations;[381-384] six reported patient outcomes with inconsistent benefit from end-to-end technique.

Early detection of anal sphincter tears immediately after vaginal delivery followed by surgical repair significantly reduced the risk of FI 3 months and 1 year postpartum in RCTs of 752 pregnant women.[385]

Delivery interventions for primary prevention of FI. The effects of episiotomy were examined in two RCTs;[386,387] the effects of Cesarean or vaginal delivery were compared in two RCTs;[388,389] the effects of delayed or immediate pushing in the second stage of labor with epidural analgesia in one RCT;[390] and the effects of delivery by forceps or vacuum extractor in three RCTs[391-393] without significant relative benefit of instrumental compared to vaginal delivery.

Surgical interventions for primary prevention of FI. Of nine RCTs that compared different surgical techniques for hemorrhoidectomy, none reported significant relative FI benefits.[394-402] The effects of "chemical sphincterotomy" in patients with chronic anal fissure were analyzed in three RCTs,[403-405] with no significant result on FI.

The effects of surgical procedures on FI in adults with full-thickness rectal prolapse were evaluated in nine RCTs,[406-414] with no significant difference between treatments.

Different surgical techniques resulted in similar rates of FI in patients with anorectal abscesses,[415] fistula-in-ano,[416-418] and anal fissure.[419-423] Adjuvant radiotherapy for adenocarcinoma of the rectum[424-426] consistently increased the risk of FI in three RCTs, by 60 percent during the day (RR 1.6), by 90 percent during the night (RR 1.9), by 70 percent in utilization of pads (RR 1.7) compared to mesorectal excision,[424] and by 220 percent (RR 2.2) compared to the low anterior resection.[424]

Surgical interventions for secondary prevention of FI. The implantation of artificial bowel sphincter reduced FI severity[427] in a multicenter, prospective, nonrandomized clinical trial of 115 patients. However, 25 percent experienced post surgical infection that required surgical revision and 37 percent needed reimplantations.

Gluteus maximus transposition did not show significant benefit compared to total pelvic floor postanal repair with anterior levatoroplasty on women with post obstetric FI.[428]

One multicenter noncontrolled nonrandomized clinical trial (Dynamic Graciloplasty Therapy Study Group) reported significant improvements in quality of life (Medical Outcomes Study Short Form 36 physical function and social functioning) after dynamic gracioplasty. The proportion of continent stools among total number of stools of more than 50 percent was 62-56 percent in nonstoma patients at 12-24 months and 37.5-43 percent in stoma patients at 24 months of followup.[429,430]

Surgical interventions used to treat ulcerative colitis[431-434] resulted in comparable fecal continence during the first 10 years after surgery, with an increased risk of FI during the longer period of followup. Clinical interventions resulted in comparable incidence and progression of FI in the majority of the RCTs with no clear evidence of better prevention of FI.

Strategies to Improve Identification of Persons at Risk and Patients who have UI and FI

Few well-designed studies examined the strategies to detect incontinence in adults. Positive clinical history of UI was associated with a small likelihood of urodynamic UI in females.[435-455] Inconsistent evidence implied that diagnostic values of x-ray,[456-461] single channel urodynamic,[462-465] and Q-tip test measuring straining angle[466-469] are similar to multichannel urodynamics. Translabial Doppler ultrasound[470,471] and transrectal ultrasound for the evaluation of the bladder neck anatomy and urethrovesical junction[472-477] (stress UI was defined as rethrovesical junction drop during stress of ≥1cm) were comparable to fluoroscopy for the detection of urinary leakage during urodynamic investigation in community adults and residents of nursing homes. Despite differences in positive predictive likelihood ratios compared to "gold standard" of urodynamic testing, the number needed to screen to detect one case of UI was similar and consistent among the studies. Effectiveness of self-reported scales, professional assessment of clinical history, and ultrasound to detect UI in women was comparable to urodynamic and consistent across race, age, and socioeconomic groups. However, clinical history and diaries were used by less than half the incontinent patients who actively sought health care for UI.[112,155,478] Population-based surveys using validated scales[447,479,480] yielded predictive likelihood ratios and the number needed to screen to detect one case of UI comparable to clinical history[435,436] but also had lower cost ($36-$67 vs. $175-$255 respectively).

The diagnostic value of tests among different age, race, and socioeconomic status subgroups has not been well established; however, the prevalence of undiagnosed UI differed by 10-20 percent in such groups.[146] Therefore, screening programs should target patients at high risk of UI. Limited evidence suggests that the Resident Assessment Protocol included in the Minimum Data Set (MDS) had a definitive predictive likelihood ratio to diagnose UI in nursing home residents.[481] Self-reported questionnaires and scales have unsatisfactory validity to diagnose FI in adults. Anal ultrasonography has the largest diagnostic value to detect anal trauma in patients with FI.[482]

Discussion

Public awareness of incontinence, its risk factors, and possible treatment options may reduce the burden of incontinence. Consistent definitions of incontinence and measures of success are important to compare the results from different studies. Despite extensive efforts to standardize the definitions of incontinence,[483] the original studies produced a plethora of measures. They measured self-reported symptoms and signs of incontinence, severity, and quality of life related to incontinence, and objective instrumental evidence of leakage inconsistently within and across the studies. Ratings of success by doctors and patients about quality of life in FI were also different.[484] Objective measures of UI showed random changes in most RCTs and could not be recommended as a measure of success for primary and secondary prevention of UI. The objective improvements in selected physiological measures were not consistent after the same interventions and did not correlate with self-reported continence and reduction in severity of UI.[322,330,485-491] The effects of treatments on quantitative measures of incontinence, including frequency and amount of leakage, were less compared to qualitative improvements in symptoms.

Other systematic reviews analyzed predominantly self-reported cure and improvement in UI, practically omitting objective measures of incontinence still commonly used in individual studies.[492-494] One review of two clinical trials with urodynamic tests concluded that the data is not sufficient to propose this invasive and costly testing as a measure of success.[495] The association between physiological testing and patient perception of severity of incontinence and quality of life is weak. The relationships between objective physiological measures of incontinence that are related to quality of life and primary diseases resulting in incontinence need future investigation. Long-term continence should be the primary outcome for future RCTs to consider the most effective clinical interventions.

Previous reviews did not find anal manometry a good measure of success in reducing FI.[496-500] Anal manometry was not a good measure of success in clinical trials of FI showing random changes between active and control interventions.[372,375,376,403,501-503] Improvement in self-reported FI was inconsistent with changes in anal manometry.[373,376,378,503] Few trials demonstrated the same direction and effect of treatment on improvement in FI and objective measures of FI.[372] Composite outcomes, including both self-reported changes in severity of incontinence and physiologic parameters in a common scale may offer a better choice to measure success of clinical interventions.[504,505]

The strength of evidence varied for the research questions in the present review. Studies of diagnostic methods had the lowest quality with few RCTs conducted.[437,462,506,507] Large population-based surveys reported prevalence of incontinence in age, gender, and race subgroups.[8,9,50,67,508] The independent contribution of risk factors on UI and FI were analyzed with adjusted odds ratios in cross-sectional and retrospective cohort studies. However, multivariate models included different sets of risk factors. Since causality between risk factors and incontinence could not be determined from such studies and the majority of risk factors are not modifiable, we hesitated to estimate events attributable to risk factors. Efficacy and comparative effectiveness of clinical interventions to reduce the risk and progression of incontinence were analyzed from RCTs. The majority of the RCTs had good quality, did not exclude subjects from the analysis of the outcomes, and provided adequate randomization. However, allocation concealment was not adequate in a large proportion of RCTs.[258,261,266,277,286,372,375,376,502,509-512] The RCTs of interventions that are regulated by the FDA, including hormone replacement therapy, had the best quality.[240,245,253,304,365,366,389,513,514] Large RCTs, including weight reduction and increased physical activity,[245] complex conservative management of UI,[240] delivery management,[388,389] and early prevention of UI in postnatal care[253] also had high quality. Variations in populations, interventions, and measures of outcomes, rather than quality of RCT resulted in heterogeneity between studies.

Conclusions

Epidemiologic surveys with behavioral risk factor surveillance systems are cost-effective to estimate the prevalence of urinary incontinence in large nationally representative population groups. Routinely collected clinical history should include an evaluation of the risk factors, symptoms, and signs of incontinence. Pregnant, obese, and aging women, women with vaginal prolapse, males treated for prostate disease, patients with rectal prolapse, and frail elderly and nursing home residents are high risk groups. Individualized management programs can improve continence in LTC facilities but are hard to sustain. Regular monitoring and documentation of the continence status in relation to implemented continence services should be quality of care

indicators for nursing homes. Pelvic floor muscle and bladder training are effective to reduce the risk of incontinence. Preventive strategies might include assessment and reduction of modifiable risk factors in early stages of incontinence. Surgery is effective in curing stress UI in females. Clinical interventions for UI in males and for FI in adults need future investigation.

Future Research

An important unresolved problem is clear definitions of the type of incontinence and patho-physiology of baseline conditions to have better estimations of prevalence and risk factors of incontinence. Inconsistencies between patient reports and physiological measures continue to pose a serious problem.[484,515] For efficacy studies, some combined measure might be applied, but for prevalence assessments, such an approach would pose serious logistical problems. Long-term effects of drugs, stimulators, and medical devices need future investigation in well-designed randomized trials. Given the social problems caused by incontinence, enthusiasm for surgical treatment remains high for treating both stress UI and FI, although future research is needed to examine the balance between benefits and harms related to surgery and the cost-effectiveness of surgical treatments compared to conservative interventions.

Managing both types of incontinence in LTC settings remains problematic. Programs that work under experimental conditions have not been sustained because they are labor intensive and essentially unreimbursed. Indeed, case mix based payments for nursing homes create a disincentive to manage incontinence.

Several other specific areas have been identified as needing more research. They include:

- Interaction between age, race, and other risk factors for UI and FI in women and men
- Effective strategies to prevent UI and FI in women and men in community and LTC settings
- Association between race and severity of UI and FI and quality of life related to UI and FI in men and women from the community and in LTC settings
- Strategies to reduce the risk of UI and FI related to pregnancy and childbirth
- Effectiveness of clinical interventions for incontinence by cognitive and physical functioning, gender, and ethnicity
- Long-term effectiveness of individual conservative therapies, conservative management programs, including community-based nonmedical interventions, and mechanical devices for UI and FI
- Comparative long-term effectiveness of conservative interventions, pharmacological interventions, combined conservative and pharmacological interventions, mechanical devices, and surgery for UI
- Individual patient factors that may modify the effects of different procedures
- Effects on FI of surgeries for hemorrhoids, rectal prolapse, rectal cancer, and anal fissures
- Effective strategies to identify patients at risk of UI and FI, including residents of LTC settings

Evidence Report

Chapter 1. Introduction

Overview

Urinary (UI) and fecal (FI) incontinence affect substantial proportions of adults in different population groups.[20] Baseline mechanisms of UI include hyperactive bladder that may result in urge UI and poor urethral sphincter function that can result in primary urethral incompetence and stress UI.[22,23] Loss of structural and functional integrity of pudendal nerve activity, pelvic floor muscles, rectal compliance and rectal sensation, and the anal sphincter may result in FI.[17,20,23,24] The differences in baseline mechanisms of incontinence lead to variable definitions of UI and FI, some specific for each type of incontinence risk factors, and effective interventions to prevent and treat UI and FI.[17,23,24] The estimated prevalence of UI in adults was 9 to 22 percent[8,9,30,35-38] but varies widely as a result of differences in definitions and sampled populations subgroups.[18] For example, recent studies reported that 25 percent of young women,[516] 44 percent[148] to 57 percent of middle-age and post-menopausal women,[93] and 75 percent of elderly females in nursing homes[32] experienced some degree of involuntary urine loss. UI is prevalent among women of all races, though the magnitude, severity, and bother may vary; 41 percent of White women, 20 percent of African-American women, and 36 percent of Hispanic women reported difficulties controlling their bladders.[18] The severity of incontinence influences quality of life and treatment decisions. In the 1999-2000 National Health and Nutrition Examination Survey, 32 to 51 percent of women experienced daily episodes of UI and 20 to 32 percent experienced weekly episodes.[9] The prevalence of UI in men varied from 11 percent among those 60-64 years old to 31 percent in older males, and from 16 percent among White men to 21 percent among African American men.[8] Daily incontinence was reported by 30 to 47 percent and weekly incontinence by 15 to 37 percent of community dwelling men[8] and by 72 percent of male nursing home residents.[32] The fraction of nursing home admissions attributable to UI in the elderly population was 10 percent for men and 6 percent for women.[517]

The prevalence of FI ranges from 0.8 to 5 percent in men and 2 to 6 percent in women living in the community[518] and to more than 50 percent in nursing home residents. Indeed, FI is among the most common reasons for nursing home admission.[21] The prevalence of combined UI and FI in adults in LTC facilities varied from 4 percent[519] to 44 percent.[34]

Population-based studies underestimate the incidence of incontinence due to sampling and self selection of the survey participants.[20] Clinic-based studies included patients actively seeking treatment for incontinence, who represent only a small proportion of incontinent adults.[13,19,146,520] Only 45 percent of women and 22 percent of men with weekly incontinence episodes ever sought medical care for UI. Primary care providers diagnosed UI in 21 percent of older incontinent women and in 10 percent of older incontinent men.[521] Despite the tremendous impact on quality of life, less than 50 percent of older adults with FI ever asked for professional help.[17,522-524]

Strategies to detect persons at risk and individuals with incontinence have been systematically reviewed for UI[15,16] but not for FI, with no special attention to high-risk populations in either group. Comparative predictive likelihood ratios of diagnostic tests for community dwelling adults and residents in long-term care (LTC) facilities are not well established.[20,21] No systematic reviews addressed the positive likelihood of diagnostic procedures for FI.[13]

Clinical interventions to reduce UI have been extensively reviewed during the last years by the Cochrane Group,[492-495,525-548] and FI[497-500,549-557] the International Continence Society,[20,21] the American College of Gastroenterology Practice Parameters Committee,[17] and the Agency for Healthcare Research and Quality.[25,26] The basis for measuring successful treatment varied across the studies that examined different interventions; the criteria for deeming a treatment successful are not well established. Pooled analyses of the selected outcomes included small samples of the studies and showed substantial heterogeneity across interventions. Patients and clinicians need synthesized analysis of clinical efficacy and comparative effectiveness of diagnostic and treatment options to make informed decisions of effective care. Policymakers require evidence-based estimations attributable to effective treatment events in different clinical settings and for subgroups of patients.

The cost of incontinence care in the United States increased over the past decades;[558] in 2004 it averaged $19.5 billion annually.[559] One estimate places the 2000 annualized cost of nursing home admissions due to incontinence at $6.0 billion ($3.0 billion each for elderly men and women).[517] Evidence-based recommendations to reduce the risk of incontinence in LTC facilities and in the community could improve health care and the quality of life for incontinent patients.

This review was commissioned as background material for an NIH/OMAR State of the Science Conference on Incontinence. The aims of the present project are: 1) to systematically review published evidence to identify individuals at risk and patients with undiagnosed UI and FI in the community and in LTC settings and 2) to synthesize evidence of the effectiveness of different clinical interventions to prevent the occurrence and progression of UI and FI in adults.

The following questions were developed for this review:

1. What are the prevalence and incidence of urinary and fecal incontinence in the community and long-term care settings?
   - Race
   - Ethnicity
   - Gender
2. What are the independent contributions of risk factors for urinary and fecal incontinence, including:
   - Age
   - Functional impairment
   - Institutionalization
   - Parity, childbirth, and postpartum state
   - Menopause
   - Dietary factors
   - Smoking
   - Obesity
   - Genetic factors
   - Prostate disorders
   - Dementia
   - Psychiatric disorders, specifically depression
   - Diabetes
   - Urinary tract infection
   - Chronic gastrointestinal (GI) conditions such as irritable bowel syndrome (IBS), diarrhea, constipation, and inflammatory bowel diseases (IBD)
   - Cardiovascular and pulmonary conditions

- Gastrointestinal, gynecologic, and urological procedures
- Neurological disorders, such as stroke and spinal cord problems

3. What is the evidence to support specific clinical interventions to reduce the risk of urinary and fecal incontinence?
4. What are the strategies to improve the identification of persons at risk and patients who have urinary and fecal incontinence?
5. What are the research priorities for identifying effective strategies to reduce the burden of illness in these conditions?

The analytical framework for Question 2 focuses on risk factors of incontinence in adults (definitions are included in Appendix A). These risk factors can be combined in one person. Independent contributions of isolated risk can be addressed in studies with adequate multivariate analysis. Such population-based studies are available for some risk factors, including age and age-related conditions and behavioral risk factors, but not for surgical procedures and rare diseases. Given this reality, the present systematic review addressed the adjusted relative risk of incontinence in adults with different levels of risk factors when possible and the absolute risk of incontinence in populations after surgical procedures and with specific diseases.

The analytical framework for the strategies to identify patients who have UI and FI included examination of diagnostic values of different tests compared to multichannel urodynamics as a "gold standard" for UI and physician diagnosis for FI. Sensitivity, specificity, positive predictive values, predictive likelihood ratio, and cost effectiveness of the index tests were compared to standard tests. The validity and reliability of incontinence-specific scales were analyzed from published literature. Conceptual and operational definitions of incontinence and risk factors of incontinence are presented in the analytical framework.

To facilitate the discussion of fecal incontinence, we have adopted the practice of using that term to encompass both fecal and anal incontinence. These two terms are frequently used interchangeably in the literature and create a great deal of confusion.

Chapter 2. Methods

Literature Search Strategy and Eligibility Criteria

Search Strategy

Studies were sought from a wide variety of sources, including MEDLINE® via PubMed®, CINAHL, Cochrane databases, and manual searches of reference lists from systematic reviews and the proceeding of the International Continence Society (ICS). The search strategies for the four research questions are described in Appendix B. Excluded references are shown in Appendix C. All work was conducted under the guidance of a Technical Expert Panel (TEP), whose members are identified in Appendix D.

Eligibility

Three investigators independently decided on the eligibility of the studies according to recommendations from the Cochrane manual for systematic reviews.[560] The algorithm to define eligibility of the studies was developed for each research question (Appendix A). We reviewed abstracts to exclude secondary data analysis, reviews, letters, comments, and case reports. Then we confirmed eligible target populations of adults in community and LTC settings. The full texts of the original epidemiologic studies published in English after 1989 were examined to include studies with eligible outcomes defined as prevalence and incidence of incontinence, absolute and adjusted relative risk of incidence, and progression of urinary, fecal, and combined incontinence (operational definitions in Appendix A). We also developed a list of risk factors for UI and FI for Question 2 (operational definitions of known risk factors of UI and FI in Appendix A). For Question 3, we included studies that examined the effects of clinical interventions (operational definitions of clinical interventions for the primary and secondary prevention of incontinence in Appendix A). For Question 4, we included studies that evaluated different strategies to detect patients with incontinence and persons at risk. Then we excluded studies that did not test the associative hypotheses and did not provide adequate information on tested hypotheses (e.g., least square means, relative risk).

Finally, we confirmed eligible levels of evidence for each research question. The following inclusion criteria were applied to select articles for full review: For questions of prevalence and risk factors of incontinence in large population-based cross-sectional analyses and cohort studies, large cross-sectional analyses and cohorts in LTC settings, case-control studies with randomly selected controls and case series with more than 100 subjects were selected. For the question on clinical interventions to reduce the risk of UI and FI, we selected randomized controlled clinical trials and multicenter nonrandomized clinical trials (fecal and combined incontinence). For the question on strategies to detect incontinence, we selected randomized controlled clinical trials, multicenter controlled clinical trials, large (>100 subjects) observational studies, and case-control studies with >10 cases that reported sensitivity, specificity, and reliability of different diagnostic methods.

Appendixes cited in this report are available at http://www.ahrq.gov/clinic/tp/fuiadtp.htm

The exclusion criteria included the following:

- Studies with target population as children and adolescents
- Studies with no information relevant to incidence and progression of incontinence
- Studies that examined the distribution of different types of incontinence among incontinent patients (all incontinent in denominator)
- Studies that evaluated the association between incontinence as independent variables in association with other patient outcomes
- Case series with small numbers of cases and no control comparison
- Studies that reported absolute values of the diagnostic tests in incontinent patients
- Studies that did not report true and false positive and negative cases of diagnostic tests
- Observational studies and nonrandomized clinical trials that examined treatments in incontinent patients and short term (less than 1 year of followup) drug trials that did not report continence rates

Quality Assessment and Rating the Body of Evidence

Study quality was analyzed using the following criteria: subject selection, length and loss of followup, adjustment for confounding factors in observational studies and intention to treat principle in clinical trials, masking the treatment status, randomization scheme and adequacy, allocation concealment, and justification of sample sizes in RCTs.[561]

The level of evidence for all studies was estimated using a subset of the U.S. Preventive Services Task Force criteria noted below.[562]

I: Properly designed randomized controlled trial

II-2A: Well-designed cohort (prospective) study with concurrent controls and multivariate analysis of the associations

II-2B: Well-designed cohort (prospective) study with historical controls and multivariate analysis of the associations

II-2C: Well-designed cohort (retrospective) study with concurrent controls and multivariate analysis of the associations

II-3: Well-designed case controlled (retrospective) study and multivariate analysis of the associations

III: Large differences from comparisons between times and/or places with or without interventions (cross-sectional comparisons).

For all questions, evidence tables were developed identifying the purpose of the study, sample, design, independent and dependent variables, and findings. For Questions 1, 2, and 3, incidence and prevalence cases of incontinence, relative risk of incontinence in categories of risk factors and clinical interventions, and outcomes level to assess severity and progression of incontinence for treatment differences were abstracted.[563,564] Baseline data were compared in different studies to test differences in the target population and unusual patterns in the data.[565,566] Standard deviations, regression coefficients, and 95 percent CI were calculated from reported means, standard errors, and sample size.[563,564] The protocol for the meta-analyses was created according to recommendations for meta-analysis of randomized controlled trials: the QUOROM statement.[567]

Applicability

Applicability of the population was estimated by evaluating the selection of the subjects in observational studies and clinical trials.[568] Large observational cohorts based on national registries, population-based surveys, and nationally representative administrative and clinical databases had high applicability. We compared the differences in prevalence of incontinence in studies that selected subjects from administrative and clinical databases and that reported random and convenience sampling of participants.[569] Applicability of the intervention duration was high for studies with followup 1 year or more and acceptable for studies with followup of 6-12 months.

We assumed the presence of publication bias and did not use statistical tests for bias defined as the tendency to publish positive results and to predict association when all conducted (published and unpublished) studies are analyzed.[560,570-572] We used several strategies to reduce bias, including comprehensive literature search of published and unpublished evidence in several databases the reference lists of systematic reviews and proceedings of the ICS, contacts with experts for additional references they might provide, and agreement on the eligibility status by several investigators.

Data Extraction

Evaluations of the studies and data extraction were performed manually and independently by three researchers. The data abstraction forms are shown in Appendix E. Errors in data extractions were assessed by a comparison with the established ranges for each variable and the data charts with the original articles. Any discrepancies were detected and discussed. Patient populations were classified as community and LTC settings. Adjustments for patient age, race, gender, comorbidities, socioeconomic status, provider characteristics, and clustering of patients and providers were extracted from the studies. The details on extracted variables are presented in the analytic framework in Appendix A.

Data Synthesis

For Questions 1 and 2, results of individual studies (expressed as crude and adjusted for confounding factors) were summarized in evidence tables to analyze differences in incontinence in categories by subject age, race, ethnicity, residency, and risk factors.

Definitions of incontinence. We analyzed separately urinary, fecal, and combined incontinence. We used the definitions of signs and symptoms of UI promoted by the ICS (Appendix A) including mixed, stress, and urge incontinence. We defined anal incontinence (AI) as involuntary loss of flatus, liquid, or solid stool. In the text we used the term FI and in the tables clarified the operational definitions of anal (flatus and fecal), FI, solid, or liquid incontinence, or its combinations. Continence was defined as self-reported absence of involuntary urine or feces loss. We defined combined incontinence as a combination of urine and fecal incontinence. When the authors reported prevalence of UI or FI but not combined incontinence in the same populations, we define the outcomes as UI only or FI only without additional assumption about possible misclassification. We also analyzed urinary continence defined as negative stress and pad tests. We used the term "urodynamic UI" to replace the older

term "genuine stress incontinence." Frequency of UI or FI was abstracted as daily, weekly, or monthly episodes of urine leakage or feces loss. Severity of UI was defined using the objectively measured urine loss in pad weight tests or self-reported pad use. Severity of FI was defined as self-reported amount of feces loss and pad use. Wet status in nursing home residents was analyzed to define severity of incontinence and effects of the treatments. We classified residents who needed indwelling urinary catheters and an external urinary drainage device as having severe or always UI. Restriction of daily activities, and perceived quality of life with UI or FI were defined using scales and composite scores.

Definitions of outcomes. We defined prevalence of incontinence as the probability of experiencing incontinence within a defined population and at a defined time point.[20,21] We defined true population incidence as newly diagnosed cases of incontinence that developed annually in the target population. True population incidence estimates were derived from large population-based surveys. However, for Question 3 we defined incidence as the probability of developing incontinence under study after active and control interventions during time of followup.[20,21] We defined reported incontinence as the prevalence of total incontinence or episodes of different types of incontinence when the authors did not access continence status as baseline or did not exclude prevalence cases from overall estimation

The absolute risk of incontinence among patients with rare risk factors was compared to the general population when no other evidence was available to estimate the adjusted relative risk.

For Question 3, relative risk (RR) and 95 percent confidence intervals (CIs) and differences in outcomes were calculated.

Patient outcomes (clinical events). We report both incidence and progression of incontinence as they were used by the authors of the original studies and with calculated rates of cure, improvement, and progression for purposes of comparison:

1. the number of patients that developed newly diagnosed incontinence (incidence cases) or the number of incontinent patients after active and control interventions (prevalence cases)
2. the number of patients cured by the clinical interventions
3. the number of patients with improved continence
4. the number of patients with progression defined as failure to cure or improve and increase in frequency and severity of incontinence.

Relative risk/odds ratio of developing incontinence was analyzed in the studies that reported incident cases. Relative risk/odds ratio of incontinence was analyzed in the studies that reported prevalence cases. Relative benefit of continence was defined as the likelihood of continence in patients after active treatment relative to those after control interventions. We defined relative benefit of improvement as a likelihood of improved incontinence in patients after active treatment relative to those after control interventions. We defined relative risk of progression of incontinence as the likelihood of increasing frequency and severity of incontinence and failure to cure/improve incontinence in patients after active treatment relative to those after control interventions

We analyzed continence separately from improvement in incontinence because continence is the most clinically desirable patient outcome and is well defined, whereas improvement can include substantial differences in definitions and changing perceptions of qualitative and quantitative parameters of improvement. We used such conservative approaches to generate precise estimates of the effectiveness. Clinicians and patients can make informed decisions based

on the treatments that resulted in greater rates of long-term continence in well designed randomized controlled trials (RCTs).

We compared the effectiveness of different clinical interventions in relation to baseline rates of incontinence, assuming undiagnosed incontinence when the authors did not report objective assessment of continence status at baseline. We defined the clinical intervention to reduce the risk of incontinence (primary prevention) when the investigators selected the subjects in clinical trials by underlying condition, not by continence status. We defined clinical intervention to reduce the progression of incontinence when incontinent patients were invited to participate in clinical trials (secondary prevention).

For surgical interventions that aimed to treat the baseline conditions, including prolapse, cancer, ulcerative colitis, hemorrhoids, and anal fissures, incontinence was analyzed as the secondary outcome. The goal of the present review was to compare rates of incontinence after such procedures rather than review other therapeutic effects on baseline diseases or all complications of surgery.

Continuous outcomes (surrogates). We defined *subjective continuous outcomes* as the number of incontinent episodes, use of supplies, and scores from validated scales to analyze the quality of life with incontinence. We defined *objective continuous outcomes* as the results of objective tests to measure the severity of incontinence.

Pooling criteria included the same operational definitions of incontinence outcomes and the same risk factors or clinical interventions.[573] Homogeneity in clinical interventions was analyzed comparing published information on behavioral, instrumental (devices), pharmacological, and surgical treatments. Meta-analysis was used to assess the consistency of the association between treatments and incontinence outcomes with random effects models.[574] The analyses were conducted separately for symptoms and signs of incontinence. Assumptions underlying meta-analysis included valid measurements of continence status and similarity in study and target populations.

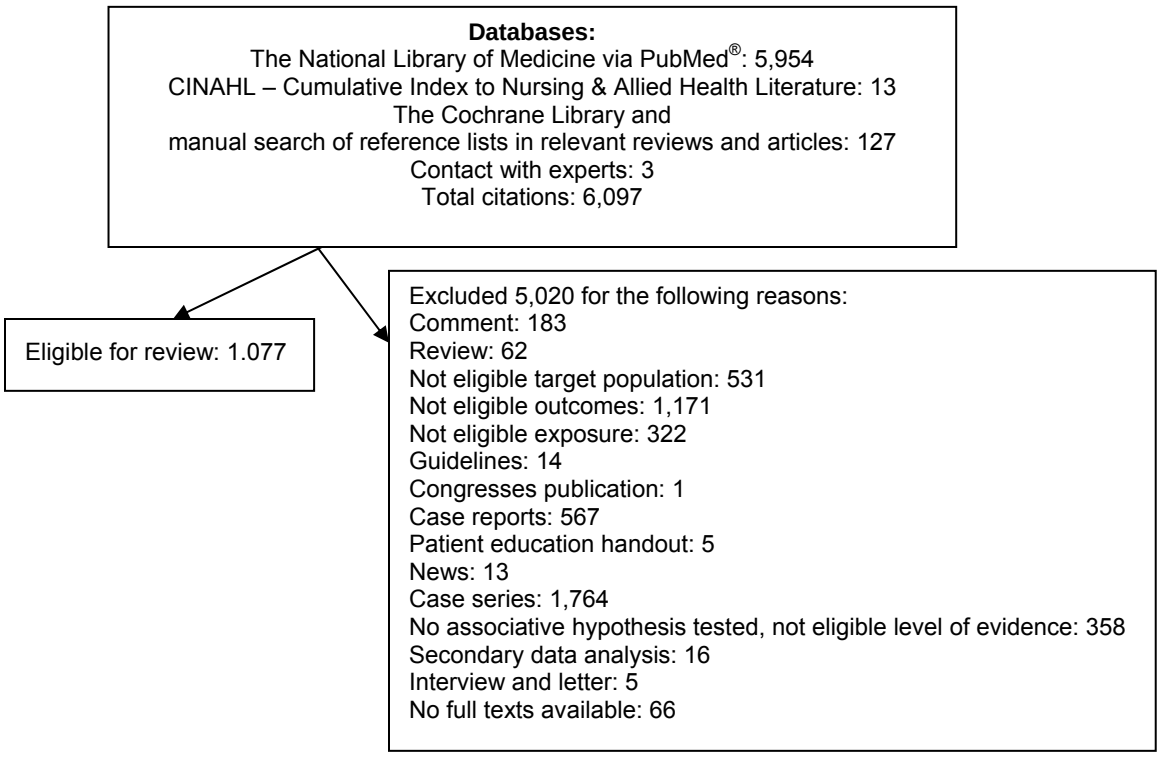
Consistency in the results was tested comparing the direction and strength of the association. Chi squared tests were used to assess heterogeneity in study results.[575,576] Significant heterogeneity means the effects of interventions on UI were not consistent in the studies (not replicable results). We explored heterogeneity with meta-regression and sensitivity analysis and reported the results from random effects models only. The analytic framework and algorithms for the meta-analysis are shown in Appendix A. Calculations were performed using STATA software at the 95 percent confidence level.[577]

For Question 4 we calculated positive predictive value, predictive likelihood ratio, number needed to screen to diagnose one case of incontinence, and number of diagnostic tests needed to detect one case of incontinence (Appendix A). Cost-effectiveness of diagnostic methods was estimated by comparing the cost and number needed to screen and the number of diagnostic tests using different tests.

Chapter 3. Results

Figure 1 traces the flow of our literature search for Questions 1-4. We retrieved 6,038 potentially relevant references (5,938 from MEDLINE®, 16 from CINAHL, 22 from the Cochrane database and a manual search of the Cochrane reviews, and 63 from a manual search of other published reviews and articles). We excluded 71 percent of the retrieved studies; 40 percent were case series; 13 percent case reports; 5 percent studies with ineligible independent variables, 19 percent with no eligible outcomes, and 12 percent with ineligible target populations.

Figure 1. Flow of study selection



Question 1. What are the Prevalence and Incidence of UI in the Community and LTC Settings?

UI in the Adult Population (Appendix Table F1)

Overview. Fourteen epidemiological studies of UI prevalence in community settings have reported prevalence rates in a combined sample of adult women and men (Table 1). Five studies were conducted in the United States,[8,30,39,54,120] two studies in Sweden,[37,114] three studies in the United Kingdom,[36,38,43] and one study each in China,[33] the Netherlands,[111] Spain,[35] Japan,[58] and Australia.[33] The majority of these population-based surveys sampled middle-aged and older adult populations. Three studies included younger adults ages 18 years and over.[36,37,54] There are

Appendixes cited in this report are available at http://www.ahrq.gov/clinic/tp/fuiadtp.htm

methodological and reporting differences among the studies. Some studies used mailed questionnaires, whereas others involved in-home interviews. Most studies reported on the actual prevalence of UI in the sample; however, one study extrapolated the prevalence estimate using census statistics for the entire United States population.[8,9] There is limited information available on the incidence, progression, and remission of UI in the adult population combining men and women.

Prevalence, severity, and impact of UI. Prevalence estimates for the adult population are fairly consistent, with most estimating between 16 to 22 percent.[8,9,30,35,37,38,120] However, estimates varied according to age and gender. Adults ages 60 years and over have the highest rates of UI. Prevalence rates differ substantially by gender, with women having higher rates across all age groups. One large study of adults ages 40 and over reported a female to male ratio at 2:6.[38]

Incidence of UI. The incident rate for the adult population varies by age, gender, and race. In a sample of 17,421 men and women ages 40 years and over, the 1-year incidence was 6 percent,[38] whereas in a study of 2,087 adults over age 70, the 2-year incidence was 20 percent, with 21 percent for urge UI and 20 percent for stress UI.[33] The largest survey involving 58,658 American men and women 65 years and over estimated a 2-year incidence rate of UI at 37 percent,[39] with rates being significantly higher in women than men, 44 and 28 percent, respectively. In this study, the incidence of UI measured as any urine loss experienced in the past 6 months increased with age beginning at 32 percent in adults 65-69 years and increasing to 54 percent in those over age 95. The impact of UI was greatest in the oldest age groups, with those rating a big impact varying from 14 percent of those 65-69 years to 27 percent for those 90-94, and 38 percent in those over 95 years. This study also found that non-Hispanics (38 percent) are more likely to be incontinent than Hispanics (31 percent), and American Indians and Whites had higher rates of UI than Blacks and Asians.[39] In contrast, Hispanics rated a slightly greater UI impact, e.g., a big problem (25 percent) compared to non-Hispanics (17 percent). A higher proportion of American Indians (30 percent) rated UI as having a big impact compared to Blacks (20 percent), Whites (17 percent), and Asians (15 percent).[39]

Progression and Remission of UI in Community Dwelling Adults

There is limited data on UI progression and remission rates comparing men and women. Evidence in adults ages 60 and over suggests that changes in severity over a 2-year period progress from continence to mild UI, and from mild to moderate UI.[47] Few people advanced to severe incontinence (e.g., 300 or more days of urine leakage and/or greater than a quarter cup of urine loss per day on 50 or more days during past 12 months)[47] One study found change patterns varied between women and men ages 60 years and over.[47] Women first developed stress UI and mixed UI as a primary condition, with urge UI as a secondary condition, whereas men developed urge UI, with stress UI as a potential secondary condition. Significantly more men than women developed urge UI over the 2-year followup period. Conflicting findings were noted in examining progression rates over a longer followup period. In a study of adults ages 70 and over involving a 10-year followup, women developed urge UI more frequently than men (23 versus 11 percent).[578]

UI remission rates vary by gender, with women having more stable incontinence (e.g., lower remission rates).[47] At 1 year, the remission rates for women and men were 11 and 27 percent, respectively, and at 2 years, they were 13 and 32 percent, respectively.[47]

Prevalence of UI in Community Dwelling Women

Overview. We identified 117 epidemiological studies of UI prevalence in community dwelling women[7,8,30,35-148] that have been published over the past 17 years, with both broad and narrow age spans of women within specific countries or regions of countries. The majority of the studies have been conducted in the United States (40 studies),[8,30,39,44,45,47,50,54-56,59,66,67,88-90,93,102,105,110,113,118,120,123,124,126,128,130,134,136-141,144,146-149] UK (10 studies),[36,38,43,52,70,77,82,103,112,132] or Northern Europe, including 13 studies from Sweden,[37,48,53,57,61,69,71,99,114,115,119,129,131] four studies from Norway,[49,62,80,98] six studies from Denmark,[51,64,73,78,96,133] and one study from Finland.[106]

Prevalence rates regarding these variations can be attributed to differences in study populations, survey methodology (including sampling, definition, and measurement of UI), and reporting methods (Table 1)**.** Although most studies of women are concentrated in middle-age and older women, other studies incorporate a broader age span with samples beginning at ages 15, 18, to 20 years and over. Study designs vary from probability-based methods of sampling of either large populations or random samples drawn from general practices, insurance plan enrollees; cross-sectional analyses of prospective cohorts of women who are participants in longitudinal studies or clinical trials in which UI is not a primary aim, cross-sectional studies of clinical populations or national panels, to case-control studies examining the effect of surgical interventions such as hysterectomy. Survey methodology involves mailed questionnaires, in-home interviews by trained interviewers, computer-assisted telephone interviews, or clinical evaluations. The definition and measurement of UI vary widely; over 20 definitions have been used (Table 1). Pooled prevalence of ever having UI was increased from 21 percent in 19-44 years old (17 studies) to 34 percent in 45-64 years old (45 studies), and to 39 percent among elderly women (11 studies) (Table 2). The differences across studies can create artifacts, as seen in Table 2, where the mean pooled prevalence for "ever" is less than the monthly rate. Younger females reported UI in the past year less frequently (9.61 percent, two studies), the prevalence increased to 35 percent among women 45-64 (11 studies) and to 41 percent among those older than 65 years old (13 studies). Elderly women reported UI in the past month (four studies) more often (56.7 percent).

Prevalence, severity, and impact of UI were reported using standardized scales or instruments. Following the method used by the 3rd International Consultation on Incontinence in summarizing prevalence estimates in women,[579] the authors used the most inclusive definition of UI ("monthly UI," "weekly UI," and "daily UI"). Severity was measured by volume of urine lost, by categorical rating scale of the individual's perception, or by seeking professional help. The amount of urine lost was typically categorized as "drops" to "wets outer clothing" or "runs down the legs/floor." In some studies, a higher percentage of women tended to lose drops[45,121,122] in comparison to larger volumes, whereas in other studies, women were more likely to have damp underwear and/or wet underwear or clothing than losing drops.[128] The severity of the leakage has been shown to vary by the frequency of leakage, with infrequent leakage more likely to be associated with drops, whereas daily leakage with a greater number having to change undergarments or outergarments.[45] There are conflicting findings about whether younger or older populations rate their UI as more severe.[38,130] In one study, older women tended to rate their UI as more severe than much younger women.[38] In a few studies, severity was measured by the perception of how severe a problem UI is to how much daily life is restricted.[37,55,190,580]

Differences in reporting prevalence rates in UI types make comparisons challenging across studies, as some studies report frequencies within the incontinent group and others report the rates within the overall population (Table 3). Overall prevalence of monthly UI was the highest in elderly females (25.3 percent, 95 percent CI 14.1; 36.5) (two studies)[111,133] and in women 45-64 years old (20.5 percent, 95 percent CI 18.3; 22.8) (9 studies).[43,45,46,62,116,124,132,133,148] Weekly incontinence was experienced more often by women older than 65 years (16.9 percent, 95 percent CI 15.1; 18.8)[42,94,97,148] and elderly women over 80 (29.9 percent, 95 percent CI 25.4; 34.4).[42] Few studies reported daily UI, 5 percent of younger women (19-44 years old)[96] and 17 percent of women older than 65 years[79] reported having daily leakage. Severe UI, defined as wet clothes or severe enough to seek treatment, was experienced by 9 percent of women over 65 (8.96 percent, 95 percent CI 7.51; 6),[59,76,77,86,128,144] and 10 percent of middle-aged women (95 percent CI 9.37;11) (seven studies).[40,51,60,77,86,89,131] Less than 2 percent of women younger than 45 years old experienced severe UI.[86]

Racial/ethnic differences. The majority of epidemiological studies have been conducted in White women in North America, Europe, Australia, and New Zealand. Although several studies have been conducted in Asian countries, including Turkey,[58,60,79,95,116,121] because of methodological differences, it is difficult to directly compare those to studies in which varying racial/ethnic groups have been sampled. There have been a limited number of studies from Middle Eastern countries, with only one study from an African country.

Eight population-based studies in the United States have reported on racial/ethnic differences in the prevalence of UI in women (Table 1). The majority of these studies document a higher prevalence of UI (including all types) in White women as compared to Black, Hispanic, and Asian women.

Type of UI. In general, stress and mixed UI were the most common types in studies that have compared stress, urge, and mixed UI (16 out of 28 studies) (Table 4). Although surveys have found differences in the frequencies of the different types of UI by age and race, these differences are inconsistent across studies. Some surveys found higher rates of stress UI in young and middle-aged women,[57,74,80,104,108] whereas others have found higher rates in older women.[37,85,133,145,581] Similar inconsistencies are noted with urge UI, with some studies reporting higher rates in older women[37,106,145] and others reporting it is more prevalent in middle-aged women[108,133] (Table 5). The prevalence of total UI increase in age categories from 19 percent in women 19-44 years (18 studies)[57,64,68,69,75,80,85,86,92,96,98-100,119,130,133,145,148] to 29 percent in those older than 45 years. Stress incontinence was the most prevalent type in women 19-44 years old (12.8 percent, 95 percent CI 8.3; 17.4) (15 studies),[37,57,64,80,85,91,95,98,104,108,109,130,133,145,124] and in those 45-64 years of age (21.5 percent, 95 percent CI 18.9; 24.1) (36 studies).[37,38,44,51,57,61,70, 73-75,77,78,80,84,85,87,89,95,104,108,116,117,122,124,127,129,131,135-137,139,141,145,148,149] However, mixed UI was the most prevalent type of incontinence in older women, 16.8 percent of women older than 65 (95 percent CI 13.7; 19.9) (19 studies)[30,35,59,66,71,72,74,80,85,90,104,106,108,110,121,128,142,143,145] and 16 percent of elderly women (95percent CI 7.3; 24.4) reported mixed UI (seven studies).[71,74,80,84,106,124,133] Prevalence of urge incontinence gradually increased from 5 percent in younger women (4.9 percent, 95 percent CI 3.7; 6.1)[37,57,64,80,85,91,95,98,101,104,108,130,133,145] to 10 percent in women 45-64 (10.2 percent, 95 percent CI 8.9; 11.5) (32 studies),[37,44,51,57,61,70,73-75,77,78,80,84,85,87,89,95,102,104,108,116,117,124,126,127,129,131,137,139,145,148,149] and to 12 percent in women older than 65 years (12.2 percent, 95 percent CI 9.9; 14.5) (28 studies).[30,35,37,56,59,61,63,66,71,72,74,80,84,85,90,104,106,108,110,118,121,123,125,128,133,142,143,145]

A small number of population-based surveys conducted in the United States have compared racial/ethnic differences in UI types.[89,118,137,149] In general, White women have higher rates of stress UI than Black, Hispanic, or Asian women,[89,149] although one study did find Hispanic women had a higher rate of stress UI than White, Black, and Asian women.[137] Black women are more likely to have higher rates of urge UI and mixed UI as compared to Whites and Hispanics.[137,149]

Incidence of UI in Community Dwelling Women

There are limited data from 18 studies on the incidence of UI in community dwelling women (Table 6).[38,45,47,56,59,62,103,134,139,149-157] Variations in incidence rates can be attributed to differences in study populations, UI definition, followup periods, and reporting methods. One-year incidence rates varied from <1 percent in Norwegian women ages 50-74 years[62] to 26 percent in American women ages 20-84 years.[139] Annual cumulative incidence rates averaged between 1-4 percent,[139,153,155] with rates increasing with advancing age.[33,38,139] In one study that examined incidence rates with respect to age, the incidence increased from 8 percent in women ages 40-49 years to 15 percent in those 80 years and over,[38] whereas in another study, rates increased from 15 percent in women ages 20-36 years to 47 percent in women 70 years and over.[139] There is a paucity of studies examining racial/ethnic differences in UI incidence rates. In one study, Whites had a slightly higher annual cumulative incidence (13 percent) than Black women (12 percent).[149]

Pooled annual incidence (Table 7) was 6.25 percent (95 percent CI 5.57; 6.93) for all ages with the highest in elderly women, 7 percent (95 percent CI 6.12; 9.37) in those older than 65 years, and 8.52 percent in women over 80 (95 percent CI 3.07; 13.98). Few surveys on the incidence of UI in women have included questions on incontinence types (Figure 2). One study involving 2,283 women ages 40-60 reported a 1-year incident rate for stress UI of 4 percent.[73] In a survey of 2,025 women ≥65 years, the 3-year incidence rate for stress and urge UI was 29 percent each.[56] In a recent survey in the United States involving 3,302 women ages 40-55 years, the 5-year cumulative incidence rates were highest for stress UI (25 percent), followed by urge UI (16 percent) and mixed UI (12 percent); other or unclassified UI had the lowest incidence rate (3 percent).[149] In this same survey, Whites and Japanese-American women had the highest incidence of stress UI compared to Chinese, Hispanic, and Black women. White women also had the highest incidence of urge UI; however, Black women had a higher incidence than Chinese, Japanese, and Hispanic women, respectively. Black women had the highest incidence of mixed UI, followed by White, Chinese, Hispanic, and Japanese women.

Overall, middle aged and elderly women developed stress UI more often (pooled annual incidence from 4 studies 9.7 percent, 95 percent CI 5.4; 13.9). Annual incidence of mixed UI was close to stress UI (pooled annual incidence from two studies 7.6 percent, 95 percent CI 4.1; 11.0). Less than 7 percent of women 45-79 years old developed urge UI (pooled annual incidence from three studies 6.44 percent, 95 percent CI 2.3; 10.6).

Summary. Evidence from large observational studies from different countries (level of evidence IIB) suggested that UI is a prevalent condition among women of all ages with overall prevalence close to the estimations of the National Health and Nutrition Examination Survey (38 percent).[9] Prevalence increased in women older than 45 years of age with further small increases in elderly women. Stress UI is the most prevalent type if UI in women 45-64 years old, while elderly women experienced mixed UI more frequently. Incidence of UI (level of evidence IIA-B)

gradually increases with age. Differences in definitions of UI contributed substantially to variability in the results from individual studies.

Progression and Remission of UI in Community Dwelling Women

There is limited data on the natural history of UI in women. Of the several studies of UI during and following childbirth, most report prevalence rates making it difficult to determine the progression and remission rates of UI in this subpopulation of women. Available data suggest that UI is a dynamic process in women, although the rates for full remission tend to be low. In nonchildbearing populations, annual remission rates range from 3 to 11 percent.[33,47,139,150,151,155] Remission rates tend to decrease with advancing age,[150,155] with one study reporting women ages 22-30 had remission rates more than twice that of women ages 41-50, 33 and 13 percent, respectively.[155] Duration of incontinence did not affect the chance of remission in a study involving women ages 20-59 years; 20 percent in the remission group and 24 percent in the incontinent group had been incontinent for at least 10 years.[151] Evidence indicates that the severity of UI tends to worsen over time.[33,47]

Data on the progression and remission of the different types of UI is scarce, with variable followup periods making it challenging to summarize remission rates. Data in women ages 60 years and over suggest that when women become incontinent they tend to first develop stress UI, either alone or in combination with urge UI. Those with stress UI alone either continue with stress UI alone or develop mixed UI over a 2-year followup period.[47] Some evidence indicates that the type of UI is relatively stable over 3 to 6.5 years,[56,139,155] particularly for stress UI. One study involving women ages 20-84 years found that the majority of women (52 percent) had the same form of UI after 6.5 years.[139] In this study, urge UI had the highest remission rate (38 percent) followed by stress and mixed UI (21 and 15 percent, respectively). In another study of women ages 40-60 years, the 1-year remission rates were 41 percent for stress UI, 42 percent for urge UI, and 38 percent for mixed UI.[150] In a study of women ages 65 years and over, the 3-year remission rates were 25 percent for stress UI and 22 percent for urge UI.[56] A study examining 10-year incidence and progression rates reported that women ages 70 and over with or without urgency had incontinence rates for urge UI of 11 percent and 15 percent respectively.[582] There was also a higher percent of women with urge UI at followup (6 percent at baseline and 26 percent at 10-years).

Prevalence of UI in Community Dwelling Men

In comparison to women, there have been fewer epidemiological studies in men (Appendix Table F2) with highly variable samples, including age categories and definitions of UI. Although there is a broad age range in the prevalence studies, the majority concentrate on middle age and older male populations (e.g., beginning at age 40, 60, or 65 years and over)[8,30,35,37,39,47,61,72,74,81,88,97,107,111,113-115,181,583-586] with fewer studies of men younger than 40 years,[37,52,54,86,145,181,587-589] including a recent national survey of men ages 18 years and over in the United States.[589] The majority of these studies have been conducted in North America or European countries using predominantly White populations. Two studies have incorporated Asian populations.[107,585] Pooled analysis (Table 8) detected a clear pattern of increased prevalence of total UI in aging men from 4.8 percent (95 percent CI 3.7; 5.9) in 19-44 years old (11 studies) to 11.2 percent (95 percent CI 10.1; 12.3) in those 45-64 years old (27 studies), to 21.1 percent (95 percent CI 19.9;

22.4) in males over 65 years of age (41 studies). The highest prevalence of UI was reported in elderly males of 32.2 percent (95 percent CI 29.6; 32.7) (17 studies). Urge UI was the most prevalent type of UI in males among all age categories increasing from 3.1 percent (95 percent CI 2.0; 4.2) in 19-44 years old (7 studies) to 11.7 percent (95 percent CI 9.3; 14.1) in those older than 65 years of age (20 studies).

Type of UI. The prevalence of UI, defined in various ways (ever, current, any, greater than two times/week, or leakage within past 4 weeks, 2, 6, or 12 months), is estimated between 3 percent in men 30 years and over in a study conducted in the United Kingdom[52] to 37 percent in men 39-91 years in a Norwegian study.[586] In a large population-based study conducted in five countries (Canada, Germany, Italy, Sweden, and the United Kingdom), the prevalence rate for men ages 18 and over was 5 percent.[145]

Studies in American men reported UI as involuntary leakage of urine during the last year, last month, or ever (Appendix Table F3). The prevalence estimations varied substantially depending on the definitions, with the higher prevalence of UI during the last year in males 19-44 years old (18.4 percent , 95 percent CI 4.5; 32.2) and 45-64 years old (24.6 percent 95 percent CI 19.92; 29.35) compared to UI during the last month (Table 9). Older males reported UI during the last month more frequently, from 29.2 percent (95 percent CI 24.4; 34.0) among those older than 65 years of age to 42.4 percent (95 percent CI 32.8; 52.0) in elderly males. Two percent of American men 45-64 years old ever experienced stress UI (95 percent CI 2.0; 2.0) and one percent reported stress UI during the last month. Urge UI was the more prevalent during the last year (6.7 percent, 95 percent CI 6.7; 6.7) of men 45-64 years old. Men over 65 years of age reported having urge UI during the last month (10.6 percent, 95 percent CI 10.6; 10.6).

Severity of UI. Fewer studies provided estimates for severity of UI in American men **(**Appendix Table F4).[54,164,181,590,591] A survey of 922 males older than 20 years who were recruited in the primary care clinic[54] reported that wet underwear less than once per month was experienced by 9 percent, monthly by 5 percent, weekly by 7 percent, and daily by 14 percent of the responders. A community-based cross-sectional survey of 778 men older than 40 years[590] reported that 10.8 percent of the responders had wet underclothing during the last year. Among males 41-60 years old from primary care clinics in a Veterans Affairs facility, 4.4 to 4.8 percent experienced daily UI. [181] The prevalence of daily UI increased to 8.4 to 8.9 percent among those older than 60 years of age. Pooled analysis (Table 10) estimated that daily UI was experienced by 4.8 percent of males 45-64 years (95 percent CI 4.8; 4.8), 8.3 percent men over 65 years old (95 percent CI 7.0; 9.6), and 9.3 percent elderly men (95 percent CI 4.5; 14.1). Severe UI that required a change of underwear was reported by 2 percent of those 45-64 years old and 4 percent of elderly men (95 percent CI 3.9; 4.1).

Racial/ethnic differences. The majority of studies have been conducted in White male populations (Table 1). Three studies from the United States provided data on prevalence rates in racial/ethnic groups using different survey methodology, including methods for estimating prevalence.[8,39,181] In one large population-based survey using a weighted prevalence estimate, non-Hispanic Black men were found to have a higher rate of UI (21 percent) compared to non-Hispanic White men (16 percent) and Mexican-American men (14 percent).[8] In the other study, non-Hispanics (38 percent) were more likely than Hispanics (31 percent) to have UI.[39] This latter study also found that American Indians and Whites had higher rates of UI than Asians and Blacks, respectively. A sample of male veterans receiving care in primary care clinics found similar rates of incontinence between Whites (32 percent) and Blacks (33 percent).[181] In a cross-national comparison of UI prevalence rates, South Korean men had the lowest rates (4 percent)

followed by men in France (7 percent), the United Kingdom (14 percent), and the Netherlands (16 percent).[585]

Incidence of UI in Community Dwelling Men

There is scarce data on the incidence of UI in community dwelling men, excluding studies of men following prostatectomy (Table 6). One-year incidence rates vary depending on the age of the study population. In one study of men 40 years and over residing in the United Kingdom, the 1-year incident rate was 4 percent, with incidence of involuntary leakage increasing from 2 percent in those 40-49 years to 11 percent in those 80 years and over.[38] In a study of American men 60 years and over, the 1-year incidence rate of involuntary leakage was 20 percent (weighted for nonresponders).[47] There are no data available on the incidence of the different types of UI or comparisons by racial/ethnic groups.

Progression and remission of UI in community dwelling men. There is limited evidence on the progression and remission of UI in men. Evidence indicates that when men became incontinent, they developed urge or other types of UI; those with urge UI alone either stayed as urge UI or developed mixed UI.[47] In one study over a 10-year period, 3 percent of men without either urgency or urgency with incontinence at baseline developed urge UI. There was a slight nonsignificant decline in men with urge UI at baseline to have it at the 10-year followup (5 percent vs. 4 percent, respectively).[582]

Epidemiology of UI in Long-Term Care Settings

Overview. In contrast to community settings, there have been fewer epidemiological studies on the prevalence, incidence, progression, and remission of UI in LTC settings. Differences in study populations, survey methodology, and definitions and measurement of UI affect the variability in prevalence estimates. Also, the timing of the survey, e.g., at admission or at a later date, also adds to the variability in estimates. More recent studies have relied on the bladder continence item on the Minimum Data Set (MDS) to operationalize UI. Two studies report data from the same cohort but derive slightly different estimates.[28,166] There are scarce data on the severity and impact of UI.

Prevalence of UI in the LTC population. The majority of studies sample both men and women ages 65 years and over residing in LTC facilities (Table 11). Although most studies provide prevalence estimates by gender, some provided only a prevalence estimate that included both men and women. For the combined group, prevalence estimates using varying definitions (e.g., any daytime urinary incontinence, at least two episodes of urine loss in the past 2 weeks, urine loss at least twice a month, or medical record or staff report of UI) ranges from 30-77 percent.[2,28-31] Measuring UI with the MDS, prevalence estimates varied from 30 percent in a large sample of 29,645 adults ages 20-109 years[31] to 77 percent in a smaller sample of 380 adults 65 years and over.[30] In a recent population-based study involving 95,911 older nursing home residents from eight southeastern states, the prevalence rate at admission was 65 percent.[32]

The prevalence of UI in female residents in LTC settings is estimated at between 60 and 78 percent.[28-30,32,164] In one study using data from the National Nursing Home Survey, the prevalence in women was estimated to be 74-85 percent.[2] However, in this same study when UI was identified from the medical record, the prevalence rate was <1 percent (1,366 per 100,000). The prevalence of UI in men ranges from 23-72 percent.[28-30,32,164]

Prevalence rates increase with advancing age in both men and women.[2,29,30] There is limited data available on racial/ethnic differences in UI prevalence. Those studies available indicate conflicting findings. In one large study involving nursing home residents from eight states, there was a higher prevalence in Blacks (71 percent) compared to Whites (64 percent) at admission, but after admission the prevalence rate was more similar (78 percent vs. 74 percent, respectively.[32]

Incidence of UI in LTC settings. Minimal data are available on the incidence of UI in LTC settings An early study involving 430 nursing home residents reported an incidence of 27 percent 2 months after admission and 19 percent at 1 year.[166] This is consistent with a later study that reported an incidence rate of 20 percent at 1 year.[33] The incidence of daytime UI between 2 months and 1 year after admission was higher in males (46 percent) than in females (16 percent).[166]

Progression and remission of UI in LTC settings. Few studies have examined the progression and remission of UI in LTC settings in a way that can be easily interpreted. Although there are no large changes documented, the evidence available suggests that UI is a dynamic condition that does change over time, including improvement. One large study involving nursing home residents from eight states that examined UI at admission and within a 4-year post-admission period reported a 0 percent progression rate.[32] In another study, the remission rate at 1 year was reported to be 10 percent.[33]

Table 1. Prevalence of UI in community dwelling adults by age and race

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Prevalence of UI in Adults (Women and Men Combined)							
Miles, 2001[592]	USA	65 years & over	Population-based mailed survey	Difficulty holding urine	--	2,660	14.1%
O'Brien, 1991[43]	UK	35 years & over	Population-based mailed survey	Urine leakage twice or more a month	79	5,661	1,109 mild incontinence 784 regular incontinence
Lagace, 1993[54]	USA	20 years & over	Cross-sectional survey using self-administered questionnaire	Urine leakage over past 12 months	86	2,830	33%
Nakanishi, 1997[58]	Japan	65 years & over	Population-based survey with in-home interview	Urine leakage	95.4	1,473	9.8%
Damian, 1998[35]	Spain	65 years & over	Population-based survey with in-home interviews	Current involuntary urine leakage	71.2	589	15.5%
Roe, 2000[36]	UK	18 years & over	Population-based mailed survey	Urine leakage ever Regular UI: Twice or more a month	53	6,319	9%
Liu, 2002[33]	China	70 years & over	Population-based survey with interview	Difficulty holding urine until getting to the toilet (urge UI) or accidentally passing urine (stress UI)	53.4	2,087	17.4% Urge UI 4.4% Stress UI 20.6% Mixed UI
Adelmann, 2004[30]	USA	65 years & over	Population-based survey with in-home interview	Ever of current urine leakage or trouble holding urine in past 18 months	59% with cooperation rate of 90%	910	22.3%
Andersson, 2004[37]	Sweden	18-79 years	Population-based mailed survey	Urine leakage at least once a week or at any time	64.5%	9,836	19% any leakage 7% weekly leakage
Bogner, 2004[120]	USA	50 years & over	Population-based survey with in-home interview	Urine loss or having trouble getting to the bathroom on time within past 12 months	42.8% of original sample	822	22.4% White 6.3% Black
McGrother, 2004[38]	UK	40 years & over	Population-based mailed survey	Urine leakage either day or night	60.2%	92,491	16.1%
Stenzelius, 2004[114]	Sweden	75 years & over	Population-based mailed survey	Difficulty controlling urine during last 3 months	50.3	4,227	39%

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Teunissen, 2004[111]	Netherlands	60 years & over	Population-based mailed survey	Urine leakage twice or more a month	88	5,748	19% (overall) 14% 60-64 years 16% 65-69 years 20% 70-74 years 26% 75-79 years 33% ≥80 years
Anger, 2006[8]	USA	60 years & over	Population-based survey using in-home interview	Difficulty controlling bladder including leaking small amounts of urine with coughing or sneezing over past 12 months	NA	9,965	17% extrapolated from U.S. population
Mardon, 2006[39]	USA	65 years & over	Population-based mailed survey	Urine leakage in past 6 months	76%	145,765	37.3% 31.9% 65-69 years 34.0% 70-74 years 37.9% 75-79 years 41.1% 80-84 years 45.6% 85-90 years 49.3% 90-94 years 54.3% ≥age 95 years 30.6% Hispanics 37.9% Non-Hispanics 38.7% American Indians 31.6% Asians 30.3% African Americans 38.3% Whites 31.2% Other
Prevalence of UI in Women							
Herzog, 1990[47]	USA	60 years & over	Population-based mailed survey	# days of urine lost in past 12 months	66-72	1,154	37.7
Lagro-Janssen, 1990[46]	Netherlands	50-65 years	Population-based survey with in-home interview	Urine leakage more than twice a month	60	1,442	22.5
Molander, 1990[48]	Sweden	65-84 years	Population-based mailed survey	Based on ICS definition	70.1	4,206	16.9
Roe, 2000[36]	UK	18 years and over	Population-based mailed survey	Ever experienced urine leakage	53 (male and female combined)	2,699	11.3

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Burgio, 1991[45]	USA	42-51 years	Cross-sectional survey with clinic and in home interviews	Urine leakage at least monthly	60	541	58.4 at some time 30.7 on regular basis
Kok, 1992[42]	Netherlands	60 years & over	Population-based mailed survey	Urine leakage twice or more a week	69	719	23.5 (weighted mean) 20.0 60-64 years 19.0 65-69 years 16.8 70-74 years 22.7 75-79 years 26.5 80-84 30.8 85-89 years 28.4 >90 years
O'Brien, 1993[43]	UK	35 years & over	Population-based mailed survey	Urine leakage twice or more a month	79 (women and men combined)	3,165	16.3 (overall) 16.1 35-44 years 16.6 45-54 years 16.7 55-64 years 14.1 65-74 years 18.0 ≥75 years
Rekers, 1992[41]	Netherlands	35-79 years	Population-based mailed survey	Urine leakage occurring at least weekly	68%	1,299	26.5 overall 5.9 daily
Brockelhurst, 1993[52]	UK	30 years & over	Cross sectional survey with in-home interviews	Ever have a bladder problems, e.g., leaking, wet pants, damp pants	Not reported	2,224	14% were or had UI 9.3% in past year 7.5% in previous 2 months
Lagace, 1993[54]	USA	20 years & over	Cross sectional survey with self-administered questionnaire	Urine leakage in past 12 months	86	826	43
Milsom, 1993[53]	Sweden	7 birth cohorts 1900-1940	Population-based mailed survey	Not provided but based ICS definition	74.6	7,459	16.8
Mommsen, 1994[51]	Denmark	30-59 years	Population-based mailed survey	Urine leakage over past year	85	2,589	17
Seim, 1995[49]	Norway	20 years & over	Population-based mailed survey	Any frequency or amount of urine leakage	77	1,820	29
Wetle, 1995[50]	USA	65 years & over	Population-based survey with in-home interview	Difficulty holding urine	85	2,360	44
Brown, 1996[55]	USA	70 years & over	Cross-sectional survey with self-administered questionnaire	Urine loss during past 12 months	--	7,949	41
Bogren, 1997[61]	Sweden	65 years & older	Population-based mailed survey	Involuntary urine loss	92	225	28

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Brieger, 1997[60]	Hong Kong	Mean age 45 (SD 15)	Population-based telephone survey	Involuntary urine loss which is either socially or hygienically unacceptable	43	1,054	13
Nakanishi, 1997[58]	Japan	65 years & over	Population-based with in-home interviews	Urine leakage	95.4	1,405 (women not specified)	9.8
Samuelsson, 1997[57]	Sweden	20-59 years	Cross-sectional mailed survey	Involuntary urine loss	77	491	27.7
Thom, 1997[59]	USA	60 years & over	Population-based mailed survey	At least one episode of urinary incontinence in past year or having sought treatment	74.7	939	72.6
Thom, 1997[59]	USA	65 years & over	Population-based using medical record and hospital records	UI diagnosis in medical record	--	3,004	6.9% all ages 4.2% 65-74 years 7.3% 75-79 years 9.4% 80+ years
Damián, 1998[35]	Spain	65 years & over	Population-based survey with in-home interviews	Difficulty controlling urine or urine escaping	71.2 (men and women combined)	589 (men and women combined)	64.2 (women)
Holtedahl, 1998[62]	Norway	50-74 years	Population-based survey with clinic interview	Any urine leakage, regular leakage with or without objective demonstration (≥2 episodes/month); and regular incontinence, ICS definition fulfilled	72.6	507	47.3% any leakage (all ages) 42.7% 50-54 55.1% 55-59 44.8% 60-64 years 39.0% 65-69 56.1% 70-74 years 30.6% regular UI with or without objective demonstration 28.2% 50-54 years 29.9% 55-59 years 35.2% 60-64 years 24.4% 65-69 years 35.4% 70-74 years 18.9% regular UI, ICS definition 16.0% 50-54 years 20.6% 55-59 years

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
							22.9% 60-64 years 17.1% 65-69 years 18.3% 70-74 years
Chiarelli, 1999[68]	Australia	18-23 years 45-50 years 70-75 years	Population-based mailed survey	Urine leakage in past year	48% 18-23 years 54% 45-50 years 41% 70-75 years	14,761 14,070 12,893	12.8 18-23 years 36.1% 45-50 years 35.0% 70-75 years
Dolan, 1999[65]	Ireland	35-74 years	Population-based mailed survey	Urine loss	66	689	58
Foldspang, 1999[64]	Denmark	20-59 years	Population-based mailed survey	Urine leakage in past year	75.5	4,710	17.7 overall 9.6 20-29 years 32.4 50-59 years
Fultz, 1999[67]	USA	70 years & over	Prospective cohort with in-person and telephone interviews	Urine loss in past 12 months	--	3,385 White 606 Black	23.0% White 16.2% Black
Hagglund, 1999[69]	Sweden	18-70 years	Population-based mailed survey	Involuntary urine loss at present time	88	14,761	26 overall 12% 18-30 years 20% 31-40 years 32% 41-50 years 36% 51-60 years 28% 61-70 years
Kuh, 1999[70]	UK	48 years	Prospective cohort mailed survey	Urine leakage over past year	93	1,378	55
Palmer, 1999[593]	USA	18 years & over	Cross-sectional mailed survey	Monthly urine leakage	57%	1,113	21%
Roe, 1999[594]	UK	18 years & over	Population-based mailed survey	Urine leakage at least twice a month	52.4%	3,356	11.3%
Stenberg, 1999[71]	Sweden	71 and 81 years	Population-based mailed survey	SUI, UUI, or MUI	87 (71 years) 62 (81 years)	2,245 1,084 (71 years) 611 (81 years)	46 (71 years) 45 (81 years)
Swinthinbank, 1999[77]	UK	19 years & over	Cross-sectional mailed survey	Any urine leakage in past month; also ICS definition of UI interfering with social life or causing a hygienic problem	80	2,075	69 30 (ICS definition) 55 19-39 years 76 40-59 years 71 60-79 years 76 80+ years

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Bortolotti, 2000[72]	Italy	40 years & over	Population-based telephone survey	Urine leakage during past year	>99	2,767	11.4 overall 7.2 40-50 years 11.8 51-60 years 9.5 61-70 years 15.9 >70 years
Hannestad, 2000[80]	Norway	20 years & over	Population-based mailed survey	Any urine leakage	80	27,936	25 overall 10% 20-24 years 14% 25-29 years 18% 30-34 years 21% 35-39 years 24% 40-44 years 28% 45-49 years 30% 50-54 years 28% 54-59 years 26% 60-64 years 27% 65-69 years 30% 70-74 years 34% 75-79 years 35% 80-84 years 35% 85-89 years 40% 90+ years
Iglesias, 2000[76]	Spain	65 years & over	Population-based survey with in-home-interview	Involuntary urine loss or wet underwear, clothes or bedclothes	95	486	42
MacLennan, 2000[7]	New Zealand	15 years & over	Population-based survey with in-home interview	Urine leakage within past year	51.3	1.546	35.3
Temml, 2000[75]	Austria	20 years & over	Cross-sectional survey with self-administered questionnaire	Involuntary urine loss within past 4 weeks	Not reported	1,262	26.3 overall 4.1 20-39 years 10.8 30-39 years 22.9 40-49 years 34.9 50-59 years 36.9 60-69 years 36.0 70+ years
Tseng, 2000[79]	Taiwan	65 years & over	Population-based with in-home interview	Involuntary urine loss in daily life	80	256	28
Ueda, 2000[74]	Japan	40 years & over	Population-based mailed survey	Any urine leakage	52.5 (women and men combined)	968	53.7

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Maggi, 2001[81]	Italy	65 years & over	Population-based survey with in-home interview	Involuntary urine leakage ever	89	1,531	22 (overall) 16.4 65-69 years 17.8 70-74 years 24.8 75-79 years 23.9 80-84 years 34.7 ≥90+ years
Muscatello, 2001[84]	Australia	41 years & over	Population-based computer-assisted telephone survey	SUI or UUI during past month	68	262	61
Schmidbauer, 2001[83]	Austria	20 years & over	Cross-sectional with self-administered questionnaire and clinical assessment	Urine leakage during past 4 weeks	--	1,262	26.3
Stoddart, 2001[82]	UK	65 years & over	Population-based mailed survey	Urine leakage in past month	79	740	31 overall 29 65-69 years 22 70-74 years 31 75-79 years 42 ≥80 years
Bogner, 2002[88]	USA	50-96 years	Population-based mailed survey	Losing urine or having trouble getting to bathroom in past 12 months (ever)	95	502	25.3
Buchsbaum, 2002[90]	USA	39-91 years	Cross-sectional survey with self-administered questionnaire	Current report of urine leakage	78.4	149	49.7
Finkelstein, 2002[86]	Canada	30 years & older	Population-based mailed survey	Self-report or urinary incontinence diagnosed by a health professional	93.6	29,520	2.5 per 100 for overall women (weighted estimated) 0.6 30-39 years 1.6 40-49 years 2.1 50-59 years 3.9 60-69 years 6.8 70-79 years 11.1 80+ years
Fitzgerald, 2002[188]	USA	16-69 years	Cross-sectional mailed survey	Urine loss when not able to get to toilet in time, when asleep, or when laughed, coughed, or sneezed	54%	269	29% monthly UI 88% White 11% Asian/Native American/Other <1% Black

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Landi, 2002[94]	Italy	65 years & older	Population-based survey using Minimum Data Set for Home Care (MDS-HC)	Any involuntary urine loss regardless of amount ≥2 times/week	97.2	2,658	63
Langa, 2002[595]	USA	70 years & over	Population-based survey with in-person interviews	Urine loss during past 12 months	--	5,188	24%
Peyrat, 2002[85]	France	20-62 years	Cross-sectional survey with self-administered questionnaire	Current report of urine leakage	60.7	1,700	27.5 (overall) 6% <25 years 18.2% 25-39 years 38.0% 40-55 years 47% >55 years
Sampselle, 2002[93]	USA (7 cities)	42-52 years	Population-based mailed survey	Urine leakage during past year	--	3,302	56.9% (overall) 60.0% White 49.5% Black 50.2% Chinese 41.4% Hispanic 52.9% Japanese
Sze, 2002[89]	USA	15-91 years	Cross-sectional survey with self-administered questionnaire	Urine loss with exertion or urgency or use of pad or protected undergarment because of urine loss with exertion	Not reported	2,370	41% White 31% Black 30% Hispanic
Van Oyen, 2002[92]	Belgium	15 years & over	Population-based survey with in-home interview	Loss of occurring bladder control sometimes	60	3,804	4.6% (overall--weighted estimate) 0.2 % 15-24 years 1.8% 25-34 years 2.3% 35-44 years 3.8% 45-54 years 8.6% 55-64 years 11.7% 65-74 years 21.0% 75+ years
Araki, 2003[107]	Japan	40-92 years	Cross-sectional outpatient survey	Amount of urine leakage	46% (men and women combined)	245	40
Espino, 2003[110]	USA	65 years & over	Population-based survey with in-home interview	Urine loss during past 12 months	90.5	1,589	15% Mexican Americans
Eva, 2003[99]	Sweden	40-60 years	Population-based mailed survey	Urine leakage weekly or more	67	1,336	9% age 40 19% age 60

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Grodstein, 2003[105]	USA	50-75 years	Prospective cohort with mailed survey	Urine loss during past 12 months	--	83,168	17.7% 17.9% White 9.6% Black 15.6% Hispanic 12.5% Asian
Hunskaar, 2004[112]	France, Germany, Spain, UK	18 years & over	Cross-sectional mailed survey	Any urine leakage	58.1	5,976	35% (overall) 23% Spain 44% France 41% Germany 42% UK
Hvidman, 2003[96]	Denmark	20-59 years	Population-based mailed survey	Urine leakage the preceding day	60.3	2,158	18.3
Landi, 2003[97]	Italy	65 years & over	Population-based survey using Minimum Data Set for Home Care	Any involuntary urine loss regardless of amount ≥2 times/week	--	3,194	52
Miller, 2003[100]	Australia	21-26 years 48-53 years 73-79 years	Population-based mailed survey	Urine leakage in past month	50% 23-26 years 83% 48-53 years 80% 73-79 years	934	89% overall 77.4% 23-26 years 95.4% 48-53 years 95.0% 73-79 years
Nuotio, 2003[106]	Finland	70 years & over	Population-based survey using interviews	SUI or UUI	93	227	59 with any type of UI
Rortveit, 2003[98]	Norway	20-64 years	Population-based mailed survey	Any involuntary urine loss	80	27,936	20.7
Adelmann, 2004[30]	USA	65 years & over	Population-based with in-home interviews	Positive response to one of 6 questions: trouble holding urine or leaking urine; losing urine when one coughs, sneezes, laughs, or with physical activity; losing urine on the way to the bathroom; frequently losing small amounts of urine; other kinds of urinary accidents; and ever having urinary accidents; or involuntary urine loss	59 (women and men combined)	308	45% ever/current UI 49% White 43% Black 31.9% Other 25.5% UI in past week 28.7% White 22.4% Black 16.4% Other Ever/current UI by age: 37.4% 65-74 years overall including 39.1% Whites, 36.4% Blacks, 47.7% 75-84 years, including 53.1% Whites, 50.0% Blacks 62.1% 85+ years

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
							overall; 53.1% Whites, 71.4% Blacks UI in past week by age: 20.4% 65-74 years overall including 22.9% Whites, 16.7% Blacks, 27.6% 75-84 years: including 23.3% Whites, 29.4% Blacks 36.3% 85+ years: 37.7% Whites, 42.9% Blacks Medically-detected UI 23.8%
Andersson, 2004[37]	Sweden	18-79 years	Population-based mailed survey	Urine leakage at any time or at least weekly	64.5 (men and women combined)	7,680 surveyed; response not provided	11% weekly 3% 18-34 years 10% 35-49 years 13% 50-64 years 21% 65-79 years 27% at any time 10% 18-34 years 26% 35-49 years 37% 50-64 years 39% 65-79 years
Bogner, 2004[120]	USA	50 years and older	Population-based mailed survey	Difficulty losing urine or having trouble getting to bathroom in time (ever)	95	502	19.8% 22.4% White 13% Black
Holroyd-Leduc, 2004[113]	USA	70 years & over years	Population-based survey using telephone and in-home interviews	Any amount of urine loss during past 12 months	87.4	5,913	18.5
Hunskaar, 2004[112]	France, Germany, UK, Spain	18 years and over	Cross-sectional mailed survey	Based on ICS definition using symptoms in past 30 days	60 France 59 Germany 64 Spain 45 UK	3,881 3,824 6,444 2,931	44% France 41% Germany 23% Spain 42% UK

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Jackson, 2004[123]	USA	70-79 years	Prospective cohort with mailed self-administered questionnaire	Urine leakage during past 12 months	98.4% of those who answered incontinence questions at baseline interview	1,584	46%
Lagergren, 2004[115]	Sweden	65 years & over	Population-based survey with self-administered questionnaires and clinic examinations	Urine loss during the past 12 months with at least one episode in past month	50-74 depending on region	4,465	14
MacLennan, 2000[7]	Australia	15-97 years	Population-based with in-home interviews	Stress or urge UI	73.3%	1,546	35.3
McGrother, 2004[38]	UK	40 years & over	Population-based mailed survey	Urine loss with categorical scale determined for frequency and volume of loss	60.2	50,002	Of those with UI: 3.5% profound 11.8% severe 7.3% moderate 11.6% minimal
Østbye, 2004[186]	Canada	65 years & over	Population-based mailed survey	Ever lose bladder control or pass water	--	5,322	19% (overall) 14.2% 65-68 years 15.9% 70-74 years 19.7% 75-79 years 25.0% 80-84 years 24.6% 85-89 years 29.0% 90+ years
Özerdogan, 2004[116]	Turkey	20 years & over	Cross-sectional mailed survey	Urine loss at least twice a month or more	--	3,259	25.8%
Stenzelius, 2004[114]	Sweden	75 & over	Population-based mailed survey	Difficulty controlling urine during last 3 months	61.6	2,636	41.6
Teunissen, 2004[111]	Netherlands	60 years & over	Population-based mailed survey	Involuntary urine loss twice or more a month	88	3,159	29% (overall) 22% 60-64 years 26% 65-69 years 29% 70-74 years 36% 75-79 years 38% ≥80 years
Vandoninck, 2004[122]	Netherlands	29-79 years	Population-based mailed survey	Ever have involuntary urine loss	73	1,071	40%
Bradley, 2005[125]	USA	57-84 years	Prospective cohort using self-administered questionnaire	Urine leakage in past 3 months	88	297	85.2% (ever)

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Jackson, 2005[128]	USA	55-75 years	Population-based with clinic interviews	Any urine leakage during past month	--	1,017	60% past month 8% severe UI
Kocak, 2005[127]	Turkey	18 years & over	Population-based survey with in-home interview	SUI, UUI, or MUI	98.8	1,012	23.9%
Lewis, 2005[596]	ISA	50-69 years	Population-based telephone or in-person interviews	Urine lost during past 12 months	--	10,678	21.7% 57% mild UI 43% severe UI
Lifford, 2005[134]	USA	50-75 years	Prospective cohort with mailed questionnaire	Urine loss at least weekly	Not reported	81,845	17.4%
Melville, 2005[124]	USA	30-90 years	Cross-sectional mailed survey	Urine leakage at least monthly	64	3,536	42%
Nygaard, 2005[130]	USA	18-60 years	Cross-sectional mailed survey	Any leakage in previous 30 days	68	2,210	38.6%
Oskay, 2005[121]	Turkey	50 years & over	Cross-sectional mailed survey	Involuntary urine loss either stress, urge, or mixed incontinence	Not reported	500	68.8%
Rohr, 2005[133]	Denmark	45-68 years	Population-based survey with in-home interview	Leaking urine >1 time/month with either physical exertion strong urgency, or both	91	5,795	32.6% 20.1%: <60 years 29.8%: 60-80 years 43.7%: ≥80 years
Ruff, 2005[126]	USA	19-82 years	Cross-sectional survey with self-administered questionnaire	Urine leakage or losing control of urination	47	233	37.6% African American
Swanson, 2005[143]	Canada	45 years & over	Cross-sectional mailed survey	Urine loss when coughing, laughing, or with activity or before reaching toilet	61.1	606	51.3% 51.7% 45-50 years 59.3% 51-55 years 55.9% 56-60 years 50.8% 61-65 years 52.2% 66-70 years 43.6% 71-75 years 45.0% 76-80 years 48.6% >81 years
Teleman, 2005[131]	Sweden	55-64 years	Population-based survey with self-administered questionnaire	Urinary leakage which causes a social and/or hygienic problem	89%	6,917	32%
Anger, 2006[8]	USA	60 years & over	Population-based mailed survey	Difficulty controlling bladder including leaking small amounts of urine with coughing and sneezing	Not reported	9,965	38% 41% non-Hispanic White 20% non-Hispanic Black 36% Mexican-American

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Brown, 2006[140]	USA	60 years & over	Population-based survey with in-home interview and physical examination	Weekly or more frequent urine leakage over past 12 months	NA	1.461 1,051 normal glucose 164 impaired fasting glucose 246 diabetes	16.8% normal glucose 33.4% impaired fasting glucose 35.4% diabetics
Danforth, 2006[138]	USA (14 states)	Mean age 44.8	Prospective cohort with mailed survey	Urine loss at least once a month or more during past 12 months	82.3	83,355	43% Overall 44% White 36% Black 45% Hispanic 86% Asian
Irwin, 2006[145]	Canada, Germany, Italy, Sweden, and UK	18 years & over	Population-based survey using computer-assisted telephone interview	Frequency of urine leakage	33% (women and men combined)	1,675	13.1% 7.3% [6.5-8.1] ≤39 years 13.7% [12.6-14.9] 40-49 years 19.3% [17.9-20.7] ≥60 years
Jackson, 2006[144]	USA	55-75 years	Population-based survey with clinic interview	Accidental urine leakage during past year	26%	1,107	66% 8% severe incontinence
Mardon, 2006[39]	USA	65 years and over	Population-based mailed survey	Urine leakage in past 6 months	67%	86,708	43.6%
Tannebaum, 2006[142]	Canada	55 years & over	Population-based mailed survey	ICI questionnaire	47%	2,361	39%

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Thom, 2006[137]	USA	40-69 years	Population-based survey with self-administered questionnaire and in-person interview	At least 1 self-reported episode of urine loss	65.1%	2,109	Age-adjusted prevalence in past year (OR, 95% CI) White: 73.3, 71.4-75.2 Hispanic: 74.8, 73.0-76.7 Black: 64.8, 62.8-66.9 Asian: 68.8, 66.9-70.8 Age-adjusted prevalence in last week White: 27.2% Hispanic: 33.1% Black: 23% Asian: 18.5%
Wehrberger, 2006[139]	Austria	20-84 years	Prospective cohort mailed survey	Urine loss during past 4 weeks	47.7%	441	32%
Harris, 2007[146]	USA	30-79 years	Population-based survey with in-home interview	Weekly urine leakage	63	331	10.3%
Huang, 2007[147]	USA	65 years & over	Prospective cohort with mailed survey	Urine leakage in past 12 months	NA	6,361	53%
Huang, 2007[187]	USA	40-69 years	Population-based mailed survey	Weekly or daily urine leakage	--	1,349	White: 17.8% weekly, 13.0% daily Asian: 10.6% weekly, 7.8% daily
Kinchen, 2007[148]	USA	21-75 years	Population-based mailed survey or telephone interview	Urine leakage in the past 7 days	49.7	3,344	44% 34.3% <50 years 50.4% 50-64 years 51.8% 65+ years
Waetjen, 2007[149]	USA	40-55 years	Prospective cohort with mailed survey	Urine loss during past year	--	3,302	46.7% monthly loss 15.3% weekly loss
Prevalence of UI in Men							
Herzog, 1990[47]	USA	60 years & over	Population-based mailed survey	Urine loss in past 12 months	66-72% check	802	18.9
O'Brien, 1991[43]	UK	35 years & over	Population-based mailed survey	Urine leakage at least twice a month	79 (men and women combined)	2,496	7.4 (overall) 2.4 35-44 years 5.5 45-54 years 5.7 55-64 years 12.1 65-74 years 15.4 ≥75 years

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Brocklehurst, 1993[52]	UK	30 years & over	Population-based survey with in-home interview	Ever have a bladder problem, e.g., leaking, wet pants, damp pants	Not reported	1,883	3.8 (past year) 2.8 (past 2 months)
Lagace, 1993[54]	USA	20 years & over	Cross-sectional survey with self-administered questionnaire	Urine leakage in past 12 months	86 (men and women combined)	104	11
Malmsten, 1997[583]	Belgium	45 years & over (7 birth cohorts)	Population-based with self-administered questionnaire	Urine leakage when arriving too late to the toilet, when laughing or coughing too much, continuously losing some urine, or losing some urine after micturition	74.2 overall 72.2 age 45 74.2 age 50 74.3 age 55 78.5 age 60 79.6 age 65 80.0 age 70 77.9 age 75 70.5 age 85-89 69.0 age 90+	10,458	Daily UI: 64.1 overall 44.0 age 45 62.5 age 50 52.0 age 55 46.3 age 60 58.1 age 65 64.4 age 70 60.0 age 75 58.9 age 80 71.7 ages 85-89 79.0 age 90+ Weekly UI: 8.2% overall 10.0 age 45 9.4 age 50 12.0 age 55 14.6 age 60 14.0 age 65 13.3 age 70 8.0 age 75 8.9 age 80 5.2 ages 85-89 3.7 age 90+ Monthly UI: 15.1 overall 30.0 age 45 12.5 age 50 24.0 age 55 17.1 age 60 18.6 age 65 13.3 age 70 18.0 age 75 23.2 age 80 10.7 ages 85-89 7.4 age 90+

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Bogren, 1997[61]	Sweden	65 years & over	Population-based mailed survey	Involuntary urine loss	92%	233	29
Schulman, 1997[587]	Belgium	30 years & over	Population-based mailed survey	Urine leakage when arriving too late to the toilet, when laughing or coughing too much, continuously losing some urine, or losing some urine after micturition	89% Men and women combined	2,499	5.2 overall 0.8 30-34 years 2.6 35-39 years 2.0 40-44 years 2.3 45-49 years 4.9 50-54 years 4.9 55-59 years 5.5 60-64 years 8.5 65-69 years 13.8 70+ years
Thom, 1997[59]	USA	65 years & over	Population-based using medical record and hospital records	UI diagnosis in medical record	--	2,982	5.3% all ages 2.8% 65-74 years 5.6% 75-79 years 7.6% 80+ years
Damián, 1998[35]	Spain	65 years & over	Population-based survey with in-home interview	Current involuntary urine leakage	71.2 (men and women combined	582 (men and women)	35.8 (men only)
Koyama, 1998[63]	Japan	66 years & over	Population-based survey with self-administered questionnaire	Involuntary urine leakage—ever	--	856	4.7%
Roe, 1999[594]	UK	18 years & over	Population-based mailed survey	Urine leakage at least twice a month	52.4%	2,681	5.3%
Bortolotti, 2000[72]	Italy	50 years & over	Population-based survey with telephone interviews and nested case-control with in-home interviews	Urine leakage in past year		2,721 telephone interviews 64 home interviews	3.4 in past year (overall) 2.0 51-60 years 2.6 61-70 years 6.6 70+ years
MacLennan, 2000[7]	Australia	15-97 years	Population-based with in-home interviews	Stress or urge UI	73.3%	1,464	4.4%
Smoger, 2000[181]	USA	25-93 years	Cross-sectional survey with in-home interview	Urine loss in past 12 months	85%	840	32.3 (overall) 32 White 33.1 Black 36.4 Other 25.4 ≤40 years 30.9 41-50 years 31.4 51-60 years 36.3 61-70 years 33.2 71-80 years 20.0 >80 years

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Temml, 2000[75]	Austria	20 years & over	Cross-sectional survey with self-administered questionnaire	Involuntary urine loss within past 4 weeks	Not reported	332	5.0 overall 1.7 20-39 years 2.7 30-39 years 3.9 40-49 years 3.7 50-59 years 7.6 60-69 years 11.5 70+ years
Ueda, 2000[74]	Japan	40 years & over	Population-based mailed survey	Urine leakage	52.5% (men and women combined)	818	2 40-59 years 4 60-69 years 4 70 + years
Maggi, 2001[81]	Italy	65 years & over	Population-based survey with in-home interview	Involuntary urine leakage ever	89	867	11.5 (overall) 4.6 65-69 years 12.6 70-74 years 12.3 75-79 years 22.2 80-84 years 23.6 ≥90 years
Stoddart, 2001[82]	UK	65 years & over	Population-based mailed survey	Urine leakage in past month	79%	781	23 (overall) 12 65-69 years 21 70-74 years 22 75-79 years 34 ≥80 years
Bogner, 2002[88]	USA	50-96 years	Population-based mailed survey	Losing urine or having trouble getting to bathroom in past 12 months	95%	279	10.8
Finkelstein 2002[86]	Canada	30 years & over	Population-based mailed survey	Self-report of urinary incontinence diagnosed by a health professional	93.6%	25,400	1.4 per 100 for overall (weighted estimate) 0.2 30-39 years 0.4 40-49 years 1.1 50-59 years 2.7 60-69 years 5.7 70-79 years 6.4 80+ years
Langa, 2002[595]	USA	70 years & over	Population-based survey with in-person interviews	Urine loss during past 12 months	--	2,255	13%

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Van Oyen, 2002[92]	Belgium	15 years & over	Population-based survey with in-home interview	Loss of occurring bladder control sometimes	60	3,462	1.4% (weighted estimate) 0.1 % 15-24 years 0% 25-34 years 0.6% 35-44 years 0.9% 45-54 years 2.7% 55-64 years 5.2% 65-74 years 13.3% 75+ years
Araki, 2003[107]	Japan	40-92 years	Cross-sectional outpatient survey	Amount of urine leakage	46% Men and women combined	305	24
Boyle, 2003[585]	France, Netherlands, South Korea, and UK	40-79 years	Population-based with in-person interview	Current urine leakage	Not reported	4,979	7.3% France 16.2% Netherlands 4.3% South Korea 14.4% UK By age: France: 5.2% 40-49 years, 9.2% 60-69 years Netherlands: 12.7% 40-49 years, 22.6% 60-69 years South Korea: 1.9% 40-49 years, 8.0% 60-69 years UK: 14.4% 40-49 years, 13.7% 60-69 years
Landi, 2003[97]	Italy	65 years & over	Population-based survey using Minimum Data Set for Home Care	Any involuntary urine loss regardless of amount ≥2 times/week	--	2,178	49

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Adelmann, 2004[30]	USA	65 years & over	Population-based survey with in-home interview	Positive response to one of 6 questions: trouble holding urine or leaking urine; losing urine when one coughs, sneezes, laughs, or with physical activity; losing urine on the way to the bathroom; frequently losing small amounts of urine; other kinds of urinary accidents; and ever having urinary accidents; or involuntary urine loss	59% (men and women combined)	163	By self report: 25.8 (ever/current) 11.7 (past week) 13.6 (medically-detected)
Andersson, 2004[37]	Sweden	18-79 years	Population-based mailed survey	Any urine leakage or urine leakage at least once a week	64.5% (men and women combined)	7,680 surveyed; response not provided	3% (weekly) 1% 18-34 years 2% 35-49 years 3% 50-64 years 8% 65-79 years 10% (any time) 3% 18-34 years 6% 35-49 years 13% 50-64 years 21% 65-79 years
Haltbakk, 2004[586]	Norway	39-91 years	Cross-sectional mailed survey of men with BPH diagnosis	Any involuntary urine leakage	78%	612	37
Holroyd-Leduc, 2004[113]	USA	69-103 years	Population-based survey with in-home interview	Any amount of urine loss during past 12 months	87.4% (men and women combined)	1,041	8.5
Lagergren, 2004[115]	Sweden	65 years & over	Population-based survey with self-administered questionnaires and clinic examinations	Urine loss during the past 12 months with at least one episode in past month	50-74 depending on region	3,053	8.5

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Østbye, 2004[186]	Canada	65 years & over	Population-based mailed survey	Ever lose bladder control or pass water	--	3,574	9% (overall) 6.3% 65-68 years 7.2% 70-74 years 9% 75-79 years 11.2% 80-84 years 16.6% 85-89 years 16.9% 90+ years
Teunissen, 2004[111],	Netherlands	60 years & over	Population-based mailed survey	Involuntary urine loss twice a month or more	88	2,589	9% (overall) 5% 65-69 years 6% 65-69 years 8% 70-74 years 14% 75-79 years 21% ≥80 years
Anger, 2006[8]	USA	60 years & over	Population-based survey with in-home interview	Difficulty controlling bladder, including small amounts of urine loss with coughing or sneezing over past 12 months	NA	Not reported	17 Weighted estimates 21 (Non-Hispanic Blacks) 16 (Non-Hispanic Whites) 14% (Mexican Americans)
Irwin, 2006[145]	Canada, Germany, Italy, Sweden, UK	18 years & over	Population-based computer-assisted telephone interview	Frequency of urine leakage	33% men and women combined	Not reported	5.4
Lewinshtein, 2006[588]	Canada	33-80 years	Cross-sectional survey using self-administered questionnaire	Frequency of urine leakage over past 4 weeks	Not reported	366	10
Mardon, 2006[39]	USA	65 years & over	Random sample of Medicare enrollees	Urine leakage in past 6 months	67% (men and women combined)	88,708	27.9 (overall) 30.6% Hispanics 37.9% Non-Hispanics 38.7% American Indians 31.6% Asians 30.3% African Americans 38.3% Whites 31.2% Other

Table 1. Prevalence of UI in community dwelling adults by age and race (continued)

Author Sample	Country	Ages (years)	Design	UI Definition	Response Rate (%)	Number	UI Prevalence (%)
Diokno, 2007[589]	USA	18 years & over	Population-based mailed survey	Urine leakage in past 30 days	--	21,590	12.7 (overall) 7.3% 18-24 years 7.2% 35-44 years 11.0% 45-54 years 15.6% 55-64 years 23.8% 65-74 years 30.2% 75+ years

Table 2. Pooled prevalence of UI in women by time of occurrence (random effects model, statistical test for between studies heterogeneity significant for all estimates)

Age	Ever	Prevalence (95% CI)	In the Past Month	Prevalence (95% CI)	In the Past Year	Prevalence (95% CI)
19-44	**17 studies** Samuelsson, 1997[57] Foldspang, 1999[64] Hannestad, 2000[80] Peyrat, 2002[85] Van der Vaart, 2002[91] Van Oyen, 2002[92] Chen, 2003[95] Rortveit, 2003[98] Chen, 2003[101] Miller, 2003[104] Parazzini, 2003[108] Mawajdeh, 2003[109] Andersson, 2004[37] Schytt, 2004[119] Nygaard, 2005[130] Rohr, 2005[133] Irwin, 2006[145] Melville, 2005[124]*	21.3 (16.3; 26.2) US* 28 (27.8; 28.)	**5 studies** Hagglund, 1999[69] Temml, 2000[75] Peyrat, 2002[85] Miller, 2003[100] Nygaard, 2005[130]	25.2 (21.7; 28.7) US* 30 (0; 59)	**2 studies** Foldspant, 1999[64] Chiarelli, 1999[68]	13.37 (9.61; 17.13)
45-64	**45 studies** Rekers, 1992[41] Burgio. 1001[44]* Seim, 1995[49] Mommsen, 1994[51] Brocklehurst, 1993[52] Samuelsson, 1997[57] Bogren, 1997[61] Dolan, 1999[65] Kuh, 1999[70] Moller, 2000[73] Ueda, 2000[74] Temml, 2000[75] Swithinbank, 1999[77] Alling Moller, 2000[78] Hannestad, 2000[80] Muscatello, 2001[84] Peyrat, 2002[85] Van der Vaart, 2002[87]	34.1 (29.6; 38.5) US* 43.2 (37.1; 49.3)	**7 studies** Hagglund, 1999[69] Temml, 2000[75] Swithinbank, 1999[77] Schmidbauer, 2001[83] Peyrat, 2002[85] Miller, 2003[100] Hunskaar, 2004[112]	40.1 (36.7; 43.5) US* 44.3 (31.7; 56.7)	**11 studies** Mommsen, 1994[51] Lagace, 1993[54]* Foldspang, 1999[64] Chiarelli, 1999[68] Kuh, 1999[70] Bortolotti, 2000[72] MacLennan, 2000[7] Sampselle, 2002[93]* Grodstein, 2003[105]* Danforth, 2006[138]* Waetjen, 2007[149]*	35.4 (31.6; 39.2) US* 37.6 (33.3; 41.9)

Table 2. Pooled prevalence of UI in women by time of occurrence (random effects model, statistical test for between studies heterogeneity significant for all estimates) (continued)

Age	Ever	Prevalence (95% CI)	In the Past Month	Prevalence (95% CI)	In the Past Year	Prevalence (95% CI)
	Sze, 2002[89]*					
	Van Oyen, 2002[92]					
	Chen. 2003[95]					
	Stewart, 2003[102]*					
	Miller, 2003[104]					
	Parazzini, 2003[108]					
	Hunskaar, 2004[112]					
	McGrother, 2004[38]					
	Andersson, 2004[37]					
	Ozerdogan, 2004[116]					
	Corcos, 2004[117]					
	Vandoninck, 2004[122]					
	Melville, 2005[124]*					
	Ruff, 2005[126]*					
	Kocak, 2005[127]					
	Tegerstedt, 2005[129]					
	Teleman, 2005[131]					
	Fritel, 2005[135]					
	Goldberg, 2005[136]*					
	Thom, 2006[137]*					
	Wehrberger, 2006[139]*					
	Lukacz, 2006[141]*					
	Swanson, 2005[143]					
	Irwin, 2006[145]					
	Waetjen, 2007[149]*					
	Kinchen, 2007[148]*					
65+	**40 studies**	35.1	**9 studies**	44.2	**13 studies**	40.8
	Molander, 1990[48]	(33.9; 36.2)	Hagglund, 1999[69]	(38.9; 49.4)	Herzog, 1990[47]*	(32.7; 48.9)
	Wetle, 1995[50]*	US*	Temml, 2000[75]	US*	Thom, 1997[59]*	US*
	Milsom, 1993[53]	35.8	Swithinbank, 1999[77]	47.7	Chiarelli, 1999[68]	47
	Nygaard, 1996[56]	(30.7; 40.9)	Stoddart, 2001[82]	(38.9; 56.3)	Bortolotti, 2000[72]	(38.9; 55.1)
	Nakanishi, 1997[58]		Muscatello, 2001[84]		Bogner, 2002[88]*	
	Thom, 1997[59]*		Peyrat. 2002[85]		Espino, 2003[110]*	
	Bogren, 1997[61]		Miller, 2003[100]		Lagergren, 2004[115]	
	Koyama, 1998[63]		Bradley. 2005[125]*		Jackson, 2004[118]*	
	Damian, 1998[35]		Jackson, 2005[128]*		Jackson, 2004[123]*	
	Brown, 1999[66]*				Mardon, 2006[39]*	
	Stenberg, 1999[71]				Brown, 2006[140]*	
	Bortolotti, 2000[72]				Jackson, 2006[144]*	
	Ueda, 2000[74]				Huang, 2007[147]*	
	Gavira Iglesias, 2000[76]					

Table 2. Pooled prevalence of UI in women by time of occurrence (random effects model, statistical test for between studies heterogeneity significant for all estimates) (continued)

Age	Ever		In the Past Month		In the Past Year	
		Prevalence (95% CI)		Prevalence (95% CI)		Prevalence (95% CI)
	Hannestad, 2000[80] Maggi, 2001[81] Muscatello, 2001[84] Peyrat, 2002[85] Buchsbaum, 2002[90]* Van Oyen, 2002[92] Dallosso, 2003[103] Miller, 2003[104] Nuotio, 2003[106] Araki, 2003[107] Parazzini, 2003[108] Espino, 2003[110]* McGrother, 2004[38] Andersson, 2004[37] Adelmann, 2004[30]* Bogner, 2004[120]* Oskay, 2005[121] Jackson, 2004[123]* Bradley, 2005[125]* Jackson, 2005[128]* McGrother, 2006[132] Rohr, 2005[133] Tannenbaum, 2006[142] Swanson, 2005[143] Irwin, 2006[145] Anger, 2006[2]*					
80+	**11 studies** Stenberg, 1999[71] Ueda, 2000[74] Hannestad, 2000[80] Maggi, 2001[81] Muscatello, 2001[84] Van Oyen, 2002[92] Nuotio, 2003[106] McGrother, 2004[38] Adelmann, 2004[30]* Rohr, 2005[133] Swanson, 2005[143]	38.5 (36.1; 40.9) US* 50.8 (35.7; 65.9)	**4 studies** Nuotio, 2003[106] Stoddart, 2001[82] Stenzelius, 2004[114] Temml, 2000[75]	56.7 (50.3; 63.1)	**4 studies** Brown, 1996[55]* Fultz, 1999[67]* Bortolotti, 2000[72] Holroyd-Leduc, 2004[113]*	22.9 (12.5; 33.3) US* 24.6 (12.4; 36.7)

* Studies conducted in the U.S.

Table 3. Pooled prevalence of UI in women by frequency and severity (random effects model, statistical test for between studies heterogeneity significant for all estimates)

Age	Monthly	Prevalence (95% CI)	Weekly	Prevalence (95% CI)	Daily	Prevalence (95% CI)	Severe	Prevalence (95% CI)
19-44			**3 studies** Kinchen, 2007[148]* Rohr, 2005[133] Eva, 2003[99]	7.4 (0.9; 13.9) US* 10.3 (0; 25.2)	**1 study** Hvidman, 2003[96]	5.1 (1.4; 8.9) US* 3.7 (0.1; 7.41)	**1 study** Finkelstein, 2002[86]	1.5 (0.8; 2.1)
45-64	**9 studies** O'Brien, 1991[43] Burgio, 1991[45]* Rekers, 1992[46] Holtedahl, 1998[62] Ozerdogan, 2004[116] Melville, 2005[124]* McGrother, 2006[132] Rohr, 2005[133] Kinchen, 2007[148]*	20.6 (18.3; 22.8) US* 21.9 (19.1; 24.9)	**6 studies** Rekers, 1992[41] Roe, 2000[36] Eva, 2003[99] Lifford, 2005[134]* Harris, 2007[146]* Kinchen, 2007[148]*	16 (13.3; 18.7) US* 17.3 (14.2; 20.4)	**9 studies** Burgio, 1991[45]* Goldberg, 2005[136]* Hannestad, 2000[80] Kinchen,2007[148]* Lagace, 1993[54] Ruff, 2005[126] Samuelsson, 1997[57] Vandoninck, 2004[122] Thom, 1997[59]*	8.1 (6.3; 10) US* 8.9 (5.5; 12.4))	**7 studies** Rekers, 1992[40] Mommsen, 1994[51] Brieger, 1997[60] Swithinbank, 1999[77] Finkelstein, 2002[86] Sze, 2002[89]* Teleman, 2005[131]	10.2 (9.4; 11) US* 10.5 (9.1; 11.8)
65+	**4 studies** O'Brien, 1991[43] Holtedahl, 1998[62] Teunissen, 2004[111] Rohr, 2005[133]	22.7 (20.9; 24.5) US* 17.5 (12.3; 22.7)	**4 studies** Kok, 1992[42] Landi, 2002[94] Landi, 2003[97] Kinchen, 2007[148]*	16.9 (15.1; 18.8) US* 11.3 (9.1; 13.5)	**10 studies** Tseng, 2000[79] Espino, 2003[110]* Anger, 2006[2]* Bradley, 2005[125]* Huang, 2007[147]* Jackson,2005[128]* Kinchen,2007[148]* Oskay, 2005[121] Stoddart, 2001[82] Thom, 1997[59]*	17 (13.2; 21) US* 8.3 (6.2; 10.5)	**5 studies** Thom, 1997[59]* Gavira-Iglesias, 2000[76] Swithinbank, 1999[77] Finkelstein, 2002[86] Jackson, 2005[128]* Jackson, 2006[144]*	8.9 (7.5; 0.4) US* 8 (7.2; 8.8)
80+	**2 studies** Rohr, 2005[133] Teunissen, 2004[111]	25.3 (14.1; 36.6)	**1 study** Kok, 1992[42]	29.9 (25.4; 34.5)	**2 studies** Anger, 2006[2]* Brown, 1999[66]*	38 (32.4; 44	**1 study** Finkelstein, 2002[86]	15.5 (10.7; 20.3)

* Studies conducted in the U.S.

Table 4. Prevalence of UI by incontinence type, age, and race in community dwelling women

Author	Country	Age	Number	Stress Incontinence (%)	Urge Incontinence (%)	Mixed Incontinence (%)	Other or Unclassified Incontinence (%)
Prevalence of UI Type in Women							
Burgio, 1991[44]	USA	42-50 years	541	47.9	11.7	35.8	
Mommsen, 1994[51]	Denmark	30-59 years	2,589	14.8	8.6	7.1	
Nygaard, 1996[56]	USA	65 years & over	2,025	40.3	36.3		
Bogren, 1997[61]	Sweden	65 years & over	225	33	66		
Brieger, 1997[60]	Hong Kong	Mean age 45 (SD 15)	1,054	10	0.7		
Samuelsson, 1997[57]	Sweden	20-59 years	491	15.7% overall 2.0% 20-29 years 17.0% 30-39 years 28.7% 40-49 years 21.8% 50-59 years	2.0% overall 2.5% 20-29 years 0% 30-39 years 3.8% 40-49 years 2.0% 50-59 years	5.3% overall 1.3% 20-29 years 2.5% 30-39 years 4.6% 40-49 years 12.8% 50-59 years	4.7% overall 3.5% 20-29 years 4.2% 30-39 years 4.6% 40-49 years 6.8% 50-59 years
Schulman, 1997[587]	Belgium	30 years & over	2,770	53	55		
Thom, 1997[59]	USA	60 years & over	939	16.9	23.9	23.6	8.3
Damián, 1998[35]	Spain	65 years & over	589 women and women; women not reported separately	13.5	12.3	61.8	12.3
Koyama, 1998[63]	Japan	66 years & over	1,448	50.4	46.5		
Brown, 1999[66]	USA	Mean age 67 (SD 7)	2,763	12.8	14.4	14.4 10.2 (stress-mixed) 5.9 (urge-mixed)	
Foldspang, 1999[64]	Denmark	20-59 years	4,710	15.1	8.7	6.8	
Kuh, 1999[70]	UK	48 years	1,378	50	22	20	

Table 4. Prevalence of UI by incontinence type, age, and race in community dwelling women (continued)

Author	Country	Age	Number	Stress Incontinence (%)	Urge Incontinence (%)	Mixed Incontinence (%)	Other or Unclassified Incontinence (%)
Muscatello, 1999[84]	Australia	41 years & over	262	35 all ages 29 41-49 years 42 50-59 years 46 60-69 years 27 70+ years	29 all ages 18 41-49 years 33 50-59 years 38 60-69 years 32 70+ years		
Stenberg, 1999[71]	Sweden	71 and 81 years	2,245	36 (71 years) 32 (81 (years)	30 (71 years) 31 (81 years)	20 (overall)	
Swinthinbank, 1999[77]	UK	19 years & over	2,075	60	46		6 nocturnal UI 12 unknown cause
Bortolotti, 2000[72]	Italy	50 years & over	229	55	12	24	
Hannestad, 2000[80]	Norway	20 years & over	27,936	50 all ages 48 20-24 years 54 25-29 years 59 30-34 years 60 35-39 years 60 40-44 years 65 45-49 years 55 50-54 years 52 55-59 years 42 60-64 years 38 65-69 years 33 70-74 years 34 75-79 years 32 80-84 years 28 85-89 years 28 90+ years	11 all ages 13 20-24 years 13 25-29 years 10 30-34 years 7 35-39 years 8 40-44 years 7 45-49 years 7 50-54 years 9 55-59 years 10 60-64 years 16 65-69 years 16 70-74 years 19 75-79 years 21 80-84 years 23 85-89 years 12 90+ years	36 all ages 33 20-24 years 28 25-29 years 27 30-34 years 29 35-39 years 29 40-44 years 27 45-49 years 36 50-54 years 37 55-59 years 46 60-64 years 44 65-69 years 48 70-74 years 44 75-79 years 40 80-84 years 40 85-89 years 48 90+ years	3 all ages 6 20-24 years 5 25-29 years 4 30-34 years 4 35-39 years 3 40-44 years 2 45-49 years 2 50-54 years 2 55-59 years 2 60-64 years 2 65-69 years 2 70-74 years 3 75-79 years 7 80-84 years 9 85-89 years 12 90+ years
Møller, 2000[73]	Denmark	40-60 years	2,284	13.1	7.3	16.4	
Temml, 2000[75]	Austria	20 years & over	332	39.8	26.5		
Ueda, 2000[74]	Japan	40-75 years	818	33.9 all ages 11.3 40-49 years 10.6 50-59 years 8.6 60-69 years 3.4 70+ years	6.9 all ages 1.3 40-49 years 1.2 50-59 years 2.6 60-69 years 1.8 70+ years	12.9 all ages 3.8 40-49 years 4.1 50-59 years 1.9 60-69 years 3.1 70+ years	

Table 4. Prevalence of UI by incontinence type, age, and race in community dwelling women (continued)

Author	Country	Age	Number	Stress Incontinence (%)	Urge Incontinence (%)	Mixed Incontinence (%)	Other or Unclassified Incontinence (%)
Muscatello, 2001[84]	Australia	41 years & over	232	35% overall 29% 41-49 years 42% 50-59 years 46% 60-69 years 27% 70+ years	29% overall 18% 41-49 years 33% 50-59 years 38% 60-69 years 32% 70+ years		
Buchsbaum, 2002[90]	USA	39-91 years (mean 68 years)	149	29.7	24.3	35.1	10.8
Nuotio, 2002[106]	Finland	70 years & over	227		All ages: 41.8 70-79 years: 31.2 80-98 years: 45.6		
Peyrat, 2002[85]	France	20-62 years	1,700	12.4: all ages 3.0: <25 years 8.3: 25-39 years 17.3: 40-55 years 24.0 >55 years	1.6: all ages 0: <25 years 8.3: 25-39 years 17.3: 40-55 years 0: >55 years	13.5: All ages 3.0: <25 years 8.5: 25-39 years 19.0: 40-55 years 24.0: >55 years	
Sze, 2002[89]	USA	15-91 years	2,370	39 White 27 Black 24 Hispanic	19 White 16 Black 16 Hispanic		
Van der Vaart, 2002[87]	Netherlands	35-70 years	1,625	50.5 nonhysterectomy 57.0 hysterectomy	22.6 nonhysterectomy 38.3 hysterectomy		
Van der Vaart, 2002[91]	Netherlands	20-45 years	1,393	39.1	15.3		
Chen, 2003[95]	Taiwan	20 years & over	1,247	18.0	18.6	17.1	
Dallosso, 2003[103]	UK	40 years & over	7,046	17.3			
Espino, 2003[110]	USA	65 years & over (Mexican Americans only)	1,589	10	33	42	
Miller, 2003[104]	Australia	Three age cohorts (21-26 years; 48-53 years, and 73-79 years)	933	10.7%: 21-26 years 6.4%: 48-53 years 2.0%: 73-79 years	2.7%: 21-26 years 6.4%: 48-53 years 2.0%: 73-79 years	86.6%: 21-26 years 92.3%: 48-53 years 91.1%: 73-79 years	

Table 4. Prevalence of UI by incontinence type, age, and race in community dwelling women (continued)

Author	Country	Age	Number	Stress Incontinence (%)	Urge Incontinence (%)	Mixed Incontinence (%)	Other or Unclassified Incontinence (%)
Nuotio, 2003[106]	Finland	60-99 years	227	23	6	30	
Parazzini, 2003[108]	Italy	40 years & over	2,2	24.3%: overall 40.7%: ≤52 years 36.4%: 53-61 years 22.9%: ≥62 years	18.4%: overall 35.4%: ≤52 years 30.8%: 53-61 years 33.9%: ≥62 years	45.8%: overall 30.9%: ≤52 years 29.4%: 53-61 years 39.7%: ≥62 years	
Rortveit, 2003[98]	Norway	20-64 years	15,307	12.2	1.8	5.9	
Stewart, 2003[102]	USA	18 years & over	2,735		9.3		
Adelmann, 2004[30]	USA	65 years & over	163	38.9	9.3	11.1	5.6
Andersson, 2004[37]	Sweden	18-79 years	--	77% of those incontinent 59% 18-34 years 83% 35-49 years 83% 50-64 years 71% 65-79 years	46% of those incontinent 42% 18-34 years 38% 35-49 years 48% 50-64 years 53% 65-79 years		
Corcos, 2004[117]	Canada	35 years & over	1,683	10.6%	5.5%		
McGrother, 2004[38]	UK	40 years & over	5,816	All ages: 17.3% 16.7% 40-49 years 19.8% 50-59 years 16.2% 60-69 years 15.2% 70-79 years 18.1% ≥80 years			
Jackson, 2004[123]	USA	70-79 years	1,584	40% overall 73% Whites 27% Blacks	42% overall 64% Whites 36% Blacks		14% Other 3% Not specified
Jackson, 2005[128]	USA	55-75 years	1,107	17	10	32	
Ozerdogan, 2004[116]	Turkey	20 years & over	625	42.9	27.3	29.8	
Vandoninck, 2004[122]	Netherlands	29-79 years	1,071	68.9			
Bradley, 2005[125]	USA	57-84 years	297	51.2	49.2		
Fritel, 2005[135]	France	49-61 years	2,625	68.4			
Goldberg, 2005[136]	USA	15-85 years	542	51.8% overall 43% premenopausal 63% postmenopausal			

Table 4. Prevalence of UI by incontinence type, age, and race in community dwelling women (continued)

Author	Country	Age	Number	Stress Incontinence (%)	Urge Incontinence (%)	Mixed Incontinence (%)	Other or Unclassified Incontinence (%)
Kocak, 2005[127]	Turkey	18 years & over	1,017	33.1	25.6	41.3	
Melville, 2005[124]	USA	30-90 years	3,536	33	13	50	
Nygaard, 2005[130]	USA	18-60 years	3,562	46.5	9.7	41.9	
Oskay, 2005[121]	Turkey	50 years & over	500	37.2	32.3	30.5	
Rohr, 2005[133]	Denmark	45 years & over	5,795	24.5%: overall 15.5%: <60 years 21.8%: 60-80 years 32.4%: ≥80 years	19.6% overall 9.1%: <60 years 16.4%: 60-80 years 8.0%: ≥80 years		
Ruff, 2005[126]	USA	19-82 years	233	76% Black	84% Black	68% Black	
Swanson, 2005[143]	Canada	45 years & over	606	17.5	7.4	26.4	
Tegerstedt, 2005[129]	Sweden	30-79 years	5,489	63.2	50.5	3.2	
Teleman, 2005[131]	Sweden	55-64 years	2,682	63	57.6		8 nocturnal UI 20.7 unknown cause
Wehrsberger, 2006[139]	Austria	20-84 years	441	34	13	53	
Altman, 2006[597]	Sweden	32-90 years	48 cases 165 controls	17% abdominal rectal prolapse surgery patients 16% controls	15% abdominal rectal prolapse surgery patients 10% controls		
Brown, 2006[140]	USA	20 years & over	1,461	14.4% controls 31.2% prediabetic 30.2% diabetic	7.7% controls 24.6% prediabetic 26.4% diabetic		
Irwin, 2006[145]	Canada, Germany, Italy, Sweden, UK	18 years & over	1,675	48.9% of incontinent women 6.4%: overall 3.7%: ≤39 years 7.9%: 40-49 years 8.0% ≥60 years	1.5%: overall 1.0%: ≤ 39 years 1.1%: 40-49 years 2.5%: ≥ 60 years	2.4%: overall 1.0%: ≤ 39 years 2.4%: 40-49 years 4.1%: ≥ 60 years	2.8%: overall 1.7%: ≤39 years 2.3%: 40-49 years 4.6%: ≥60 years

Table 4. Prevalence of UI by incontinence type, age, and race in community dwelling women (continued)

Author	Country	Age	Number	Stress Incontinence (%)	Urge Incontinence (%)	Mixed Incontinence (%)	Other or Unclassified Incontinence (%)
Lukacz., 2006[141]	USA	25-89 years	4,103 787 nulliparous 389 Cesarean delivery 2,927 vaginally parous	15% overall 8% nulliparous 11% Cesarean delivery 18% vaginally parous			
McGrother, 2006[132]	UK	40 years & over	12,570	6.7			
Tannebaum, 2006[142]	Canada	55 years & over	2,361	32.0	22.0	35.0	
Thom, 2006[137]	USA	40-69 years	2,109	7.2% White 9.0% Hispanic 2.3% Black 2.4% Asian	4.8% White 4.2% Hispanic 6.0% Black 3.0% Asian	Predominantly UUI 4.0% White 5.8% Hispanic 7.6% Black 4.4% Asian Equal SUI and UUI 3.3% White 5.3% Hispanic 1.9% Black 3.2% Asian	
Kinchen, 2007[148]	USA	21-75 years	3,344	42.5	12.7	43.4	
Waetjen, 2007[149]	USA	40-55 years	3,302	15.9% Overall 31.8% Whites 13.1% Blacks 23.3% Chinese 31.1% Japanese 21.2% Hispanic	7.6% Overall 7.7% Whites 11.8% Blacks 3.2% Chinese 3.8% Japanese 1.4% Hispanic	12.4% Overall 15.5% Whites 12.9% Blacks 7.2% Chinese 6.8% Japanese 4.8% Hispanic	1.6% Overall 2.1% Whites 1.7% Blacks 1.2% Chinese 1.1% Japanese 0% Hispanic
Prevalence of UI Type in Men							
Bogren, 1997[61]	Sweden	65 years & over	233	10			
Mozes 1997[598]	Israel	45-75 years	896	2.1			
Schulman, 1997[587]	Belgium	30 years & over	2,499		45		

Table 4. Prevalence of UI by incontinence type, age, and race in community dwelling women (continued)

Author	Country	Age	Number	Stress Incontinence (%)	Urge Incontinence (%)	Mixed Incontinence (%)	Other or Unclassified Incontinence (%)
Damián 1998[35]	Spain	65 years & over	589 men and women; men not reported separately		52.2	16.1	21.1
Koskimaki, 1998[584]	Finland	50, 60, and 70 years	2,128	9	17		
Koyama, 1998[63]	Japan	66 years & over	856	11.4	54.3		
Temml, 2000[75]	Austria	20-96 years	1,236	5.9	26.5		15.3 nocturnal UI
Muscatello, 2001[84]	Australia	41 years & over	232	9% overall 7% 41-49 years 2% 50-59 years 25% 60-69 years 9% 70+ years	9% overall 7% 41-49 years 2% 50-59 years 18% 60-69 years 17% 70+ years		
Ueda, 2000[74]	Japan	40-75 years	1,836	1.3% overall 0.2% 40-49 years 0.5% 50-59 years 0.5% 60-69 years 0.1% 70+ years	7.7% overall 0.9% 40-49 years 0.7% 50-59 years 2.7% 60-69 years 3.4% 70+ years	1.5% overall 0% 40-49 years 0.4% 50-59 years 0.7% 60-69 years 0.4% 70+ years	
Engstrom, 2003[599]	Sweden	40 years & over	2,217	2% overall 1% 40-49 years 2% 50-59 years 4% 60-69 years 5% 70-80 years			
Nuotio, 2003[106]	Finland	70 years & over	171	23	6	30	
Stewart, 2003[102]	USA	18 years & over	2,469		2.6		
Andersson, 2004[37]	Sweden	18-79 years		13% overall 18% 18-34 years 13% 35-49 years 11% 50-64 years 13% 65-79 years	45% overall 18% 18-34 years 37% 35-49 years 43% 50-64 years 59% 65-79 years		
Corcos, 2004[117]	Canada	35 years & over	1,566	10.6	5.5		
Irwin, 2006[145]	Canada, German, Italy, Sweden, UK	18 years & over	19,165 (both genders)	0.6% overall 0.1% ≤39 years 0.6% 40-59 years 1.6%: ≥60 years	1.2% overall 0.4% ≤39 years 1.3%: 40-59 years 2.5%: ≥60 years	0.6% overall 0.4% ≤39 years 0.4%: 40-59 years 1.2%: ≥60 years	2.9% overall 1.5% ≤39 years 3.0%: 40-59 years 5.2%: ≥60 years

Table 4. Prevalence of UI by incontinence type, age, and race in community dwelling women (continued)

Author	Country	Age	Number	Stress Incontinence (%)	Urge Incontinence (%)	Mixed Incontinence (%)	Other or Unclassified Incontinence (%)
Diokno, 2007[589]	USA	18 years & over	21,590	24.5% overall 38.1% 18-25 years 35.7% 35-45 years 30.8% 45-55 years 19.3% 55-65 years 16.7% 65-75 years 13.2% 76+ years	44.6% overall 30.0% 18-25 years 35.4% 35-45 years 38.9% 45-55 years 46.8.3% 55-65 years 53.8% 65-75 years 56.3% 76+ years	18.8% overall 14.8% 18-25 years 12.6% 35-45 years 16.5% 45-55 years 21.0% 55-65 years 22.6% 65-75 years 22.4% 76+ years	12.3% overall 17.1% 18-25 years 16.3% 35-45 years 13.8% 45-55 years 13.0% 55-65 years 6.9% 65-75 years 8.1% 76+ years

Table 5. Pooled prevalence of UI in women by type of incontinence (random effects model, statistical test for heterogeneity between studies significant for all estimates)

Age	Stress	Prevalence (95% CI)	Urge	Prevalence (95% CI)	Mixed	Prevalence (95% CI)
19-44	**15 studies**	12.8 (8.3; 17.4)	**14 studies**	4.9 (3.7; 6.1)	**10 studies**	7.1 (5.2; 9.1)
	Samuelsson, 1997[57]	US*	Samuelsson, 1997[57]	US*	Samuelsson, 1997[57]	US*
	Foldspang, 1999[64]	20.1	Foldspang, 1999[64]	4.2 (1.3; 7.1)	Foldspang, 1999[64]	18
	Hannestad, 2000[80]	(5.8; 34.2)	Hannestad, 2000[80]		Hannestad, 2000[80]	(5.1; 30.9)
	Peyrat, 2002[85]		Peyrat, 2002[85]		Peyrat, 2002[85]	
	Van der Vaart, 2002[91]		Van der Vaart, 2002[91]		Chen, 2003[95]	
	Chen, 2003[95]		Chen, 2003[95]		Rortveit, 2003[98]	
	Rortveit, 2003[98]		Rortveit, 2003[98]		Miller, 2003[104]	
	Miller, 2003[104]		Chen, 2003[101]		Parazzini, 2003[108]	
	Parazzini, 2003[108]		Miller, 2003[104]		Nygaard, 2005[130]*	
	Mawajdeh, 2003[109]		Parazzini, 2003[108]		Irwin, 2006[145]	
	Andersson, 2004[37]		Andersson, 2004[37]			
	Nygaard, 2005[130]*		Nygaard, 2005[130]*			
	Rohr, 2005[133]		Rohr, 2005[133]			
	Irwin, 2006[145]		Irwin, 2006[145]			
	Melville, 2005[124]*					
45-64	**36 studies**	21.5 (18.9; 24.1)	**32 studies**	10.2 (8.9; 11.5)	**20 studies**	12.7 (10.9; 14.5)
	Burgio, 1991[44]*	US*	Burgio, 1991[44]*	US*	Burgio, 1991[44]*	US*
	Mommsen, 1994[51]	20.2	Mommsen, 1994[51]	8.2	Mommsen, 1994[51]	14.7
	Samuelsson, 1997[57]	(15.7; 24.8)	Samuelsson, 1997[57]	(6.3; 10)	Samuelsson, 1997[57]	(10; 19.3)
	Bogren, 1997[61]		Bogren, 1997[61]		Kuh, 1999[70]	
	Kuh, 1999[70]		Kuh, 1999[70]		Moller, 2000[73]	
	Moller, 2000[73]		Moller, 2000[73]		Ueda, 2000[74]	
	Ueda, 2000[74]		Ueda, 2000[74]		Hannestad, 2000[80]	
	Temml, 2000[75]		Temml, 2000[75]		Peyrat, 2002[85]	
	Swithinbank, 1999 [77]		Swithinbank, 1999[77]		Chen, 2003[95]	
	Alling Moller, 2000[78]		Alling Moller, 2000[78]		Miller, 2003[104]	
	Hannestad, 2000[80]		Hannestad, 2000[80]		Parazzini, 2003[108]	
	Muscatello, 2001[84]		Muscatello, 2001[84]		Ozerdogan, 2004[116]	
	Peyrat, 2002[85]		Peyrat, 2002[85]		Melville, 2005[124]*	
	van der Vaart, 2002[87]		van der Vaart [87]		Kocak, 2005[127]	
	Sze, 2002[89]*		Sze, 2002[89]*		Tegerstedt, 2005[129]	
	Chen, 2003[95]		Chen, 2003[95]		Thom, 2006[137]*	
	Miller, 2003[104]		Stewart, 2003[102]*		Wehrberger, 2006[139]*	
	McGrother, 2004[38]				Irwin, 2006[145]	
	Andersson, 2004[37]		Parazzini, 2003[108]		Waetjen, 2007[149]*	
	Ozerdogan, 2004[116]		Andersson, 2004[37]		Kinchen, 2007[148]*	

Table 5. Pooled prevalence of UI in women by type of incontinence (random effects model) (continued)

Age	Stress	Prevalence (95% CI)	Urge	Prevalence (95% CI)	Mixed	Prevalence (95% CI)
	Corcos, 2004[117]		Ozerdogan, 2004[116]			
	Vandoninck, 2004[122]		Corcos, 2004[117]			
	Melville, 2005[124]*		Melville, 2005[124]*			
	Kocak, 2005[127]		Ruff, 2005[126]*			
	Tegerstedt, 2005[129]		Kocak, 2005[127]			
	Teleman, 2005[131]		Tegerstedt, 2005[129]			
	Fritel, 2005[135]		Teleman, 2005[131]			
	Goldberg, 2005[136]*		Thom, 2006[137]*			
	Thom, 2006[137]*		Wehrberger, 2006[139]*			
	Wehrberger, 2006[139]*		Irwin, 2006[145]			
	Lukacz, 2006[141]*		Waetjen, 2007[149]*			
	Irwin, 2006[145]		Kinchen, 2007[148]*			
	Waetjen, 2007[149]*					
	Kinchen, 2007[148]*					
65+	**31 studies**	16.1 (13.7; 18.6)	**28 studies**	12.2 (9.9; 14.5)	**19 studies**	16.8 (13.7; 19.9)
	Nygaard, 1996[56]*	US*	Nygaard, 1996[56]*	US*	Thom, 1997[59]*	US* 17.8
	Thom, 1997[59]*	15.9	Thom, 1997[59]*	13.3	Damian, 1998[35]	(12.9; 23)
	Bogren, 1997[61]	(12.4; 19.5)	Bogren, 1997[61]	(9.7; 16.8)	Brown, 1999[66]*	
	Koyama, 1998[63]		Koyama, 1998[63]		Stenberg, 1999[71]	
	Damian, 1998[35]		Damian, 1998[35]		Bortolotti, 2000[72]	
	Brown, 1999[66]*		Brown, 1999[66]*		Ueda, 2000[74]	
	Stenberg, 1999[71]		Stenberg, 1999[71]		Hannestad, 2000[80]	
	Bortolotti, 2000[72]		Bortolotti, 2000[72]		Peyrat, 2002 [85]	
	Ueda, 2000[74]		Ueda, 2000[74]		Buchsbaum, 200[90]*	
	Hannestad, 2000[80]		Hannestad, 2000[80]		Miller, 2003 [104]	
	Muscatello, 2001[84]		Muscatello, 2001[84]		Nuotio, 2003[106]	
	Peyrat, 2002[85]		Peyrat, 2002[85]		Parazzini, 2003[108]	
	Buchsbaum, 2002[90]*		Buchsbaum, 2002[90]*		Espino, 2003[110]*	
	Dallosso, 2003[103]		Miller, 2003[104]		Adelmann, 2004[30]*	
	Miller, 2003[104]		Nuotio, 2003[106]		Oskay, 2005[121]	
	Nuotio, 2003[106]		Parazzini, 2003[108]		Jackson, 2005[128]*	
	Parazzini, 2003[108]		Espino, 2003[110]*		Tannenbaum, 2006[142]	
	Espino, 2003[110]*		Andersson, 2004[37]		Swanson, 2005[143]	
	Andersson, 2004[37]		Jackson, 2004[118]*		Irwin, 2006[145]	
	Jackson, 2004[118]*		Adelmann, 2004[30]*			
	Adelmann, 2004[30]*		Oskay, 2005[121]			
	Oskay, 2005[121]		Jackson, 2004[123]*			
	Jackson, 2004[123]*		Bradley, 2005[125]*			
	Bradley, 2005[125]*		Jackson, 2005[128]*			
	Jackson, 2005[128]*		Rohr, 2005[133]			
	McGrother, 2006[132]		Tannenbaum, 2006[142]			

Table 5. Pooled prevalence of UI in women by type of incontinence (random effects model) (continued)

Age	Stress	Prevalence (95% CI)	Urge	Prevalence (95% CI)	Mixed	Prevalence (95% CI)
	Rohr, 2005[133] Tannenbaum, 2006[142] Swanson, 2005[143] Irwin, 2006[145] Melville, 2005[124]*		Swanson, 2005[143] Irwin, 2006[145]			
80+	**7 studies**	15.9 (7.9; 23.9)	**4 studies**	11.4 (5.5; 17.4)	**7 studies**	15.9 (7.3; 24.4)
	Melville, 2005[124]* Stenberg, 1999[71] Ueda, 2000[74] Hannestad, 2000[80] Muscatello, 2001[84] McGrother, 2004[38] Rohr, 2005[133]	US* 8.4 (8.3; 8.4)	Stenberg, 1999[71] Ueda, 2000[74] Hannestad, 2000[80] Melville, 2005[124]*	US 10.9 (10.9; 10.9)	Stenberg, 1999[71] Ueda, 2000[74] Hannestad [80] Muscatello, 2001[84] Nuotio, 2003[106] Rohr, 2005[133] Melville, 2005[124]*	US* 28.9 (28.9; 29)

* Studies conducted in the U.S.

Table 6. Incidence of UI in community dwelling adults

Author	Country	Ages (years)	Response Rate	Number	Followup	Urinary Incontinence Definition	Incidence (%)	Annual Cumulative Incidence Rate (%)
Women and Men Combined								
Liu, 2002[33]	China	70 years & over	53.4	2,087	1 and 2 years	Difficulty holding urine until getting to the toilet (urge UI) and accidentally passing urine (stress UI)	1-year: 19.8% urge UI at least occasionally 3.1% urge UI often 14.5% stress UI at least occasionally 1.9% stress UI often 2-years: 33.7% urge UI at least occasionally 25.4% stress UI at least occasionally	
McGrother, 2004[38]	UK	40 years & over	60.2%	39,602	1 year	Daytime or nighttime leakage	6.3%	
Mardon, 2006[39]	USA	65 years & over	67% to initial survey 82% to followup survey	58,658	2 years	Urine loss in past 6 months	37.3%	
Women								
Herzog, 1990[47]	USA	60 years & over	66-72	1,956	1 and 2 years	Urine loss over past 12 months	22.4% at 1 year 18.6% at 2 years	
Burgio, 1991[45]	USA	42-51 years	60	486	3 years	Urine leakage at least monthly	8%	
Nygaard, 1996[56]	USA	65 years & over	--	2,025	3 years	Difficulty holding urine until getting to toilet or urine leakage with exertion	28.6% Stress UI 28.5% Urge UI	
Thom, 1997[59]	USA	65 years & over	--	3,004	9 years	UI diagnosis in medical record	Rate/1,000 person-years: 23.0 overall 7.7 65-74 years 20.2 75-79 years 30.9 80+ years	

Table 6. Incidence of UI in community dwelling adults (continued)

Author	Country	Ages (years)	Response Rate	Number	Followup	Urinary Incontinence Definition	Incidence (%)	Annual Cumulative Incidence Rate (%)
Holtedahl, 1998[62]	Norway	50-74 years	70%	489	1 year	Any urine leakage, regular leakage (≥2 episodes/ month) with or without objective demonstration; and regular incontinence, ICS definition fulfilled	0.6%	
Møller, 2000[150]	Denmark	40-60 years	71.5	2,284	1 year	Stress, urge, and mixed incontinence	4.0% Stress UI 2.7% Urge UI 5.8% Mixed UI	
Samuelsson, 2000[151]	Sweden	20-59 years	77	491	5 years	Involuntary urine loss	13.7%	2..9% (any) 0.5% (weekly)
Sherburn, 2001[152]	Australia	45-55 years	--	1,897	7 years	Involuntary urine loss	35%	
Liu, 2002[33]	China	70 years & over	53.4	2,087 women and men combined	1 and 2 years	Difficulty holding urine until getting to the toilet (urge UI) and accidentally passing urine (stress UI)	Stress UI at 1 year: 1.9% often 15.9% occasional 16.5% at least occasional Urge UI at 1 year: 2.1% often 12.6% occasional 14.5% at least occasional At 2-years (at least occasionally): 30.8% Stress UI 37.5% Urge UI	
Dallosso, 2003[103]	UK	40 years & over	65.3% Baseline 91.2% at 1 year	6,426	1 year	Stress urinary leakage several times a month	8.3%	
Grodstein, 2004[153]	USA	50-75 years	Prospective cohort with mailed questionnaire	39,436	4 years	Urine leakage 1-3 times/month; frequent UI over past 12 months: at least once/week	3% ages 50-55	3.2% per year for occasional incontinence 1.6% for frequent incontinence

Table 6. Incidence of UI in community dwelling adults (continued)

Author	Country	Ages (years)	Response Rate	Number	Followup	Urinary Incontinence Definition	Incidence (%)	Annual Cumulative Incidence Rate (%)
Hagglund, 2004[155]	Sweden	22-50 years	73%	248	4 years	Involuntary urine loss at present time	17%	4%
McGrother, 2004[38]	UK	40 years & over	79.8%	9,598	1 year	Involuntary urine leakage (day or night) ever	8.8% overall 8.4% 40-49 years 7.9% 50-59 years 8.5% 60-69 years 9.4% 70-70 years 14.7% ≥ 80 years	
Lifford, 2005[134]	USA	50-75 years	88.5%	47,461	4 years	Urine leakage at least weekly	6.2% 7.0% without diabetes 10.5% with diabetes	
Jackson, 2006[144]	USA	55-75 years	--	1,107	1 and 2 years	Urine leakage during past year	At 1-year: 21% without diabetes 26% with diabetes At 2-years 24% without diabetes 20% with diabetes	
Wehrberger, 2006[139]	Austria	20-84 years	47.7%	441	6.5 years	Urine leakage during past 4 weeks	25.6% 14.8% 20-39 years 25.7% 40-49 years 23.6% 50-59 years 23.9% 60-69 years 47.3% ≥70 years	3.9% annually 2.3% 20-39 years 4.0% 40-49 years 3.6% 50-59 years 3.7% 60-69 years 7.3% ≥70 years
Danforth, 2007[156]	USA	54-79 years	--	31,355	2 years	Urine leakage	2,355 cases	
Waetjen, 2007[149]	USA	40-55 years	81.8	3,302 Baseline 2,702 Followup	Annually for 5 years	Urine leakage at least monthly	55.7% Overall 65.2% White 58.2% Blacks 43.8% Japanese 34.0% Hispanic	11.1% any incontinence 1.2% severe incontinence 11.6% Blacks 13.4% Whites
Men								
Herzog, 1990[47]	USA	60 years & over	69% and 72%	1,956	1and 2 years	Urine loss over past 12 months	9.0% at 1 year 9.2% at 2 years	

Table 6. Incidence of UI in community dwelling adults (continued)

Author	Country	Ages (years)	Response Rate	Number	Followup	Urinary Incontinence Definition	Incidence (%)	Annual Cumulative Incidence Rate (%)
Thom, 1997[59]	USA	65 years & over	--	2,982	9 years	UI diagnosis in medical record	Rate/1,000 person-years: 23.8 overall 7.0 65-74 years 17.8 75-79 years 37.2 80+ years	
Liu, 2002[33]	China	70 years & over	53.4	2,087 women and men combined	1 and 2 years	Difficulty holding urine until getting to the toilet (urge UI) and accidentally passing urine (stress UI)	Stress UI at 1 year: 2.2% often 9.7% occasional 11.9% at least occasional Urge UI at 1 year: 3.9% often 13.5% occasional 17.4% at least occasional At 2-years (at least occasionally): 20.7% Stress UI 30.4% Urge UI	
McGrother, 2004[38]	UK	40 years & over	77.6%	7,823	1 year	UI as involuntary leakage of urine	3.8% overall 2.2% 40-49 years 2.5% 50-59 years 4.0% 60-69 years 7.1% 70-79 years 10.9% ≥80 years	

Table 7. Pooled annual incidence of UI in women (random effects model) 18 studies

Age categories	Annual incidence (95% CI)
19-44	1.64 (0.76; 2.52)
45-64	5.80 (5.02; 6.57)
65+	7.74 (6.12; 9.37)
80+	8.52 (3.07; 13.98)
All ages	6.25 (5.57; 6.93)
Burgio, 1991[45]	
Herzog, 1990[47]	
Nygaard, 1996[56]	
Thom, 1997[59]	
Holtedahl, 1998[62]	
Moller, 2000[150]	
Samuelsson, 2000[151]	
Sherburn, 2001[152]	
Dallosso, 2003[103]	
Grodstein, 2004[153]	
McGrother, 2004[38]	
Dallosso, 2004[154]	
Hagglund, 2004[155]	
Lifford, 2005[134]	
Wehrberger, 2006[139]	
Waetjen, 2007[149]	
Danforth, 2007[156]	
Townsend, 2007[157]	

Figure 2. Annual incidence of UI in women by type of incontinence (random effects model)

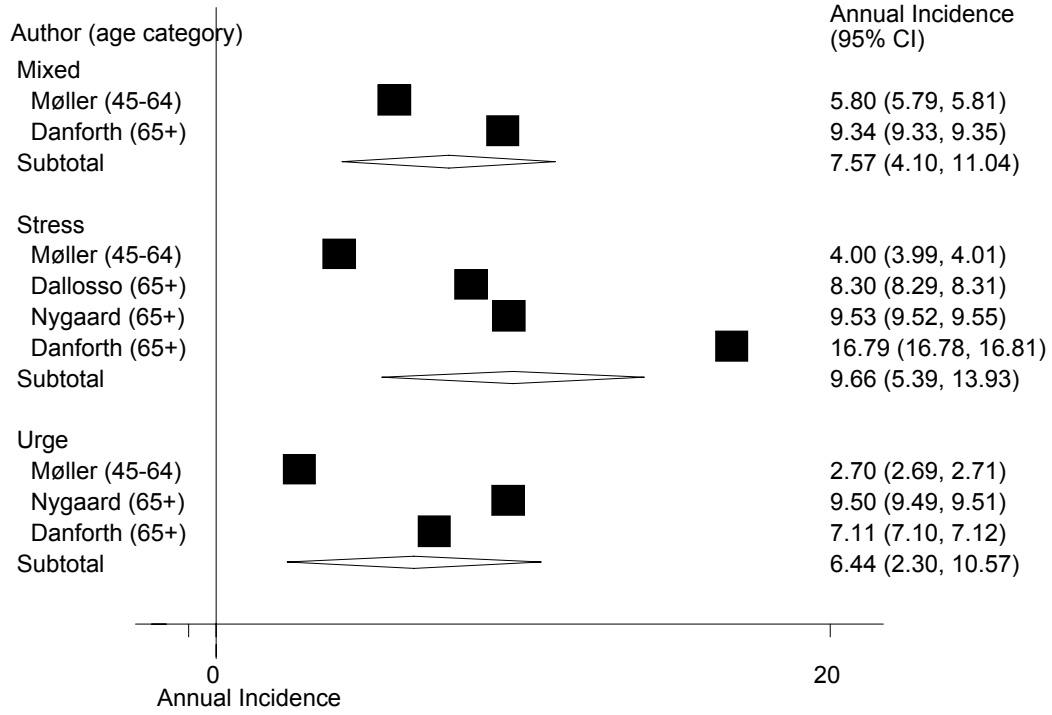


Table 8. Pooled prevalence of total, mixed, stress, and urge male UI among age categories (random effects model)

Age (studies)	Prevalence (95% CI)
19-44 years	
Total UI (11)	4.81 (3.69; 5.94)
Mixed UI (3)	0.70 (0.11; 1.29)
Stress UI (5)	0.74 (0.14; 1.34)
Urge UI (7)	3.09 (1.96; 4.21)
45-64 years	
Total UI (27)	11.20 (10.14; 12.26)
Mixed UI (4)	1.53 (0.94; 2.12)
Stress UI (13)	3.78 (1.56; 6.00)
Urge UI (14)	7.75 (4.99; 10.50)
65+ years	
Total UI (41)	21.13 (19.90; 22.35)
Mixed UI (10)	6.13 (2.53; 9.74)
Stress UI (15)	2.67 (1.95; 3.39)
Urge UI (20)	11.70 (9.27; 14.14)
80+ years	
Total UI (17)	32.17 (29.62; 34.73)
Mixed UI (1)	9.40 (9.34; 9.46)
Urge UI (3)	18.18 (6.84; 29.51)

Table 9. Pooled prevalence of UI in American males by definition and age categories (random effects model)

Time when Involuntary leakage of urine was reported (months) (studies)	Prevalence (95% CI)
Total UI	**19-44 years**
During last month (1)	7.21 (7.13; 7.29)
During last year (2)	18.35 (4.53; 32.17)
	45-64 years
During last month (2)	15.52 (11.57; 19.47)
During last year (3)	24.64 (19.92; 29.35)
Ever (2)	6.40 (2.62; 15.42)
	65+ years
During last month (2)	29.21 (24.44; 33.97)
During last year (5)	24.38 (19.44; 29.31)
Ever (3)	16.84 (13.05; 20.63)
	80+ years
During last month (2)	42.39 (32.80; 51.99)
During last year (3)	27.70 (15.49; 39.91)
Ever(3)	33.98 (27.34; 40.61)
Stress UI	**45-64 years**
During last month (1)	1.00 (1.11; 2.29)
During last year (1)	1.40 (1.39; 1.41)
Ever (1)	2.00 (1.99; 2.01)
Urge	**45-64 years**
During last month (1)	2.00 (3.41; 3.43)
During last year (1)	6.70 (6.68; 6.72)
Ever (1)	2.60 (2.59; 2.61)
	65+ years
During last month (1)	10.60 (10.58; 10.62)
During last year (2)	8.46 (8.45; 8.48)
Ever (1)	9.62 (9.58; 9.65)
	80+ years
During last year (1)	3.50 (3.46; 3.54)

Table 10. Pooled prevalence of UI in American males by severity and age categories (random effects model)

Frequency and Severity of Leakage Episodes (Studies)	Prevalence (95% CI)
Daily	
19-44 years (2)	3.02 (2.39; 3.66)
45-64 years (1)	4.80 (4.77; 4.83)
65+ years (2)	8.30 (7.04; 9.56)
80 and over (2)	9.33 (4.53; 14.14)
Minimal	
19-44 years (1)	9.00 (8.93; 9.07)
45-64 years (2)	14.44 (5.74; 23.14)
80 and over (1)	4.00 (3.93; 4.07)
Moderate	
19-44 years (1)	10.80 (10.79; 10.81)
45-64 years (1)	8.90 (7.13; 10.67)
65+ years (1)	5.95 (5.26; 6.64)
80 and over (1)	12.00 (11.88; 12.12)
Severe	
19-44 years (1)	3.00 (2.96; 3.04)
45-64 years (2)	2.00 (1.13; 2.87)
65+ years (1)	1.55 (1.13; 1.98)
80 and over (1)	4.00 (3.93; 4.07)

Table 11. Prevalence of UI and incontinence types in LTC populations by age, gender, and race

Author	Country	Gender	Ages (years)	Design	Urinary Incontinence Definition	Response Rate (%)	Number	UI Prevalence (%)
Palmer, 1991[28]	USA	Men and women	≥65 years	Prospective cohort with 1-year follow-up	Any daytime urinary incontinence reported by nursing assistants; those with indwelling catheters were considered incontinent	45	196	44.2 (overall at 1 year) 2 weeks after admission: 23 men 77 women
Borrie, 1992[34]	Canada	Men and women			Urinary incontinent episodes occurring 1-2 times a week or more	--	457	62
Ouslander, 1993[166]	USA	Men and women	≥65 years	Prospective cohort of new admissions in 8 nursing homes	Any daytime urinary incontinence reported by nursing assistants; those with indwelling catheters were considered incontinent	81 of eligible residents	454	39 (overall) Incidence: 27% at 2 months 19% at 1 year
Brandeis, 1997[164]	USA	Men and women	≥60 years	Random sample from 270 nursing homes in 10 states; used MDS data	At least 2 episodes of involuntary urine loss within past 2 weeks	92.6	2,014	49 (overall) 45.1 men 78.4 women
Adelmann, 2004[30]	USA	Men and women	≥65 years	Random sample of Medicaid enrollees in one metropolitan area; used MDS data	Any non-zero response on MDS question related to bladder incontinences		380	77.2 (overall) 78.4 women 72.0 men 61.2% 65-74 years 75.0% 75-84 years 82.7% 85+ years 77.1 White 72.7 Black 87.5 Other
Aggazzotti, 2000[29]	Italy	Men and women	Not reported	Cross-sectional survey using clinical records and questionnaires	Involuntary urine loss at least twice a month	89.8	839	54.5 (overall) 59.8 women (overall) 42.9 <65 years 55.1 65-74 years 58.1 75-84 years 60.1 85-94 years 76.0 ≥95 years 39.2 men (overall) 19.1 <65 years 22.7 65-74 years 51.8 75-84 years 52.4 85-94 years 57.1 ≥95 years

Table11. Prevalence of UI and incontinence types in LTC populations by age, gender, and race (continued)

Author	Country	Gender	Ages (years)	Design	Urinary Incontinence Definition	Response Rate (%)	Number	UI Prevalence (%)
Jumadilova, 2005[31]	USA	Men and women	20-109 years; mean age 78	Cross-sectional database analysis using MDS data from 378 nursing homes	The MDS question on bladder incontinence (Section H, 1.b) was used to classify patients on level of UI, with 0 (no incontinence) to 4 (incontinent most of the time).	--	29,645	30% (overall-UI alone) 58% (UI and FI)
Anger, 2006[2]	USA	Women	Not reported	National population-based survey using the National Nursing Home Survey	Admission or current diagnosis of urinary incontinence in medical records; also staff survey on residents who had difficulty in controlling urination	Not reported	1,125,163 in 1995 1,156, 1,134 in 1997 1,170,065 in 1999	1,366 per 100,000 (<1.4%) as identified in medical record 73.8% to 85.4% as identified by the National Nursing Home Survey 56.3% to 58.6% had difficulty controlling urination 9.5% to 11.7% had indwelling urethral catheter or ostomy Averaged over 3 waves by age: 15.6% ≤ 4 years 36.2% 75-84 years 48.3% ≥ 5 years Of incontinent women: 83.7% were White, 11% Black, and 2.8% were Hispanic
Boyington, 2007[32]	USA	Men and women	≥65 years	Population-based sampling involving nursing homes from 8 states	Any non-zero response on the MDS bladder incontinence item indicating incontinent episodes occurring once a week or more	NA	95,911	65.4% at admission 64.1% Whites 71.2% Blacks 74.3% post-admission 73.5% Whites 78.2% Blacks 75.0% women 72.2% men Progression – 8.9%
Liu[33]	Australia	Men and women	≥70 years	The State Electoral Data Base survey at three years	SUI, UUI, or MUI	53.4	4187	Males 1 time point Urge Stress Often 6.6 2.3 Occasionally 25.2 15.8

Table11. Prevalence of UI and incontinence types in LTC populations by age, gender, and race (continued)

Author	Country	Gender	Ages (years)	Design	Urinary Incontinence Definition	Response Rate (%)	Number	UI Prevalence (%)
								2 time point Urge Stress Often 8.5 4.7 Occasionally 22.1 13.7 3 time point Urge Stress Often 6.2 4.2 Occasionally 29 17.7 Females 1 time point Urge Stress Often 10.2 4.4 Occasionally 31.2 24.6 2 time point Urge Stress Often 10.6 5.3 Occasionally 32 23.6 3 time point Urge Stress Often 8.9 5.3 Occasionally 39.1 30.1 Total 1 time point Urge Stress Often 8.4 3.3 Occasionally 28.2 20.1 2 time point Urge Stress Often 9.6 5.0 Occasionally 27 18.6 3 time point Urge Stress Often 7.5 4.8 Occasionally 34.1 24 Total age adjusted 1 time point Urge Stress Often 7.7 2.9 Occasionally 27.5 19.5 2 time point Urge Stress Often 9.4 4.2 Occasionally 25.7 17.5 3 time point Urge Stress Often 6.7 4.1 Occasionally 33 22.9 Time: 1 2 3 all Urge 17.6 15 19.9 17.4 Stress 4.5 2.0 6.9 4.4 Mixed 18.9 21.6 21.8 20.6 Incidence in males at 12 months:

Table11. Prevalence of UI and incontinence types in LTC populations by age, gender, and race (continued)

Author	Country	Gender	Ages (years)	Design	Urinary Incontinence Definition	Response Rate (%)	Number	UI Prevalence (%)
								Urge Stress Often 3.9 2.2 Occasional 13.5 9.7 Incidence in females at 12 months: Urge Stress Often 2.1 1.6 Occasional 20.5 15.9 Incidence of Urge Males 20.9 Females 21.8 Total 21.2 Incidence of Stress Males 17.3 Females 21.9 Total 19.6 Progression of urge Males 2 Females 3 Total 2.5 Progression of stress Males 1.1 Females 1.9 Total 1.5
Borrie, 1992[34]	UK	Men and women	Mean age: men 73.6 years; women 73.8 years	Prevalence survey in long-term care hospital	1) Fully continent (completely independent); 2) Dry but staff assistance required; 3) One to two incontinent events/week; 4) 3 to 7 incontinent events per week; 5) 2 to 4 incontinent events/24 hours; 6) Always incontinent (includes the need for an indwelling urinary catheter and an external urinary drainage device).	95%	457	62% Men and women 61% Men 65 % Women

Table11. Prevalence of UI and incontinence types in LTC populations by age, gender, and race (continued)

Author	Country	Gender	Ages (years)	Design	Urinary Incontinence Definition	Response Rate (%)	Number	UI Prevalence (%)
Nelson, 2005[4]	USA	Men and women	Mean age 85.9 years	Wisconsin annual nursing home survey	Resident-based MDS definition; continence of urine - complete control of the bladder and no indwelling urinary catheter. UI - usually, occasionally, frequently or always incontinent, or had an indwelling urinary catheter.	Lost to followup from 1992 to 1993 43.2%	18,170 nursing	55.4% 1992 61.5% 1993 Incidence 23.6%/year
Peet, 1995[519]	UK	Men and women	>65 years; Mean age 82.7 years	Survey of long term care in Leicestershire	Urine incontinence	95%	627 446 397 1,704 1,244 946 192 202 5,758	Type of LTC 20.7 acute 30.9 geriatric 28.2 psychogeriatric 21.3 local authority 19.1 private residential 29.7 private nursing 6.3 voluntary sector 15.3 LTC hospitals 22.7 total
Chiang, 2000[600]	USA	Men and women	Mean age 84 years	Survey of 20 nursing homes in 3 West Coast states using chart abstraction or review of Minimum Data Set	Incontinence status using MDS 6-point scale, dichotomized as being present to any degree versus absent of complete urinary control.		464	13%
Buchanan, 2002[601]	USA	Men and women	Mean age 76.4 years	Retrospective analysis of MDS admission assessments from June 23, 1998 through September 11, 2000, for nursing home residents receiving hospice care	Incontinence status using MDS scale		40,622	Continent 54.4% Usually continent 5.9% Occasionally incontinent 6.3% Frequently incontinent 9.4% Incontinent 24.0%
Bliss, 2006[5]	USA	Men and women	Mean age 83 years	Cross-sectional analysis of MDS data base in 1999	Incontinence status using MDS 3-point scale		59,558	7.7

Question 1. What are the Prevalence and Incidence of FI in the Community and LTC Settings?

The absence of a standard and accepted definition of FI has hampered drawing conclusions about the epidemiology of both fecal and dual incontinence. Definitions vary by the inclusion of flatus, severity characteristics of FI, and subjective significance (e.g., requiring FI to be a social or hygienic problem). There is often a lack of data to determine whether dual incontinence is actually present. The ICS recommended analyzing the prevalence of AI, including involuntary loss of flatus, in all age groups because this extended definition gives a more precise estimation of impact of incontinence on quality of life in young adults.[21] In this review, prevalence and incidence are reported for any FI (i.e., with or without UI), any AI (i.e., FI and flatus incontinence), dual incontinence, and FI only (without UI) when data are available The authors also reported the prevalence of different types of incontinence (including loss of solid or liquid feces) and severity of incontinence.

Prevalence of Combined UI and FI in Adults in LTC Settings

Prevalence of combined UI and FI in adults in LTC settings varied from 4 percent[519] to 44 percent[34] across the studies (Table 12). One of the largest cross-sectional studies of 10,215 older nursing home residents in the United States, identified from the MDS, reported 40 percent prevalence of combined incontinence.[5] By contrast, another study found a prevalence of 18 percent, analyzing data from the regional census of older residents.[519] Almost half the residents in Canadian LTC hospitals had combined incontinence.[34] The prevalence was lower in nursing homes in the United Kingdom (4 percent), and in short-term nursing homes (9 percent).[519] Residents in geriatric (27 percent), private nursing (33 percent), and psycho-geriatric nursing homes had higher rates of combined incontinence.[519]

Prevalence of FI with or without UI in Adults in LTC Settings

Prevalence of FI with or without UI in adults in LTC settings varied from less than 5 percent across nursing homes in the United Kingdom[519] to 12 percent in the largest national American study.[5] One study at the state level reported a prevalence of 46 percent[3] and an annual incidence of FI in nursing homes of 14 percent.[4] The prevalence varied depending on baseline disease, from 27 percent in residents who needed supervision to 83 percent in patients with severe mental impairment.[34] More than half of the residents in geriatric and psycho-geriatric LTC facilities wear pads for FI.[519] The prevalence depended on the definitions of incontinence and whether having only FI (versus combined UI and FI) was reported (Appendix Table F5). Moderate FI was reported in 8 percent of women in nursing homes.[161] Thirteen percent of residents experienced incontinent episodes 1-3 days per week, 16 percent 4-7 days per week, and 23 percent less than once a week.[602] Frail residents (16 percent) and patients with stroke (25 percent) and dementia (45 percent) had the highest prevalence of frequent FI.[602]

In conclusion, fecal and combined incontinence is prevalent in LTC facilities. Combined incontinence is more prevalent than FI alone. Rates depend on the data set, definitions and severity of incontinence, and baseline diseases status. The prevalence among race, age, and ethnic groups needs future research.

Prevalence of FI in Community Dwelling Elderly Adults

Three percent[111] to 6 percent[158] of older adults living at home suffer from combined UI and FI (Table 13). The prevalence in elderly men varied substantially from 2 to 6 percent in Europe[111] to 39 percent in the United States.[6] The same prevalence of 4 to 6 percent of combined incontinence was found in European elderly women[111] with a rate several times higher in American females (27 percent).[6]

The prevalence of FI varied from 6 to 10 percent in Europe[111,603] to 15 percent in Japan[58] to 26 percent in the United States.[158] The prevalence of solid FI was around 2 percent in two studies,[111,158] while liquid FI was more than ten times higher in the American study (17 percent)[158] than in Europe (1 percent).[111] The prevalence did not show consistency in elderly males with ranges in FI from 3 percent[6] to 16 percent.[219] The prevalence of FI in elderly women averaged 6 to 8 percent in Europe[111] and 12 percent in the United States.[219]

Prevalence of FI in Community Dwelling Men

Prevalence of FI in community dwelling men varied across the studies depending on definitions of incontinence and population characteristics, including the proportion of subjects with FI only in the samples when anal or combined incontinence were analyzed.(Table 14).

Combined UI and FI were reported in 6 to 15 percent of younger men, while 7 to11 percent experienced FI in a cross-sectional, community-based study.[6] Less than 2 percent of younger men were incontinent with solid or liquid feces;[604-606] 6 percent[605] to 21 percent[604] reported stains in underwear. Older European men had combined incontinence less often (1-4 percent)[111] than American men (15 to 25 percent).[6]

The prevalence of FI was consistently <10 percent in several studies of men older than 60 years[6,50,111,508,604,606-609] and in studies with combined age groups.[7,217,610-612] One Portuguese study reported the highest rate (16 percent) of FI in patients of a geriatric ambulatory service.[613]

Pooled prevalence of FI in community dwelling men varied across the studies with a less expected fact that the addition of flatus incontinence did not increase the prevalence of AI compared to reported prevalence of FI only (Table 15).p The lowest prevalence of AI (1.6 percent) was reported in two studies with the median age of participants between 45 and 64 years. The prevalence of FI was less than 10 percent in all age groups and increased from 6.4 percent in those 45-64 years old to 9.6 percent in elderly men. The prevalence of solid feces incontinence was reported by 1.4 percent of men 45-64 years of age and by 2 percent of elderly males. The most prevalent was combined incontinence in elderly persons; 16 percent of men over 80 years experienced UI and FI.

Prevalence of FI in Community Dwelling Women

Although no study investigated FI vs. AI in the same sample, there was a consistent pattern of a higher prevalence (two to four-fold) of AI than that of FI in women across age categories; this suggests that combining incontinence of flatus and feces in the same definition may contribute to increased prevalence estimates.

Less than 10 percent of females in the community experienced combined incontinence (Table 16).[6,111,162,212,614] Older women had higher rates of combined incontinence, but only in one

study.[6] The prevalence of AI increased with age from 11 percent in females under 40 to 36 to 45 percent in older women.[615]

The prevalence of FI also increased with age from 6 percent in women younger than 40 years,[161] to 9 percent in those 50-59 years and 13 to 18 percent in older women.[6,42] Association with age was found in two studies,[6,111] but the rates were not consistent across studies. The prevalence of FI varied by the type of incontinence (Appendix Table F6). The prevalence of flatus was less than 10 percent in the majority of the studies.[162,205,232,604,612,613,616-618] Only four studies reported flatus incontinence in more than 20 percent of women.[99,125,212,619] The prevalence of incontinence of liquid feces was less than 10 percent in 50 percent of the studies.[163,205,604,612,616,617,619] Few studies reported a prevalence of more than 10 percent[125] or 20 percent.[99] The prevalence of incontinence of solid and liquid feces was <10 percent in four of 12 studies that reported this outcome.[163,508,604,606] Most of the studies found that 5-10 percent of women were incontinent of solid and liquid feces.[42,50,99,607-609,613] The prevalence of solid feces was <5 percent in 10 of 15 studies that assessed this outcome.[125,163,205,217,604,612,616,617,619,620] Four studies found that 5-10 percent experience incontinence of solid feces.[99,161,615,621] Severity of FI in females increased with age (Appendix Table F7).[161] The prevalence of monthly FI varied from 6 percent[162] to 25 percent;[125] One percent[162] to 5 percent[163] of women had more than one FI episode per month. The prevalence of weekly FI was less than 7 percent in the majority of the studies.[125,160,161,163] Less than 2 percent of community dwelling women reported daily FI.[125,161]

Pooled prevalence of AI was the highest in women compared to other definitions and increased from 22 percent to 45 percent with aging (Table 17) An inclusion of flatus incontinence in the definition contributes to increased prevalence estimates in females. Prevalence of FI was higher than in males and increased from 7 percent in those 45-60 years of age to 10 percent among elderly women. Combined UI and FI were experienced by 10 to 12 percent of women. The prevalence of monthly FI varied from 6 percent to 25 percent; 1 percent to 5 percent of women had more than one FI episode per month. The prevalence of weekly FI was less than 7 percent in four studies. Less than 2 percent of community dwelling women reported daily FI in three studies.

Prevalence of FI in Community Dwelling Adults

Several studies did not differentiate prevalence of FI by gender (Appendix Table F8). Combined UI and FI increased with age[111] and varied from 1 percent to 6 percent in older adults.[222] The prevalence of FI was 2 percent in an American study[622] and 5 percent in a French study.[623] The prevalence of FI also increased with age and sample;[111,159] it varied from approximately 5 to 8 percent in a community based study[111] to 12-19 percent among adults visiting primary care physicians or gastroenterologists.[159] The prevalence of FI of liquid feces was 7 percent,[624] higher than FI of solid or liquid feces (3 percent[625] to 4 percent[626]). Daily FI was reported by 3 percent of adults,[159] weekly FI by 4 percent[160] to 5 percent,[159] and monthly FI by 7 percent[159] (Appendix Table F9). Daily incontinence of solid feces was found in 0.4 percent of adults;[627] weekly incontinence was experienced by 0.1 percent[623] to 3 percent[627] of adults.

Prevalence of FI in Community Dwelling Adults by Race

African American and White men had the same prevalence of FI (14 percent vs. 11 percent, respectively) (Appendix Table F10).[219] Prevalence of FI varied in African American women

from 9 percent[219] to 19 percent[628] and in White women from 7 percent[187] to 21 percent,[628] being lowest in Asian American women (4 percent).[187] The prevalence of combined UI and FI was 11 percent in Asian women and 20 percent in White women.[187]

Limitations

Variations in definitions of FI and its severity, few population level studies with multivariate analyses, differences in samples, and inconsistency in factors adjusted in statistical modeling prevent firm conclusions; pooled estimates and meta-analysis procedures could not be conducted in many instances. Data were inconsistently reported for FI severity characteristics (frequency, amount, consistency of leakage, and duration) and analyses of associated factors were few, so knowledge is limited. Use of a standard definition of FI that excludes flatus and determination of a minimum set of variables to be collected and used in multivariate analyses are recommended.

Summary

In conclusion, the published evidence, level IIB-III, suggests that the prevalence of FI increases with age and varies, depending on the country where studies were conducted; population-based, clinic-based, or administrative sampling of the adults; and definitions of FI with increased prevalence of AI in women but not in men.. Data were inconsistently reported for FI severity characteristics (frequency, amount, consistency of leakage, and duration), and analyses of associated factors were few, so knowledge is limited. Use of a standard definition of FI that excludes flatus and determination of a minimum set of variables to be collected and used in multivariate analyses are recommended.

Less than 10 percent of females in the community experienced combined incontinence. The prevalence of combined incontinence in men was not consistent and varied by age and residency categories. The prevalence of FI was consistently <10 percent in men of different age groups. Most of the studies found that 5 to 10 percent of women were incontinent of solid and liquid feces and <5 percent of solid feces. The prevalence of FI was the same among race categories. Heterogeneity in prevalence across studies does not allow valid pooled estimates. The primary cause for FI; risk factors, age, and gender may contribute to differences in results. Adjusted prevalence and incidence of FI should be investigated in prospective studies. Studies with older adults identified through medical records and administrative databases reported higher prevalence of FI. Differences between quantitative definitions of FI account for variation in the results. Studies of FI incidence and risk factors are greatly needed.

Table 12. Prevalence of FI in LTC settings

Author	Population Subgroup	Sample Size	Prevalence (%)
Combined UI and FI			
Peet, 1995[519]	LTC hospitals	202	7.9
	Nursing homes, local authority	1,704	13.9
	Nursing homes, total	5,758	17.7
	Nursing homes, acute	627	9.4
	Nursing homes, geriatric	446	26.5
	Nursing homes, private nursing	946	32.6
	Nursing homes, private residential	1,244	10.2
	Nursing homes, psychogeriatric	397	36.5
	Nursing homes, voluntary sector	192	4.2
Borrie, 1992[34]	LTC hospital	457	44.0
Nelson, 2005[4]	Nursing homes, incidence	3,859	12.4
Bliss, 2006[5]	Nursing homes	10,215	39.7
FI			
Peet, 1995[519]	LTC hospitals	202	4.5
	Nursing homes, local authority	1,704	2.9
	Nursing homes, total	5,758	3.1
	Nursing homes, acute	627	4.2
	Nursing homes, geriatric	446	2.7
	Nursing homes, private nursing	946	4.3
	Nursing homes, private residential	1,244	2.9
	Nursing homes, psychogeriatric	397	1.8
	Nursing homes, voluntary sector	192	0.5
Borrie, 1992[34]	LTC hospital	457	46.0
	LTC hospital, Assistance required	59	42.0
	LTC hospital, Cerebrovascualr diseases	113	42.0
	LTC hospital, COPD	52	31.0
	LTC hospital, Dementia	139	66.0
	LTC hospital, Diabetes	51	45.0
	LTC hospital, Hypertension	40	45.0
	LTC hospital, Immobile	233	67.0
	LTC hospital, Independent	110	13.0
	LTC hospital, residents with Ischemic heart disease	58	41.0
	LTC hospital, residents with malignant neoplasm	34	32.0
	LTC hospital, residents with mild mental impairment	96	31.0
	LTC hospital, residents with moderate mental impairment	78	68.0
	LTC hospital, residents with multiple sclerosis	25	48.0
	LTC hospital, residents with no mental impairment	140	14.0
	LTC hospital, residents with Parkinson's disease	40	62.0
	LTC hospital, residents with prostate disease	28	50.0
	LTC hospital, residents with severe mental impairment	123	83.0
	LTC hospital, supervised residents	33	27.0
Brocklehurst, 1998[602]	Nursing homes	497	52.0
Nelson, 1998[3]	Nursing home	18,170	46.0
Nelson, 2005[4]	Nursing homes, incidence	3,850	14.7
Bliss, 2006[5]	Nursing homes	10,215	12.4
Wear Pad			
Peet, 1995[519]	Long term care hospitals	202	45.2
	Nursing homes	1,704	45.5
	Nursing homes	5,758	49.3
	Nursing homes, acute	627	17.4
	Nursing homes, geriatric	446	48.7
	Nursing homes, private nursing	946	52.5
	Nursing homes, private residential	1,244	55.6
	Nursing homes, psychogeriatric	397	67.7
	Nursing homes, voluntary sector	192	51.5

Table 13. Prevalence of FI in community dwelling elderly adults

Author Sample	Definition	Prevalence (%)	95% CI
Men and Women			
Teunissen, 2004[111] N = 4,650	Combined UI and FI, >80 years old	6.0	4.0; 8.9
	Combined UI and FI, total	3.0	2.6; 3.5
	FI, >80 years old	10.0	7.4; 13.4
	FI, Total	6.0	5.4; 6.7
	Liquid feces	1.1	
	Solid feces	2.0	
Bliss, 2004[158] N = 1,352	Combined UI and FI	1.7	
	FI	26.3	
	FI one or more times within the past year	19	
	FI daily	1.5	
	Liquid feces	16.6	
	Soils underwear	21.6	
	Solid or liquid feces	1.97	
Nakanishi, 1997[58] N = 1,405	FI	15.3	13.5; 17.3
Prosser, 1997[603] N = 527	FI	9.3	7.1; 12.1
Goode, 2005[219] N = 1,000	FI	12.0	
Men			
Roberts, 1999[6] N = 23	Combined UI and FI	39.1	19.1, 59.0
	Fecal incontinence	3.1	2.9, 9.1
Teunissen, 2004[111] N = 2,137	Combined UI and FI	6.0	2.8; 11.9
	Combined UI and FI	2.0	1.5; 2.6
	FI	16.0	10.4; 23.7
	FI	7.0	6.0; 8.2
	Liquid feces	0.6	
	Solid feces	1.9	
Goode, 2005[219] N = 1,000	FI	12.4	
Women			
Roberts, 1999[6] N = 33	Combined UI and FI	27.3	12.1; 42.5
Teunissen, 2004[111] N = 2,513	Combined UI and FI	6	3.6; 9.7
	Combined UI and FI	4	3.3; 4.8
	FI	8	5.1; 12.1
	FI	6	5.1; 7.0
	Liquid feces	1.5	
	Solid feces	2.1	
Goode, 2005[219] N = 1,000	FI	11.6	
Bharucha, 2005[161] N = 2,800	Moderate FI	0.8	
Bradley, 2005[125] N = 297	Strain with defecation	25	

Table 14. Prevalence of FI in community dwelling men

Author (Sample)	Definition	Prevalence (95% CI)
<60 Years		
Roberts, 1999[6] (N = 38)	Combined UI and FI	15.8 (4.2; 27.4)
Roberts, 1999[6] (N = 188)	FI	6.9 (3.3; 10.5)
Roberts, 1999[6] (N = 778)	Combined UI and FI	5.9 (4.1; 7.6)
	FI	11.1 (8.8; 13.5)
Walter, 2002[604] (N = 758)	Flatus	17.8 (15.3; 20.7)
	Underwear staining	21.0 (18.2; 24.0)
Walter, 2002[604] (N = 758)	Liquid feces	0.7 (0.3; 3.4)
	Solid feces	0.2 (0.0; 1.0)
Enck, 1991[605] (N = 65)	Solid or liquid feces	1.5 (0.3; 8.2)
	Underwear staining	6.2 (2.4; 14.8)
Thomas, 1984[606] (N = 5,975)	Solid or liquid feces	1.0 (0.8; 1.3)
>60 Years		
Roberts, 1999[6] (N = 65)	Combined UI and FI	15.4 (6.6; 24.2)
Roberts, 1999[6] (N = 80)	Combined UI and FI	25.0 (15.5; 34.5)
Roberts, 1999[6] (N = 141)	FI	12.1 (6.7; 17.5)
Roberts, 1999[6] (N = 206)	FI	5.8 (2.6; 9.0)
Roberts, 1999[6] (N = 778)	FI	11.1 (9.0; 13.5)
Teunissen, 2004[111] (N = 2,137)	Combined UI and FI	1.0 (0.5; 1.8)
	Combined UI and FI	1.0 (0.5; 2.0)
	Combined UI and FI	2.0 (1.0; 3.9)
	Combined UI and FI	4.0 (2.1; 7.2)
	FI	6.0 (4.4; 8.1)
	FI	6.0 (4.2; 8.4)
	FI	8.0 (4.6; 11.3)
	FI	9.0 (5.9; 13.3)
Adolfsson, 1998[180] (N = 661)	Constipation	9.0
	Solid or liquid feces	4.0
	Urgency	10.0
Lopes, 1997[613] (N = 43)	FI	16.3 (8.1; 30.0)
Walter, 2002[604] (N = 213)	FI	1.0 (0.3; 3.4)
O'Keefe, 1995[608] (N = 270)	FI	8.1 (5.4; 12.0)
Diokno, 1990[607] (N = 666)	FI	5.4 (3.9; 7.4)
Thomas, 1984[606] (N = 1,102)	FI	4.1 (3.1; 5.4)
Wetle, 1995[50] (N = 1,449)	FI	8.5 (7.2; 10.0)
Edwards, 2001[508] (N = 1,625)	FI	1.0 (0.6; 1.5)
Verhagen, 2001[609] (N = 3,345)	FI	8.0 (7.1; 9.0)
Talley, 1992[160] (N = 328)	FI more than once a week	4.5 (1.3; 7.7)
	FI more than once a week	4.6 (1.4; 7.8)
Combined Age Groups		
Damon, 2006[623] (N = 706)	AI	2.4 (1.1; 4.7)
Nelson, 1995[622] (N = 6,959)	AI	0.8
Lam 1999[618] (N = 259)	FI	15.1 (11.2; 19.9)
	Flatus	8.1 (5.4; 12.1)
Roche, 2002[612] (N = 268)	FI	3.0 (1.5; 5.8)
	Flatus	3.0 (1.5; 5.9)
	Liquid feces	2.6 (1.3; 5.3)
	Solid feces	0.4 (0.1; 2.1)
Kalantar, 2002[217] (N = 286)	FI	10.8 (7.7; 15.0)
	Solid feces	3.1 (1.7; 5.9)
	Liquid feces	9.4 (6.6; 13.4)
MacLennan, 2000[7] (N = 1,464)	FI	2.3 (1.6; 3.2)
	Flatus	6.8 (5.7; 8.2)
Drossman, 1993[610] (N = 2,639)	FI	0.5 (0.3; 0.8)
Perry, 2002[611] (N = 4,633)	FI	2.8 (2.4; 3.3)
	Underwear staining	9.6 (8.8; 10.5)

Table 15. Pooled prevalence of AI (FI) in males by type and age categories (random effects model)

Type	Age (Studies)	Prevalence (95% CI)
AI	45-64 years (2)	1.6 (0.0; 3.2)
FI	45-64 years (8)	6.43 (4.8; 8.1)
FI	65+ years (12)	7.18 (5.3; 9.1)
FI	80 and over (3)	9.63 (4.5; 14.8)
Liquid feces	45-64 years (3)	3.34 (2.0; 4.7)
Solid feces	45-64 years (3)	1.39 (0.4; 2.4)
Solid feces	80 and over (1)	1.92 (1.9; 1.9)
Solid or liquid feces	45-64 years (2)	2.17 (<0.01; 4.3)
Solid or liquid feces	65+ years (1)	4 (4.0; 4.0)
FI+UI	45-64 years (2)	9.53 (5.4; 13.6)
FI+UI	65+ years (2)	8 (6.3; 9.7)
FI+UI	80 and over (2)	15.70 (12.0; 19.4)

Table 16. Prevalence of FI in community dwelling women

Author	Age	Sample Size	Prevalence (95 % CI)
Combined UI and FI			
Roberts, 1999[6]	50-59	114	17.5 (10.5; 24.5)
	60-69	117	21.4 (14.0; 28.8)
	70-79	91	15.4 (8.0; 22.8)
	>50	762	9.4 (7.1; 11.6)
Teunissen, 2004[111]	60-64	2,513	3.0 (1.9; 4.6)
	65-69		4.0 (2.6; 6.0)
	70-74		5.0 (3.3; 7.4)
	75-79		7.0 (4.6; 10.4)
Griffiths, 2006[614]		321	8.4
Ballester, 2005[162]		115	9.7
Boreham, 2005[212]		457	9.9
AI			
Gordon,1999[615]	<30	9	11.0
Kahn, 2005[629]	>18	1,004	20.0
Gordon,1999[615]	>80	22	45.0
Boreham, 2005[212]	18-65	457	28.4 (24.4; 32.8)
Gordon,1999[615]	31-40	17	29.0
	41-50	40	28.0
	51-60	58	19.0
	61-70	73	30.0
	71-80	64	36.0
Nelson, 1995[622]		6,959	1.4
Damon, 2006[623]		706	7.5 (5.0; 10.7)
Gordon,1999[615]		283	29.0
Roberts, 1999[6]	50-59	114	8.8 (3.6; 14.0)
	60-69	157	14.0 (8.6; 19.4)
	70-79	105	10.5 (4.6; 16.4)
	>80	24	12.5 (0.0; 25.7)
Bharucha, 2005[161]	<40	2,800	5.6
	<60		6.7
Roberts, 1999[6]	>50	762	15.2 (12.5; 17.9)
Bharucha, 2005[161]	>61	2,800	5.8
Teunissen, 2004[111]	60-64	2,513	4.0 (2.8; 5.7)
	65-69		5.0 (3.5; 7.1)
	70-74		7.0 (5.0; 9.7)
	75-79		8.0 (5.4; 11.5)
Melville,2005[163]		3,444	7.2
Bharucha, 2005[161]		2,800	12.1 (11.0; 13.1)
Ballester, 2005[162]		115	13.6

Table 17. Pooled prevalence of AI (FI) in females by type and age categories (random effects model)

Type	Age Categories (Studies)	Prevalence (95% CI)
Anal	19-44 years (3)	22.10 (16.10; 28.10)
Anal	45-64 years (3)	16.98 (9.61; 24.35)
Anal	65+ years (1)	33.00 (27.12; 38.88)
Anal	80 and over (1)	45.00 (44.81; 45.19)
FI	45-64 years (5)	7.31 (5.29; 9.32)
FI	65+ years (3)	8.53 (7.32; 9.75)
FI	80 and over	9.52 (7.26; 11.79)
Solid feces	45-64 years (14)	3.59 (2.75; 4.43)
Solid feces	80 and over (1)	2.07 (2.06; 2.08)
Liquid feces	45-64 years (12)	6.79 (5.15; 8.42)
Liquid feces	80 and over (1)	1.47 (1.47; 1.48)
Solid and liquid feces	45-64 years (1)	2.17 (2.16; 2.17)
Solid and liquid feces	65+ years (10)	7.18 (5.13; 9.24)
Solid or liquid feces	45-64 years (18)	5.03 (4.17; 5.89)
Flatus	19-44 (2)	16.28 (1.99; 34.55)
Flatus	45-64 years (12)	14.23 (10.73; 17.72)
FI+UI	45-64 years (3)	9.63 (1.67; 20.93)
FI+UI	65+ years (2)	10.37 (8.49; 12.24)
FI+UI	80 and over	12.43 (10.23; 14.62)

Question 2. What are the Independent Contributions of Risk Factors for Urinary, Fecal, and Combined Urinary and Fecal Incontinence?

Overview of Risk Factors for UI

Early epidemiological studies identified a number of potential risk factors of UI in a variety of adult populations (childbearing women, nonchildbearing women, men, men following prostate surgery) using univariate or bivariate analyses. In the past decade, there have been an increasing number of large population-based studies that incorporate multivariate analyses enabling the determination of the independent effect of a particular risk factor. However, the majority of studies have been cross-sectional in design which provides data only on risk factors for prevalent incontinence (Appendix F Table 1). Many of these studies are national population-based surveys on the general health of a particular population and are limited by the variables included in the study. Longitudinal studies incorporating multivariate analyses that provide data on the risk factors for incident incontinence are scarce.

In women, the major modifiable risk factors included obesity, vaginal trauma, and vaginal prolapse. Studies on risk factors such as lifestyle factors, selected chronic diseases, and medication use are limited. Inconsistencies in findings related to particular risk factors might be explained, in part, by the differences in the age of the study populations, the definition and measurement of UI, and the risk factors available for analysis. Longitudinal studies have found that risk factors for prevalent vs. incident UI vary.[149] In general, the risk factors for the various types of UI (stress, urge, and mixed) also vary. Aging tends to be associated with changing risk profiles associated with UI and UI type. The evidence presented next includes only those studies that incorporated multivariate analyses.

Risk Factors for UI in Community Dwelling Women

Age. Age tends to be linearly associated with UI, with prevalence and incidence rates increasing steadily with advancing age.[7,41,53,55,56,62,65,80,81,83,85,99,105,133,138,143,184] However, in older women an increase in incidence of weekly[123] UI was not significant when women 75-79 years were compared to those 70-74 years of age (Appendix Table F11). The large Canadian Study of Health and Aging cohort reported no significant increase in annual incidence of UI in women 75-84 or older than 85 years compared to women younger than 75 years of age.[186]

Prevalent UI significantly increased with age in 20[7,55,66,67,73,74,81,84,92,96,97,105,118,124,133,138,149,185-187] of 28 studies that reported the association.[7,55,62,66,67,73,74,81,84,92,93,95-97,105,118,124,132,133,138,140,144,149,185-189] Only one population-based cross-sectional study of 5,701 female participants in the Health and Retirement Study showed a decrease of 3 percent per 1 additional year in prevalence of moderate UI with 15 or fewer days with incontinence episodes in the last month.[189] Adjusted odds of prevalent stress UI increased by 110 percent per 5 year incremental increase in age in participants of the Heart & Estrogen/Progestin Replacement Study[66] with nonsignificant dose response association in the British cohort of 12,570 female respondents older than 40 years.[132] The largest increase in odds of stress UI (239 percent) was reported among women over 80 years compared to those younger than 60 years[133] in the European population-based study of 5,795 elderly community dwelling females.[133]

Prevalence of total weekly UI significantly increased by 106 percent per additional 1 year[96,149] and daily UI by 103 per additional 5 years of age.[140] Adjusted odds of occasional monthly UI was 1.2 and odds of severe UI 1.3 times in women 40-44 years compared to those younger than 40 years old.[138] Women 45-54 years old experienced UI 2.1 times more often and those older than 55 years of age 3.1 time more often than those 15-34 years old.[7] Odds of reporting any UI was 3.7 times greater in women 50-59 than those 41-49 years old.[84] Women older than 70 years experienced UI 1.49[81] to 2.9 times[84] more often than women under 50. The dose response association with severity of UI was shown in the Nurses' Health Study with odds ratio 1.45 for occasional, 1.56 for occasional severe, 1.67 for frequent and severe, and 1.81 for weekly severe UI in women older than 70 compared to those under 50.[84] Women 75-84 years old had 1.47[186] to 6.7[92] times higher odds of UI compared to women under 75 years and those 15-24 years old, respectively.

Adjusted prevalence rates of weekly urge UI increased by 1.2[66] per 5 additional years of age and by 1.8 times [187] per 10 additional years of age in a dose response model. Monthly urge UI was 1.8 time more frequent[133] among women 60-80 years old than for those under 60. Elderly women older than 80 years reported monthly UI four times more often than women younger than 60.[133] One community base Japanese survey of 968 women older than 40 years reported lower odds of urge UI among those older than 60.[74]

Maternal age at the time of either the first or last delivery has been examined as a risk factor for subsequent UI; however, the effect age has on the development of UI appears to lessen by age 50.[630] Several studies have found that age 35 years or older at first delivery increased the risk of UI or frequent UI when compared to younger women.[105,197] Similarly, one study found a lower risk in women who were 25 years or younger at their first delivery than their older counterparts (23 percent vs. 28 percent, respectively).[630] Another study found that being age 30 or more at the second delivery doubled the odds of becoming incontinent.[197] Two studies reported that the strongest associations with UI were for women who were under the age of 22 years at their first delivery.[105,135] In one study examining maternal age at subsequent deliveries, women older than 30 and 40 years at a second vaginal delivery had lower rates of UI and urge UI.[64] Other studies have not been able to demonstrate an independent effect of age on UI in the immediate postpartum period.[198] Age at last delivery appears to be less of a risk factor.[630]

Gender. Female gender has been consistently documented as a strong predictor of UI in bivariate analyses,[30,36,39,47,61,74,92,97,107,114] with an age-adjusted odds of UI of 3.1.[92] One in six women after age 30 have UI, compared to 1 in 20 men.[587] Women have higher rates of UI than men in all age groups.[81,86] In early adult years, women have a two to four times higher rate of UI than men; however, in advanced years (e.g., ages 75 or 85 and over), even though women continue to have higher rates, the prevalence rates are more similar.[81] In a study of 54,920 adults ≥30 years, the UI rate in women was 2.5 per 100 versus 1.4 per 100 in men.[86] Other studies find that UI prevalence is 6.8 times higher in women.[75]

Race/Ethnicity. There is growing evidence that race/ethnicity is a predictor of UI, UI severity, and UI type in nonchildbearing and childbearing women (Appendix Table F12). In earlier studies, White women tended to have higher rates of UI than other ethnic/racial groups (Blacks, Asian Americans, including Japanese and Chinese, and Hispanics).[30,59,89,93,105,120,138] In more recent studies, being non-White was associated with lower odds of having UI and severe UI,[144] with the exception of being Hispanic.[138] A higher UI incident rate in Whites was reported in two studies (OR 3.1, 95 percent CI 2; 4.8) (Figure 3).[123,149] African American women had

higher odds of incident urge but lower odds of incident stress UI. Hispanic women developed weekly UI more often compared to Caucasian (OR 2.96, 95 percent CI 1.06; 8.18).

Prevalence of mild, moderate, and severe UI was lower among African American women than White women in all six studies that examined the association (Figure 4).[93,105,137,138,149,189] Prevalence of moderate UI was lower among Hispanic women compared to Caucasian women in four of five studies (Figure 5).[93,105,138,149,189] However, evidence was not consistent. Prevalence of mild or severe UI was either less or the same in Hispanic women than in White women. Asian women had lower odds of moderate or severe UI (Appendix Figure F1) in two studies.[105,138]

Race/ethnicity was associated with different types of UI, including stress, urge, or mixed UI (Appendix Table F12). After multiple adjustments, the risk of stress UI was higher in White women than in Black and Asian American women.[118,137] In one study White women had a 2.8 times higher risk of stress UI than Black women.[66] In contrast, the risk of urge UI was similar in Black and Asian American women compared to White women.[59] In other studies, White women had three times the risk of Black women with respect to urge UI.[118]

Obesity. Obesity has been consistently established as a strong predictor of UI, especially severe UI (Appendix Table F13). Incident monthly UI was 110 percent higher and daily 112 percent higher per one unit increase in BMI.[149] Obese females developed monthly UI 1.7 times more often (95 percent CI 1.2; 2.5) than women with normal weight.[103]

Prevalent urge UI showed a positive dose response association 1.1 times per one unit increase in BMI,[51] (OR 1.08, 95 percent CI 1.1; 1.1), 1.4 times in women with BMI 25-30 than <25 kg/m^2,[133] and 1.8 times (OR 1.8 95 percent CI 1.4; 2.4) in those with BMI >30 kg/m2.[133] Asian overweight women experienced urge UI three times more often than those with normal weight (OR 3.4, 95 percent CI 1.2; 9.2).[187]

The largest increase in stress UI was shown in obese women with uterovaginal prolapse compared to normal weight females without prolapse (OR 33.0, 95 percent CI 12.5; 87.1).[95] In contrast, underweight women after surgery for UI reported stress UI more often than females with greater BMI.[631] Severe UI was more prevalent in overweight women (BMI 25-29kg/m^2 OR 1.5, 95 percent CI 1.4; 1.6) and obese women (BMI >30 OR 3.1, 95 percent CI 2.9; 3.3).[138]

The effect of BMI differed depending on definitions of UI (Figure 6). Odds of ever having UI were higher in underweight and overweight women.[116,191] Adjusted odds of UI in the past month were higher in overweight and obese females.[83,92,133,143] Weekly UI was more prevalent in obese but not overweight women with a dose response increase per one unit of BMI.[66,90,92,96,138,189] With the definition of UI in the past year (Figure 7), the majority of the studies showed a significant increase in UI corresponding to greater BMI.[7,51,59,68,72,144]

The association between BMI and UI varied depending on frequency of leakage episodes (Figure 8) The majority of the studies reported a significant raise in daily UI corresponding to an increase in BMI per one unit (OR 1.44, 95 percent CI 1.3; 1.6), per five units (OR 1.6, 95 percent CI 1.4; 1.7), or in overweight women (OR 1.65, 95 percent CI 1.3; 2.1).[55,67,70,149,189] Incremental increase per one unit in BMI was not associated with higher adjusted rates of at least monthly UI; however, obese women had greater odds of UI compared to women with normal weight.[67,104,121,124,138,149,190] Underweight and obese women had increased odds of having at least weekly UI.[67,92,138,185] Daily and weekly stress UI were significantly associated with an increase in BMI in all studies (Figure 9).[51,66,70,118,132,133,135,149,187] The association with UI at least monthly or in the past year was less consistent.

Studies in older women have found that a higher BMI (OR 1.3 per 5kg/m^2, CI 1.1; 1.6) was associated with stress UI but not urge UI.[118] Other studies found that increasing BMI was

associated with urge UI in women ages 40-60 years, whereas one study did not find an association.[66]

Some studies have incorporated alternative anthropomorphic measures such as waist circumference, visceral fat area measured by computed tomography scan of the abdomen, and sagittal diameter[66,118,149] with mixed outcomes (Appendix Table F14). One study found that waist to hip ratio was predictive of stress UI.[66] Other studies found increasing waist circumference is weakly associated with prevalent mixed UI (OR 1.0, 95 percent CI 1.0; 1.1 per 1cm increase in waist circumference), stress UI (OR 1.0, 95 percent CI 1.0; 1.1), and total monthly UI (OR 1.1, 95 percent CI 1.0; 1.1).[149]

Evidence on maternal weight and maternal weight gain during pregnancy is conflicting. In one study, women with higher BMIs (>25kg/m^2) and higher maternal BMIs (during pregnancy) increased their odds by 168 percent in developing UI at 3 months postpartum as compared to women with lower BMIs.[197] In another study, higher predelivery BMI (per 5kg/$m^{2)}$ increased the odds of UI at 6 months postpartum by 20 percent.[203] In other studies, maternal weight gain was not associated with UI[199] or the development of stress UI 10 years after the index delivery.[196]

Genetic influence. Evidence from four studies suggests a genetic influence on UI.[632-635] In one study, daughters of mothers with stress UI had a higher prevalence of stress UI than age-matched controls, 71.4 percent versus 40.3 percent, respectively.[632] Furthermore, UI symptoms appeared 7 years earlier in "incontinent families" than in those without a history of incontinence.[632] In a case-control study examining relatives of women with urodynamically diagnosed UI, first-degree relatives had a UI prevalence of 20.3 percent versus 7.8 percent in relatives of the control group.[635] Both mothers and sisters had significantly higher prevalence rates of stress UI than controls. Although daughters had a UI prevalence rate twice as high as controls, the difference was not significant. [635] In a population-based study, daughters of mothers with any type of UI had a 1.3 times higher risk of being incontinent, (95 percent CI 1.2; 1.4), a 1.5 times higher risk (95 percent CI 1.3; 1.8) of stress UI and 1.8 times higher risk (95 percent CI 0.8; 3.9) of urge UI.[633] Daughters were also at higher risk of having severe incontinence if the mother had severe incontinence (1.9; 95 percent CI 1.3; 3.0). [633] Younger sisters of female siblings with UI, stress UI, or mixed UI had increased relative risks, respectively of 1.6 (95 percent CI 1.3; 1.9), 1.8 (95 percent CI 1.3; 2.3), and 1.7 (95 percent CI 1.1; 2.8).[633] In another population-based study involving 548 monozygotic and 620 dizygotic twin pairs, the heritability for urge UI was 42 percent (95 percent CI 16; 63) among women ages 48-64 years and 49 (95 percent CI 29; 65) in those ages70-94 years.[634] Mixed UI also had a substantial genetic component; however, the role of genetic factors was less clear.[634]

Lifestyle Factors

Physical activity. There is limited data on the role of physical activity as a risk factor for UI (Appendix Table F14). Intensive physical activity in women 50-79 years of age in the Nurses' Health Study was associated with a significant reduction in incident UI (OR 0.9, 95 percent CI 0.8; 1.0).[156] Physically active women developed stress UI less frequently (OR 0.71, 95 percent CI 0.56; 0.91).[156] The same study reported a significant negative association between walking and incident urge UI (OR 0.7, 95 percent CI 0.5; 0.9).[156]

In a large study of women ≥20 years, after adjusting for age, number of children, coughing, and wheezing/dyspnea, increasing levels of low physical activity had weak and negative associations with UI.[192] No significant effects were noted for high intensity physical activity with

respect to stress, urge, and mixed UI. Similarly, a large study of women ≥40 years did not find an effect for those with different levels of physical activity or participating in vigorous activities.[103] In a study examining the impact of physical activity on urine leakage in 665 primiparous women, high impact exercise before pregnancy was significantly associated with UI 1 year after childbirth, increasing the odds of UI by 40 percent.[636] In two surveys, physical exercise in the past year was not associated with UI.[55,83]

Education and occupational status. Studies on occupational factors and UI risk are rare. In a study involving 1,581 Taiwanese women ≥20 years, having an occupation that involved weight lifting or other labor was not significantly associated with stress UI.[95] Women without private health insurance had higher adjusted odds of urinary symptoms (OR 2.6, 95 percent CI 1.4; 5).[84]

Surprisingly, higher education was associated with increased odds of prevalent UI in the majority of the studies.[67,70,72,83,93,149,189,191] College graduates 42-52 years old experienced UI 1.31 times more often compared to women without degrees;[93] university graduates 50-64 years old reported UI 2 times more often (OR 2.0; 95 percent CI 1.8; 2.3)[191] than females with lower education. One study found that higher education was an independent risk factor for UI for all ethnic groups except Chinese Americans but that educational level was not associated with moderate/severe UI.[93] However, in contrast to these studies, one study of postpartum incontinence reported that having less than a college education doubled the risk of UI.[203]

Marital status and social support. Married women had the same prevalence of UI as women who were widowed, divorced, or never married.[84] A large Study of Women's Health Across the Nation[149] suggested no association between level of social support and incident monthly UI. However, the same cohort reported higher prevalence rates of UI among women within the lower quartile of social support.[149] Psychological stress was associated with greater urinary symptoms including UI (OR 2.7, 95 percent CI 1.1; 7)[84] but not with UI in the past month.[83] Low social activity was not associated with risk of stress, urge, or mixed UI in women ≥70 years.[106] The interpretation of whether decreased social activity and poor social support precipitates UI or is a result of UI is unclear.

Dietary factors.

Caffeine. Evidence of caffeine consumption as a risk factor for UI is limited and conflicting. In a Norwegian study of 34,755 women ≥20 years of age, coffee consumption (number of cups/day) was not associated with UI in a multivariate analysis, whereas tea drinkers were at a slightly higher risk for all types of UI. (Appendix Table F15).[192] In other studies, coffee consumption has either not been associated with UI risk[55,103] or was shown to reduce the odds by 50 to 60 percent, depending on the amount consumed.[72] One large study in the United Kingdom did not find an association between tea consumption and UI risk.[103]

Carbonated beverages. Data on the type and amount of beverages consumed is scarce. In one study involving 6,424 women, daily consumption of carbonated beverages increased the odds of stress UI in women ≥40 years by 62 percent.[103] Although this study also examined the effect of carbonated beverages in women with overactive bladder, it was not possible to determine the effect in those who had urge UI alone.

Food consumption. Only one study has examined the role of different food groups on the risk of stress UI.[103] Consumption of various amounts of vegetables and chicken were not associated with stress UI, whereas eating bread daily or more was associated with decreasing the odds of stress UI by 24 percent.[103]

Alcohol use. Few studies have examined the effect of alcohol consumption on UI.[55,67,72,83,84,92,190] Some studies that did examine alcohol use, including the type of alcohol

consumed, did not include it in a multivariate analysis.[103,118] Alcohol consumption, as measured by number of glasses of alcoholic beverages consumed over a two-week period and the number consumed each week, has not been found to be a risk factor for UI.[55,72,83,192] Only one study reported a greater odds of weekly UI among women with daily alcohol use compared to never drinkers.[83] Women with low and moderate alcohol consumption had lower adjusted rates of occasional UI.[190]

Smoking. Smoking as a risk factor for UI has been assessed in several studies.[55,72,83,93,103,118,138,192] (Appendix Table F16). Six studies[92,93,138,186,189,192] of 12[67,72,83,92,93,138,143,186,189,191,192] found a significant positive association between smoking and UI. One study suggests that smoking status per se is not associated with UI, but rather examining the dose-response relationship between numbers of cigarettes smoked, either as a former or current smoker, may be more relevant.[192] In this study both former and current smoking was associated with UI, but only for those who smoked more than 20 cigarettes per day, raising the odds of UI by 2.7 and 3.0, respectively.[192] However, severe incontinence was weakly associated with smoking, regardless of number of cigarettes. Interestingly, adjusted odds of current smokers in the same study[192] had higher odds of mixed and total but significantly lower odds of stress UI. Neither smoking status nor a dose response between numbers of cigarettes smoked per day was found to be a risk factor in a survey involving 2,767 Italian women.[72] Although a survey of 1,262 women in the United Kingdom found that the number of cigarettes was not associated with UI, being a former smoker did increase the odds by 30 percent.[83] In a large study of 83,355 American women ages 37-54 years, former smoking was not associated with UI, whereas current smoking was significantly associated with frequent and severe UI.[138] Current smoking increases the odds of moderate/severe UI by 20-55 percent.[93,138] Smoking during pregnancy independently increased the odds of UI by 290 percent (odds ratio 2.9, 95 percent CI 1.4; 3).[198]

Functional status.

Cognitive function. Studies on the role of cognitive function as a predictor of UI in community dwelling women are scarce (Appendix Table F17). The prospective Canadian Study of Health and Aging did not find a significant association between impaired cognitive function and incident UI in elderly community dwelling women.[186] However, another prospective study, Study of Osteoporotic Fractures, reported an increase in odds of developing UI by 1.3 times (OR 1.3, 95 percent CI 1.1; 1.6) among older women with decline in walking speed, by 1.4 times (OR 1.4, 5 percent CI 1.2; 1.6) among those with decline in chair stand speed, and by 1.6 times in females with reduced Mini-Mental State Examination scores (OR 1.6, 95 percent CI 1.1; 2.1).[147]

Prevalence of UI was higher by 166 percent in frail community dwelling elderly with impaired cognitive status (OR 1.7, 95 percent CI 1.3; 2.1), who were participants in the Italian Silver Network Home Care project.[97] However, the Canadian Study of Health and Aging did not find a significant association between cognitive decline and prevalent UI.[186] In a survey of adults ≥75 years, memory problems significantly increased the odds of UI by 70 percent.[114] One study found that memory difficulties significantly increased the odds of having stress UI in a cross-sectional analysis but not in a longitudinal analysis at 1 year.[132]

Depression. An increasing number of studies are examining depression as a risk factor for UI (Appendix Table F17).[59,90,106,118,191] Postmenopausal women with depressive symptoms developed UI 2.7 time more often (OR 2.7, 95 percent CI 1.4; 5.3) during 2 years of followup in a prospective cohort study.[123] The association was random in another large cohort of the Study of Women's Health Across the Nation with 6 years of followup.[149]

Prevalence of UI was significantly higher in depressed women in five studies[90,124,149,189,191] of eight[90,97,106,118,124,149,189,191] that examined the association in multivariate analysis. The largest increase in adjusted odds of UI was observed in women with current depression (OR 2.0, 95 percent CI 1.2; 7.6)[90] or current major depression (OR 2.5, 95 percent CI 1.7; 3.7).[124] Some studies indicated that depressive symptoms are a risk factor for a particular type of UI rather than UI in general. Depressive symptoms have been strongly associated with urge UI in some studies, raising the risk by 2.7 times in women ages 70-79 years.[118]

Physical function. Decreased physical function measured by self report and physical performance tests has been consistently documented as a strong predictor for UI in six studies[67,81,92,97,144,189] of eight[67,81,92,97,106,132,144,189] that examined this association (Appendix Table F17). Poor mobility increased the odds of UI by 4.7 times in women over the age of 60[42] and in other studies mobility limitations, including difficulty walking, increased the odds of UI ranging from 23 to 81 percent in older women.[81,114]

ADL impairments strongly increase the risk of UI and UI types, although findings vary. Physical impairment was associated with increased odds of stress UI by 40 to 70 percent, except in the worst level of functioning, where it was not significantly associated.[132] However, in another study, it was not associated with stress UI but strongly associated with urge UI.[98] In a study of women ages 55-75 years, lower scores on the SF-36 physical function scale were significantly associated with any and severe UI.[144] In another study involving women ≥65 years, ADL disability increased the odds of UI by 175 percent.[81] The strongest association was reported in the national health survey in Belgium with increased prevalence of UI by 415 percent (OR 4.2, 95 percent CI 1.9; 6.0) in women with moderate physical limitations and by 521 percent (OR 5.2; 95 percent CI 1.2; 8.6) among those with severe physical limitations.[92]

Decreased physical performance measured with an objective Health ABC Performance Scale (performance on repeated chair stands, gait speed, standing balance, and a narrow walk test of balance), was associated with urge UI (OR 1.6 per point on 0-4 scale, 95 percent CI 1.1; 2.3), whereas it was not associated with stress UI.[118] Muscle strength as measured by grip and quadriceps strength was not associated with daily UI; however, faster gait speed (OR 0.8 per 2 units, 95 percent CI 0.6; 1.0) was associated with decreased incontinence.[55]

The variability in populations, definitions, and measurement of UI and functional status contributed to the differences in the results from individual studies.

Gynecological Factors

Parity. We identified 24 observational studies that reported odds ratios of UI in association with parity (Table 18).[55,59,64,68,70,72,83,92,93,95,96,105,119,124,133,135,138,149,185,191,193-196] Incident UI was not associated with parity.[149,193] A positive significant association between prevalent UI and parity was reported in 13 studies,[68,72,83,93,96,105,119,124,138,185,191,193,195] while six studies did not find a significant increase in prevalent UI in relation to parity (Figure 10).[59,64,92,133,149,194] The number of births did not show a dose response association with prevalent UI (odds ratio per one additional birth 1.0, 95 percent CI 1.0; 1.1) but did with moderate severe UI (odds ratio per one additional birth 1.1, 95 percent CI 1.0; 1.1) and severe UI (odds ratio per one additional birth 1.1, 95 percent CI 1.0; 1.1). All six studies that measured prevalent stress UI reported a significant positive association with parity (Figure 11).[72,95,133,149,195,196] Prevalent stress UI and severe stress UI did not show a significant dose response association with the number of births. Only one study[195] of four [72,133,195,196] found an increase in urge UI corresponding to parity.

The role of parity is complex and changes as a woman ages. One study reported that age modified the association between parity and UI with a significant association in young and middle aged women and attenuation of the association in older females.[195] Particularly in studies of perimenopausal and postmenopausal an association has not been found between parity and UI or with UI type,[118,128] suggesting that aging tends to diminish this effect. In a study involving separate multivariate analyses in three age cohorts (ages 18-23, 45-50, and 70-75 years), the effect of increasing parity declined with age.[68] In other studies involving both cross-sectional and longitudinal analyses, the role of parity changes after 1 year. Odds ratios associated with parity are higher in women <60 years than in women ≥60 years.[105] Certain risk factors, such as vaginal delivery, are strong predictors of UI in younger women, but with changes associated with aging and menopause, this effect seems to disappear. In premenopausal women, the number of vaginal childbirths was strongly associated with UI.[96] In other studies, the relative risk of having stress UI 10 years after childbirth was not associated with the number of vaginal deliveries.[196]

Obstetric and fetal factors.

UI during and following pregnancy. Evidence suggests that UI developing during pregnancy is a risk factor for UI in the immediate postpartum period[197] and in subsequent years[64,96] raising the odds of UI by two to 11 times[96,198] (Appendix Table F18). One study found that the odds of developing UI, stress, urge, and mixed UI were 2.2, 3.4, and 3.2 times higher, respectively, for women who had UI during pregnancy than women who did not.[64]

Women who experienced postpartum UI had four to five times higher odds of developing UI,[64,119] with four times higher odds for developing stress UI, and 2.6 and 3.2 odds for developing urge and mixed incontinence, respectively.[64]

Mode of Delivery. The majority of the studies report that spontaneous vaginal deliveries are more likely to be associated with UI,[7,197,199] stress UI and severe stress UI,[135] and subsequent stress UI surgery[631] compared to Cesarean delivery (labored and unlabored). Cesarean section was associated with lower odds of UI in seven studies,[119,197,199-203] by 80 percent[201] to 41 percent[200] and did not show a significant association in five studies[135,141,196,204,205] (Table 19). Two studies reported higher odds of UI when women after Cesarean section were compared with nulliparous females (Figure 12).[7,206] Vaginal delivery compared to Cesarean increased the risk of total UI with little evidence of association with stress and urge UI. Adjusted odds of UI was higher after forceps delivery by 150 percent[199] to 187 percent[198] compared to vaginal delivery (Figure 13), by 310 percent to 430 percent[199] compared to Cesarean section, and by 430 percent compared to nulliparous women.[206] Vacuum delivery was associated with random changes in UI in the majority of the studies (Table 19). One study found that previous pregnancy was a risk factor for severe stress UI in women who reached the age of 50, although the mode of delivery had less effect.[135] Breech delivery was not associated with an increased risk of UI or any UI type.[98]

Few prospective studies reported protective effects of Cesarean section on UI compared to vaginal delivery.[119,197,202,205]

*Oxytocin***.** The prior use of oxytocin significantly increased the odds of UI by 1.9 times in women ≥60 years.[59]

Epidural analgesia. Evidence does not support that epidural analgesia increases the risk of incontinence.[98]

Duration of labor. Several studies have examined labor time and the duration of specific stages of labor. One study found that labor time, duration of second, passive, and active stages, as well as the duration that the fetal head was deeply engaged was not associated with UI.[199]

Another study found that labor beyond 24 hours was not associated with UI.[59] In contrast, a study found that functional delivery disorders increased the odds of having moderate/severe UI.[98]

Episiotomy, lacerations, and perineal suturing. Episiotomy has not been associated with UI, either having had one or several episiotomies.[59,64,196] Perineal rupture and perineal suturing were not significantly associated with UI.[59,64,196]

Gestational age. Relatively few studies have examined gestational age as a risk factor for UI. Studies available do not support an independent association with UI.[59,98,197]

Fetal weight and head circumference. There is inconsistent data on the effect of fetal weight on UI. Two studies found that heavier babies increased the risk of UI.[98,197] In one study, heavier babies (birth weight in the top quartile or ≥4,000 grams increased the odds of becoming incontinent by 10-56 percent,[98] and in another a heavier fetal weight increased the odds of developing stress UI but not urge or mixed UI.[98] However, most studies do not report a significant association between fetal weight and UI.[196,199] Relatively few studies have examined fetal head circumference as a risk factor. Data from three studies indicate that it is not an independent risk factor for UI,[98,199] although one study found it to significantly increase the odds of urge UI by 80 percent.[98]

*Lactation***.** Breast feeding as a risk factor for subsequent UI has been examined in a few studies with conflicting findings.[96,198] Although lactation was associated in bivariate analysis with UI, in multivariate analyses, it was not independently associated with UI.[96] In another study, length of breast-feeding slightly increased the odds of UI by 17 percent.[198]

Menstrual cycle and menopause. Because of the presence of estrogen and progesterone receptors in the lower urinary tract, female UI is assumed to be associated with a woman's hormonal status and the fluctuations in it (Appendix Table. F19).One study 2,158 premenopausal women in Denmark examining the role of hormonal variation found that self-reported UI the day before completing a survey questionnaire was strongly associated with a recent decrease in bleeding duration (OR 2.2, 95 percent CI 1.3; 3.6).[96]

Because of the increased prevalence of UI in the perimenopausal years, menopause has been assumed to be a key risk factor in UI. One study found that perimenopausal status was independently associated with UI, increasing the odds by 127 percent (OR 1.3, 95 percent CI 1.1; 1.5).[93] The large Women's Health in the Lund Area study found an increase in adjusted odds of UI by 144 percent among premenopausal women (OR 1.4, 95 percent CI 1.1; 1.8) and by 1.5 percent in depressed premenopausal women (OR 1.5, 95 percent CI 1.1; 2.0).[191] Studies examining menopause assessed by self report have not found it to be an independent risk factor for stress UI.[70,95] Although menopause was not found to be significantly associated with UI, the number of years past menopause did increase the odds of UI by 15 percent, suggesting the aging process may have a greater role in the development of UI than hormonal status.[90]

Gynecological or abdominal surgery. There is mixed evidence related to prior gynecological surgery as a risk factor (Appendix Table F20). Five[55,83,108,124,138] studies of eight[55,62,72,83,108,124,138,144,191] that examined this association reported significantly higher adjusted rates of total UI among women after hysterectomy. The increase was 160 percent (OR 1.6, 95 percent CI 1.1; 2.1) for UI in the past month,[108] 130 percent for at least monthly UI (OR 1.3, 95 percent CI 1.1; 1.6),[124] 140 percent for daily UI (OR 1.4, 95 percent CI 1.1, 1.6),[55] and 160 percent for severe UI (OR 1.6; 95 percent 1.5; 1.7).[138] In contrast, rates of stress UI were either the same after hysterectomy in four studies[87,108,118,135] or were less in the Women's Health Australia study (OR 0.8, 95percent CI 0.7; 0.9).[68] Women after hysterectomy also had the same prevalence of urge UI in three studies.[70,74,108] Only one European cross-sectional study reported

higher adjusted odds of bothersome urge UI among women after hysterectomy (OR 2.6, 95 percent CI 1.4; 4.4).[87] Depressed women after hysterectomy had UI 1.3 times more often (OR 1.3, 95 percent CI 1.0;1.7).[191] Diabetics after hysterectomy also had increased adjusted rates of weekly UI (OR 2.3, 95 percent CI 1.0; 5.2).[140]

Evidence on the relationship between UI and other gynecological conditions and procedures is conflicting (Appendix Table F21). Women with previous gynecological surgery had stress UI twice as often (OR 2, 95 percent CI 1.1; 3.7).[95] Women with prolapse (OR 4.11, 95 percent CI 2.15; 7.86)[92] and after prolapse surgery had increased odds of UI.[62,68] In another study, pelvic organ prolapse surgery was not significantly associated with UI.[135] Women who had both a hysterectomy and prolapse repair were 1.8 to 2.3 times more likely to have UI compared to women without these surgeries.[68]

Other surgeries on the uterus, excluding hysterectomies, led to conflicting findings, depending on the measurement of UI, when UI was confirmed by objective measures, they did raise the odds of having UI by 2.2 times, but when self report was used as the UI measure, there was no association.[62] In another study of premenopausal women, having had abdominal or gynecological surgery was associated with a 170 percent higher risk when compared to women without this surgery;[96] and in another study involving both premenopausal and postmenopausal women, prior gynecological surgery doubled the odds of having UI.[95]

Pelvic floor muscle contraction strength. Two studies examined the role of pelvic floor muscle contraction or exercises on either the prevalence or incidence of UI. In one cross-sectional study involving 507 women who completed a clinical evaluation, poor ability to contract pelvic floor muscles was strongly associated with UI (adjusted odds ratio of 3.5 for objectively confirmed according to the ICS definition UI and 4.5 for self-reported UI) depending on the definition of UI.[62] In a study of primiparous women, inability to interrupt urine flow doubled the odds of being incontinent.[636]

Other factors. One clinical study found that abnormal findings on a gynecological examination were significantly associated with having UI in women ages 50-74.[62] Vaginal symptoms (dryness, discharge, itching, dyspareunia) in postmenopausal women are significantly associated with any UI and severe UI.[144] In this same study, atrophic vaginitis was significantly associated with any UI but not severe UI. Vaginal colonization with E. coli was not independently associated with any or severe UI.[144]

In a study of 665 primiparous women, perceived discomfort in the lower abdomen increased the odds of UI by 3.6 times.[636] One large survey of middle-aged American women found that fibroids were associated with prevalent UI but not incident UI.[149]

Urological Factors

Childhood voiding dysfunction. There is limited evidence available on the role of childhood voiding dysfunctions as a risk factor for UI in adulthood. Evidence available suggests that childhood nocturnal enuresis is associated with the development of UI in adulthood, particularly urge UI. In one study, the odds of having UI were increased by 2.4 times among premenopausal women.[96] In two other studies, childhood nocturnal enuresis increased the odds of urge UI by 2.7 times.[70,637] but was not associated with stress UI.[70] It was also associated with increasing the risk of severe UI almost 3-fold.(Kuh, 1999, #1578). Childhood daytime incontinence has also shown to be associated with adult urge UI (OR 2.6, 95 percent CI 1.1; 5.9).[637]

Lower urinary tract symptoms. Few epidemiological studies have examined the association of lower urinary tract symptoms (urgency, frequency, nocturia, dysuria, difficulty with bladder emptying) as independent risk factors for either prevalent or incident UI. Findings are inconsistent across studies (Appendix Table F22). Urinary frequency was independently associated with UI in women ≥60 years,[42] whereas it was not associated with UI risk in women ages 20-84 years.[139] Urgency increased the odds of UI by 9.3 times in women ages 60-84 years, but was not found to be associated in those ≥85 years.[42] However, in another study with women ages 20-84 years, urgency did not predict UI risk.[139] Nocturia increased the odds of UI in women ≥85 years but not in those ages 60-84.[42] Stinging or burning urine was significantly associated with UI in three age cohorts (ages 18-23, 45-50, and 70-75 years).[68]

In a study of postpartum women, frequency of urination increased the odds of having UI one year after delivery.[198]

Urinary tract infections. There is inconsistent data on the role of urinary tract infections as a risk factor for UI (Appendix Table 23). Women with urinary tract infections had higher rates of UI in 11 studies[66,72,74,90,92,97,108,116,121,127,144] of 15[66,70,72,74,90,92,96,97,106,108,116,121,127,144,187] that examined the association. Women with recurrent urinary tract infection had the highest increase in UI by 230 percent for weekly UI (OR 2.3, 95 percent CI 1.3; 3.9)[127] and for monthly UI (OR 2.3, 95 percent CI 1.6; 3.1),[108] 220 percent for UI in the past year (OR 2.2, 95 percent CI 1.4; 3.4),[72] and by 470 percent for ever having UI (OR 4.7, 95 percent CI 4.7; 8.9).[116]

Several studies reported that menopausal status can influence the association between urinary tract infections and UI. One study in premenopausal women,[96] one study in postmenopausal women,[106] and one study that included both premenopausal and postmenopausal women did not find a significant increase in odds of UI among women with urinary tract infection.[139] In contrast, one survey in postmenopausal women found that the lifetime number of urinary tract infections (six or more) increased the risk of UI by 1.9 times for any UI and 2.0 times for severe UI.[144] Two studies found urinary tract infection increased the odds of UI by 4.8 times in women who were perimenopausal and by 3.4 in women who were menopausal.[90,152]

Urinary tract infections have been associated with UI type; in one survey two or more urinary tract infections in the past year doubled the odds of having urge UI.[66] In another study, cystitis was significantly associated with stress UI at baseline and 1 year later, increasing the odds of stress UI by 50 to 90 percent.[132]

Postvoid residual bladder volume. One study found that postvoid residual bladder volume was not associated with UI in postmenopausal women.[128]

Bladder or urinary surgery. Several studies have examined whether prior bladder or urinary surgery is a risk factor for UI. Some studies have not found significant associations,[144] whereas another study found that UI surgery doubled the odds of having UI in perimenopausal women.[135]

Medical Conditions

Arthritis and musculoskeletal disorders. Evidence from three studies,[7,86,118] suggested that women with arthritis had higher rates of UI (Figure 14). Two studies found that arthritis was associated with increased odds of UI by 80-88 percent.[7,86] Arthritis was also an independent risk factor for UI type. In a study involving women ages 70-79 years, arthritis was significantly associated with both urge and stress UI.[118]

Joint pain was significantly associated with stress UI in a 1-year followup study, increasing the odds of UI by 40 percent.[132] A history of hip fracture increased the odds of UI by 38 percent.[81] Osteoporosis was associated with UI in one study,[7] but the association can be confound by age.

Diabetes. There is growing evidence to suggest that diabetes mellitus increases the odds of having UI (Appendix Table F24).Two studies[134,149] of three[134,149,186] reported that women with diabetes develop UI more often. Incidence of weekly UI was higher by 147 percent (OR 1.5; 95 percent CI 1.2; 1.9) in women with duration of diabetes more than 10 years.[134] The same Nurses' Health Study cohort showed that incidence of severe UI was increased by 175 percent (OR 1.8, 95 percent CI 1.3, 2.3) and very severe by 126 percent (OR 2.6; 95 percent CI 1.4; 5.0).[134] The Study of Women's Health Across the Nation found 302 percent increase in developing monthly UI in women with diabetes independent on other risk factors (OR 3.0, 95 percent CI 1.1; 8.1).[149]

Prevalence of stress UI was greater in women with diabetes in three studies[95,133,149] of six[66,95,108,133,135,149] that examined the association (Figure 15). Pooled odds ratio of prevalent stress UI was not significant (OR 1.4, 95 percent 0.9; 2.1). The result of meta-analysis was sensitive to one study, The Heart & Estrogen/Progestin Replacement Study Research Group, randomized trial of 2,763 women taking combination hormone therapy to prevent coronary heart disease, that did not find a significant association between diabetes and stress UI.[66] However, the majority of the studies reported a significant increase in adjusted odds of total UI among women with diabetes (Figure 16)[55,66,72,86,93,97,108,116,124,127,128,133,134,138,149,186] Pooled analysis of 16 studies resulted in an odds ratio of 1.4 (95 percent CI 1.2; 1.5) of having prevalent UI in women with diabetes. Four of five studies found a significant increase in adjusted odds of urge UI among women with diabetes (Figure 17).[66,108,118,133,149] Pooled analysis of five studies estimated that diabetic women had urge UI 1.7 times more frequently than nondiabetics (95 percent CI 1.2; 2.2).

Diabetic complications such as macroalbuminuria, retinopathy, and/or peripheral neuropathy significantly increased the odds of having UI in two studies.[128,140] Diabetic neuropathy was associated with an adjusted odds ratio of 2.4 and macroalbuminuria increasing the odds by 3.8.[140] However, in another study, a BMI adjustment decreased the strength of these associations.[128] This same study also found that neither diabetes treatment (diet, pill, or insulin) nor duration of treatment was associated with UI after adjustment for BMI. Blood glucose control as measured by HbA_{1c} was also not associated with UI.[128]Women who have insulin-dependent diabetes were found to have a 3.5 times higher risk of urge UI when compared to women without diabetes.[128]

Stroke. One prospective cohort , the Canadian Study of Health and Aging, found that elderly community dwelling women had higher risk of developing UI after stroke (OR 1.6, 95 percent CI 1.1; 2.2).[207] Prevalence of UI was significantly higher among women after stroke in five[55,86,97,133,186]of six[55,67,86,97,133,186] studies that examined this association (Figure 18) Pooled analysis of six studies estimated an increase by 167 percent of UI in women with history of stroke (OR 1.7 95 percent CI 1.4; 2.1). Severe UI was more prevalent in women with history of stroke in one study (OR 1.9, 95 percent CI 1.4; 2.8).[67] Paraplegia was also associated with UI (OR 1.6, 95 percent CI 1.1; 2.6).[133]

Neurological disorders. There is conflicting evidence on neurological diseases and prevalent UI (Appendix Table F25). Women with any neurological diseases had greater rates of ever having UI (OR 3.8, 95 percent CI 1.7; 8.6).[116] Parkinson's disease was associated with increased odds of having UI in one study (OR 2.3, 95 percent CI 1.1; 4.5)[81] while two other studies[97,133] did not find a significant association.

Pulmonary disorders. Asthma and chronic obstructive pulmonary disease (COPD) have been studied as potential risk factors for UI in several studies with conflicting findings (Appendix Table F26). Although most studies find COPD to predict UI risk,[81,124,133] in a large study involving 29,520 women,[86] COPD was not associated with UI. In a smaller survey involving 1,531 women ≥65 years, COPD increased the odds of UI by 53 percent.[81] In other studies, COPD was associated with the type of UI. In women ages 55-75 years, the odds of having stress UI were increased five-fold, although it was not associated with urge UI risk.[118] Asthma was not associated with UI risk in one study,[86] whereas in another study it increased the odds of stress UI by 50 percent at baseline but was not significantly associated 1 year later.[132] Several studies indicated that frequent or prolonged coughing increases the odds of UI by 33 to 60 percent[114,638]

Comorbidity and poor health. Some studies have examined the role of comorbidity in relation to UI (Appendix Table F26). Elderly community dwelling women with kidney problems (OR 1.7, 95 percent CI 1.2; 2.3) and foot diseases (OR1.4, 95 percent CI 1.0; 1.8) were at risk of developing UI.[186] Women with two or more comorbid diseases had higher adjusted rates of UI (OR 5.9, 95 percent CI 3.7; 9.6).[92] Increased comorbidity index was associated with higher adjusted odds of UI in three studies.[121,124,189]

In studies involving community dwelling females, poor self-rated health increased the odds of having daily UI by 60 percent[55] and was weakly associated with stress UI.[118] In another study, poor health was not associated with stress or urge UI in post-menopausal women; however, it did increase the odds of having mixed UI by 143 percent (OR 1.4, 95 percent CI 1.1; 1.8).[66] In a large survey of women ages 40-55 years, poor health was associated with increased odds of urge UI but not mixed or stress UI.[149] Women with poor or fair health experienced UI 2.6[187] to 2.9[84] times more often.

Cardiovascular disorders. There is limited evidence on the role of cardiovascular disorders such as heart problems and hypertension on UI (Appendix Table F26). Hypertension was strongly associated with UI in two studies,[83,127] whereas two studies did not find a significant association with any UI[639] or with stress UI.[95] In large surveys, heart problems,[639] including congestive heart failure,[55,97] were not associated with UI.

Gastrointestinal diseases and procedures.

Constipation. A limited number of studies have explored the role of constipation as a UI risk factor (Appendix Table F27).[68,144,152] Three studies[68,121,144] reported a significant increase in adjusted odds of UI in women with constipation among six studies that examined this association.[68,74,97,121,144] One study found that constipation increased the odds of having severe UI by 50 percent, whereas it was weakly associated with having any UI.[144] In another study involving different multivariate analyses in three age cohorts (ages 18-23, 45-50, and 70-75 years), constipation nearly tripled the odds of having UI.[68] However, two studies did not find a significant association between constipation and UI; one study in homecare patients[97] and the other with women ages 45 years and over.[143] Bowel straining significantly increased the odds of stress UI at baseline by 150 percent; however, the effect was not present 1 year later.[132] Constipation was not associated with urge UI.[74] Constipation 4-6 weeks after childbirth was independently associated with UI at 1-year postpartum in all women (primiparae and multiparae women combined), and in primiparae alone but not in multiparae women.[119] Women with bowel symptoms had higher adjusted rates of UI in one study[68]with random findings in another.[185] One study[96] of seven reported a significant increase in prevalence of UI after abdominal surgery.[72,96,108,135,144,185]

Other surgical procedures. One study found that varicose veins and hemorrhoids were independently associated with UI at 1-year post-partum in primiparous women by 50 percent.[640] Previous surgery for UI was associated with increased odds of weekly UI (OR 1.4, 95 percent CI 1.2; 1.8)[83] and stress UI (OR 1.3, 95 percent CI 1.3; 4).[135] In one study, urological surgeries were not associated with prevalent UI in women.[72]

Medications

Relatively few studies have investigated the independent effect of medications on prevalent or incident UI (Appendix Table F28).

Incident UI. Only one study reported incident UI in women with diabetes treated with pharmacological agents and found that insulin administration but not oral medications were association with a 350 percent increase in developing of UI (OR 3.5, 95 percent CI 1.6; 7.9).[123]

Diuretics. The evidence on the role of diuretics on UI risk is conflicting. Earlier studies that examined bivariate associations indicated that diuretics were associated with UI in older adults.[641] However, large studies involving multivariate analyses did not find that diuretics including nonthiazide diuretics increased the odds of having UI.[55,86] Diuretics is a strong predictor of UI type, particularly urge UI.[133] One study found that diuretics significantly increased the odds for stress and urge UI in women ages 40-60 years by two to four times.[78]

Estrogen. Several epidemiological studies have examined estrogen therapy as a risk factor for UI (Appendix Table F29).[55,59,105,118,144,191] The risk of UI is elevated among women taking postmenopausal hormones (oral and transdermal estrogen with and without progestin) as compared to those who have never taken them.[153] Women taking transdermal estrogen with and without progestin (RR 1.7, 95 percent CI 1.4; 2.06 and RR 1.5, 95 percent CI 1.2; 1.8, respectively) had a slightly higher risk of UI than those who took the oral forms (RR 1.5, 95 percent CI 1.4; 1.6 and RR 1.3, 95 percent CI 1.2; 1.4). This same study also found there was little risk after cessation of hormones and a decreasing risk of incontinence with increasing time since last hormone use.[105] Ten years after stopping hormone use, the risk was identical in women who had and had not taken hormone therapy. Two studies found that oral hormone replacement therapy increased the odds of having UI by 1.9 times.[55,59] Vaginal estrogen cream use was significantly associated with any UI in women ages 55-75 years, although this same association was not found with severe UI.[144] Systemic hormone replacement therapy is strongly associated with urge and stress UI. In a study of 1,584 women ages 70-79 years, current oral estrogen use increased the odds of urge UI by 70 percent and stress UI by 98 percent, respectively.[118] Hormone use for menstrual disorders was also an independent risk factor for UI.[96] Former use of oral contraceptives increases the odds of UI by 18-20 percent, although current use was not associated.[138]

Psychotropic medications. A few studies have examined whether antidepressants in general or specific types of antidepressants are a risk factor for UI. In a large survey, antidepressant use was associated with increased odds of having UI by 75 percent.[86] In a study involving 6,642 women, the use of selective serotonin reuptake inhibitors (SSRIs) or serotonin norephinephrine reuptake inhibitors (SNRIs) was not associated with UI in multivariate models that included all women, depressed women only, and nondepressed women who reported depressive symptoms.[191] However, in a subanalysis of depressed women on SSRI/SNRIs, there was a significant association between drug use and UI.[191] Tranquilizers have been shown to increase the risk of UI by 65 percent.[86] The contribution of psychotropic medications, independent from

baseline disease on UI, has not been examined in prospective observational studies. The results from RCTs showed that serotonin-noradrenaline reuptake inhibitor, duloxetine improved stress UI,[642] suggesting that depression rather than the antidepressant could be considered as a risk factor for UI.

Other medications. In a large survey of 29,520 women, pain, narcotics, asthma, hypertensive, and heart medications were not associated with an increased risk of UI.[86] In this same survey, antibiotics were significantly associated with UI, increasing the odds by 64 percent, laxatives by 67 percent, and hypnotics by 52 percent. However, another study did not find an association between sleeping medications and UI risk.[106] Polypharmacy (e.g., three drugs or more) was not associated with UI risk in women ages 70 years and over.[106]

Summary. Limited evidence, Level IIA from prospective cohort studies suggested that increased BMI, diabetes, comorbidities, cognitive decline, and hormone therapy were associated with developing UI in community dwelling females. Prevalence of UI was higher in aging and depressed women, after stroke, vaginal trauma, and in women with physical dependency. The strength of the association depends on definitions of UI by time, type, and severity. Differences in assessment of associated factors may also contribute to the effects on UI. Hormone status of women modified the effects of other associated factors. Comparisons across the studies were difficult to make due to methodological heterogeneity in adjustment and statistical models.

Risk Factors for UI in Community Dwelling Men

The prevalence of UI in elderly males with different risk factors was examined in one population based survey (Appendix Table F30).[607] Men with arthritis had the highest prevalence of mixed (51 percent), urge (43 percent), and stress UI (46 percent) compared to other internal diseases. Mixed UI was reported in 29-39 percent of males with hearing and vision problems; 35 percent reported urge UI. Diabetics experienced stress UI more often than men with other diseases (36 percent). Urge UI was prevalent in men with pulmonary diseases (27 percent). The prevalence of UI was 36 percent in men who used diuretics, 38 percent in men treated for prostate problems, and 60 percent in those taking antispasmodic agents [181] After prostate surgery (47 percent) and bladder surgery (58 percent of men) had a higher prevalence of UI.[181] However, one European survey of 840 men reported lower compared to other studies prevalence of UI after transvesical prostatectomy for benign prostatic hyperplasia.[643]

The prevalence of UI in men with prostate cancer varied from less than 1 percent[173] to 30 percent[180] and 44 percent[181] being lower than 10 percent in the majority of the studies[167-174] (Appendix Table F31). The rates of UI in men treated for prostate cancer varied substantially depending on the treatment use, time of followup, population characteristics, and definitions of UI (Appendix Table F32). The largest case series reported that 8 percent of men experienced UI after radical prostatectomy (Appendix Table F33).[644] A retrospective analysis of a national random sample of 12,079 Medicare beneficiaries showed that the incontinence rate after radical prostatectomy decreased from 20 percent in 1991 to 4 percent in 1995, being the highest in older patients.[175] One prospective population-based cohort, the Prostate Cancer Outcomes Study, found differences in the rates of occasional and frequent UI after radical prostatectomy.[172] The rates of UI after radiation therapy differed across the published case series. The largest (1,192 males followed for 52 months after external beam radiotherapy) reported 5 percent with Grade 1 UI using the modified Radiation Therapy Oncology Group/Subjective, Objective, Management,

and Analytic scale (Grade I - Occasional [less frequent than weekly] use of incontinence pads).[170]

Associations between UI and risk factors were reported in several studies (Table 20).[72,74,81,83,84,86,92,97,170,174,175,180-182,644] Age was an independent risk factor for UI in two studies.[58,97] One study reported crude significant association,[81] not confirmed in the largest retrospective cohort study of Medicare beneficiaries.[175] Limited evidence suggested that age was significantly associated with urge UI (OR 5.34, 95 percent CI 2.26; 12.62) among those older than 70 years compared to younger men,[74] with random association with stress UI.[645] Non-White men had the same rates of UI compared to Whites.[175] Marital status[84] and education in men[72,83,92] were not associated with lower odds of UI. Two studies showed that a sedentary lifestyle was associated with UI in males.[83,92]

Alcohol intake (Figure 19)[72,83,84,92] did not show an association with male UI. Only one study of 748 men 61-70 years old showed that 15-21 alcoholic drinks weekly were associated with lower adjusted odds of urine loss during the last year).[72] Three studies examined crude and adjusted odds of UI among smokers and none found a significant association (Figure 20).[72,83,92]

BMI in relation to UI was examined in two studies with univariate[79,92] and three studies with multivariate[72,83,84] analysis (Figure 21). Only one study of 232 males reported an increase in adjusted odds of total UI by 320 percent among obese males.[84] Males with diabetes had significantly higher adjusted rates of UI in two[97,176] studies of five[58,72,86,97,176] with pooled odds ratio of 1.4 (95 percent CI 1.1;1.6) (Figure 22).

Comorbidities and poor general health were associated with UI in several studies (Table 21).[81,84,92,97] The presence of FI was associated with an increased odds of urge UI in one study of 2,198 males (OR 17, 95 percent CI 7.5; 40)[176] but with random changes in another.[106] Males with arthritis had higher adjusted odds of total[86] (OR1.6, 95 percent CI 1.1; 2.4) or urge UI (OR 1.8, 95 percent CI 1.4; 2.4).[176]

Dementia was associated with an increase adjusted odds of UI in nursing home male residents[4] but not in community dwelling older men in Japan.[58] The National Population Health Survey in Canada reported that use of narcotics, laxatives, and diuretics were associated with greater odds of UI independent of other risk factors.[86] Memory problems, epilepsy, and neurological diseases were associated with higher rates of UI (Figure 23).[4,58,72,86,97,176-178] Stroke was shown as a strong and independent risk factor for UI (Figure 24) in nursing home residents[4] and in community dwelling males[58,86,97,176,177] with a pooled odds ratio of 2.12 (95 percent CI 1.36; 3.29). Restrictions in activities of daily living were associated with higher crude and adjusted odds of UI in males in all studies that examined the relationship (Figure 25).[4,81,92,97,106,114]

Males with urinary tract infections had higher adjusted rates of UI (Figure 26) with a pooled odds ratio of 3.5 (95 percent CI 2.3; 5.2).[72,74,92,97,106] Acute genitourinary toxicity, enuresis, incomplete urination, and other urological conditions were associated with higher adjusted odds of UI in all studies that examined the relationship (Figure 27).[72,170,174,179]

Men with prostate diseases had higher rates of UI after adjustment for confounding factors in the majority of the studies (Figure 28).[72,83,92,170,176,180-183] Prostate cancer (RR 2 95 percent, CI 1.5; 2.8), radical prostatectomy (RR 4.3, 95 percent CI 2.6; 7.3), and radiotherapy for prostate cancer (RR 2.3, 95 percent CI 1.3; 4.1) were associated with increased adjusted relative risk of UI.[180]

Summary. Consistent published evidence, Level IIb-III suggested that poor general health, limitation in daily activities, stroke, diabetes, and treatments for prostate cancer were associated with higher risk of UI in men.

Association between Stroke and UI in Community Dwelling Adults

Acute stroke was associated with a 280-520 percent higher prevalence of UI compared to age-matched adults without stroke.[177] The prevalence of UI among patients with acute stroke varied from 7 percent[646] to more than 30 percent[220,647-649] (Table 22).The prevalence varied depending on definitions of UI from 11 percent for partial to 36 percent for complete UI.[220] One study reported the incidence of UI in patients with stroke as 2 percent for women and 4 percent for men.[650] The prevalence decreased with the time of followup after an acute stroke (11 to 36 percent) to 8 to 11 percent at 6 months.[220] Elderly patients experienced UI more often, from 35 percent in younger patients to 57 percent among those older than 80 years (Table 23).[647] The adjusted odds of UI remained higher 4 years after stroke.[177] Age was associated with increased risk of UI among patients with stroke by 72 percent per 10 years.[220] The results, however, were not consistent across the studies, with 16 times greater odds of UI after 75 years of age in one study[651] but an association in the opposite direction in another.[652] Functional impairment after stroke including dysphasia, dysphagia, visual field defect, motor weakness, and cognitive impairment was associated with significant increase in UI.[177,651-653]

Risk Factors for UI in LTC Settings

Association between risk factors and UI in LTC settings. The prevalence of UI increased with the length of stay in nursing homes from 39 percent at 2 weeks to 44 percent at 1 year after admission.[28] It is not clear if this is an effect of prolonged exposure or a difference in case mix (Table 24). The majority of residents with cognitive impairment experienced UI (72 to 84 percent).[1] The proportion of incontinent patients increased responding to severity of impairment, from 60 percent in mild to 93 percent in severely demented.[34] Physical dependency was associated with a higher prevalence of UI, from 26 percent in independent residents to 81 percent immobile.[34] The prevalence of UI among dependent residents was more than 70 percent in seven countries and varied from 87 percent in Iceland to 72 percent in the United States.[1] The prevalence of UI among residents with diabetes ranged from 55 percent[29] to 65 percent.[34] Almost all (93 percent) residents with FI also experienced UI.[29] One study of 9,013 patients with multiple sclerosis reported 21 percent UI and 9 percent of frequent UI.[654] The estimations were not consistent; however, the prevalence of UI among patients with urinary tract infection in Italy was 63 percent in one study[1] and 81 percent in another.[29] Few studies examined adjusted odds ratios of UI among residents in LTC independent of other confounding factors. Aging was associated with increased odds of UI by 3 percent per year to 24 percent per 5 years of age (Table 25).[4,165] In contrast with higher incidence of UI in males,[166] prevalence of UI was lower in males than females in two studies[29,165] of three [29 ,165,655] that examined this association. Race, BMI, diabetes, arthritis, and cardiovascular diseases did not show significant association with UI, but the evidence was limited to one state survey of nursing homes.[4,165]

Stroke increased the adjusted odds of UI by 20 to 40 percent.[4,165] Physical dependency was a strong and independent risk factor for UI in several studies (Table 26).[4,29,164,165] Impairment of ADLs was associated with three to four times larger odds of UI.[4,164] Residents with dependency

in toilet use experienced UI six times more often.[165] The odds of UI were seven times higher among wheelchair users and bedridden residents.[29] Mental impairment was associated with 192 to 361 percent higher prevalence of UI.[29]

FI was associated with ten[29] to 20[165] times larger odds of UI. The conditions that assume intensive bowel control and frequent checking of wet condition of residents, including tube feeding and diarrhea, were associated with lower UI. In conclusion, consistent evidence suggests that restrictions in ADL, physical dependency, and cognitive impairment are risk factors for UI in LTC. Factors that induce UI also seem to affect FI.

Figure 3. Association between incident UI in women of different races compared to Caucasian women (results from two studies)[123,149]

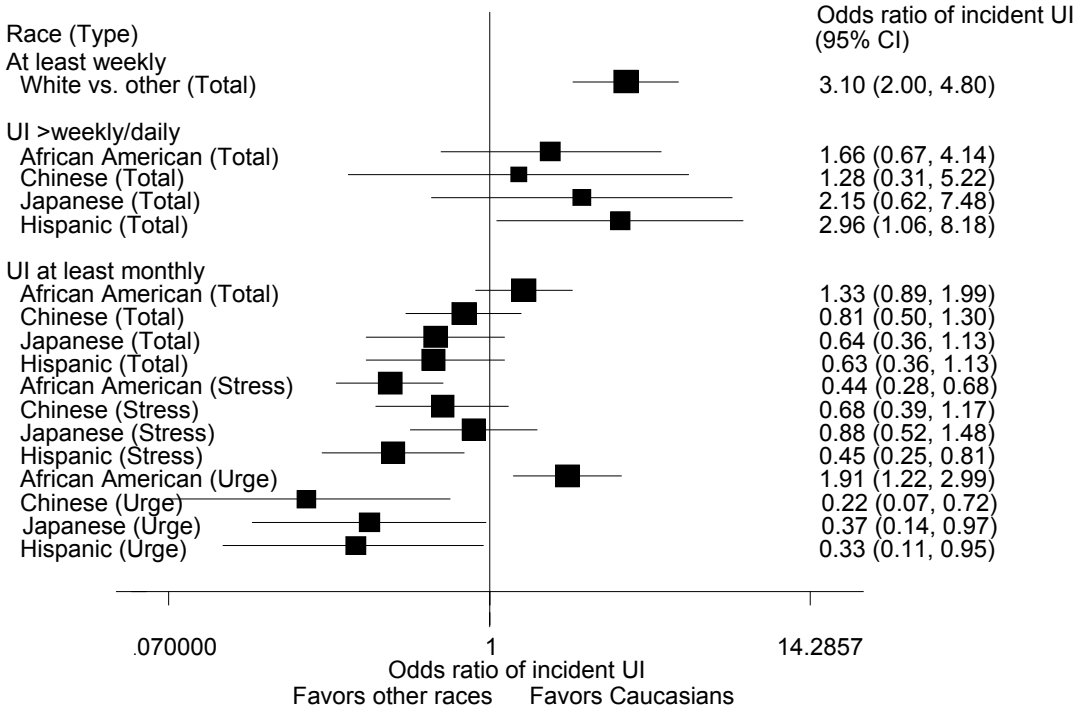


Figure 4. Prevalent UI in African American women compared to Caucasian women

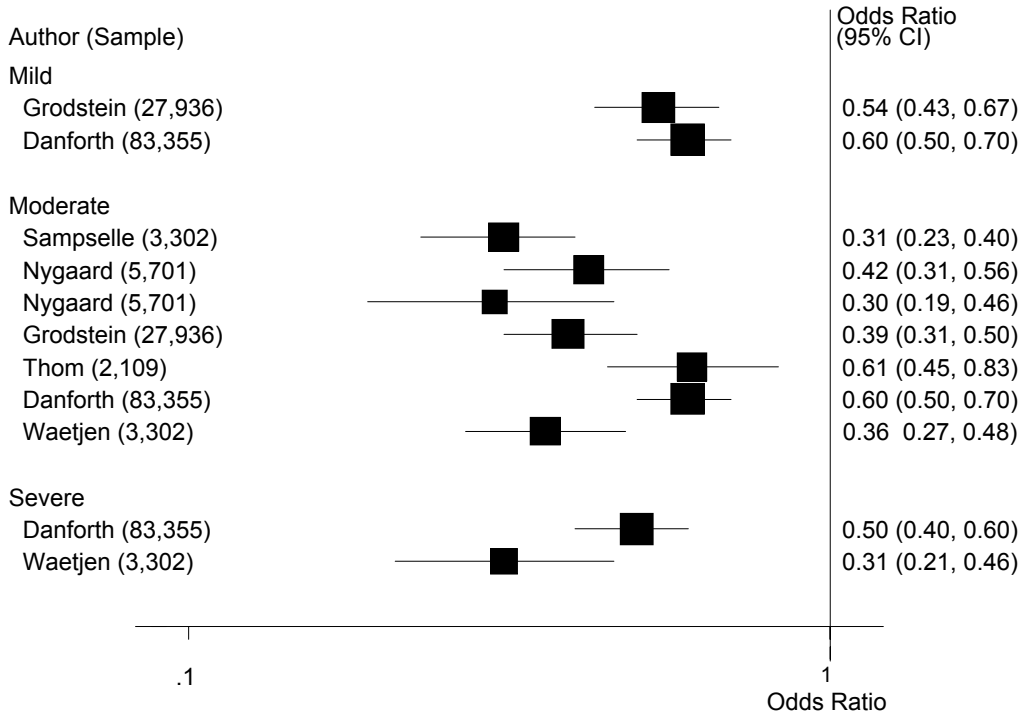


Figure 5. Prevalent UI in Hispanic women compared to Caucasian women

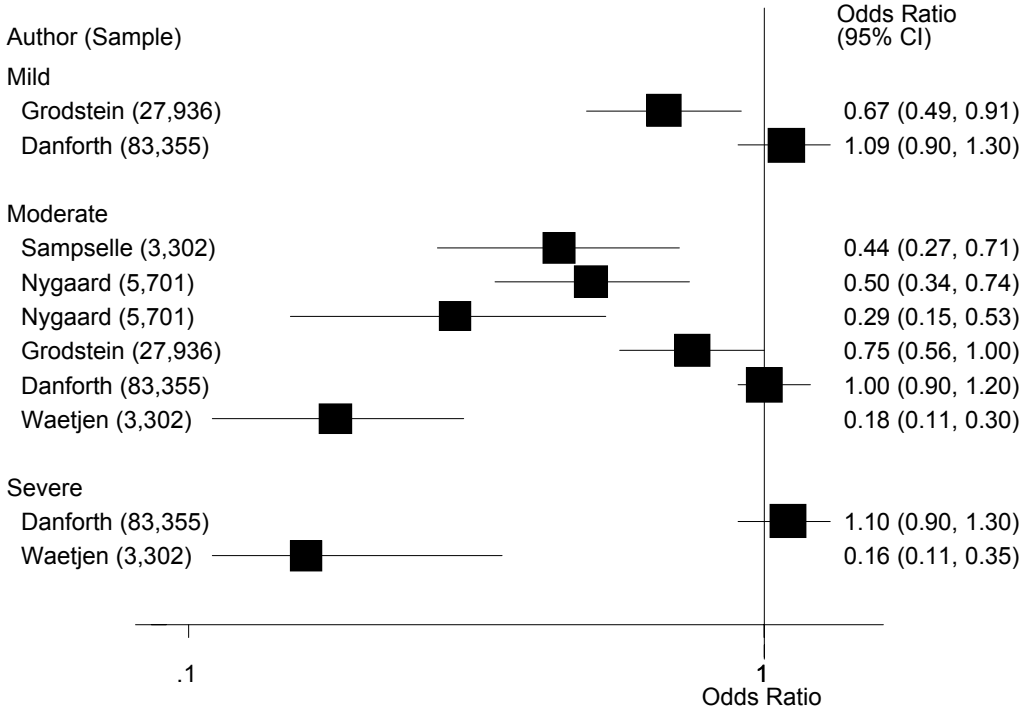


Figure 6. Association between prevalent UI and BMI in women depending on time of having UI

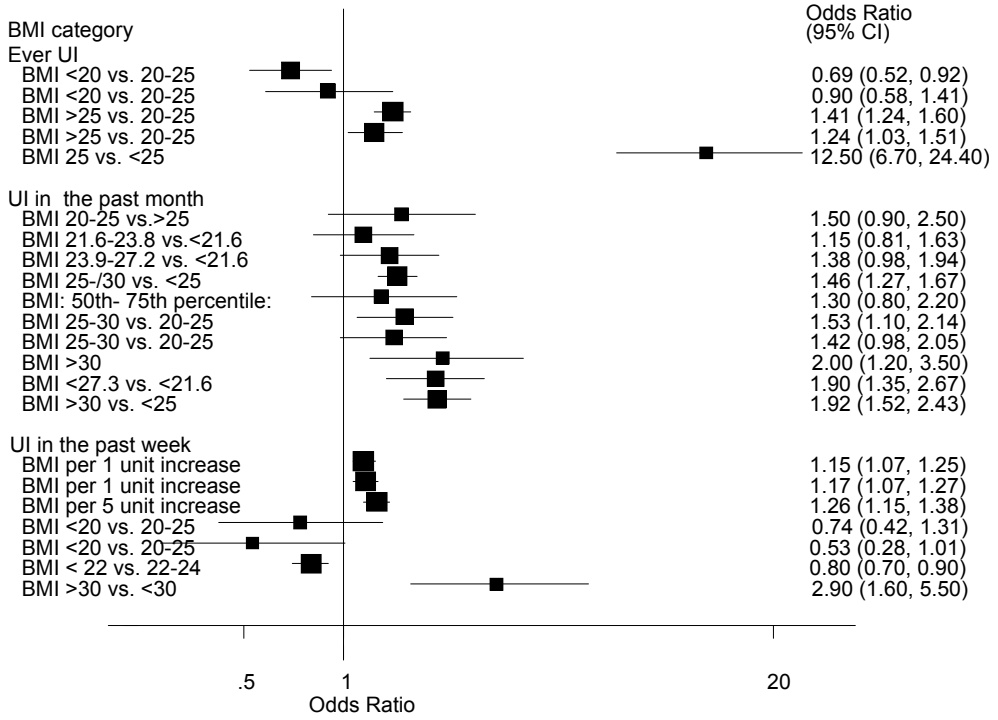


Figure 7. Association between prevalent UI and BMI in women who reported involuntary urine loss in the past year

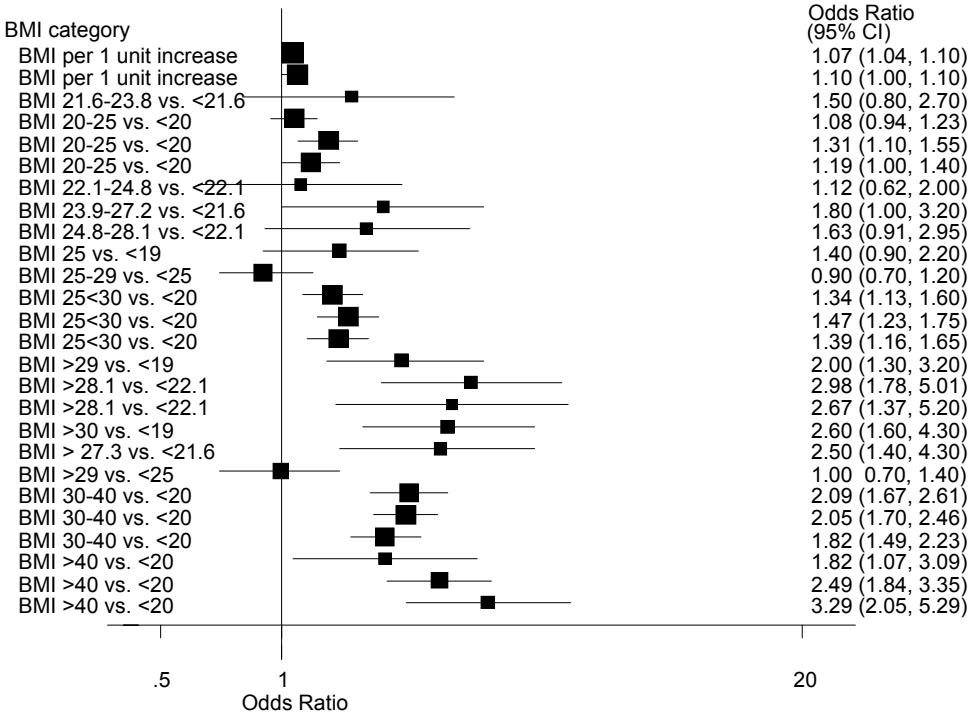


Figure 8. Association between severity of prevalent UI and BMI in women

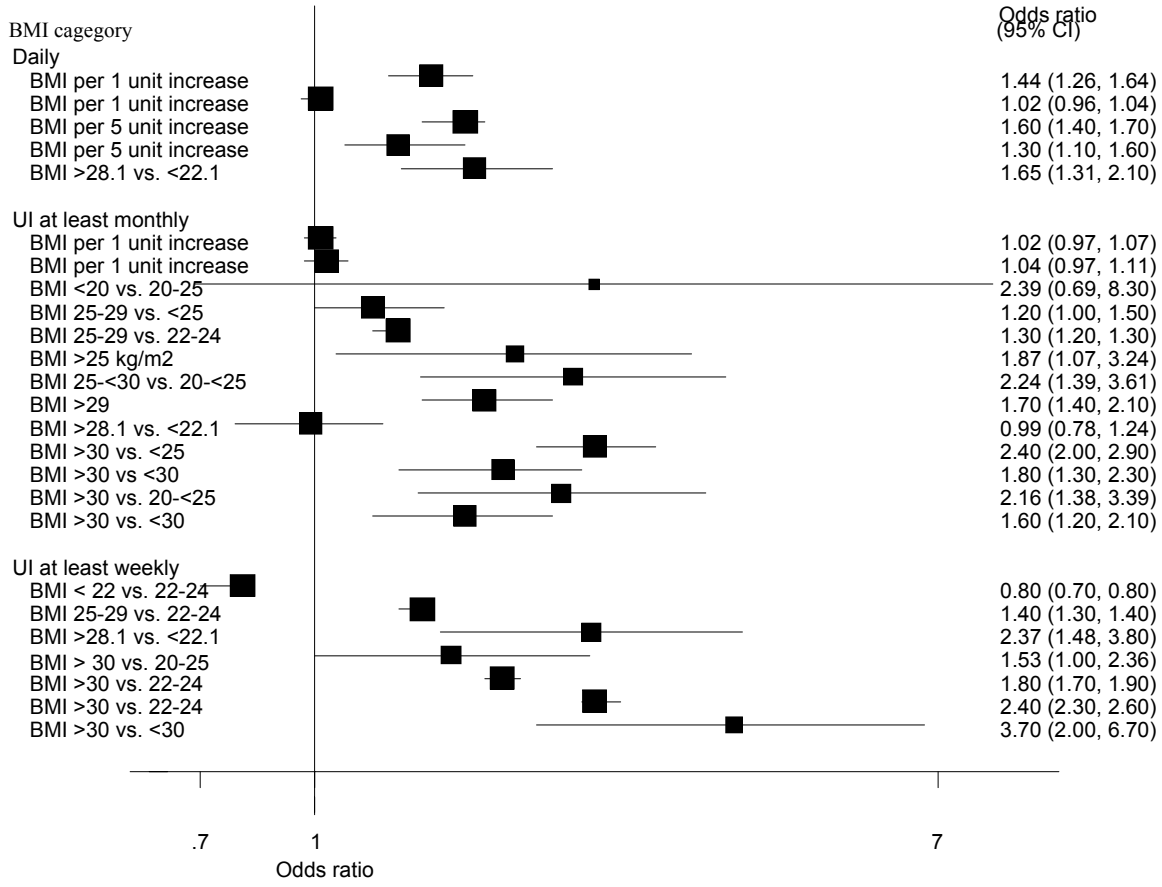


Figure 9. Association between severity of prevalent stress UI and BMI in women

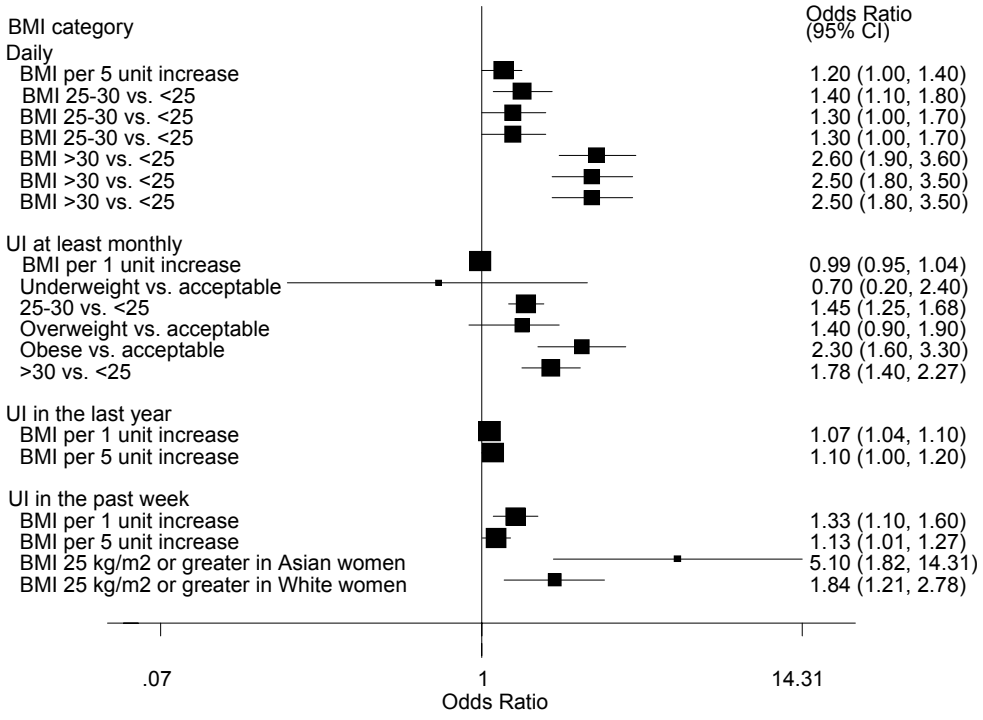


Table 18. Association between parity and UI in females

Author	Incontinence	Parity	OR (95% CI)
Brown, 1996[55]	Daily UI	Number of live births >2 vs. 1	1.2 (1.0; 1.6)
Thom1997[59]	UI	Parity 2	1.4 (0.5; 2.1)
		Parity 3	1.5 (0.7; 2.9)
		Parity 4	1.5 (0.9; 2.7)
Chiarelli, 1999[68]	UI	Once vs. never	2.82 (2.37; 3.35)
		Twice vs. never	2.59 (1.86; 3.61)
		Three or more vs. never	4.84 (2.54; 9.20)
Kuh, 1999[70]	Severe incontinence	Number of children	1.2 (0.99, 1.5)(
Bortolotti, 2000[72]	Total UI	Parity 0	1 (1; 1)
		Parity 1	1.3 (0.7; 2.4)
		Parity 2	1.9 (1; 3.3)
		Parity >3	2.2 (1.2; 4)
	Stress UI	Parity 0	1
		Parity 1	3.9 (1.6; 9.5)
		Parity 2	3.9 (1.7; 9)
		Parity >3	3.7 (1.5; 9.1)
	Urge UI	Parity 0	1
		Parity 1	0.2 (0.2; 3.1)
		Parity 2	0.8 (0.4; 5)
		Parity >3	1.5 (0.4; 5.3)
	Mixed	Parity 0	1
		Parity 1	0.2 (0.1; 0.8)
		Parity 2	0.8 (0.3; 1.9)
		Parity >3	1.5 (0.6; 3.3)
Rortveit 2001[195]	Total UI	Parity 0	1
		Parity 1	1.6 (1.5; 1.8)
		Parity 2	1.8 (1.6; 1.9)
		Parity 3	2 (1.8; 2.2)
		Parity >4	2.3 (2.1; 2.5)
	Stress UI	Parity 0	1
		Parity 1	1.9 (1.6; 2.2)
		Parity 2	2.3 (2.0; 2.6)
		Parity 3	2.4 (2.1; 2.7)
		Parity >4	2.3 (2.0; 2.7)
	Urge UI	Parity 0	1
		Parity 1	1.2 (0.9; 1.6)
		Parity 2	1 (0.8; 1.3)
		Parity 3	1.1 (0.9; 1.5)
		Parity >4	1.5 (1.2; 1.9)
	Mixed UI	Parity 0	1
		Parity 1	1.5 (1.2; 1.8)
		Parity 2	1.7 (1.4; 1.9)
		Parity 3	2.1 (1.8; 2.5)
		Parity >4	2.8 (2.4; 3.3)
	UI	20-34 years old Parity 0	1
		20-34 years old Parity 1	2.2 (1.8; 2.6)
		20-34 years old Parity 2	2.4 (2.0; 2.8)
		20-34 years old Parity 3	2.4 (2.0; 3.0)
		20-34 years old Parity >4	3.3 (2.4; 4.4)
	Stress	20-34 years old Parity 0	1
		20-34 years old Parity 1	2.7 (2.0; 3.5)
		20-34 years old Parity 2	3.4 (2.7; 4.4)
		20-34 years old Parity 3	3.6 (2.7; 4.8)
		20-34 years old Parity >4	4 (2.5; 6.4)
	Urge	20-34 years old Parity 0	1
		20-34 years old Parity 1	1.7 (1.1; 2.8)

Table 18. Association between parity and UI in females (continued)

Author	Incontinence	Parity	OR (95% CI)
		20-34 years old Parity 2	1 (0.6; 1.7)
		20-34 years old Parity 3	1.2 (0.6; 2.3)
		20-34 years old Parity >4	1 (0.2; 4.1)
	Mixed	20-34 years old Parity 0	1
		20-34 years old Parity 1	1.9 (1.4; 2.7)
		20-34 years old Parity 2	2.3 (1.7; 3.1)
		20-34 years old Parity 3	1.7 (1.1; 2.6)
		20-34 years old Parity >4	4 (2.3; 7.0)
	UI	35-44 years old Parity 0	1
		35-44 years old Parity 1	1.4 (1.1; 1.9)
		35-44 years old Parity 2	1.5 (1.2; 1.9)
		35-44 years old Parity 3	1.6 (1.3; 2.1)
		35-44 years old Parity >4	1.6 (1.2; 2.2)
	Stress	35-44 years old Parity 0	1
		35-44 years old Parity 1	1.9 (1.2; 2.9)
		35-44 years old Parity 2	2.2 (1.5; 3.2)
		35-44 years old Parity3	2.4 (1.6; 3.6)
		35-44 years old Parity >4	2.1 (1.4; 3.2)
	Urge	35-44 years old Parity 0	1
		35-44 years old Parity 1	1.3 (0.5; 3.5)
		35-44 years old Parity 2	1.1 (0.5; 2.5)
		35-44 years old Parity 3	1.1 (0.5; 2.6)
		35-44 years old Parity >4	1.8 (0.7; 4.6)
	Mixed	35-44 years old Parity 0	1
		35-44 years old Parity 1	1 (0.6; 1.7)
		35-44 years old Parity 2	1 (0.6; 1.5)
		35-44 years old Parity 3	1.1 (0.7; 1.7)
		35-44 years old Parity >4	1.2 (0.8; 2.0)
	UI	45-54 years old Parity 0	1
		45-54 years old Parity 1	1.7 (1.3; 2.2)
		45-54 years old Parity 2	1.6 (1.3; 2.1)
		45-54 years old Parity 3	1.7 (1.3; 2.2)
		45-54 years old Parity >4	2 (1.5; 2.6)
	Stress	45-54 years old Parity 0	1
		45-54 years old Parity 1	1.5 (1.0; 2.2)
		45-54 years old Parity 2	1.7 (1.2; 2.3)
		45-54 years old Parity 3	1.5 (1.1; 2.1)
		45-54 years old Parity >4	2 (1.4; 2.8)
	Urge	45-54 years old Parity 0	1
		45-54 years old Parity 1	1.5 (0.6; 3.8)
		45-54 years old Parity 2	1.1 (0.5; 2.5)
		45-54 years old Parity 3	1.1 (0.5; 2.5)
		45-54 years old Parity >4	0.8 (0.3; 2.2)
	Mixed	45-54 years old Parity 0	1
		45-54 years old Parity 1	2 (1.1; 3.5)
		45-54 years old Parity 2	1.5 0.9; 2.6)
		45-54 years old Parity 3	2.3 (1.4; 3.8)
		45-54 years old Parity >4	2.4 (1.4; 4.1)
	UI	55-64 years old Parity 0	1
		55-64 years old Parity 1	1.9 (1.4; 2.7)
		55-64 years old Parity 2	1.6 (1.2; 2.1)
		55-64 years old Parity 3	1.8 (1.3; 2.4)
		55-64 years old Parity >4	1.9 (1.4; 2.6)
	Stress	55-64 years old Parity0	1
		55-64 years old Parity 1	1.9 (1.2; 3.1)
		55-64 years old Parity 2	1.2 (0.8; 1.9)
		55-64 years old Parity 3	1.5 (1.0; 2.2)
		55-64 years old Parity >4	1.3 (0.9; 2.0)
	Urge	55-64 years old Parity 0	1

Table 18. Association between parity and UI in females (continued)

Author	Incontinence	Parity	OR (95% CI)
		55-64 years old Parity 1	0.7 (0.2; 2.5)
		55-64 years old Parity 2	1.1 (0.4; 2.6)
		55-64 years old Parity 3	1.2 (0.5; 2.8)
		55-64 years old Parity >4	1.2 (0.5; 2.7)
	Mixed	55-64 years old Parity 0	1
		55-64 years old Parity 1	2.8 (1.3; 6.2)
		55-64 years old Parity 2	3.1 (1.5; 6.3)
		55-64 years old Parity 3	3.4 (1.7; 6.8)
		55-64 years old Parity >4	4.6 (2.3; 9.2)
	UI	65-74 years old Parity 0	1
		65-74 years old Parity 1	0.9 (0.7; 1.2)
		65-74 years old Parity 2	0.9 (0.8; 1.2)
		65-74 years old Parity 3	1.1 (0.9; 1.3)
		65-74 years old Parity >4	1.1 (0.9; 1.3)
	Stress	65-74 years old Parity 0	1
		65-74 years old Parity 1	0.8 (0.5; 1.3)
		65-74 years old Parity 2	0.8 (0.6; 1.2)
		65-74 years old Parity 3	0.8 (0.6; 1.2)
		65-74 years old Parity >4	1.1 (0.8; 1.5)
	Urge	65-74 years old Parity 0	1
		65-74 years old Parity 1	0.8 (0.4; 1.7)
		65-74 years old Parity 2	1.3 (0.7; 2.2)
		65-74 years old Parity 3	1.1 (0.6; 2.0)
		65-74 years old Parity >4	1 (0.5; 1.7)
	Mixed	65-74 years old Parity 0	1
		65-74 years old Parity 1	1 (0.7; 1.5)
		65-74 years old Parity 2	1 (0.7; 1.4)
		65-74 years old Parity 3	1.3 (0.9; 1.8)
		65-74 years old Parity >4	1.2 (0.9; 1.6)
	UI	>75 years old Parity 0	1
		>75 years old Parity 1	0.9 (0.7; 1.1)
		>75 years old Parity 2	1.1 (0.9; 1.3)
		>75 years old Parity 3	1.1 (0.9; 1.3)
		>75 years old Parity >4	1.2 (1.0; 1.4)
	Stress	>75 years old Parity 0	1
		>75 years old Parity 1	0.8 (0.5; 1.4)
		>75 years old Parity 2	1.1 (0.8; 1.6)
		>75 years old Parity 3	1.1 (0.8; 1.6)
		>75 years old Parity >4	1 (0.7; 1.5)
	Urge	>75 years old Parity 0	1
		>75 years old Parity 1	1.1 (0.6; 1.8)
		>75 years old Parity 2	0.8 (0.5; 1.2)
		>75 years old Parity 3	0.8 (0.5; 1.3)
		>75 years old Parity >4	0.9 (0.6; 1.5)
	Mixed	>75 years old Parity 0	1
		>75 years old Parity 1	0.8 (0.5; 1.3)
		>75 years old Parity 2	1.2 (0.9; 1.7)
		>75 years old Parity 3	1.3 (0.9; 1.8)
		>75 years old Parity >4	1.5 (1.1; 2.0)
Schmidbauer2001[83]	UI	Parity 0	1
		Parity 1	1.36 (1.0; 1.83)
		Parity 2	1.38 (1.05; 1.82)
Sampselle, 2002[93]	UI	Parous	1.62 (1.31; 2.01)
Van Oyen, 2002[92]	UI	Number of children vs.0	1
		Number of children 1 vs.0	2.24 (0.95; 5.27)
		Number of children 2 vs.0	1.8 (0.75; 4.32)
		Number of children 3 vs.0	1.12 (0.36; 3.45)
		Number of children 4 vs.0	1.99 (0.64; 6.12)

Table 18. Association between parity and UI in females (continued)

Author	Incontinence	Parity	OR (95% CI)
Grodstein2003[105]	Occasional leaking urine	Parity 0	1
		Parity 1	1.14 (1.02; 1.28)
		Parity 2	1.26 (1.14; 1.38)
		Parity 3	1.31 (1.19; 1.44)
		Parity 4	1.39 (1.26; 1.53)
		Parity 5+	1.43 (1.29; 1.58)
	At least enough to wet underwear	Parity 0	1 (1)
		Parity 1	1.14 (0.99; 1.32)
		Parity 2	1.23 (1.09; 1.39)
		Parity 3	1.33 (1.18; 1.50)
		Parity 4	1.44 (1.27; 1.64)
		Parity 5+	1.56 (1.38; 1.78)
	Frequent leaking urine	Parity 0	1 (1)
		Parity 1	1.22 (1.08; 1.36)
		Parity 2	1.37 (1.25; 1.51)
		Parity 3	1.47 (1.33; 1.61)
		Parity 4	1.58 (1.43; 1.74)
		Parity 5+	1.72 (1.55; 1.90)
	At least enough to wet underwear	Parity 0	1 (1)
		Parity 1	1.3 (1.13; 1.48)
		Parity 2	1.41 (1.26; 1.58)
		Parity 3	1.54 (1.37; 1.72)
		Parity 4	1.62 (1.44; 1.82)
		Parity 5+	1.83 (1.62; 2.05)
Hvidman, 2003[96]	UI	Vaginal childbirths >1	3.1 (1.7; 5.8)
		OR per vaginal birth	1.53 (1.23; 1.90)
Uustal Fornell, 2004[185]	UI	Children 2 (vs. 1-2)	1.8 (1.2; 3.0)
Melville, 2005[124]	Any UI	Number of deliveries	1.2 (1.1; 1.2)
Moghaddas, 2005[191]	Any UI	Nulliparity (yes)	0.72 (0.58; 0.90)
		Nulliparity (yes)	0.81 (0.61; 1.10)
		Nulliparity (yes)	0.6 (0.42; 0.87)
Rohr, 2005[133]	Any UI	No. of deliveries 0	1
		1 or 2	1.07 (0.90; 1.28)
		3+	1.2 (1.00; 1.44)
	Stress	No. of deliveries 0	1
		1 or 2	1.13 (0.93; 1.37)
		3+	1.27 (1.04; 1.55)
	Urge	No. of deliveries 0	1
		1 or 2	1.02 (0.83; 1.25)
		3+	1.04 (0.84; 1.28)
Danforth, 2006[138]	UI	1 birth	1.4 (1.3; 1.5)
		2 births	1.6 (1.5; 1.7)
		≥3 births	1.6 (1.5; 1.7)
Waetjen, 2007[149]	Prevalent incontinence Any (at least monthly)	Nulliparous	Referent
		Parous	1.43 (1.00; 2.03)
	Prevalent incontinence Frequent (>weekly/daily)	Nulliparous	Referent
		Parous	1.7 (1.05; 2.73)
	Incident incontinence Any (at least monthly)	Nulliparous	Referent
		Parous	1.31 (0.88; 1.96)
	Incident incontinence Frequent (>weekly/daily)	Nulliparous	Referent
		Parous	2.57 (0.58; 11.48)
	Prevalent stress	Nulliparous	Referent
		Parous	1.91 (1.31; 2.79)
	Prevalent mixed	Nulliparous	Referent
		Parous	2.16 (1.26; 3.71)
	Incident stress	Nulliparous	Referent
		Parous	1.44 (0.87; 2.40)

Table 18. Association between parity and UI in females (continued)

Author	Incontinence	Parity	OR (95% CI)
	Incident urge	Nulliparous	Referent
		Parous	0.92 (0.51; 1.68)
Foldspang, 1999[64]	UI	Number of vaginal deliveries	1.2 (1; 1.3)
Chen, 2003[95]	Stress UI	Parities >2	2 (1.1; 3.8)
Rortveit, 2001[195]	UI	0	1
		1	1.6 (1.5; 1.8)
		2	1.8 (1.6; 1.9)
		3	2 (1.8; 2.2)
		>4	2.3 (2.1; 2.5)
	Stress	0	1
		1	1.9 (1.6; 2.2)
		2	2.3 (2.0; 2.6)
		3	2.4 (2.1; 2.7)
		>4	2.3 (2.0; 2.7)
	Urge	0	1
		1	1.2 (0.9; 1.6)
		2	1 (0.8; 1.3)
		3	1.1 (0.9; 1.5)
		>4	1.5 (1.2; 1.9)
	Mixed	0	1
		1	1.5 (1.2; 1.8)
		2	1.7 (1.4; 1.9)
		3	2.1 (1.8; 2.5)
		>4	2.8 (2.4; 3.3)
	UI	20–34 years 0	1
		20–34 years 1	2.4 (1.9; 2.9)
		20–34 years ≥2	2.8 (2.3; 3.3)
		35–64 years 0	1
		35–64 years 1	1.8 (1.5; 2.2)
		35–64 years ≥2	2 (1.6; 2.3)
		>65 years 0	1
		>65 years 1	0.8 (0.7; 1.1)
		>65 years ≥2	1.1 (0.9; 1.3)
Fritel, 2005[135]	Severe stress UI	0	0.5 (0.3; 0.8)
		1	1
		2	1.2 (1.0; 1.6)
		3+	1.2 (0.8; 1.7)
Altman, 2006[196]	Stress	0 (baseline)	
		1	2.4 (1.2; 4.3)
		2	1.7 (0.8; 1.9)
		3–4	1.9 (0.8; 3.1)
	Urge	0 (baseline)	1
		1	2.5 (0.4; 6.2)
		2	3.1 (0.5; 9.7)
		3–4	2.2 (0.7; 9.2)
Burgio, 1996[194]	UI	Number of births	1.218 (0.970, 1.529)
Wilson, 1996[193]	UI	3 months after delivery, parity 2	1.3 (1; 1.8)
		3 months after delivery, parity 3	1.4 (1; 2)
		3 months after delivery, parity 4	1.1 (0.6; 2)
		3 months after delivery, parity 5+	2.2 (1; 4.9)
		3 months after delivery, parity 2, continent before pregnancy	1.5 (1; 2.4)
		3 months after delivery, parity 3, continent before pregnancy	1 (0.6; 1.9)
		3 months after delivery, parity 4, continent before pregnancy	1 (0.4; 2.9)
		3 months after delivery, parity 5+, continent before pregnancy	0.9 (0.1; 8.2)

Figure 10. Odds ratios of UI in females with different numbers of births

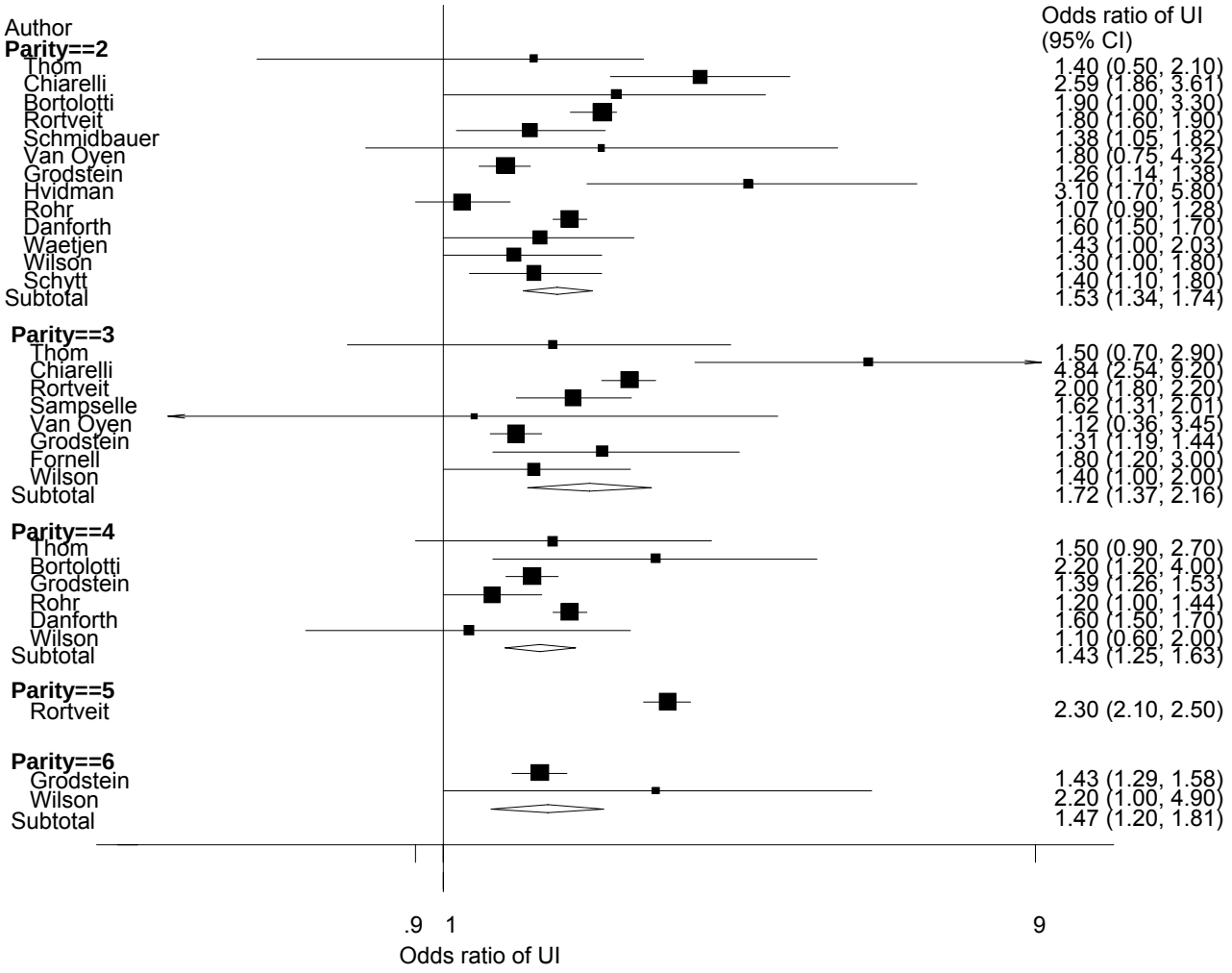


Figure 11 . Odds ratios of stress UI in females with different numbers of births

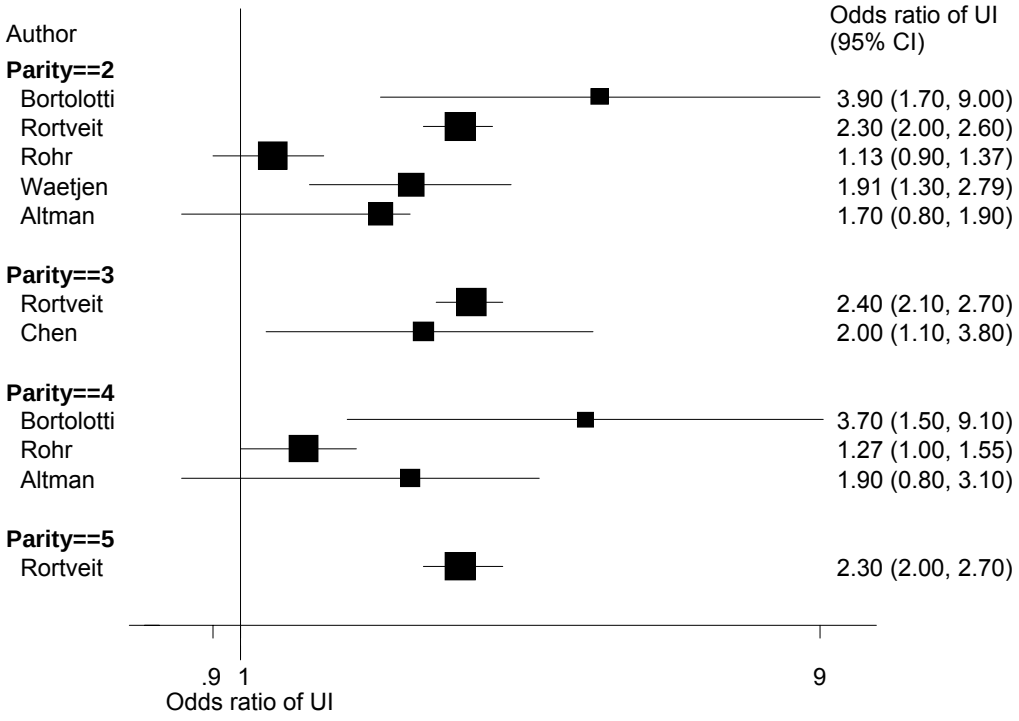


Table 19. Odds ratio of UI according to delivery

Author	Urinary Incontinence	Delivery	Odds Ratio (95% CI)
Cesarean			
Rortveit, 2003[206]	Any UI	Cesarean vs. nulliparous	**1.5 (1.2; 1.9)**
	Moderate/severe UI	Cesarean vs. nulliparous	1.4 (1.0; 2.1)
MacLennan, 2000[7]	Mixed	Cesarean only vs. nulliparous	**2.5 (1.5; 4.3)**
		Both vaginal and Cesarean vs. nulliparous	**4.7 (2.3; 9.3)**
Fritel, 2005[135]	Severe stress UI	Caesarean vs. vaginal	0.8 (0.5; 1.3)
Chaliha, 1999[205]	Stress	Cesarean vs. vaginal	1 (0.8; 1.2)
	Urge	Cesarean vs. vaginal	0.5 (0.2; 1.1)
Hojberg, 1999[204]	UI	Caesarean at 1 pregnancy vs. nulliparous	1.3 (0.4; 4.3)
Farrel, 2001[199]	UI	6 weeks after labored Cesarean vs. elective Cesarean	2.3 (0.3; 17.6)
		6 weeks after Cesarean in second stage vs. elective Cesarean	1.2 (0.1; 12.2)
		6 weeks after Cesarean in labor vs. vaginal	**0.4 (0.2; 0.8)**
		Labored Cesarean vs. elective Cesarean	2.5 (0.3; 18.5)
		Cesarean in second stage vs. elective Cesarean	0.6 (0.04; 9.1)
		Cesarean in labor vs. vaginal	0.6 (0.3; 1.0)
Thompson, 2002[200]	UI	8 weeks after Cesarean vs. vaginal	**0.25 (0.14; 0.44)**
		16 weeks after Cesarean vs. vaginal	**0.59 (0.35; 0.99)**
		24 weeks after Cesarean vs. vaginal	**0.55 (0.31; 0.98)**
Hvidman, 2003[201]	UI	Cesarean vs. vaginal	**0.2 (0.06; 0.9)**
Schytt, 2004[119]	UI	Cesarean vs. vaginal	**0.5 (0.3; 0.9)**
Casey, 2005[202]	UI	Cesarean vs. vaginal	**0.5 (0.3; 0.8)**
Glazener, 2006[197]	UI	Caesarean vs. vaginal	**0.28 (0.19; 0.41)**
Lukacz, 2006[141]	UI	Cesarean vs. nulliparous	1.3 (0.82; 1.9)
Burgio, 2007[203]	UI	Cesarean vs. vaginal	**0.5 (0.3; 0.9)**
Altman, 2006[196]	Stress	Episiotomy vs. noninstrumental	0.9 (0.3; 2.6)
	Urge	Episiotomy vs. noninstrumental	1.7 (0.5; 4.1)
Forceps			
Rortveit, 2003[206]	Any UI	Forceps vs. no forceps	0.9 (0.7; 1.1)
	Mixed	Forceps vs. no forceps	1 (0.7; 1.3)
	Moderate severe UI	Forceps vs. no forceps	0.9 (0.7; 1.2)
	Stress UI	Forceps vs. no forceps	0.9 (0.7; 1.1)
	Urge	Forceps vs. no forceps	0.8 (0.4; 1.5)
MacLennan, 2000[7]	Mixed	At least one forceps vs. nulliparous	**4.3 (2.8; 6.6)**
Fritel, 2005[135]	Severe stress UI	Forceps vs. vaginal	0.8 (0.6; 1.1)
Farrel, 2001[199]	UI	6 weeks after forceps	1.3 (0.6; 2.5)
		6 weeks after forceps vs. vaginal	**1.5 (1.1; 2.2)**
		6 weeks after forceps vs. Cesarean	**4.3 (2.2; 8.2)**
		6 months after forceps vs. vaginal	1.5 (1.0; 2.3)
		Forceps vs. Cesarean	**3.1 (1.7; 5.9)**
Burgio, 2003[198]	UI	Forceps vs. vaginal	**1.87 (1.1; 3.22)**
Casey, 2005[202]	UI	Forceps vs. vaginal	1.5 (0.8; 2.6)
Glazener, 2006[197]	UI	Forceps/breech vs. vaginal	1.18 (0.92; 1.51)
Vacuum Delivery			
Rortveit, 2003[206]	Mixed	Vacuum vs. no vacuum	0.8 (0.5; 1.1)
	Moderate severe UI	Vacuum vs. no vacuum	0.8 (0.6; 1.1)
	Stress UI	Vacuum vs. no vacuum	0.8 (0.6; 1.0)
	Any UI	Vacuum vs. no vacuum	0.8 (0.7; 1.0)
	Urge	Vacuum vs. no vacuum	1.2 (0.7; 2.2)
Altman, 2006[196]	Stress	Vacuum extraction vs. noninstrumental	1.8 (0.3; 2.7)
	Urge	Vacuum extraction vs. noninstrumental	1.5 (0.4; 5.5)
Hvidman, 2003[201]	UI	Vacuum extraction or forceps vs. vaginal	**0.2 (0.03; 0.8)**
Glazener, 2006[197]	UI	Vacuum vs. vaginal	1.16 (0.83; 1.63)

Table 19. Odds ratio of UI according to delivery (continued)

Author	Urinary Incontinence	Delivery	Odds Ratio (95% CI)
Schytt, 2004[119]	UI	Vacuum extraction or forceps vs. vaginal	1.1 (0.7; 1.8)
Vaginal Delivery			
MacLennan, 2000[7]	Mixed	Vaginal only vs. nulliparous	**3.4 (2.4; 4.9)**
Rortveit, 2003[206]	Moderate/severe UI	Vaginal vs. nulliparous	**2.6 (2.1; 3.1)**
	Any UI	Vaginal vs. nulliparous	**2.3 (2.0; 2.6)**
Chen, 2003[95]	Stress UI	Vaginal	1.3 (0.9; 2.1)
Hojberg, 1999[204]	UI	First, vaginal vs. nulliparous	**5.7 (3.9; 8.3)**
		Parity >3; only vaginal vs. nulliparous	**4.8 (3.0; 7.9)**
		Parity 3; only vaginal vs. nulliparous	**7.7 (3.9; 15.3)**
Farrel, 2001[199]	UI	6 weeks after vaginal vs. Cesarean	**2.8 (1.5; 5.3)**
		6 months after vaginal vs. Cesarean	**2.1 (1.1; 3.7)**
Burgio, 2003[198]	UI	12 months after vaginal vs. baseline	**2.36 (1.36; 4.1)**
Lukacz, 2006[141]	UI	Vaginal parous vs. nulliparous	**2.3 (1.7; 3.0)**
		Vaginal parous vs. Cesarean	**1.8 (1.3; 2.6)**
		Vaginal parous vs. unlabored Cesarean	**3.9 (1.5; 9.2)**
		Vaginal parous vs. labored Cesarean	1.6 (1.0; 2.6)
Borcello-France, 2006[231]	UI	Vaginal vs. Cesarean	1.3 (0.8; 2.3)

Bold - significant association at 95% confidence level

Figure 12. Odds ratio of UI after vaginal delivery compared to Cesarean section

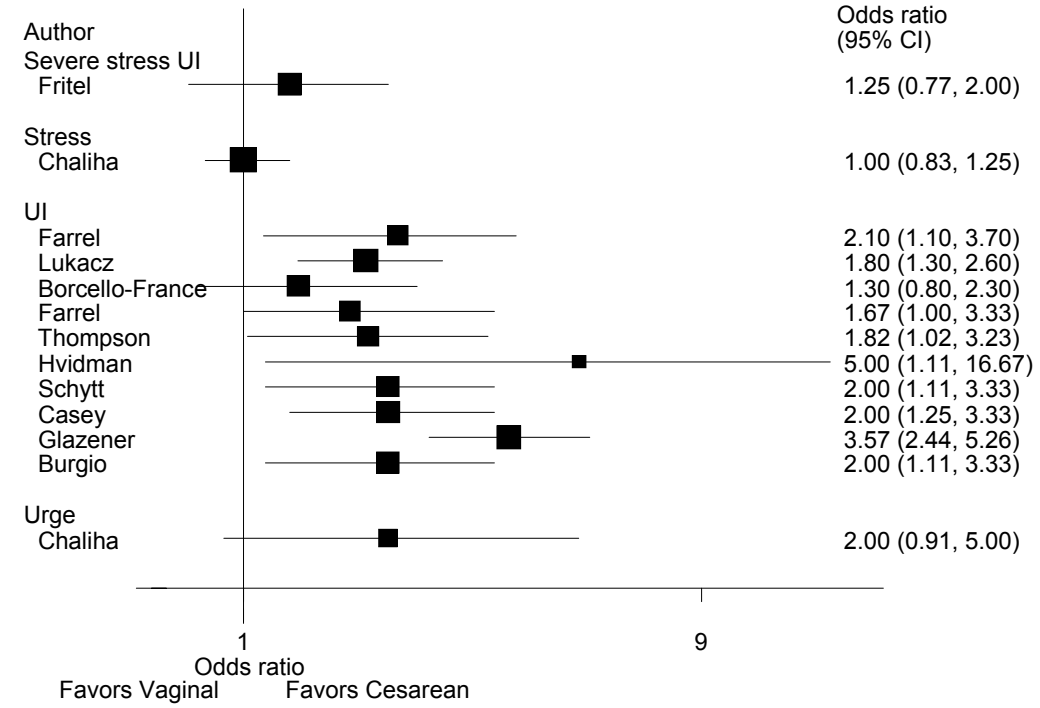


Figure 13. Odds ratio of UI after forceps delivery compared to vaginal or no forceps

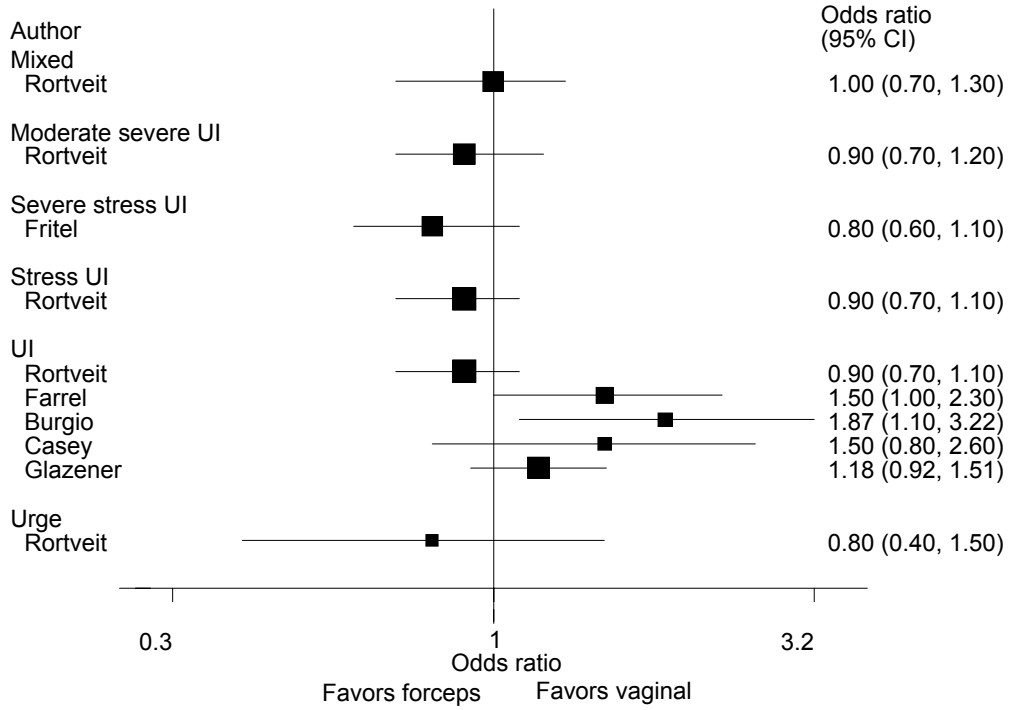


Figure 14. Association between arthritis and UI in women

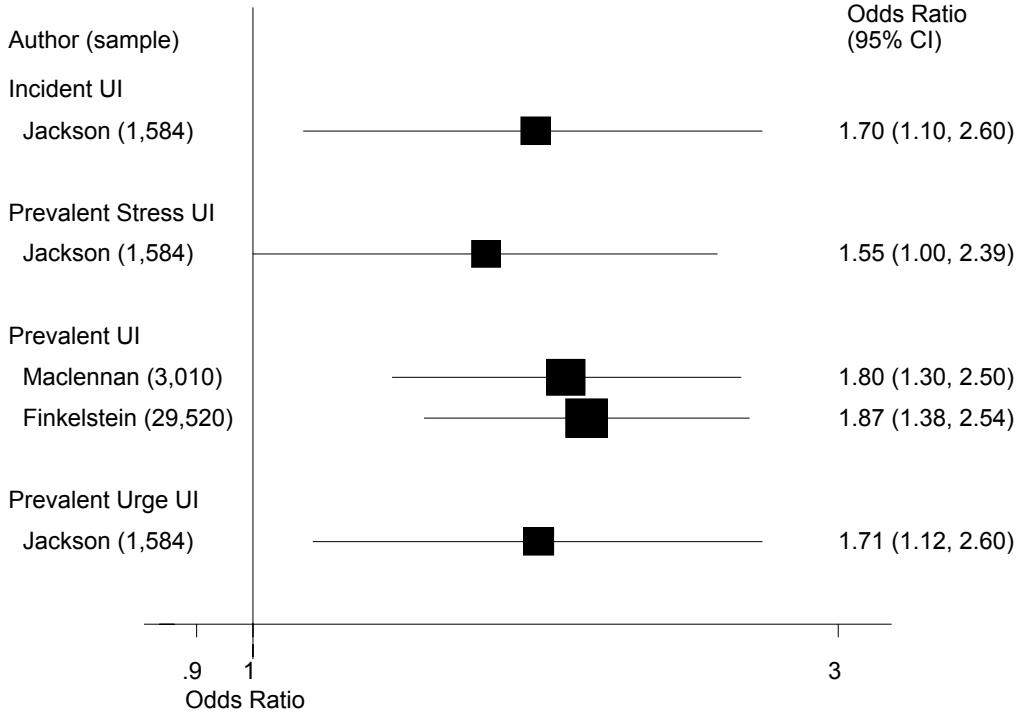


Figure 15. Association between prevalent stress UI and diabetes in females

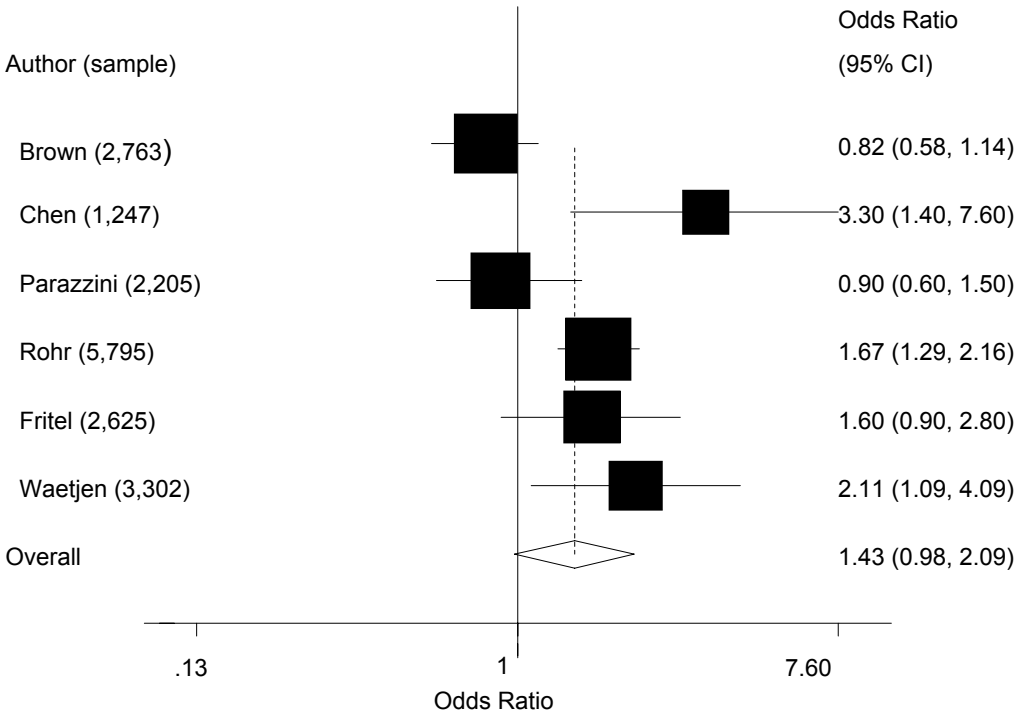


Figure 16. Association between prevalent UI and diabetes in women

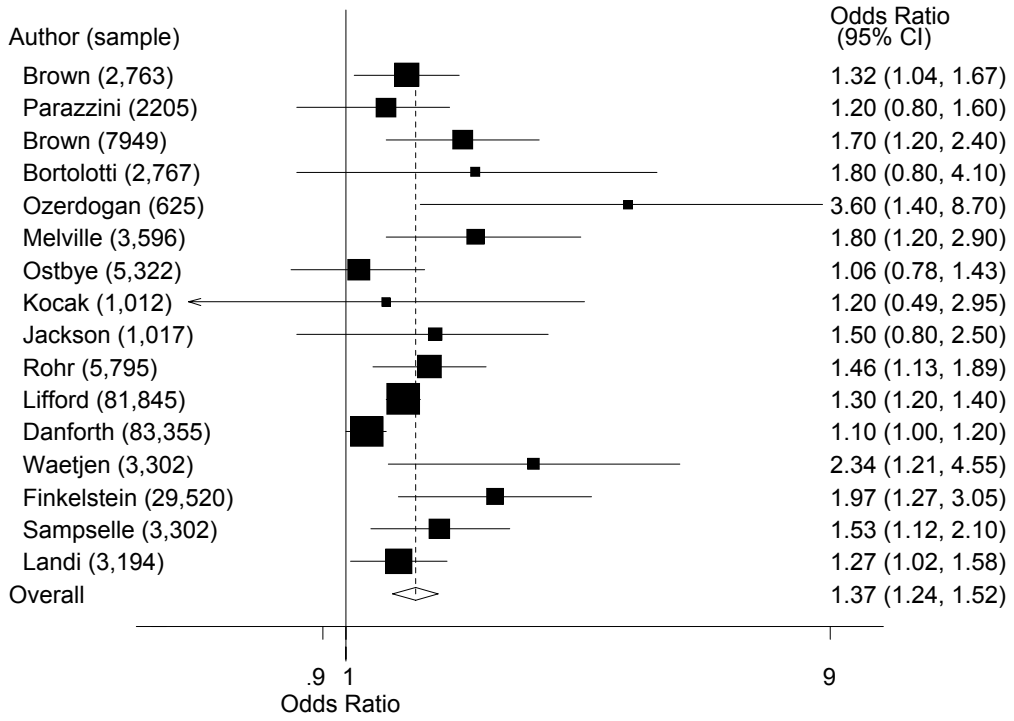


Figure 17. Association between prevalent urge UI and diabetes in women

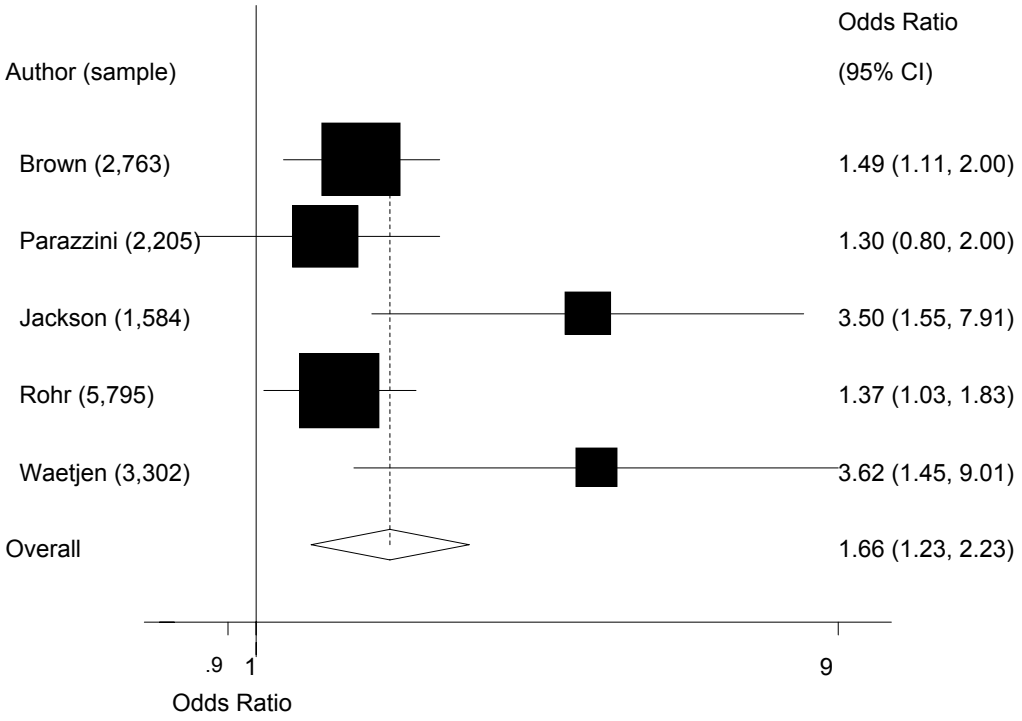


Figure 18. Association between stroke and prevalent UI in women

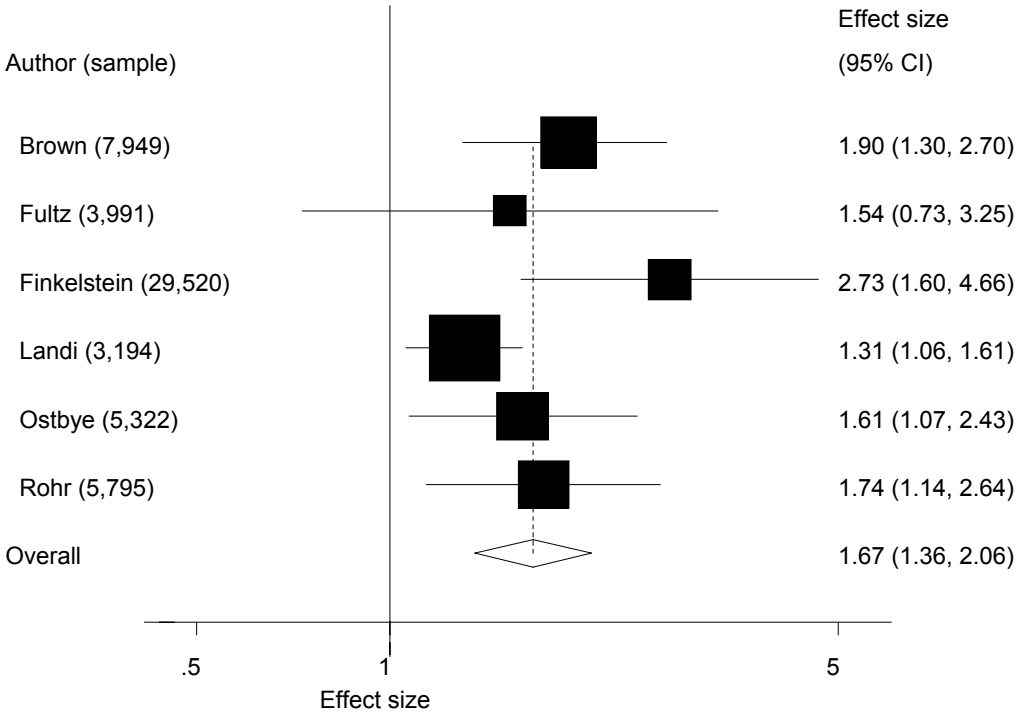


Table 20. Association between age, race, and behavioral risk factors with male UI

Author	Sample	Level of Risk Factors	Relative Measure of the Association (95% CI)
Age (total)			
Maggi, 2001[81]	867	Age >70 years	2.49 (1.45; 4.28)
Landi, 2003[97]	2,178	75–84 vs. 65-74	**0.97 (0.66; 1.44)**
	2,178	>85 vs. 65-74	**1.99 (1.39; 2.84)**
Hu, 2003[175]	12,079	Age 70–74 vs. 65–69	**0.97 (0.84; 1.12)**
	12,079	Age >74 vs. 65–69	**0.99 (0.83; 1.17)**
Nakanishi, 1997[58]	1,405	Age >75	**4.99 (2.63; 9.44)**
Nelson, 2005[4]	2,559	Age (per year)	**1.03 (1.02; 1.04)**
Burkhard, 2006[183]	536	Age	**0.96 (0.90; 1.02)**
Age (stress)			
Maral, 2001[645]	1,000	Age 45-54 vs. 35-44	1.40 (0.14; 13.98)
	1,000	Age 55-64 vs. 35-44	4.54 (0.60; 39.61)
	1,000	Age >65 vs. 35-44	6.03 (0.80; 52.90)
Age (urge)			
Ueda, 2000[74]	968	Age 60-69	**2.16 (0.90; 5.17)**
	968	Age 70-79	**5.34 (2.26; 12.62)**
Nuotio, 2002[578]	171	Age (Per year)	**1.01 (0.95; 1.08)**
Race (total)			
Hu, 2003[175]	12,079	Nonwhite vs. white	**0.88 (0.72; 1.07)**
Coffee (total)			
Bortolotti, 2000[72]	748	Coffee cups/day 1 vs. 0	**0.30 (0.10; 1.00)**
	683	Coffee cups/day 2 vs. 0	**0.30 (0.10; 0.70)**
	1,198	Coffee cups/day 3+ vs. 0	**0.70 (0.20; 2.00)**
Education (total)			
Bortolotti, 2000[72]	748	Education secondary vs. primary education	**0.90 (0.40; 1.80)**
Schmidbauer, 2001[83]	1,236	Secondary or higher education vs. primary	**1.57* (0.92; 2.68)**
Van Oyen, 2002[92]	3,462	Higher education vs. primary	0.76 (0.42; 1.35)
Physical activity (total)			
Schmidbauer, 2001[83]	1,236	Physical activity 1+/week vs. none	**0.49* (0.25; 0.96)**
Van Oyen, 2002[92]	3,462	<4hours/week of physical activity vs. training	1.85 (0.76; 4.46)
	3,462	Sedentary life vs. training	2.70 (1.12; 6.48)
Marital status (total)			
Muscatello, 2001[84]	232	Single vs. married	**1.90 (0.90; 4.20)**
	232	Never married vs. married	**1.50 (0.70; 3.60)**

Bold - adjusted odds ratios; * relative risk; underlined - significant association at 95% confidence level

Figure 19. Association between alcohol intake and male UI

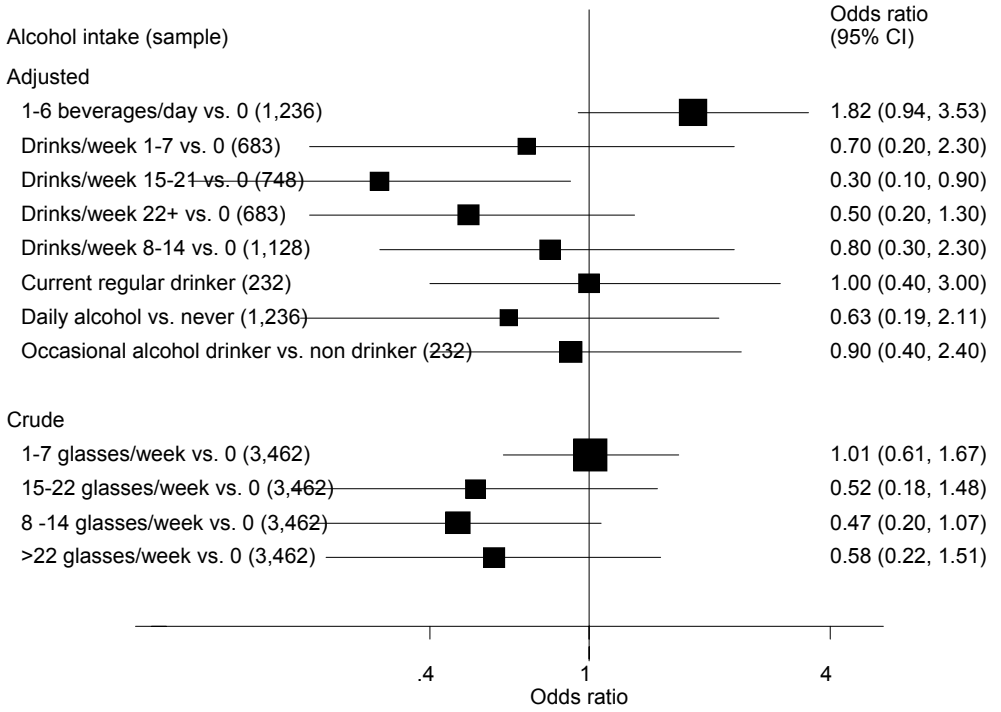


Figure 20. Association between smoking and male UI

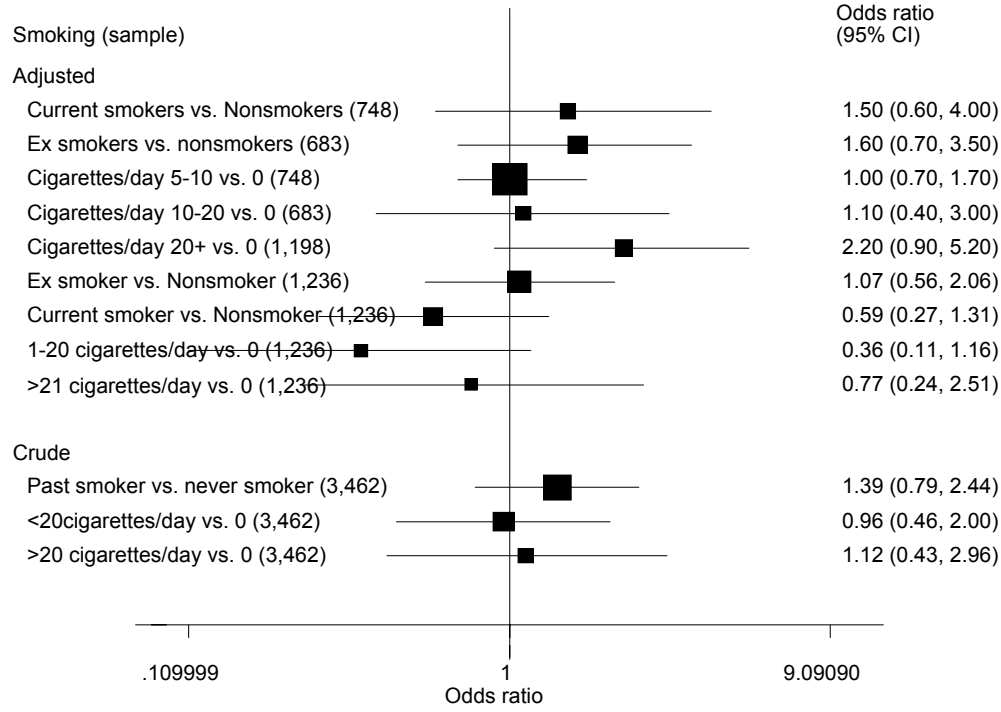


Figure 21. Association between BMI and male UI

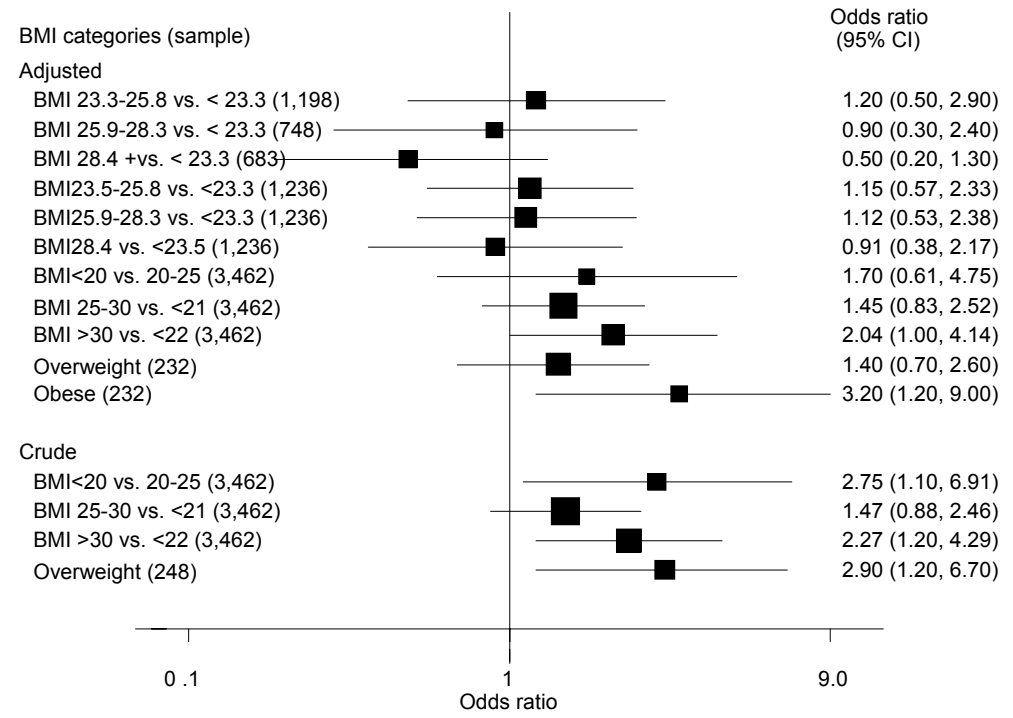


Figure 22. Association between diabetes and male UI (random effects model)

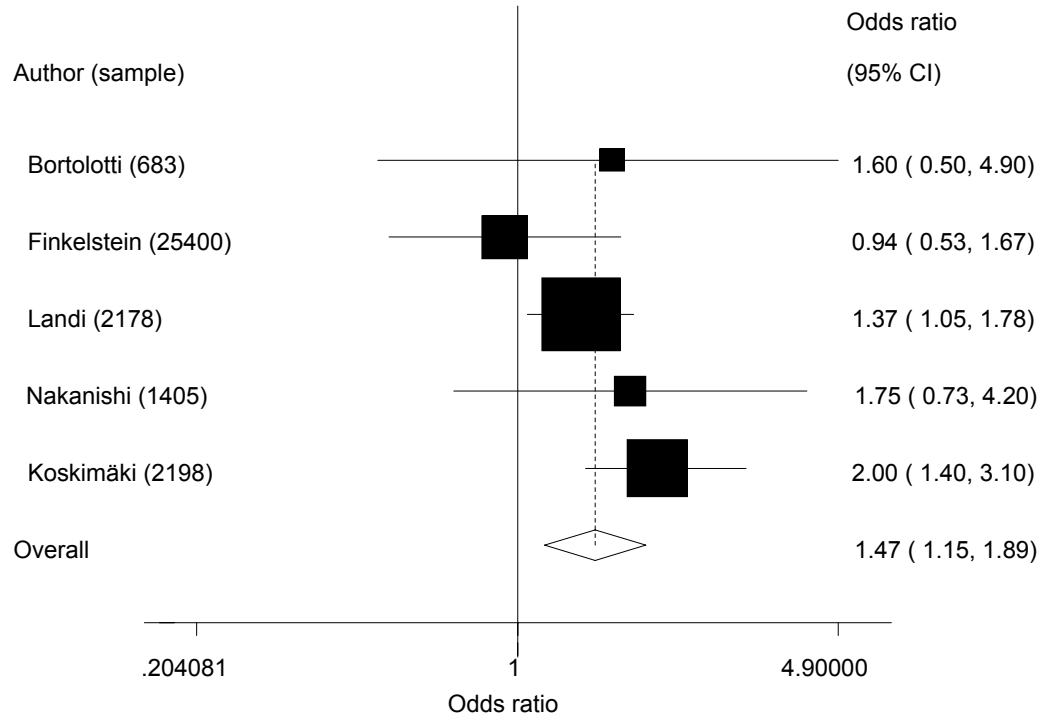


Table 21. Association between risk factors and male UI

Author	Sample	Risk Factor	Relative Measure of Association (95% CI)
Muscatello, 2001[84]	232	Self reported poor health	**4.70 (1.90; 11.40)**
Maggi, 2001[81]	867	Self-rated health	1.69 (1.00; 2.88)
Nakanishi, 1997[58]	1,405	Poor general health	**3.18 (1.72; 5.89)**
Schmidbauer, 2001[83]	1,236	Systolic blood pressure >146 vs. <145	***0.81 (0.44; 1.49)***
		Diastolic blood pressure >90 vs. <90	***1.23 (0.67; 2.27)***
Finkelstein, 2002[86]	25,400	Hypertension	**1.88 (0.81; 4.36)**
		Heart problems	**1.01 (0.58; 1.76)**
Landi, 2003[97]	2,178	Heart failure	**1.06 (0.79; 1.41)**
		Atrial fibrillation	**1.11 (0.82; 1.52)**
Ueda, 2000[74]	968	Angina	2.76
Koskimaki, 2001[176]	2,198	Hypertension	**1.2* (0.90; 1.60)**
		Heart disease	**1.2* (0.90; 1.70)**
Van Oyen, 2002[92]	3,462	Comorbidity	1.67 (0.80; 3.49)
		Comorbidities	3.85 (1.98; 7.51)
		Comorbidity	**1.33 (0.60; 2.94)**
		Comorbidities	**2.65 (1.28; 5.52)**
Maggi, 2001	867	Constipation	**0.76 (0.35; 1.70)**
		Diarrhea	6.92 (2.22; 21.50)
		Comorbidity	1.52 (0.89; 2.61)
Finkelstein, 2002[86]	25,400	Back problems	**2.10 (1.50; 2.93)**
Landi, 2003[97]	2,178	Hip fracture	**1.06 (0.74; 1.51)**
		Constipation	**1.10 (0.86; 1.41)**
Ueda, 2000[74]	968	Constipation	**0.762* (0.35; 1.66)**
Nuotio, 2003[106]	171	Comorbidity	**1.40 (0.66; 2.93)**
Stenzelius, 2004[114]	1,642	Edema in legs	**1.32 (1.11; 1.58)**
		Diarrhea	**0.66 (0.50; 0.88)**
		Dizziness	**1.26 (1.07; 1.50)**
		Fatigue	**1.21 (1.02; 1.44)**
Koskimaki, 2001[176]	2,198	Lower back pain	**1.6* (1.00; 2.30)**
		Constipation	**1.3* (0.80; 2.20)**
		Inguinal hernia	**1.9* (0.90; 4.00)**
Landi, 2003[97]	2,178	CPS score 2-4 vs. 0-1	**2.04 (1.61; 2.58)**
		CPS score >5 vs. 0-1	**5.37 (3.90; 7.38)**
Nuotio, 2003[106]	171	Fecal incontinence	**3.50 (0.24; 50.37)**
Koskimaki, 2001[176]	2,198	FI	**17* (7.50; 40.00)**
Finkelstein, 2002[86]	25,400	Arthritis	**1.59 (1.07; 2.38)**
Nelson, 2005[4]	2,559	Arthritis	**0.80 (0.70; 1.00)**
Koskimaki, 2001[176]	2,198	Arthritis	**1.8* (1.40; 2.40)**
		Rheumatoid arthritis	**1* (0.40; 2.70)**
Nakanishi, 1997[58]	1,405	Dementia	**2.71 (0.41; 17.96)**
Nelson, 2005[4]	2,559	Dementia	**1.50 (1.20; 1.70)**
Schmidbauer, 2001[83]	1,236	Feeling stressed	**0.86 (0.45; 1.63)**
Muscatello, 2001[84]	232	High stress	**1.80 (0.70; 4.40)**
Nuotio, 2003[106]	171	Low social activity	**1.29 (0.61; 2.75)**
		Depressive mood	**2.69 (1.14; 6.34)**
Nakanishi, 1997[58]	1,405	No participation in social activity	**1.10 (0.55; 2.21)**
		No life worth living	**1.29 (0.66; 2.53)**
		Anxiety	**1.55 (0.78; 3.05)**
Bortolotti, 2000[72]	748	BPCO	**1.70 (0.70; 4.00)**
Finkelstein, 2002[86]	25,400	Asthma	**1.30 (0.73; 2.32)**
		COPD	**1.33 (0.74; 2.40)**
Stenzelius, 2004[114]	1,642	Protracted coughing	**1.33 (1.04; 1.69)**
Koskimaki, 2001[176]	2,198	Pulmonary disease	**1.3* (0.90; 1.90)**
Smoger, 2000[181]	840	Use of antispasmodic agents	3.11 (1.00; 9.96)
		diuretics	1.20 (0.84; 1.69)

Table 21. Association between risk factors and male UI (continued)

Author	Sample	Risk Factor	Relative Measure of Association (95% CI)
Van Oyen, 2002[92]	3462	Diuretics	2.24 (1.07; 4.67)
Finkelstein, 2002[86]	25,400	Pain medication	**0.77 (0.52; 1.15)**
		Tranquilizers	**1.16 (0.58; 2.35)**
		Antidepressants	**1.79 (1.00; 3.23)**
		Hypnotics	**1.09 (0.65; 1.84)**
		Narcotics	**2.03 (1.28; 3.20)**
		Laxatives	**2.34 (1.46; 3.75)**
		Asthma medication	**1.55 (0.84; 2.87)**
		BP medication	**0.45 (0.20; 1.00)**
		Heart medication	**1.38 (0.81; 2.35)**
		Diuretics	**2.11 (1.28; 3.47)**
		Antibiotics	**1.11 (0.74; 1.66)**
Nuotio, 2003[106]	171	Polypharmacy	**1.55 (0.68; 3.50)**
		Sleeping medication	**0.70 (0.30; 1.62)**

* urge UI; italic - relative risk; bold - adjusted odds ratios; underlined - significant association at 95% confidence level

Figure 23. Association between neurological diseases and male UI

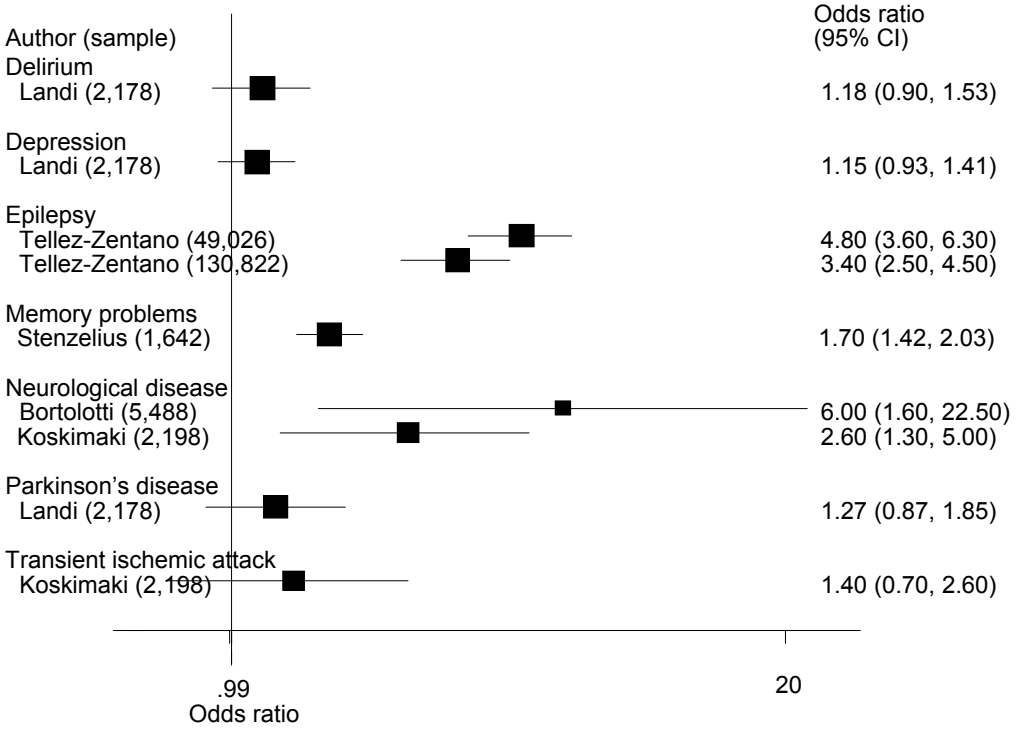


Figure 24. Association between stroke and male U

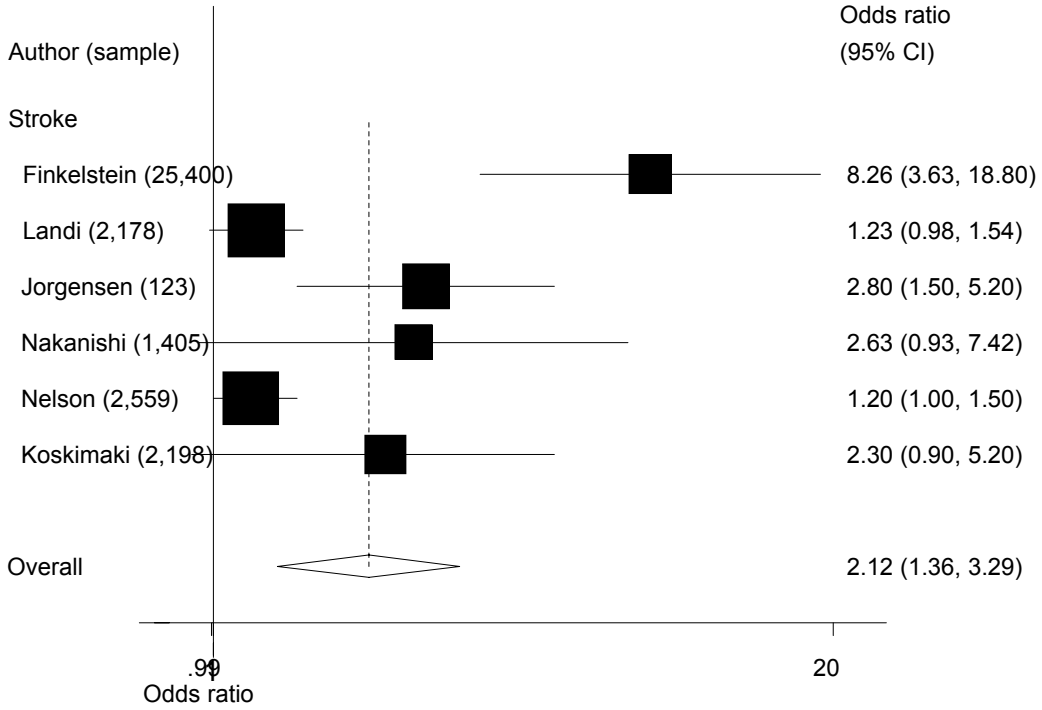


Figure 25. Association between ADL and male UI

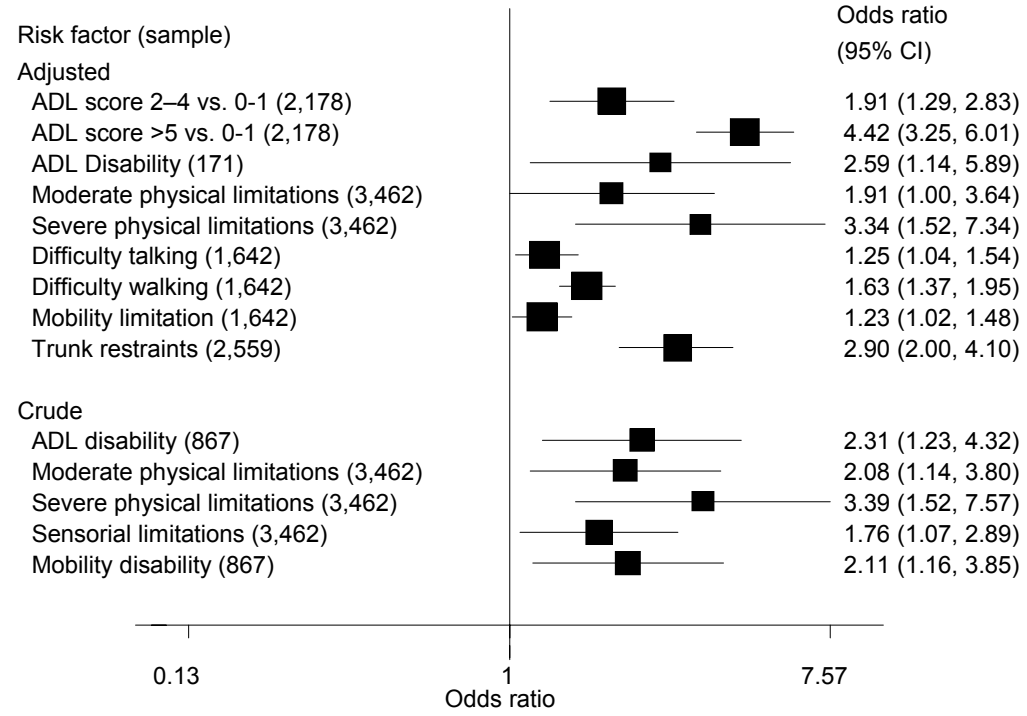


Figure 26. Association between urinary tract infections and symptoms and male UI

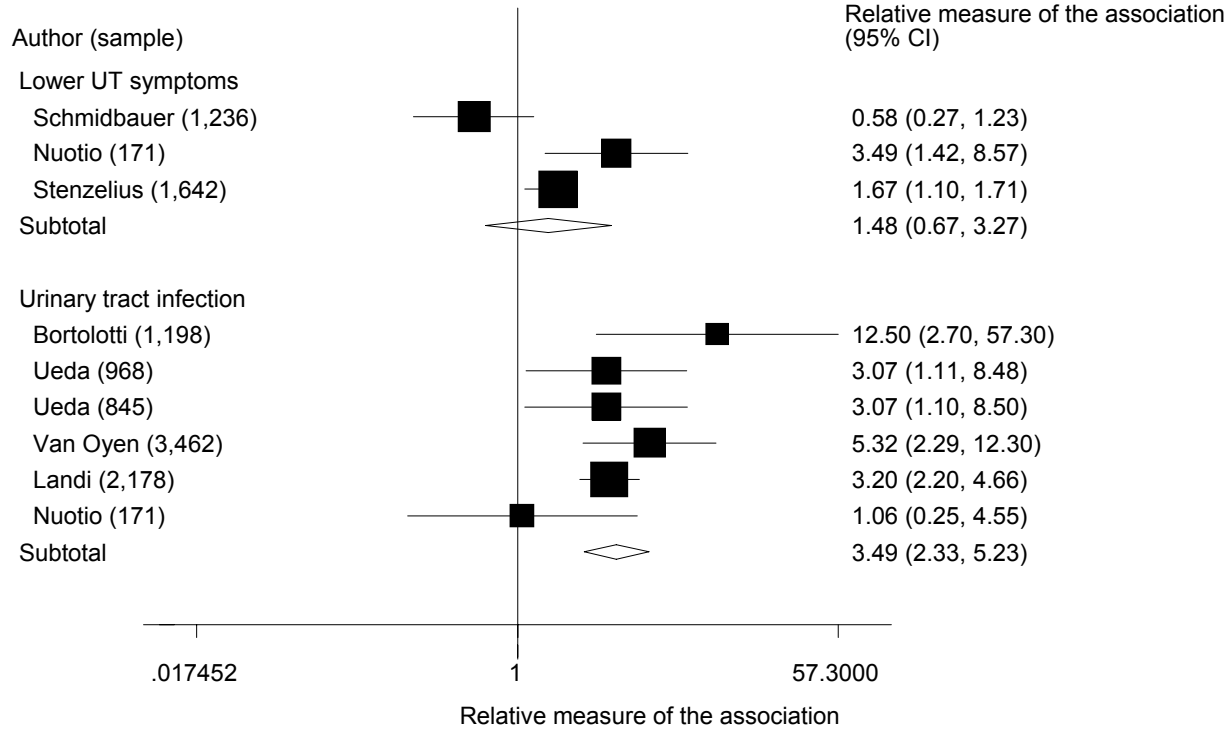


Figure 27. Association between urinary tract conditions and male UI

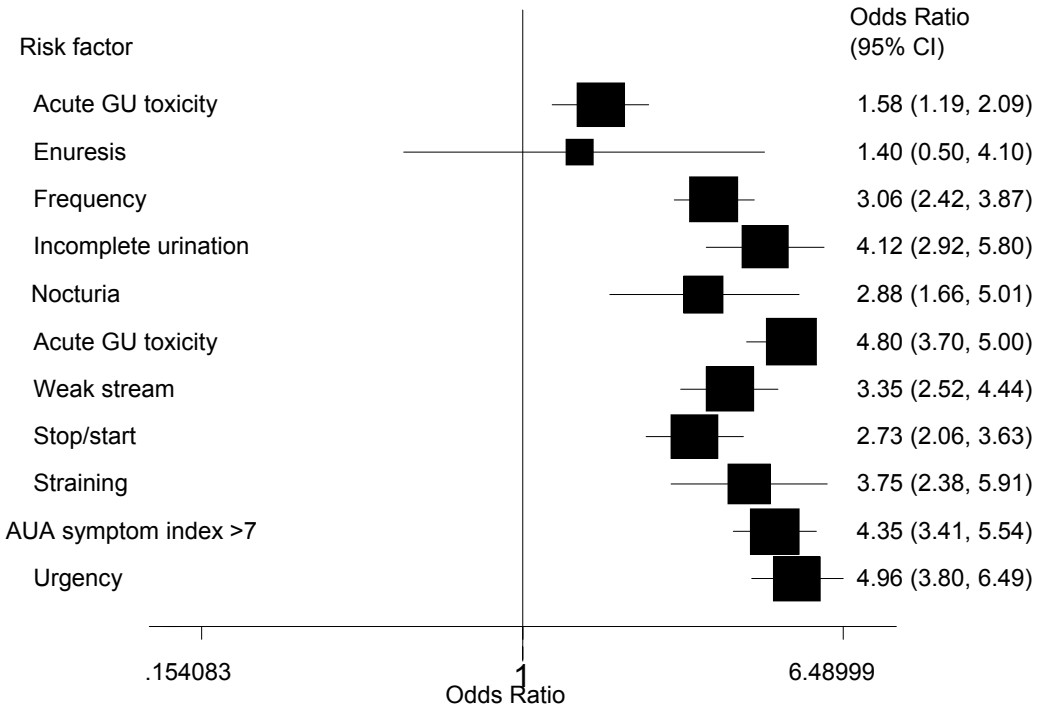
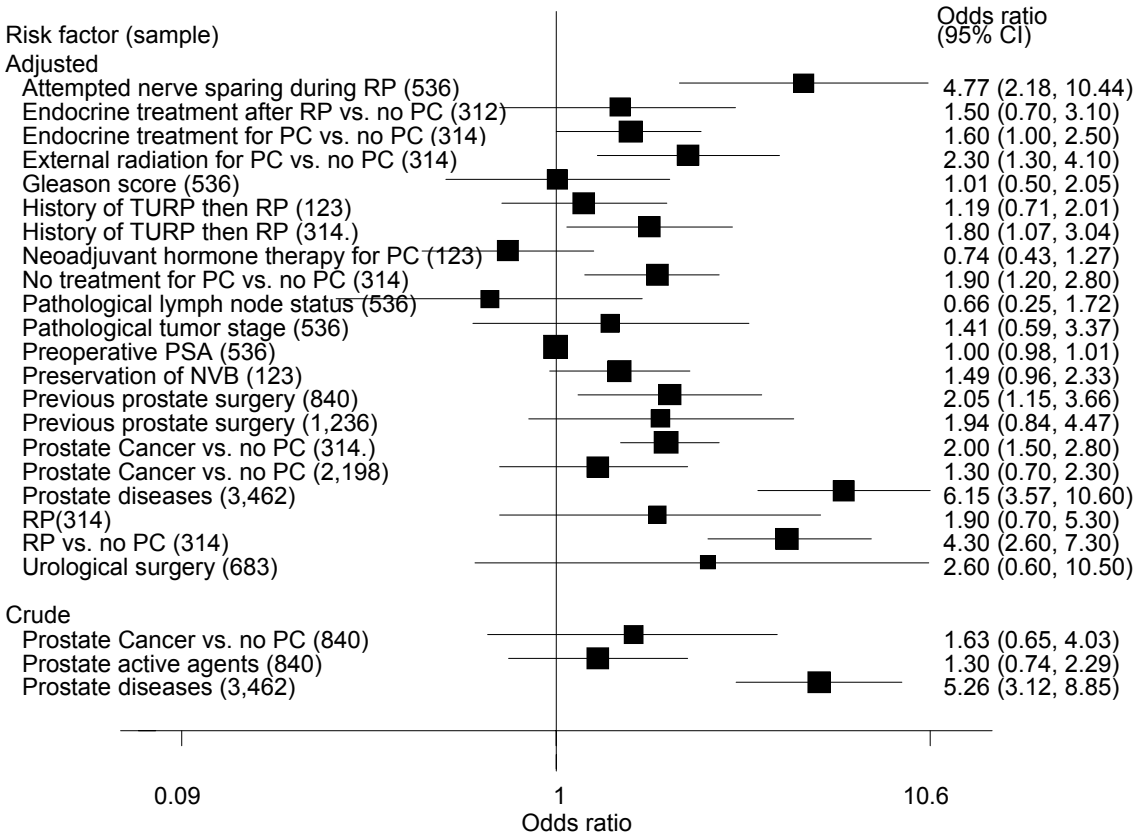


Figure 28. Association between prostate diseases, treatments for prostate disease, and male UI



PC - prostate cancer; RP - radical prostatectomy, TURP - transurethral resection of prostate; PSA - prostate specific antigen; NVB - neurovascular bundle resection

Table 22. Prevalence of UI in patients with stroke

Author	Patient Population	UI	Sample Size	Prevalence (% CI)
Nakayama, 1997[220]	Acute stroke patients from The Copenhagen Stroke Study	Full UI	935	36
	Acute stroke patients from The Copenhagen Stroke Study	Partial UI	935	11
	At discharge	Full UI	935	15
		Partial UI	935	13
	At 6-Month Followup	Full UI	935	8
		Partial UI	935	11
	Full UI on Admission	Full UI at discharge	935	30
		Partial UI at discharge	935	10
		Full UI 6 at month followup	935	14
		Partial UI at 6 month followup	935	10
Di Carlo,1999[647]	Acute first-in-a-lifetime stroke (European Union Concerted Action)	UI in <80 years	3,141	34.9
		UI in >80 years	1,358	57.4
		UI	4,499	41.7
Hankey, 2000[648]	Acute cerebrovascular disease in the Perth Community Stroke Study	UI	492	43.6
Lawrence, 2001[649]	Acute first-in-a-lifetime in the South London Stroke Register	UI	1,259	48.2
	Total anterior circulation infarcts	UI	189	87 (82; 92)
	Partial anterior circulation infarcts	UI	250	37 (31; 43)
	Posterior circulation infarcts	UI	142	38 (30; 45)
	Lacunar infarcts	UI	283	25 (20; 30)
	Primary intracerebral hemorrhage	UI	170	70 (63; 78)
	Subarachnoid hemorrhage	UI	77	71 (57; 85)
Paolucci, 2001[656]	Survivors after the first stroke.	UI	178	15.7
	UNILATERAL SPATIAL NEGLECT	UI	178	44.9
	Survivors after the first stroke.	UI at discharge	178	4.9
	UNILATERAL SPATIAL NEGLECT	UI at discharge	178	20.5
Patel, 2011[651]	Acute first-in-a-lifetime in the South London Stroke Register	UI	235	40
	3 month followup	UI	235	19
	1 year followup	UI	235	15
	2 year followup	UI	235	10
van Kuijk. 2001[651]	Survivors after first-time, unilateral hemispheric stroke	Incident UI	143	2.9 (1.8; 4.8)
		Incident UI in Women	143	1.7 (0.6; 45)
		Incident UI Men	143	3.9 (2.2; 6.9)
		Regained continence rate	143	14.6 (7.3; 29.2)
Lee, 2003[646]	Subarachnoid haemorrhage	UI	322	3.1
	Intracerebral haemorrhage	UI	322	5.2
	Ischemic stroke	UI	322	6.7
	transient ischemic attack	UI	322	2

Table 23. Association between stroke and UI in community dwelling adults

Author Sample	Age	Risk Factors	Odds Ratio (95% CI)
Nakayama, 1997[220] N = 935; 60% female	74.6	Age for 10-year increments	**1.72 (1.32; 2.25)**
		Lesion size for a 10-mm increase in diameter	**1.22 (1.1; 1.36)**
		DM	**3.38 (1.75; 6.51)**
		Hypertension	**0.5 (0.29; 0.87)**
		Other disabling disease	**2.4 (1.28; 4.52)**
		Initial Scandinavian Stroke Scale score - 10-point increase in SSS score	**0.39 (0.3; 0.45)**
Patel, 2001[651] N = 235; 50% female	73.3	<50	1
		50–75	6.14 (0.97; 38.89)
		>75	**15.9 (2.18; 116.17)**
		Female sex	0.84 (0.39; 1.8)
		Total Anterior Circulatory Infarction	1
		Partial Anterior Circulatory Infarction	0.36 (0.09; 1.48)
		Posterior Circulatory Infarction	0.45 (0.09; 2.4)
		Lacunar Infarction	**0.12 (0.02; 0.62)**
		Primary Intracerebral hemorrhage	1.31 (0.24; 7.12)
		Subarachnoid hemorrhage	**15.4 (1.32; 179.8)**
		Unknown	0.83 (0.12; 5.85)
		Hypertension	0.76 (0.35; 1.65)
		Diabetes mellitus	0.93 (0.31; 2.8)
		Atrial fibrillation	1.4 (0.53; 3.68)
		Dysphasia	2.04 (0.76; 5.47)
		Dysphagia	**4.03 (1.85; 8.73)**
		Visual field defect	**4.78 (1.78; 12.9)**
		Motor weakness	**5.41 (1.38; 21.1)**
Patel, 2001[652] N = 207; 42% female	73.1	>75	**0.38 (0.17; 0.83)**
		Female sex	0.71 (0.34; 1.47)
		Total anterior circulation infarcts	1
		Partial anterior circulation infarcts	2.22 (0.78; 6.37)
		Posterior circulation infarcts	2.24 (0.43; 11.6)
		Lacunar infarcts	**3.66 (1.1; 12.2)**
		Primary intracerebral hemorrhage	1.42 (0.5; 4.03)
		Subarachnoid hemorrhage	0.6 (0.09; 4.13)
		Unknown	3.78 (0.48; 29.7)
		Hypertension	0.64 (0.31; 1.3)
		Diabetes mellitus	1.23 (0.47; 3.22)
		Atrial fibrillation	1.03 (0.45; 2.33)
		Motor weakness	1.23 (0.27; 5.56)
		Dysphasia	1.45 (0.65; 3.22)
		Dysphagia	0.77 (0.35; 1.71)
		Barthel index 0-14	1
		Barthel index 15-18	**21.8 (5.95; 79.7)**
Tang, 2004[653] N = 280; 45% female	70.9	Poststroke dementia	**6.7 (3.5; 12.8)**
Jorgensen, 2005[177] N = 213/242 noninstitutionalized stroke survivors and healthy control		Stroke	**2.8 (1.5; 5.2)**
		Acute stroke (<1 year)	**5.2 (1.6; 17.2)**
		1–4 Years after stroke	**5.3 (2.3; 12.6)**
		5–10 Years after stroke	2.2 (1; **5)**
		> 10 years after stroke	1.4 (0.5; **4.1)**
		Weakness of a leg (SSS score, <5), or depressive symptoms (MADRS score, >7), or lower cognitive function (MMSE score<24)	**3.5 (1.5; 8.2)**
		2–3 of weakness of a leg (SSS score, <5), or depressive symptoms (MADRS score, >7), or lower cognitive function (MMSE score<24)	**7.2 (2.1; 24.6)**

Bold - significant at 95% confidence level

Table 24. Prevalence of UI among residents in LTC with risk factors

Author	Country	Risk Factor	Sample	Prevalence (%)
Cognitive Impairment				
Borrie, 1992[34]	UK	No mental impairment	140	27
		Mild mental impairment	96	60
		Moderate mental impairment	78	86
		Severe mental impairment	123	93
		Dementia	139	78
Sgadari, 1997[1]		Denmark, impaired cognitive status	1,799	72.4
		France, impaired cognitive status	167	81.4
		Iceland, impaired cognitive status	377	78.9
		Italy, impaired cognitive status	586	79
		Japan, impaired cognitive status	539	84
		Sweden, impaired cognitive status	436	83.9
		USA, impaired cognitive status	126,070	78.3
Dependency				
Borrie, 1992[34]	UK	Independent	110	26
		Supervised	33	52
		Assistance required	59	69
		Immobile	233	81
Sgadari, 1997[1]		Denmark, dependent	1,799	81.2
		Denmark, bedfast	1,799	69.3
		France, dependent	167	83.5
		France, bedfast	167	82.5
		Iceland, dependent	377	79.1
		Iceland, bedfast	377	86.6
		Italy, dependent	586	82.7
		Italy, bedfast	586	82.5
		Japan, dependent	539	80.8
		Japan, bedfast	539	79.5
		Sweden, dependent	436	87
		Sweden, bedfast	436	57.9
		USA, dependent	126,070	71.5
		USA, bedfast	126,070	61.9
Internal Diseases				
Borrie, 1992[34]	UK	Diabetes	51	65
		Malignant neoplasm	34	44
		Cerebrovascular diseases	113	70
		Parkinson's disease	40	78
		Multiple sclerosis	25	60
		COPD	52	42
		Prostate disease	28	79
		Ischemic heart disease	58	64
		Hypertension	40	65
Aggazzotti, 2000[29]	Italy	Diabetes	121	55.4
		Constipation	253	72.7
		Fecal incontinence	196	93.4
		Neurological disease	322	71
		Bone fracture	21	52.4
		Urinary tract infection	79	81
		Psychiatric disease	89	29
		Hypertension	330	58
		Cardiovascular diseases	82	46
Buchanan, 2001[654]	USA	Multiple sclerosis	9,013	21.3
		Multiple sclerosis, occasional UI	9,013	5.6
		Multiple sclerosis, frequent UI	9,013	9
Sgadari, 1997[1]		Denmark, urinary tract infection	1,799	68.4
		France, urinary tract infection	167	77.8

Table 24. Prevalence of UI among residents in LTC with risk factors (continued)

Author	Country	Risk Factor	Sample	Prevalence (%)
		Iceland, urinary tract infection	377	56.4
		Italy, urinary tract infection	586	62.7
		Japan, urinary tract infection	539	54
		Sweden, urinary tract infection	436	80.9
		USA, urinary tract infection	126,070	50.9
LOS				
Palmer, 1991[28]	USA	2 weeks after admission	434	39
		2 months after admission	317	47
		1 year after admission	196	44

Table 25. Association between UI and risk factors (adjusted odds ratios) in LTC settings

Author	Age	Sample	Gender % Female	Odds Ratio (95% CI)
Age				
Nelson, 2005[4]	85.9	3,850	71	**1.03 (1.02; 1.04)**
Nelson, 2001[165]	85.9	10,328	71	**0.99 (0.98; 0.99)**
				0.98 (0.98; 0.99)
Aggazzotti, 2000[29]	82	839	59.8	**1.24** every 5 years **(1.02; 1.51)**
Saxer, 2005[655]		2,722	67	**0.43 - Age 65 to 74 vs. >95 (0.19; 0.95)**
				0.62 - 75 to 84 vs. >95 (0.32; 1.21)
				0.64 - 85 to 94 vs. >95 (0.34; 1.23)
Male Gender				
Nelson, 2005[4]	85.9	3,850	71	0.8 (0.7; 1)
Nelson, 2001[165]	85.9	10,328	71	**0.8 (0.7; 0.9)**
				0.8 (0.7; 0.8)
Aggazzotti, 2000[29]	82	839	59.8	**0.51 (0.81; 0.33)**
Saxer, 2005[655]		2,722	67	**1.69 (1.36; 2.09)**
Race (NW = 1, W = 0)				
Nelson, 2005[4]	85.9	3,850	71	1 (1; 1)
Nelson, 2001[165]	85.9	10,328	71	1 (1; 1)
				1 (1; 1)
BMI				
Nelson, 2005[4]	85.9	3,850	71	1 (1; 1)
Nelson, 2001[165]	85.9	10,328	71	1 (1; 1)
	85.9	10,328	71	1 (1; 1)
Diabetes				
Nelson, 2005[4]	85.9	3,850	71	1 (1; 1)
Nelson, 2001[165]	85.9	10,328	71	1 (1; 1)
				1 (1; 1)
CVD				
Nelson, 2005[4]	85.9	3,850	71	1 (1; 1)
Nelson, 2001[165]	85.9	10,328	71	1 (1; 1)
				1 (1; 1)
Stroke				
Nelson, 2005[4]	85.9	3850	71	1.2 (1; 1.5)
Nelson, 2001[165]	85.9	10,328	71	**1.3 (1.2; 1.4)**
				1.4 (1.2; 1.5)
Arthritis				
Nelson, 2005[4]	85.9	3850	71	0.8 (0.7; 1)
Nelson, 2001[165]	85.9	10,328	71	1 (1; 1)
				1 (1; 1)

Bold - significant association at 95% confidence level.

Table 26. Association between dependency, mental, gastrointestinal diseases, and UI (adjusted odds ratios) in LTC settings

Author	Age	Sample	% Female	Risk Factor	OR (95% CI)
Dependency					
Nelson, 2005[4]	85.9	3,50	71	Trunk restraints	**2.9 (2; 4.1)**
				Impaired vision	1 (1; 1)
				Pressure ulcer	1 (1; 1)
				Tube feeding	1 (1; 1)
				Loss of ADL	**3.1 (2.6; 3.8)**
		951		Toilet use	1 (1; 1)
				Eating	**1.3 (1.1; 1.6)**
				Hygiene	**1.7 (1.3; 2.1)**
				Dressing	**1.8 (1.5; 2.3)**
				Bed mobility	1 (1; 1)
				Locomotion	**1.3 (1.1; 1.5)**
				Transferring	1 (1; 1)
Brandeis, 1997[164]	60-105	2,14	75.5	Impairment of ADL	**4.2 (3.2; 5.6)**
				Restraints: Trunk	**1.7 (1.5; 2)**
				Restraints: Chair	**1.4 (1.2; 1.6)**
				Restraints: Bedrails	**1.3 (1.1; 1.5)**
Nelson, 2001[165]	85.9	10,328	71	Trunk restraints	**2.5 (2.3; 2.8)**
				Impaired vision	**1.4 (1.3; 1.5)**
				Pressure ulcer	1 (1; 1)
				Tube feeding	**0.6 (0.4; 0.7)**
				Trunk restraints	**2.4 (2.1; 2.7)**
				Impaired vision	**1.4 (1.3; 1.6)**
				Pressure ulcer	1 (1; 1)
				Tube feeding	**0.7 (0.5; 0.9)**
				Dependency in toilet use, 1992	**5.6 (4.9; 6.6)**
				Dependency in eating, 1992	**3 (2.8; 3.3)**
				Dependency in hygiene, 1992	**2 (1.7; 2.5)**
				Dependency in dressing, 1992	1 (1; 1)
				Dependency in bed mobility, 1992	**1.8 (1.6; 1.9)**
				Dependency in locomotion, 1992	**1.2 (1.1; 1.3)**
Nelson, 2001[165]	85.9	10,328	71	Dependency in transferring, 1992	1 (1; 1)
				Dependency in toilet use, 1993	**6.3 (5.3; 7.4)**
				Dependency in eating, 1993	**2.9 (2.7; 3.2)**
				Dependency in hygiene, 1993	**1.8 (1.5; 2.3)**
				Dependency in dressing, 1993	1 (1; 1)
				Dependency in bed mobility, 1993	**1.9 (1.7; 2.1)**
				Dependency in locomotion, 1993	**1.2 (1.1; 1.3)**
				Dependency in transferring, 1993	1 (1; 1)
Aggazzotti, 2000[29]	82	839	59.8	Mobility With support	**1.8 (1.5; 3.0)8**
				Mobility with care providers	**5.63 (2.92; 10.8)**
				Wheelchair/bedridden	**7.38 (4.86; 11.2)**
Saxer, 2005[655]		2722	67	No loss in long-term memory	**0.7 (0.54; 0.9)**
				Cognitive abilities	**0.64 (0.49; 0.83)**
				No problem moving in bed	**0.51 (0.36; 0.73)**
				No problem moving around among 65-74 years	0.33 (0.07; 1.57)
				No problem moving around among-84	**0.28 (0.11; 0.75)**
				No problem moving around among 85-94	0.63 (0.25; 1.61)
				Minor problem moving around among 65-74	0.74 (0.15; 3.68)
				Minor problem moving around	1.02 (0.37; 2.83)

Table 26. Association between dependency, mental, gastrointestinal diseases, and UI (adjusted odds ratios) (continued)

Author	Age	Sample	% Female	Risk Factor	OR (95% CI)
				among 75-84	
				Minor problem moving around among 85-94	1.1 (0.41; 2.93)
		At 12 months		No loss in long-term memory	**0.19 (0.08; 0.46)**
				No problem moving in bed	**0.17 (0.06; 0.48)**
				No problem moving about in own corridor	**0.15 (0.03; 0.67)**
				no problem moving in bed	**0.13 (0.03; 0.55)**
		At 12 months adjusted for baseline condition		No loss in long-term memory	**0.53 (0.36; 0.78)**
				No problem walking in room	**0.34 (0.18; 0.63)**
Gastrointestinal Diseases					
Nelson, 2005[4]	85.9	3850	71	Constipation	1 (1; 1)
				Fecal impaction	1 (1; 1)
				Diarrhea	1 (1; 1)
Nelson, 2001[165]	85.9	10,328	71	Fecal incontinence	**20.5 (18.6; 22.6)**
				Constipation	**1.3 (1.2; 1.4)**
				Fecal impaction	1 (1; 1)
				Diarrhea	**0.7 (0.5; 0.8)**
				Fecal incontinence	**17.8 (16.1; 19.7)**
				Constipation	**1.3 (1.2; 1.4)**
				Fecal impaction	1 (1; 1)
				Diarrhea	**0.7 (0.6; 0.9)**
Aggazzotti, 2000[165]	82	839	59.8	Fecal incontinence	**10.4 (1.4; 20.2)**
Mental Diseases					
Nelson, 2005[165]	85.9	3850	71	Depression	1 (1; 1)
Brandeis, 1997[165]	60-105	2014	75.5	Use of anti anxiety/hypnotics	0.7 (0.5; 1)
Nelson, 2001[165]	85.9	10,328	71	Depression, 1992	1 (1; 1)
				Depression, 1993	1 (1; 1)
Aggazzotti, 2000[165]	82	839	59.8	Alternating mental orientation	**1.92 (1.08; 3.44)**
	82	839	59.8	No mental orientation	**3.61 (2.42; 5.39)**

Bold – significant associations at 95% confidence level.

Overview of Risk Factors for FI

Age. In the past decade, a large body of evidence has suggested an association between FI and patient age . Age was a strong predictor of FI and combined UI and FI in the majority of the studies (79 percent or 22/28) (Table 27). The association between age and FI was examined among women only.[187,208-213] Adjusted odds of AI increased by 87 percent for every additional 10 years of age in Asian women and by 36 percent in White women.[187] The frequent comorbidity of FI and UI may be attributable to the common cause of both disorders, such as pelvic floor sphincter injuries.[4,58,162,186] Women over age 42 reported combined UI and FI 16 times more often than younger females after adjustment for other risk factors.[186] Japanese adults over age 75 had 319 percent higher odds of combined UI and FI compared to those 65-74 years old.[58] The association between age and FI was not linear.[657] However, one study reported a 30 percent increase in the adjusted odds of FI corresponding to a 10 year increment in age in women.[225] The threshold age for women was related to menopausal age; no significant increase in FI was shown when women older than 30 or 35 years were compared to women younger than 29 years of age.[230] The results became significant when 30-49 year old women were compared to those 50-69 years old (211 percent increase in FI) or those 70-90 years old (222 percent increase in FI).[163] No studies reported adjusted odds ratios of FI in men, with an inconsistent increase in the crude odds of FI after 35,[658] 44,[659] or 65 years of age.[221] Studies with women and men analyzed together reported a 2 percent increase in FI in adults older than 40 years[222] and a 271 percent increase in FI after age 75[58] after adjustment for other risk factors.

Age not only increases the risk of FI, it likely modifies the effects of other risk factors, including birth related anal trauma. Maternal age older than 25 years was associated with greater odds of FI[214] and persistent FI.[215] Women 20-24 years old at the time of delivery did not experience a larger risk of FI compared to younger pregnant women.[218] Less expected was the fact that pregnant women below age 20 experienced FI more often than women over 30.[218]

The interaction between age and other risk factors requires future research. Pooled analysis indicated that studies with older adults reported higher crude rates of FI, but the estimation had low validity due to significant statistical heterogeneity between studies.[518]Age, but not study quality, contributed to differences in rates of FI.[518] The authors used different age categories which made pooling more questionable. Pooled analysis of patients' individual data should give better information of the curve-linear association and meaningful cut-points for men and women independent of other risk factors.

Gender. This line of research shows mixed results (Table 28). Traditionally, FI is believed to be more prevalent in women.[6,622] Two recent studies confirmed this finding by reporting a greater prevalence of FI in women.[7,508] One study reported greater prevalence of combined incontinence (FI + UI) in community-living elderly women than men.[660] However, three different groups of researchers found no differences in the prevalence of FI in women and men.[4,216,217] Four other studies showed that male gender is an independent risk factor for FI[3,58,222,224] and combined incontinence.[58] One study indicated that men ages 75-79 or 85-89 are more likely to have FI, combined incontinence, and less severe FI than women in the same group.[114] The majority of these studies involved a large sample (more than 4,000) elderly people (>65 years) and adjusted for at least one risk factor. However, a definite association between gender and FI cannot be drawn given varying study designs, sampling and statistical methods, FI definitions, and varying control for potential risk factors. Valid synthesis of different studies

would be possible when relative risk of incident incontinence, adjusted for age and gender-specific confounding factors, was examined in prospective cohorts.

Race. Limited evidence from one study suggested that Asian women had a higher prevalence of birth related FI compared to other ethnic groups after adjustment for mode of delivery, maternal age, perineal trauma, BMI, and total number of births (Appendix Table F34).[215] The prevalence of combined UI and FI was two times higher in non-White than White residents of nursing homes in Wisconsin, independent of other risk factors identified in the Health Care Financing Administration Minimum Data Set.[4] Younger Taiwanese women living in the community (mean age of 43 years) had a prevalence of FI of 2.5 percent,[213] a rate similar or less than that reported in non-Asian women of a similar age group.[218,232] The association between race and severity of FI and quality of life related to FI in men and women from the community and in LTC facilities requires future investigation.

Diet, BMI, and diabetes. The highest prevalence of FI (44 percent) was reported among women with morbid obesity undergoing laparoscopic weight loss surgery (Appendix Table F35). The prevalence of FI among patients with diabetes mellitus varied from 1 percent in women[163,211] to 13 percent in a study of both genders;[626] 3 percent of men and women with diabetes experienced incontinence of solid feces and 13 percent solid or liquid feces.[626]

Adults with decreased serum levels of vitamin B12 (300pg/ml or less) had a significantly higher prevalence of combined UI and FI (Table 29).[661] No other dietary intakes have been shown to increase the risk of FI. Increased BMI and the presence of diabetes in residents of nursing homes were not associated with higher rates of combined UI and FI.[3,4] Higher BMI in women did not increase the risk of FI[208,210-213] but was associated with higher prevalence of flatus[662] and liquid feces incontinence.[185] One study of 8,774 women reported a 70 percent increase in risk of persistent postnatal FI in obese women (Appendix Table F36).[218]

Inconsistent evidence suggested that men and women with diabetes had FI more frequently than nondiabetics with rates higher by 70 percent[216] to 300 percent[58] in older adults and by 207 percent in younger adults[217] after adjustment for other risk factors.

Physical activity. Physically active adults had a 70 percent lower risk of fecal urgency after adjustment for other risk factors (Appendix Table F37).[125] Distance runners had a FI prevalence of 12 percent in one study with no formal control comparison.[663] The association between physical activity and incidence of FI and quality of life related to FI in adults in community and LTC requires future investigation.

Smoking and pulmonary diseases. The association between smoking and FI is inconsistent in direction and effect size (Table 30).[125,185,186,208,218,226,227] White women with obstructive pulmonary diseases had a 208 percent higher rate of FI after adjustment for possible confounding factors.[187] Women with chronic bronchitis had liquid incontinence 3.5 times more often in a bivariate analysis.[185] Older men and women with protracted coughing experienced increased risk of combined UI and FI by 65 percent.[114]

Muscle-skeletal disorders. The crude prevalence of FI was 71 percent higher among older men with arthritis with attenuation of the association in multivariate analysis (Table 31).[186] Foot and ankle problems in elderly adults were associated with a two-fold increase in prevalence but not incidence of FI.[186] Arthritis in older men and women increased the risk of liquid FI by 80 percent in bivariate analysis of 1,352 adults over 75 years old.[158]

Neoplasm. Older patients with rectal cancer had the highest prevalence of FI (55 percent),[664] but other studies showed lower prevalence of FI among patients with rectal cancer[665,666]

(Appendix Table F38). Patients after proctocolectomy with J-pouch anastomosis reported 25 percent prevalence of FI with lower rates after W-pouch anastomosis.[667]

Comorbidities. High rates of medical comorbidities in women were associated with a 2.6 times higher adjusted risk of FI (Table 32).[163] Incremental increases in the Charlson Comorbidity Scale scores in women were associated with 76 percent higher adjusted odds of FI.[219] The presence of kidney diseases in older adults was associated with a significant risk of incident FI by 48 percent in women and 94 percent in men.[186] Men suffering from transient ischemic attack had a three times higher prevalence of FI.[219] Women with arterial hypertension reported FI 2.4 times more often compared to normotensive females after adjustment for other risk factors.[213] Heart disease in nursing home residents did not increase the risk of FI.[3,4]

Stroke and other neurological disorders. The prevalence of FI was 30 percent[221] to 34 percent[220] after acute stroke (Appendix Table F39). The absolute risk of FI was less than 10 percent several months after stroke in most studies.[220-222,668] Stroke was associated with a significant increase in adjusted odds of FI in the majority of the studies (Table 33). Combined UI and FI was five times more frequent in community dwelling adults after stoke[58] but not in residents of nursing homes.[4] Incident FI occurred twice as frequently in women but not in men after a stroke.[186] Adjusted prevalence of FI was three[216] to five[58] times higher in stroke survivors compared to adults without a stroke. Incremental 10-year increase in age at the time of a stroke was associated with a 45 percent higher probability of FI 6 months after the stroke.[220] Diabetics experienced FI 2.2 times more often after stroke compared to non diabetics after adjustment for confounding factors.[220] Severity of stroke was positively associated with FI.[220,221] Functional dependency and need for assistance with toilet access 3 months after stroke in men and women was associated with a 349 percent increase in FI. Residents of nursing homes after stroke suffered from FI 1.2-1.3 times more often.[4] Adjustment for other risk factors of FI attenuated the strength of association, but a higher odds ratio was still highly significant (4.9, 95 percent CI 14; 16).[58]

Several studies examined the prevalence of FI in patients with neurological diseases (Appendix Table F40). The prevalence of FI was 10 percent in men and 5 percent in women with Parkinson's Disease.[669] Two studies of patients with multiple sclerosis reported that 21 percent[524] to 51 percent[670] experienced FI. Among patients with spinal cord injury, subjects with tetraplegia had the highest prevalence of FI (14 percent)[671] compared to 4 percent in cases with paraplegia, and 2 percent in patients with incomplete injury.[671]

Functional impairments and dependency status in association to FI in residents of nursing homes were examined in one study using Wisconsin annual nursing home surveys (Table 34).[3,4] Tube feeding was associated with an 8-9 percent increase in the odds of FI,[3] dependence in daily activities with 6-7.3 higher odds of FI, and dependency in eating with four times higher odds of FI after adjustment for all risk factors in the model.[3] Nursing home institutionalization was examined in one study of 430 residents.[166] Increased length of stay from 2 weeks to 1 year was associated with a seven times higher prevalence of FI.[166] Residents with pressure ulcers experienced FI 2.3 to 2.6 times more often; this increase was independent of other FI risk factors. (Appendix Table F41)[3]

Functional status and mental health in association with FI in community dwelling adults. Poor general health and dementia increased the risk of combined UI and FI in adults after adjustment for confounding factors (Table 35).[58] Crude rates of combined incontinence were significantly higher in older adults with memory problems, edema in legs, and slow healing wounds.[114] The odds ratios of FI were significantly higher by 188 percent in women and by 218

percent in men with poor general health,[219] by 400 percent in adults with functional limitations,[222] and by 80 percent in adults with decreased mobility and severe/mild physical activity impairment.[223] Major depression in women was associated with 273 percent higher rates of FI independent of other risk factors.[163] Geriatric depression in men was associated with a 283 percent higher risk of FI.[219] Adults with dementia had FI twice as often in two studies after adjustment for other risk factors of FI.[223,224] Impaired cognitive status in men was associated with a five-fold increase in the adjusted odds ratio of FI.[186] Older men and women with Mini-Mental State Examination (MMSE) score <15 had a 250 percent increase in the adjusted rates of FI.[223]

Chronic gastrointestinal conditions. Constipation, chronic diarrhea, and fecal impaction increased the adjusted relative odds of FI, but not combined incontinence, in residents of nursing homes (Appendix Table F42).[3,4] Constipation increased the risk of FI by 209-211 percent in women (Table 36).[187,212] Women with irritable bowel syndrome experienced FI 2.7 to 6.3 times more often after adjustment for other risk factors.[187,211,212] Crude rates of combined incontinence were significantly higher in men and women with chronic gastrointestinal disorders.[114] The adjusted rates of FI were 240 percent[225] to 450 percent[219] higher in women with diarrhea, 190 percent higher in irritable bowel syndrome patients, 250 percent higher in females with anal fistula, and 140 percent higher after cholecystectomy.[225] Adults with incomplete bowel evacuation had four times higher odds of FI.[217] Frequent diarrhea and water stools were associated with higher rates of liquid FI (Appendix Table F43).[224] One study reported increased crude rates of severe FI in association with chronic gastrointestinal problems in adults.[158]

Surgical procedures. The majority of women (97 percent) after surgery for rectal prolapse experienced FI (Appendix Table F44).[672] Hemorrhoid surgery in women was associated with a 270 percent increase in the odds of FI.[211] Patients with inflammatory bowel disease after ileal pouch-anal anastomosis and pouchitis had a 43 percent prevalence of occasional and 11 percent of frequent FI.[673] Perianal surgery of the skin outside of the anal canal was associated with a five times higher adjusted odds ratio of FI.[217] The odds of FI were not significantly different among women after anorectal surgery after adjustment for parity and delivery.[225] Isolated flatus incontinence at least once a week occurred 1.5 times more often after previous lower abdominal or urological surgery.[227] The association was not consistent across different surgeries and studies. Gynecological surgery increased the adjusted odds ratio of AI by 180 percent (Appendix Table F45).[213]

Drug administration. Crude rates of combined UI and FI were higher after diuretic and laxative use (Appendix Table F46).[661] One large study of 6,099 adults over 65 years old reported a significant increase in the adjusted odds of FI after anticonvulsants, antidepressants, anti Parkinson medications, antipsychotic, narcotics, and hypnotics.[216] Hormone replacement therapy in morbidly obese women before laparoscopic weight loss surgery[208] and contraceptive use[225] did not show a significant association with FI.

Prostate diseases. The prevalence of FI was less than 10 percent in all studies among men with prostate diseases (Appendix Table F47).[180,674,675] Prostate diseases, including prostate cancer, were associated with an increased adjusted odds ratio of FI (Table 37).[180,219] Both baseline prostate diseases and treatments have been associated with an increased risk of FI. Baseline FI before perineal prostatectomy for localized prostate cancer was associated with 600 percent higher adjusted rates of FI and 400 percent higher rates of severe FI after surgery.[676] Patients with positive surgical margins experienced severe FI seven times more often after surgery.[676] Radical prostatectomy was associated with a significant increase in the adjusted odds

ratio of FI by 530 percent compared to healthy controls.[180] External beam radiation was associated with higher rates of bowel symptoms than radical prostatectomy independent of other confounding factors.[677,678]

Anal trauma. Consistent evidence suggests that anal trauma was associated with significant risk of FI independent of other risk factors (Table 38). The adjusted odds of FI were 4.4 times higher in women with anal sphincter tear.[232] Women with anal injury not related to childbirth had 240 percent increases in FI.[225] The adjusted odds ratio of bothersome FI was 16 times higher in women with anal sphincter defect.[679] A combination of anal injury and pelvic organ prolapse increased the odds of bothersome FI by seven times. Women with anal injury, pelvic organ prolapse, and UI had an adjusted odds ratio of 55 to experience bothersome FI.[679] Perianal injury increased risk of FI by 262 percent in men and women in one study.[217] The independent contribution of anal injuries in males and females by age and race categories requires future investigation. Abortions were not associated with FI in one study (Appendix Table F48).[227] Menopause did not increase the adjusted odds of FI[210,213] but was associated with a higher prevalence of FI in another study[226] (Appendix Table F49).

FI in association with UI. The prevalence of FI was 25 percent[210] to 28 percent[680] in women with stress UI and 41 percent in women with overactive bladder.[210] UI was associated with 11-12 times higher odds of FI in residents of nursing homes in one study (Appendix Table F50).[3] Several studies reported an increase in the crude odds of FI in patients with UI[187,208,210-213,681] but only one study[211] found a significant (1.9 times) increase in the adjusted odds ratio of FI in 881 women with UI (Table 39). Urinary symptoms other than UI in men and women were associated with a significant increase in crude odds of combined UI and FI in one study.[114] UI in men and women was associated with 2.9[223] to eight times greater odds of FI.[222] The adjusted odds of FI in women with UI were two to six times higher compared to continent females.[162,163,219,226] The presence of stage II pelvic organ prolapse and/or urinary incontinence compared to stage 0 or I pelvic organ prolapse and no UI increased the adjusted odds of bothersome FI by 4.9 times.[679]

Prolapse. Most studies reported a prevalence of FI of more than 10 percent in women with genital prolapse (Appendix Table F51). The adjusted odds of FI were 1.9 times in patients with rectal prolapse[211] and 3.2[213] to five times in women with utero-vaginal prolapse (Appendix Table F52). One study reported a significant increase in the crude odds of flatus, liquid, and solid FI in women with genital prolapse.[185] More than a third of men and women with rectal prolapse reported FI.[682] Burch colposuspension was associated with greater adjusted odds of flatus and liquid FI compared to healthy controls 14 years after surgery.[683] Women after Burch colposuspension also experienced more severe flatus and liquid incontinence with greater impact on their quality of life (Appendix Table F53).[683]

FI related to pregnancy and birth. Consistent evidence suggested a significant dose response increase in the absolute risk of FI after vaginal trauma. The prevalence of FI was 7 percent at 3 months and 5 percent at 12 months postpartum (Appendix Table F54).[684] Women with sphincter tears experienced higher rates of FI, from 15 percent among nullipara to 30 percent after more than two deliveries.[685] The highest prevalence (40 percent) was reported in nullipara with fourth degree sphincter tear after index delivery.[686] Less than 1 percent of women experienced FI after vacuum delivery.[211] The prevalence was 2 percent[211] to 5 percent[687] after forceps delivery and 13 percent[211] after episiotomy or vaginal delivery.[210] The prevalence of combined UI and FI was 6 percent at 10 months[688] and 2 percent at 24 months postpartum.[684] Pregnant women[657] and women after episiotomy[628] reported 13 percent FI. The prevalence of FI was lower by 1 percent in nulliparous and 3 percent after spontaneous vaginal delivery.[163] The

prevalence of FI was lowest (0.3 percent) after Cesarean sections.[163] The prevalence of flatus was 4 percent in pregnant women with one previous delivery,[227] 6 percent at 3 months after delivery,[684] 8 percent after instrumental delivery,[689] and 25 percent after previous multiple pregnancies[689] and among multiparous women.[658] One small study reported the highest prevalence of flatus 30 years postpartum in women with anal disruption (59 to 76 percent) and episiotomy (70 percent).[690] The prevalence of liquid incontinence was less than 6 percent[227,658] and solid incontinence less than 5 percent[227,658,684,688] in pregnant women and after different modes of delivery. Women with obstetric sphincter tears experienced higher rates of incident FI and severe FI (Appendix Table F55). More than 5 percent of women with complete third-degree tears after the first pregnancy and more than two deliveries after that experienced severe FI.[685] Almost 7 percent of women 12 months after instrumental delivery and/or a high birth weight infant reported solid and liquid FI.[658] Complete FI with liquid and solid incontinence was reported by 12 percent of women 13 years after an obstetrical anal sphincter tear.[691] More than 2 percent of young women 3 months postpartum complained about weekly solid or liquid incontinence.[228]

The relative effects of different risk factors were less consistent across the studies and depended on the definitions of FI and adjustment for confounding factors (Table 40). The adjusted odds of FI were significantly increased after delivery of heavy babies,[202] among women with narrow subpubic arch angle,[692] and with FI during pregnancy,[209] after increased number of births,[215,226] and a high degree of perineal injury.[187,209,228-231] No independent significant risk factors were reported for solid FI.[185,693,694] Caesarean section was associated with a reduced risk of frequent FI[214] in contrast with forceps delivery followed by frequent and persistent FI[214,215,218] (Table 41). The number of births[215] and anal injury[218,227] were associated with higher adjusted odds of severe FI.

Fetal characteristics were examined in association to FI in 11 studies (Appendix Table F56).[202,205,218,226-228,232,662,689,692,695] Fetal weight was associated with random changes in AI[205,228,232,692] and FI,[662,689] but with a significant increase in the adjusted odds of FI by 240 percent in one study of 3,887 women.[202] Head circumference of the baby did not show a significant relationship with FI[205,692] or fecal urgency.[205]

Women with FI during pregnancy experienced higher rates of FI after delivery (Table 42).[209,662] Women with narrow subpubic arch angle experienced FI almost nine times more often independent of other risk factors.[692] The number of births associated with FI was examined in 18 studies,[163,185,186,208,212,218,227,229,230,657,658,695,696] but only five found a significant increase in odds of FI independent on other risk factors.[209,213,215,226,232] Women giving birth had FI three times more often compared to childless females.[232] Four studies reported dose response associations between FI and the number of births.[209,213,215,226] Adjusted odds of persistent FI were 3.2 times greater among women after four or more deliveries.[215]

The association between FI and delivery management was examined in several studies (Appendix Table F57). Mediolateral episiotomy after the first pregnancy was associated with lower odds by 83 percent of FI in one study[229] of seven.[202,227-229,695,697] Prolonged pushing time was associated with 22 percent higher odds of solid FI.[218] Cesarean surgery was shown to reduce the risk of FI by 42 percent and frequent FI by 64 percent in one study[214] of 14.[163,185,202,205,208,214,215,218,225,226,228,692,695,698] Forceps delivery was associated with increased adjusted odds of FI in one multicenter study[215] with random results in others.[202,214,215,218,226-228,692,699-701] An inconsistent increase in FI was shown after instrumental delivery in one study.[230] The operative delivery in women with stage II pelvic organ prolapse and/or UI was associated with a 4.5 times greater

adjusted odds of bothersome FI.[679] Vacuum extraction did not show a significant association with postpartum FI.[214,215,218,227,694,701] Vaginal delivery was not shown as a significant risk factor for FI.[7,163,185,210,212,213,225,229,231,695]

Birth related perianal trauma was associated with a large increase in adjusted rates of FI in eight of 24 studies (Table 43)[187,209,218,228-232] Women with sphincter tears had 230 percent[209] to 280 percent[231,232] higher rates of FI. The degree of perineal damage showed dose response association with FI.[229,230] Women with stage IV perineal damage experienced FI more often compared to damage of grades I-II.[228,229] Full thickness of the internal anal sphincter defect was associated with 510 percent higher rates of FI after adjustment for other risk factors.[230]

Summary. In conclusion, aging and dependency in daily activities were strongly associated with the development of FI in LTC facilities. Neurological disorders, perineal trauma, and rectal diseases, including neoplasm, are among the independent risk factors of FI in community dwelling adults. Women are at risk of FI related to pregnancy and birth. The strength of the association varied depending on the definitions of FI. Primary prevention of diseases associated with increased risk of FI could reduce the incidence and severity of incontinence in adults. Strategies to reduce the risk of FI related to pregnancy and birth are not well documented and require future research.

Table 27. Association between age and FI

Author Sample	Definition of FI	Gender	Age as a Risk Factor (strata with cut offs)	Odds Ratio (95% CI)
Richter, 2005[208] N = 180	AI	Women only	Age	1.02 (0.98; 1.05)
Pollack, 2004[209] N = 349	AI	Women only	Age	**1.10 (1.00; 1.20)**
Ng, 2002[210] N = 320	AI	Women only	>65	**1.77 (0.33; 9.41)**
Meschia, 2002[211] N = 881	AI	Women only	Age	**1.30 (0.80; 2.00)**
Boreham, 2005[212] N = 457	AI	Women only	Age (per year)	**1.05 (1.03; 1.07)**
Chen, 2003[213] N = 1,253	AI	Women only	> 65	**0.8 (0.4; 1.8)**
Huang, 2006[187]	AI	Asian women only	Age (per decade)	**1.87 (1.26; 2.79)**
		White women only	Age (per decade)	**1.36 (1.14; 1.61)**
Ostbye, 2004[186] N = 8,949	FI+ UI	Men only	85+ vs. 75-84	3.273 (1.02; 10.52)
		Men only	85+ vs. 75-84	1.213 (0.36; 4.11)
		Women only	85+ vs. 75-84	2.37 (0.92; 6.09)
		Women only	85+ vs. 75-84	1.646 (0.68; 4.0)
		Men only	85+ vs. 65-74	4.409 (1.20; 16.14)
		Men only	85+ vs. 65-74	2.064 (0.50; 8.49)
		Women only	85+ vs. 65-74	4.235 (1.35; 13.26)
		Women only	85+ vs. 65-74	3.907 (1.24; 12.32)
Nelson, 2005[4] N = 8,170	FI + UI	Combined	Age	**1.02 (1.00; 1.03)**
Ballester, 2005[162] N = 103	FI + UI	Women only	>42	**16.7 (1.9; 141.1)**
Nakanishi, 1997[58] N = 1,405i	FI + UI	Combined	>75	**3.19 (1.69; 6.04)**
Quslander, 2005[216] N = 6,099	FI	Combined	>85 vs.65-74	3.28 (1.32; 8.16)
		Combined	>85 vs.75-84	2.00 (0.90; 4.42)
Ostbye, 2004[186] N = 8,949	FI	Women only	75-84 vs. <65-74	**1.55 (1.06; 2.26)**
		Women only	85+ vs. <65-74	**1.91 (1.14; 3.17)**
		Women only	75-84 vs. <65-74	**1.16 (0.89; 1.51)**
		Women only	85+ vs. <65-74	**1.34 (0.87; 2.08)**
		Men only	75-84 vs. <65-74	**2.97 (1.64; 5.39)**
		Men only	85+ vs. <65-74	**3.41 (1.44; 8.11)**
		Men only	75-84 vs. <65-74	**1.25 (0.86; 1.83)**
		Men only	85+ vs. <65-74	**2.51 (1.26; 5.01)**
		Men only	85+ vs. 75-84	2.37 (0.86; 6.5)
		Men only	85+ vs. 75-84	2.25 (0.99; 5.09)
		Women only	85+ vs. 75-84	1.99 (0.76; 5.21)
		Women only	85+ vs. 75-84	1.43 (0.62; 3.28)
		Men only	85+ vs. 65-74	3.59 (1.13; 11.41)
		Men only	85+ vs. 65-74	4.75 (1.71; 13.23)
		Women only	85+ vs. 65-74	2.84 (0.97; 8.29)
		Women only	85+ vs. 65-74	2.35 (0.91; 6.03)
Nelson, 2005[4] N = 8,170	FI	Combined	Age	**1.02 (1.00; 1.03)**
Nelson, 1998[3] N = 18,224	FI	Combined	Age in 1992	**1.00 (1.00; 1.01)**
		Combined	Age in 1993	**1.00 (1.00; 1.01)**
Nakanishi1997[58] N = 1,405	FI	Combined	75+ vs. 65-74	4.1 (2.66; 6.3)
		Combined	>75	**2.71 (1.23; 5.94)**
Melville, 2005[163] N = 6,888	FI	Women only	50-69 vs. 30-49	**2.11 (1.47; 3.03)**
		Women only	70-90 vs. 30-49	**2.22 (1.47; 3.36)**

Table 27. Association between age and FI (continued)

Author Sample	Definition of FI	Gender	Age as a Risk Factor (strata with cut offs)	Odds Ratio (95% CI)
McKinnie, 2005[657] N = 1,004	FI	Women only	Age (per year)	1.05 (1.03; 1.07)
		Women only	Age (per year)	**1.05 (1.03; 1.07)**
Mahony, 2007[230] N = 500	FI	Women only	30-34 vs. ≤29	**1.20 (0.30; 4.70)**
		Women only	>35 vs. ≤29	**2.70 (0.70; 11.30)**
MacArthur, 2001[214] N = 7,879r	FI	Women only	Maternal age 25-29 vs. <25	**1.22 (0.88; 1.69)**
		Women only	Maternal age 30-34 vs. <25	**1.71 (1.21; 2.42)**
		Women only	Maternal age > 35 vs. <25	**1.75 (1.04; 2.94)**
Macarthur, 2005[215] N = 4,046	FI	Women only	Maternal age 25-29 vs. <25	**1.09 (0.84; 1.41)**
		Women only	Maternal age 30-34 vs. <25	**1.60 (1.18; 2.16)**
		Women only	Maternal age >35 vs. <25	**1.72 (1.06; 2.79**
Longstreth, 1993[659] N = 1,264	FI	Women only	>65 vs.<44	3.60 (2.20; 4.00)
		Men only	>65 vs.<44	2.00 (0.90; 2.20)
Abramov, 2005[226] N = 542	FI	Women only	≥40	**2.82 (1.21; 6.6)**
Ballester, 2005[162] N = 103	FI	Women only	>42	4.6 (0.9; 22.7)
Bharucha, 2006[225] N = 2,800	FI	Women only	Age (per decade)	**1.3 (1.2; 1.4)**
Brittain, 2006[222] N = 2,800	FI	Combined	>40	**1.02 (1.01; 1.03)**
Chassagne, 1999[223]	FI	Combined	≥70	1.7 (1; 2.8)
Chiarelli, 2003[658] N = 568	FI	Men only	>35	4.33 (1.56; 12.01)
Harari, 2003[221] N = 1,069	FI	Combined	≥65	**2.16 (1; 4.8)**
Macarthur, 2005[215] N = 1,793 N = 3,813	Persistent FI	Women only	Maternal age 25-29 vs. <25	**2.61 (1.07; 6.37)**
			Maternal age 30-34 vs. <25	**6.00 (2.42; 14.79)**
			Maternal age >35 vs. <25	**6.00 (1.85; 19.45)**
			Maternal age 25-29 vs. <25	**1.12 (0.72; 1.74**
			Maternal age 30-34 vs. <25	**1.95 (1.19; 3.19)**
			Maternal age >35 vs. <25	**2.65 (1.25; 5.63)**
Faltin, 2006[695] N = 540	Symptoms ≥2 once/week or 3 symptoms (incontinence to flatus, liquid or solid stool; need to wear a pad; lifestyle alteration)	Women only	Age at followup 45-50 vs. <45	1.23 (0.65; 2.3)
			Age at followup >50 vs. <45	2.21 (1.19; 4.1)
Guise, 2007[218] N = 8,774	Severe incontinence, incontinence of stool	Women only	Age at this delivery 20-24.9 vs. <20	**0.78 (0.54; 1.11)**
			Age at this delivery 25-29.9 vs. <20	**0.78 (0.55; 1.11)**
			Age at this delivery ≥30 vs. <20	**0.61 (0.43; 0.86)**
			Age at 1st delivery 20-24.9 vs. <20	**0.79 (0.62; 1)**
			Age at 1st delivery 25-29.9 vs. <20	**0.74 (0.58; 0.95)**
			Age at 1st delivery ≥30 vs. <20	**0.6 (0.46; 0.77)**
Hojberg, 2000[227]	Isolated flatus incontinence at least once a week	Combined	15-24 vs. 25-29	**0.9 (0.6; 1.3)**
			Age 30-34 vs. 25-29	**1.3 (1; 1.8)**
			Age > 35 vs. 25-29	**1.6 (1.1; 2.4)**
Abramov, 2005[226] N = 542	Flatus	Women only	Age ≥40 years	**1.9 (1.11; 3.24)**

Bold - multivariate odds ratios

Table 28. Association between gender and FI (women as a reference gender)

Author Sample	Definition of FI	Age	Odds Ratio (95% CI)
Stenzelius, 2004[114] N = 4,277	FI + UI		0.70 (0.53; 0.93)
		75-79	1.18 (0.84; 1.65)
		80-84	0.91 (0.66; 1.25)
		85-89	1.28 (0.89; 1.83)
		>90	0.93 (0.58; 1.47)
Nelson, 2005[4] N = 8,170	FI + UI		**1.00 (1.00; 1.00)**
Nakanishi, 1997[58] N = 1,405	Fecal I + UI		**1.61 (0.88; 2.94)**
Stenzelius, 2004[114] N = 4,277	FI	75-79	1.11 0.81; 1.52)
		80-84	0.85 (0.63; 1.14)
		85-89	1.20 (0.85; 1.70)
		>90	0.90 (0.58; 1.40)
Quander, 2005[216] N = 6,099	FI		**1.00 (1.00; 1.00)**
Nelson, 2005[4] N = 8<170	FI		**1.00 (1.00; 1.00)**
Nelson, 1998[3]	FI		**1.20 (1.10; 1.30)**
N = 18,244			**1.30 (1.10; 1.40)**
Nakanishi, 1997[58]	FI		1.33 (0.89; 1.99)
N = 1,405			**1.58 (0.73; 3.41)**
Brittain, 2006[222] N = 38,633	FI		**1.27 (1.05; 1.52)**
Johanson, 1997[224] N = 388	FI		**1.5 (1.1; 1.9)**
Stenzelius, 2004[114] N = 4,277	FI; a little	75-79	1.23 (0.87; 1.73)
	FI, very much	75-79	0.78 (0.40; 1.54)
	FI; a little	80-84	0.92 (0.66; 1.28)
	FI; very much	80-84	0.73 (0.40; 1.33)
	FI; a little	85-89	1.17 (0.79; 1.72))
	FI; very much	85-89	1.32 (0.70; 2.46)
	FI; a little	>90	0.87 (0.53; 1.44)
	FI; very much	>90	1.01 (0.48; 2.12)
Bliss, 2004[158] N = 1,352	Mucus		4.5 (1.5; 16.7)
Johanson, 1997[224] N = 388	Solid		**1.6 (1.2; 2.1)**

Bold - multivariate odds ratios

Table 29. Association between FI and diet, BMI, and diabetes

Author Sample	Age	Level of Risk Factors in Population Groups	Odds Ratio 95% CI
BMI			
AI in Women			
Meschia, 2002[211] N = 881	58.6	Incremental increase by 1 unit	**1.50 (0.90; 2.30)**
Richter, 2005[208] N = 180	16-55	Incremental increase by 1 unit in women with morbid obesity before laparoscopic weight loss surgery	0.96 (0.92; 1.00)
Ng, 2002[210] N = 320		>20, women	**0.93 (0.34; 2.56)**
Boreham, 2005[212] N = 457	18-64	Incremental increase by 1 unit	**1.04 (1.01; 1.08)***
Chen, 2003[213] N = 1,253	≥20	1st vs. 4th (≤25 percentile)	**0.80 (0.40; 1.40)**
		2nd vs. 4th (> 5-50 percentile)	**0.90 (0.50; 1.50)**
		3rd vs. 4th (> 0-75 percentile)	**0.70 (0.40; 1.30)**
Combined Incontinence in Men and Women			
Nelson, 2005[4] N = 8,170	84	Incremental increase by 1 unit in men and women in nursing homes	**0.98 (0.96; 1.00)**
FI			
Melville, 2005[163] N = 6,888	30 – 90	Obese women (BMI >29) vs. BMI<25	**1.38 (0.99; 1.93)**
		Overweight women (BMI 25-29) vs. BMI <25	**0.95 (0.64; 1.40)**
Chiarelli, 2003[658] N = 568	15-44	>25 vs. <25 women 12 months postpartum	0.82 (0.33; 2.02)
Ballester, 2005[162] N = 103	20-64	Women with BMI ≥25 vs. <25	2.30 (0.60; 8.30)
MacArthur, 2001[214] N = 7,879	42.9	2nd quartile vs. lowest quartile in women 3 months postpartum	**0.79 (0.52; 1.21)**
		3rd quartile vs. lowest quartile in women 3 months postpartum	**1.00 (0.68; 1.47)**
		4th quartile vs. lowest quartile in women 3 months postpartum	**0.72 (0.48; 1.09)**
Abramov, 2005[226] N = 542	26-86	≥30 vs. 25	**1.35 (0.72; 2.54)**
		25–30 vs. <25	**1.28 (0.67; 2.44)**
Nelson, 2005[4] N = 8,170	84	Incremental increase by 1 unit in men and women in nursing homes	**0.98 (0.96; 1.00)**
Nelson, 1998[3] N = 18,244	84	Incremental increase by 1 unit in men and women in nursing homes,1992	**1.00 (1.00; 1.30)**
		Incremental increase by 1 unit in men and women in nursing homes,1993	**1.00 (1.00; 1.04)**
Mazouni, 2005[689] N = 159	29.4	Incremental increase by 1 unit in women13 months instrumental delivery	1.00 (1.00; 1.00)
		Obese women	1.20 (0.75; 1.92)
		Obese women	**1.10 (0.70; 1.77)**
		Overweight women	1.08 (0.65; 1.79)
		Overweight women	**0.99 (0.60; 1.64)**
Flatus Incontinence in Women			
van Brummen, 2006[662] N = 487	30	23.7, 1 year postpartum	1.00 (1.00; 1.00)
		24.8, 1 year postpartum	1.08 (1.02; 1.13)*
Abramov, 2005[226] N = 542	26-86	≥30	**1.06 (0.65; 1.72)**
		25–30	**1.40 (0.91; 2.16)**
Uustal Fornell, 2004[185] N = 930 Obese 1,304 Overweight	>40	Obese BMI >30	1.80 (1.00; 3.10)
		Overweight >25 BMI	1.70 (1.20; 2.40)*

Table 29. Association between FI and diet, BMI, and diabetes (continued)

Author Sample	Age	Level of Risk Factors in Population Groups	Odds Ratio 95% CI
Liquid Feces Incontinence in Women			
Uustal Fornell, 2004[185] N = 930 Obese 1,304 Overweight	>40	Obese BMI >30	2.50 (1.40; 4.20)*
		Overweight >25 BMI	1.40 (0.90; 2.00)
Solid Feces Incontinence in Women			
Uustal Fornell, 2004[185] N = 930 Obese 1,304 Overweight	>40	Obese BMI >30	1.30 (0.50; 3.80)
		Overweight >25 BMI	1.20 (0.60; 2.40)
Diabetes Mellitus			
AI in Women			
Richter, 2005[208] N = 180	16-55	Diabetes and morbid obesity before laparoscopic weight loss surgery	0.59 (0.27; 1.31)
Boreham, 2005[212] N = 457	18-64	Diabetes	1.54 (0.49; 4.80)
Chen, 2003[213] N = 1,253	≥20	Diabetes mellitus	**1.90 (0.90; 4.10)**
Combined Incontinence in Men and Women			
Nelson, 2005[4] N = 8,170	84	Diabetes, nursing homes, men and women	**1.00 (1.00; 1.00)**
Nakanishi, 1997[58] N = 1,405	>65	Men and women with diabetes	**0.26 (0.05; 1.23)**
FI			
Quander, 2005[216] N = 6,099	>65	Men and women with diabetes	**1.70 (1.40; 2.10)***
Ostbye, 2004[186] N = 8,949	>65	Prevalence in women with diabetes	**1.09 (0.63; 1.87)**
		Incidence in women with diabetes	**1.30 (0.91; 1.87)**
		Prevalence in men with diabetes	**2.49 (1.32; 4.69)***
		Incidence in men with diabetes	**1.32 (0.81; 2.15)**
Nelson, 2005[4] N = 8,170	84	Men and women with diabetes, nursing homes	**1.00 (1.00; 1.00)**
Nelson, 1998[3] N = 18,224	84	Men and women with diabetes, nursing homes 1992	**1.00 (1.00; 1.00)**
		Men and women with diabetes, nursing homes 1993	**1.00 (1.00; 1.00)**
Nakanishi, 1997[58] N = 1,405	>65	Men and women with diabetes	1.00 (0.47; 2.12)
		Men and women with diabetes	**3.08 (1.16; 8.17)***
Kalantar, 2002[217] N = 642	>18	Men and women with diabetes	**2.07 (0.68; 6.32)***
Diet			
Combined Incontinence			
FI			2.23 (1.24; 3.98)*
FI			
Ostbye, 2004[186] N = 8,949	>65	Prevalence in women coffee drinker	**1.13 (0.78; 1.62)**
		Incidence in women coffee drinker	**1.08 (0.82; 1.43)**
		Prevalence in men coffee drinker	**2.03 (1.05; 3.90)***
		Incidence in men coffee drinker	**1.06 (0.70; 1.61)**

Bold - multivariate odds ratios
* Significant difference

Table 30. Association between FI, smoking, and pulmonary diseases

Author Sample	Age	Definition of Fecal Incontinence	Risk Factor in Population Groups	Odds Ratio (95% CI)
Smoking				
Richter, 2005[208] N = 180	16-55	AI	Current smoker women with morbid obesity before laparoscopic weight loss surgery	0.58 (0.18; 1.84)
Abramov, 2005[226] N = 542	26-86	FI	Smoking women	**1.72 (0.79; 3.73)**
Ostbye, 2004[186] N = 8,949	>65	Incidence of FI	Women smoked <1 pack/day	**1.02 (0.75; 1.38)**
			Women smoked 1+ pack/day	**1.23 (0.83; 1.82)**
			Men smoked <1 pack/day	**0.33 (0.17; 0.63)***
			Men smoked 1+ pack/day	**0.59 (0.32; 1.11)**
			Women smoked <1 pack/day	**0.85 (0.56; 1.29)**
			Women smoked 1+ packs/day	**1.33 (0.8; 2.2)**
			Men smoked <1 pack/day	**0.42 (0.23; 0.78)***
			Men smoked 1+ pack/day	**0.67 (0.37; 1.2)**
Bradley, 2005[125] N = 297	Mean age of 68.2	Fecal urgency	Smoking Women	**2.9 (0.7; 11.7)**
Guise, 2007[218] N = 8,774		Severity, incontinence of stool	Current smoking women	**1.85 (1.46; 2.35)***
Hojberg, 2000[227] N = 1,726	≥15	Severity, isolated flatus incontinence at least once a week	Smoking men and women	**1 (0.7; 1.3)**
Abramov, 2005[226] N = 542	26-86	Flatus incontinence	Smoking women	**0.95 (0.55; 1.62)**
Uustal Fornell, 2004[185] N = 885	>40	Flatus incontinence	Smoking women	0.90 (0.60; 1.40)
	>40	Liquid feces incontinence	Smoking women	0.70 (0.40; 1.10)
		Solid feces incontinence	Smoking women	0.60 (0.10; 0.80)*
Pulmonary Diseases				
Richter, 2005[208] N = 180	16-55	AI	Sleep apnea in women with morbid obesity before laparoscopic weight loss surgery	1.46 (0.75; 2.82)
Huang, 2006[187] N = 345		AI	Women with chronic obstructive pulmonary disease	**2.08 (1.18; 3.69)***
Stenzelius, 2004[114] N = 4,277	>75	Combined incontinence	Men and women with protracted coughing	1.65 (1.17; 2.32)*
Uustal Fornell, 2004[185] N = 885	>40	Liquid incontinence	Women with chronic bronchitis	3.50 (1.30; 9.90)*
		Solid incontinence	Women with chronic bronchitis	2.20 (0.00; 13.30)

Bold - multivariate odds ratios
* Significant difference

Table 31. Association between FI and muscle-skeletal diseases

Author	Age	Fecal Incontinence	Risk Factors in Population Groups	Odds Ratio (95% CI)
Richter2005[208] N = 180	16-55	AI	Arthritis in women with morbid obesity before laparoscopic weight loss surgery	1.64 (0.76; 3.55)
Nelson, 2005[4] N = 8,170	84	Combined incontinence	Arthritis in men and women in nursing homes	**0.80 (0.60;** 1.00)
		FI	Arthritis in men and women in nursing homes	**0.80 (0.70; 1.00)**
Nelson1998[3] N = 18,224	84	FI	Arthritis in men and women in nursing homes, 1992	**0.90 (0.80; 1.00)**
Chiarelli, 2003[658] N = 568	15-44	FI	Joint hyper mobility at 12 months postpartum	2.75 (1.05; 7.19)
Ostbye, 2004[186] N = 8,949	>65	Prevalence of FI	Arthritis in women	**1.43 (0.97; 2.1**)
		Incidence of FI	Arthritis in women	**1.17 (0.86; 1.59)**
		Prevalence of FI	Arthritis in men	**1.29 (0.76; 2.81)**
		Incidence of FI	Arthritis in men	**0.96 (0.66; 1.39)**
		FI	Arthritis in men and women in nursing homes, 1993	**0.80 (0.70; 0.90)***
		Prevalence of FI	Foot and ankle trouble in women	**2.01 (1.18; 3.44)***
		Incidence of FI	Foot and ankle trouble in women	**1.15 (0.79; 1.67)**
		Prevalence of FI	Foot or ankle trouble in men	**2.01 (1.18; 3.44)***
		Incidence of FI	Foot or ankle trouble in men	**1.15 (0.79; 1.67)**
Bliss, 2004[158] N = 1,352	75	Severity, soils underwear or floor	Lower back pain/sciatica in men and women	1.5 (1.1; 2.1)
		Type, liquid FI	Arthritis in men and women	**1.8 (1.2; 2.7)***

Bold - multivariate odds ratios
* Significant difference

Table 32. Association between FI and comorbidities

Author Sample	Age	Definition of Fecal Incontinence	Risk Factors in Population Groups	Odds Ratio (95% CI)
Curless, 1994[702] N = 31	25-93	FI	Colorectal cancer in men and women	3.4 (1.5; 7.6)*
Kalantar, 2002[217] N = 642	>18	FI	Radiation treatment to lower abdomen or pelvis in men and women	**2.72 (0.83; 8.89)**
Goode, 2005[219] N = 501		FI	Swelling in feet and legs in men	**3.49 (1.8; 6.76)***
		FI	transient ischemic attack/mini-stroke in men	**3.11 (1.3; 7.41)***
Nelson, 2005[4] N = 8,170	84	Combined incontinence	Heart disease in men and women in nursing homes	**1.00 (1.00; 1.00)**
		FI	Heart disease in men and women in nursing homes	**1.00 (1.00; 1.00)**
Nelson, 1998[3] N = 18,224	84	FI	Heart disease in men and women in nursing homes, 1992	**0.90 (0.80; 1.00)**
		FI	Heart disease in men and women in nursing homes, 1993	**1.00 (1.00; 1.00)**
Richter, 2005[208] N = 180	16-55	AI	Hypertension in women with morbid obesity before laparoscopic weight loss surgery	1.04 (0.55; 1.98)
Chen, 2003[213] N = 1,253	≥ 20	AI	Hypertension in women	**2.4 (1.2; 4.9)***
Melville, 2005[163] N = 6,888	30 - 90	FI	High medical comorbidity in women	**2.58 (1.66; 4.01)***
		FI	Moderate medical comorbidity in women	**1.76 (1.13; 2.73)***
Goode, 2005[219] N = 499		FI	Charlson Comorbidity Scale score in women	**1.29 (1.07; 1.55)***
Ostbye, 2004[186] N = 8,949	>65	Prevalence of FI	Kidney diseases in women	**1.46 (0.95; 2.24)**
		Incidence of FI	Kidney diseases in women	**1.48 (1.05; 2.09)***
		Prevalence of FI	Kidney diseases in men	**1.70 (0.85; 3.87)**
		Incidence of FI	Kidney diseases in men	**1.94 (1.15; 3.27)***

Bold - multivariate odds ratios
* Significant difference

Table 33. Association between FI and stroke

Author Sample	Age	Stroke in Population Groups	Odds Ratio (95% CI)
Combined Incontinence			
Nelson, 2005[4] N = 8,170	84	Men and women after stroke in nursing homes	**1.00 (1.00; 1.00)**
Nakanishi, 1997[58] N = 1,405	>65	Men and women after stroke	**5.39 (2.23; 13.05)***
FI			
Ostbye, 2004[186] N = 8,949	>65	Prevalence of FI in men after stroke	**1.44 (0.59; 3.53)**
		Incidence of FI in men after stroke	**1.14 (0.64; 2.04)**
		Prevalence of FI in women after stroke	**1.54 (0.78; 3.07)**
		Incidence of FI in women after stroke	**2.07 (1.44; 2.98)***
Harari, 2003[221] N = 1,069		Dysphagia 7-10 days after stroke in men and women	**2.16 (1.2; 3.8)***
		Glasgow Coma Score ≥15 7-10 days after stroke in men and women	**1 (1; 1)**
		Glasgow Coma Score <15 7-10 days after stroke in men and women	**2.84 (1.6; 5)***
		Initial UI 7-10 days after stroke in men and women	**17.96 (8.8; 36.8)***
Brittain, 2006[222] N = 38,633	≥40	Men and women after stroke	**1.33 (1.01; 1.76)**
Harari, 2003[221] N = 846 N = 1,069		Visual and/or sensory neglect 3 months after stroke in men and women	**0.98 (0.2; 5.3)**
		Visual field defect 7-10 days after stroke in men and women	**2.69 (1.6; 4.6)***
Nakayama, 1997[220] N = 935	75	10mm increase in lesion size 6 months after stroke in men and women	**1.30 (1.17; 1.47)***
		10-year increase in age at stroke in men and women (FI was measured 6 months after stroke)	**1.45 (1.09; 1.93)***
		Diabetes in men and women 6 month after stroke	**2.20 (1.14, 4.28)***
Harari, 2003[221] N = 846 3 months after stroke		Initial UI 3 months after stroke in men and women	**3.34 (0.6; 6.6)**
		Need for assistance with toilet access 3 months after stroke in men and women	**3.49 (1.4; 17.3)***
Nakayama, 1997[220] N = 935	75	Other disabling diseases 6-month after stroke in men and women	**2.07 (1.07; 3.99)***
		Severity of stroke 6 months after stroke in men and women	**0.36 (0.29; 0.45)**
Quander, 2005[216] N = 6,099	>65	Stroke in men and women	**2.80 (2.20; 3.50)***
Nelson, 2005[4] N = 8,170 N = 18,224	84	Stroke in men and women in nursing homes (8,170)	**1.00 (1.00; 1.00)**
		Stroke in men and women in nursing homes, 1992 (18,224)	**1.30 (1.20; 1.50)***
		Stroke in men and women in nursing homes, 1993 (18,224)	**1.20 (1.10; 1.30)***
Nakanishi, 1997[58] N = 1,405	>65	Stroke in men and women	10.58 (5.81; 19.28)*
		Stroke in men and women	**4.85 (1.43; 16.41)***

Bold - multivariate odds ratios
* Significant difference

Table 34. Association between FI and functional status of residents in nursing homes

Author Sample	Risk Factors of Fecal Incontinence	Odds Ratio (95% CI)
Combined UI and FI		
Nelson, 2005[4] N = 8,170	Dementia	**1.80 (1.40; 2.20)***
	Dependency in dressing	**2.00 (1.50; 2.70)***
	Dependency in eating	**1.60 (1.30; 2.10)***
	Dependency in hygiene	**1.60 (1.20; 2.20)***
	Impaired vision	**1.00 (1.00; 1.00)**
	Trunk restraints	**2.90 (2.00; 4.30)***
	Tube feeding	**1.00 (1.00; 1.00)**
	Depression	**1.00 (1.00; 1.00)**
	Dementia	**1.70 (1.40; 2.00)***
Nelson, 1998[3] N = 18,224	Dementia, 1992	**1.50 (1.40; 1.70)***
	Dementia, 1993	**1.40 (1.30; 1.50)***
Nelson, 2005[4] N = 8,170	Dependency in dressing	**1.90 (1.50; 2.50)***
	Dependency in eating	**1.50 (1.20; 1.90)***
	Dependency in hygiene	**1.50 (1.10; 1.90)***
	Impaired vision	**1.00 (1.00; 1.00)**
	Trunk restraints	**2.50 (1.70; 3.60)***
	Tube feeding	**1.00 (1.00; 1.00)**
Nelson, 1998[3] N = 18,224	Bed mobility, 1993	**2.10 (1.90; 2.30)***
	Dependency in dressing, 1992	**1.00 (1.00; 1.00)**
	Dependency in eating, 1992	**4.10 (3.80; 4.40)***
	Dependency in hygiene, 1992	**2.50 (2.00; 3.00)***
	Impaired vision, 1992	**1.50 (1.40; 1.70)***
	Dependency in locomotion,1992	**1.10 (1.00; 1.20)**
	Loss of activities of daily living,1992	**6.00 (4.70; 7.70)***
	Toilet use, 1992	**5.20 (4.40; 6.10)***
	Transferring, 1992	**1.00 (1.00; 1.00)**
	Trunk restraints, 1992	**3.20 (4.70; 7.70)***
	Tube feeding, 1992	**7.60 (5.60; 10.40)***
	Bed mobility, 1993	**2.20 (2.00; 2.40)***
	Dependency in dressing, 1993	**1.50 (1.20; 1.90)***
	Dependency in eating, 1993	**4.10 (3.80; 4.40)***
	Dependency in hygiene, 1993	**2.20 (1.80; 2.70)***
	Impaired vision, 1993	**1.40 (1.30; 1.50)***
	Dependency in locomotion, 1993	**1.00 (1.00; 1.00)**
	Loss of activities of daily living, 1993	**7.30 (5.50; 9.70)***
	Toilet use, 1993	**3.90 (3.30; 4.60)***
	Transferring, 1993	**1.00 (1.00; 1.00)**
	Trunk restraints, 1993	**3.00 (2.70; 9.80)***
	Tube feeding, 1993	**8.80 (6.30; 12.30)***
Nelson, 2005[4] N = 8,170	Depression	**1.00 (1.00; 1.00)**
Nelson, 1998[3] N = 18,224	Depression, 1992	**1.00 (1.00; 1.00)**
	Depression, 1993	**0.90 (0.80; 1.00)**
Ouslander, 1993[166] N = 430	1 year vs. 2 months length of stay in nursing home	5.194 (2.844; 9.483)*
	1 year vs. 2 weeks length of stay in nursing home	7 (3.755; 13.048)*

Bold - multivariate odds ratios
* Significant difference

Table 35. Association between FI with functional status and mental health in adults

Author (Sample)	Age	Risk Factors in Population Groups	Odds Ratio 95% CI
Combined UI and FI in Men and Women			
Stenzelius, 2004[114] (N = 4,277)	>75	Definition of incontinence - difficulty talking	2.13 (1.56; 2.93)*
		Definition of incontinence - difficulty walking	1.37 (0.98; 1.93)
		Memory problems	2.26 (1.48; 3.46)*
		Mobility limitation	1.40 (1.02; 1.92)
		Edema in legs	1.74 (1.30; 2.33)*
		Slow-healing wounds	1.94 (1.34; 2.81)*
Nakanishi, 1997[58] (N = 1,405)	>65	Anxiety	**1.13 (0.57; 2.23)**
		Dementia	**15.37 (3.77; 62.67)***
		Poor general health	**9.44 (4.41; 20.19)***
		Restricted social activity	**2.92 (0.96; 8.91)**
		Life not worth living	**1.65 (0.89; 3.03)**
Endo, 2002[661] (N = 605)		Need help in instrumental activity of daily living	0.821 (0.777; 0.867)
FI			
Nakanishi, 1997[58] (N = 1,405)	>65	Anxiety	1.32 (0.83; 2.1)
		Anxiety	**1.1 (0.47; 2.58)**
		Dementia	22.82 (9.22; 56.45)*
		Dementia	**0.01 (0; 2.48)**
Johanson, 1997[224] (N = 388)	31-103	Dementia	**2.1 (1.6; 2.6)***
Chassagne, 1999[223] (N = 1,186)	≥60	History of dementia	**2.1 (1.2; 3.5)**
		Mini-Mental Status Examination (MMSE) ≥15	**1 (1; 1)**
		Mini-Mental Status Examination (MMSE) score <15	**2.5 (1.4; 4.4)***
		Neurological diseases	1.9 (1; 3.4)
Ostbye, 2004[186] (N = 8,949)	>65	Cognitive status 3MS <78 in women	***1.8 (1.02; 3.2)***
		Cognitive status 3MS <78 in men	***1.28 (0.65; 2.54)***
		Cognitive status3MS <50 in women	***2.55 (0.26; 25.27)***
		Cognitive status3MS <50 in men	***6.29 (0.56; 71.2)***
		Cognitive status 3MS <78 in women	**0.22 (0.05; 0.89)***
		Cognitive status 3MS <78 in men	**1.03 (0.42; 2.52)**
		Cognitive status3MS <50 in women	**1.04 (0.12; 8.75)**
		Cognitive status3MS <50 in men	**4.57 (2.01; 10.35)***
Stenzelius, 2004[114] (N = 4,277)	>75	Fatigue	1.77 (1.13; 2.77)*
Goode, 2005[219] (N = 501)		Men living alone	**2.38 (1.23; 4.62)***
Chassagne1999[223] (N = 1,186)	≥60	Decreased mobility (severe/mild physical activity impairment)	**1.8 (1.1; 3)***
Johanson1997[224] (N = 388)	31-103	Restricted mobility	**1.5 (1.2; 1.9)***
Nakanishi1997[58] (N = 1,405)	>65	No life worth living	**1.74 (0.69; 4.39)**
	>65	No participation in social activity	**0.84 (0.34; 2.06)**
		Poor general health	10.82 (6.8; 17.22)*
		Poor general health	**2.34 (0.99; 5.53)**
		Social activity	4.75 (2.68; 8.43)*
Brittain, 2006[222] (N = 38,633)	≥40	Functional limitations	**4.02 (3.27; 4.95)***
Endo2002[661] (N = 533)		Modifecal incontinence Cumulative Illness Rating Scale (CIRS)	1.204 (1.056; 1.373)*
Kalantar2002[217] (N = 642)	>18	Fair/poor general health	**2.74 (1.18; 6.36)***
Goode2005[219] (N = 501 men and 499 men)		Poor self-perceived health status in women	**1.88 (1.01; 3.5)***
		Poor self-perceived health status in men	**2.18 (1.13; 4.2)***
		Geriatric depression scale score ≤5 in men	**1 (1; 1)**
		Geriatric depression scale score >5 in men	**2.83 (1.27; 6.28)***
Melville2005[163] (N = 6,888)	30-90	Major depression in women	**2.73 (1.67; 4.51)***

Bold - multivariate odds ratios; italic - incidence of incontinence; underlined - prevalence of fecal incontinence
* Significant difference

Table 36. Association between FI and gastrointestinal conditions in adults

Author Sample	Age	Risk Factors in Population Groups	Odds Ratio (95% CI)
AI in women			
Boreham, 2005[212] N = 457	18-64	Constipation	**2.11 (1.22; 3.63)***
Huang, 2006[187] N = 345		Frequent constipation	**2.09 (1.39; 3.16)***
Boreham, 2005[212] N = 457	18-64	Hemorrhoid surgery	1.22 (0.36; 4.13)
Meschia, 2002[211] N = 881	58.6	Hemorrhoid surgery	**2.70 (1.10; 7.00)***
Huang, 2006[187]		Irritable bowel syndrome, White women	**3.21 (2.1; 4.89)***
Meschia, 2002[211] N = 881	58.6	Irritable bowel syndrome	**6.30 (3.50; 11.50)***
Boreham, 2005[212] N = 457	18-64	Irritable bowel syndrome	**3.22 (1.75; 5.93)***
Combined UI and FI in Men and Women			
Stenzelius, 2004[114] N = 4,277	>75	Constipation	1.44 (1.06; 1.94)*
		Diarrhea	7.72 (5.80; 10.29)*
		Definition of incontinence difficulty swallowing	1.63 (1.18; 2.26)*
FI in Women			
Bharucha, 2006[225] N = 2,800	≥20	Constipation	**1.1 (0.8; 1.5)**
		Diarrhea	**2.4 (1.6; 3.6)***
		Diarrhea ± constipation	**1.7 (0.98; 3)**
		Irritable bowel syndrome	**1.9 (1.3; 2.7)***
		Urgency, no diarrhea or constipation	**5.1 (3.7; 7.1)***
		Anal abscess	**1.1 (0.5; 2.4)**
		Anal fissure	**1.2 (0.9; 1.8)**
		Anal fistula	**2.5 (1.2; 5.2)***
		Cholecystectomy	**1.4 (1.02; 1.9)***
Goode, 2005[219] N = 499 women and 501 men		Chronic diarrhea	**4.55 (2.03; 10.2)***
Chiarelli, 2003[658] N = 568	15-44	Constipation at twelve months postpartum	2.46 (1.11; 5.46)*
FI in Men and Women			
Stenzelius, 2004[114] N = 4,277	>75	Abdominal pain	1.86 (1.15; 3.01)*
		Diarrhea	6.77 (4.20; 10.90)*
Kalantar, 2002[217] N = 642	>18	Hard or lumpy stool	**1.52 (0.8; 2.88)**
		Incomplete evacuation	**3.72 (1.99; 6.96)***
		Loose or watery stools	**4.89 (2.56; 9.33)***
		Straining on defecation	**1.63 (0.85; 3.13)**
		Urgency	**5.57 (2.95; 10.51)***
Goode, 2005[219] N = 501 men		Chronic diarrhea in men	**6.08 (2.29; 16.16)***
Johanson, 1997[224] N = 388	31-103	Frequent diarrhea	**2.4 (1.3; 4.6)***
		Watery stool	**1.8 (1; 3)**

Bold - multivariate odds ratios
* Significant difference

Table 37. Association between FI and prostate diseases

Author Sample	Age	Incontinence and Bowel Symptoms	Risk Factors	Odds Ratio (95% CI)
Adolfsson, 1998[180] N = 359	50-80	FI	Not reporting any treatment for prostate diseases	**2.20 (0.40; 11.00)**
Goode, 2005[219] N = 501		FI	Prostate diseases	**2.29 (1.04; 5.02)***
Adolfsson, 1998[180] N = 359	50-80	FI	Treatment for prostate cancer; endocrine	**3.20 (0.80; 12.10)**
			Treatment for prostate cancer; endocrine treatment subsequent to external radiation or radical prostatectomy	**1.80 (0.30; 12.40)**
			Treatment for prostate cancer; external radiation	**3.80 (0.90; 15.90)**
			Treatment for prostate cancer; prostatectomy	**5.30 (1.40; 20.20)***
			Prostate cancer	**3.10 (1.30; 8.00)***
Kirschner-Hermanns, 2005[676] N = 132	63.4	FI	Baseline fecal incontinence before extrafascial perineal prostatectomy for Stage cT1-cT3N0M0 prostate cancer	**6.02 (2.29; 15.80)***
			Prostate volume before extrafascial perineal prostatectomy for Stage cT1-cT3N0M0 prostate cancer	**1.02 (1.00; 1.05)**
		Severe FI	Baseline FI before extrafascial perineal prostatectomy for Stage cT1-cT3N0M0 prostate cancer	**3.96 (1.27; 12.39)***
			Positive surgical margins after extrafascial perineal prostatectomy for Stage cT1-cT3N0M0 prostate cancer	**7.22 (2.05; 25.44)***
Potosky, 2004[678] N = 1,187	55-82	Bleeding with bowel movements	5 years radical prostatectomy vs. external beam radiotherapy for localized prostate cancer	**0.58 (0.31; 1.06)**
		Bothered by frequent bowel movement to pain, or urgency	5 years radical prostatectomy vs. external beam radiotherapy for localized prostate cancer	**1.23 (0.52; 2.89)**
Potosky, 2000[677] N = 1,591	55-79	Bothered by frequent bowel movement, pain, or urgency	2 years after radical prostatectomy vs. external beam radiotherapy for localized prostate cancer	**0.68 (0.31; 1.50)**
Adolfsson, 1998[180]	50-80	Bowel urgency	Not reporting any treatment for prostate disease	**1.00 (0.40; 2.40)**
Potosky, 2000[677] N = 1,591	55-76	Bowel urgency	2 years after radical prostatectomy vs. external beam radiotherapy for localized prostate cancer	**0.40 (0.27; 0.59)***
Potosky, 2004[678] N = 1,187	55-76	Bowel urgency	5 years after radical prostatectomy vs. external beam radiotherapy for localized prostate cancer	**0.56 (0.36; 0.87)***
Adolfsson, 1998[180] N = 359	50-80	Bowel urgency	Treatment for prostate cancer: endocrine	**1.30 (0.50; 3.30)**
			Treatment for prostate cancer: endocrine treatment subsequent to external radiation or radical prostatectomy	**2.50 (0.90; 6.90)**
			Treatment for prostate cancer: external radiation	**2.40 (0.90; 6.20)**
			Treatment for prostate cancer: prostatectomy	**0.90 (0.10; 6.00)**
			Prostate cancer	**1.50 (0.80; 2.70)**
			No prostate cancer	**1.00 (1.00; 1.00)**
		Constipation	Not reporting any treatment	**1.70 (0.70; 4.20)**
			Treatment for prostate cancer: endocrine	**1.00 (0.30; 3.60)**

Table 37. Association between FI and prostate diseases (continued)

Author Sample	Age	Incontinence and Bowel Symptoms	Risk Factors	Odds Ratio (95% CI)
			Treatment for prostate cancer: endocrine treatment subsequent to external radiation or radical prostatectomy	**3.90 (1.40; 10.40)***
			Treatment for prostate cancer: external radiation	**2.00 (0.60; 6.90)**
			Treatment for prostate cancer: prostatectomy	**2.20 (0.50; 9.40)**
			With prostate cancer	**1.80 (0.90; 3.80)**
			Without prostate cancer	**1.00 (1.00; 1.00)**
Potosky, 2004[678] N = 1,187	55-74	Diarrhea	5 years after radical prostatectomy vs. external beam radiotherapy for localized prostate cancer	**0.84 (0.55; 1.26)**
			5 years radical prostatectomy vs. external beam radiotherapy for localized prostate cancer	**0.70 (0.41; 1.22)**
Potosky, 2000[677] N = 1,591	55-74	Diarrhea	2 years after radical prostatectomy vs. external beam radiotherapy for localized prostate cancer	**0.50 (0.34; 0.72)***
		Painful bowel movements	2 years after radical prostatectomy vs. external beam radiotherapy for localized prostate cancer	**1.00 (0.58; 1.80)**
Potosky, 2004[678] N = 1,187	55-75	Painful bowel movements	5 years after radical prostatectomy vs. external beam radiotherapy for localized prostate cancer	**1.31 (0.73; 2.35)**
Potosky, 2000[677] 1,591N =	55-78	Painful hemorrhoids	2 years after radical prostatectomy vs. external beam radiotherapy for localized prostate cancer	**0.38 (0.23; 0.64)***
Potosky, 2004[678] N = 1,187	55-78	Painful hemorrhoids	5 years after radical prostatectomy vs. external beam radiotherapy for localized prostate cancer	**0.43 (0.25; 0.74)***
		Passing mucus from rectum	5 years radical prostatectomy vs. external beam radiotherapy for localized prostate cancer	**0.36 (0.20; 0.66)***
		Tenderness during bowel movements	5 years radical prostatectomy vs. external beam radiotherapy for localized prostate cancer	**0.85 (0.46; 1.56)**
Potosky, 2000[677] N = 1,1591	55-77	Wetness in rectal area	2 years after radical prostatectomy vs. external beam radiotherapy for localized prostate cancer	**0.63 (0.40; 0.99)***
Potosky, 2004[678] N = 1187	55-77	Wetness in rectal area	5 years after radical prostatectomy vs. external beam radiotherapy for localized prostate cancer	**0.75 (0.47; 1.20)**

Bold - multivariate odds ratios
* Significant difference

Table 38. Association between FI and anal trauma in females

Author Sample	Age	Definition of Incontinence	Risk Factor	Odds Ratio (95% CI)
Faltin, 2001[232] N = 1,228	15-93	AI	Anal sphincter tear in women	**4.4 (2; 9.1)***
Kalantar, 2002[217] N = 642	>18	FI	Perianal injury in men and women	**2.62 (1.11; 6.23)***
Bharucha, 2006[225] N = 2,800	≥20	FI	Non childbirth anal injury in women	**2.4 (1.3; 4.5)***
Faltin, 2006[695] N = 540		Severity, at least 2 symptoms at least once a week or 3 symptoms (symptoms: incontinence to flatus, liquid or solid stool; need to wear a pad; lifestyle alteration)	Anal sphincter tear 18 years after rupture of anal sphincter during childbirth	1.7 (1; 2.8)
Nichols, 2005[679] N = 190	53	Bothersome AI	Anal sphincter defect in women	**16.10 (6.80; 38.20)***
			Anal sphincter defect on ultrasonography and pelvic floor disorders vs. no defect in women	36.40 (12.00; 114.00)*
			Anal sphincter defect on ultrasonography and pelvic floor disorders vs. no defect in women	5.90 (3.00; 11.00)
			Anal sphincter injury in stage 0 or I pelvic organ prolapse and no UI in women	**7.20 (1.80; 28.10)***
			Anal sphincter injury in stage II pelvic organ prolapse and/or UI in women	**55.00 (13.00; 230.00)***

Bold - multivariate odds ratios
* Significant difference

Table 39. Association between FI and UI

Author Sample	Age	Risk Factors	Odds Ratio (95% CI)
AI			
Boreham, 2005[212] N = 457	18-64	UI	2.66 (1.65; 4.28)*
Meschia, 2002[211] N = 881	58.6	Detrusor instability	2.30 (1.20; 4.10)*
Ng, 2002[210] N = 320		Genuine stress incontinence	**1.19 (0.42; 3.40)**
Meschia, 2002[211] N = 881	58.6	Genuine stress incontinence	1.60 (1.10; 2.30)*
Ng, 2002[210] N = 320		Mixed incontinence	**1.80 (0.56; 5.77)**
Meschia, 2002[211] N = 881	58.6	Mixed incontinence	2.30 (1.30; 3.90)*
Ng, 2002[210] N = 320		Overactive bladder	1.10 (0.42; 2.88)
Chen, 2003[213] N = 1,253	≥20	Overactive bladder	**3.2 (1.6; 6.7)***
Nichols, 2004[681] N = 100	57	Pelvic organ prolapse and urinary incontinence vs. UI only or pelvic organ prolapse only	2.72 (1.20; 6.10)*
Chen, 2003[213] N = 1,253	≥20	Stress UI	**1.5 (0.7; 3)**
Richter, 2005[208] N = 180	16-55	UI in women with morbid obesity before laparoscopic weight loss surgery	6.34 (2.52; 15.93)*
Meschia, 2002[211] N = 881	58.6	UI	**1.90 (1.30; 2.80)***
Huang, 2006[187] N = 345		UI, Asian women	2.22 (1.32; 3.76)*
		UI, White women	3.38 (2.52; 4.53)*
Combined UI			
Stenzelius, 2004[114] N = 4,277	>75	Urinary symptoms other than UI in men and women	2.29 (1.69; 3.12)*
FI			
Chiarelli, 2003[658] N = 568	15-44	UI 1 year postpartum	0.83 (0.04; 17.05)
		Flow-stopping inability 1 year postpartum	1.22 (0.5; 2.92)
		UI 1 year postpartum	0.26 (0.02; 2.53)
Brittain, 2006[222] N = 38,633	≥40	UI in men and women	**8.1 (6.62; 9.69)***
Chiarelli, 2003[658] N = 568	15-44	UI 12 months postpartum	6.03 (2.37; 15.33)*
		UI before pregnancy	1.6 (0.58; 4.4)
		UI during pregnancy	0.66 (0.27; 1.61)
Chassagne, 1999[223] N = 1,186	≥60	History of UI in men and women	**2.9 (1.8; 4.6)***
Abramov, 2005[226] N = 542	26-86	Stress UI	**2.11 (1.12; 3.98)***
Melville, 2005[163] N = 6,888	30-90	UI	**2.32 (1.7; 3.15)***
Ballester, 2005[162]2 N = 103	20-64	UI	**6 (1.7; 21)***
Goode, 2005[219] N = 499		UI	**2.65 (1.34; 5.25)***

Table 39. Association between FI and UI (continued)

Author Sample	Age	Risk Factors	Odds Ratio (95% CI)
Flatus Incontinence			
Kjolhede, 2005[683] N = 508		Burch colposuspension for UI vs. healthy controls 14 years after surgery	**1.98 (1.17; 3.37)***
Abramov, 2005[226] N = 542	26-86	Stress UI	**1.72 (1.14; 2.59)***
Uustal Fornell, 2004[185] N = 885	>40	UI	4.80 (3.00; 7.80)*
Liquid Feces Incontinence			
Bliss[158] N = 1,352	Mean age of 75±6	UI in men and women	2.9 (1.9; 4.2)*
Kjolhede, 2005[683] N = 508		Burch colposuspension for UI vs. healthy controls 14 years after surgery	**3.67 (1.43; 9.42)***
Uustal Fornell, 2004[185] N = 885	>40	UI	4.90 (2.90; 8.70)*
Mucus Incontinence			
Bliss, 2004[158] N = 1,352	Mean age of 75±6	UI in men and women	3.6 (1.2; 12)*
Solid Feces Incontinence			
Kjolhede, 2005[683] N = 508		Burch colposuspension for UI vs. healthy controls 14 years after surgery	**2.96 (0.42; 20.90)**
Uustal Fornell, 2004[185] N = 885	>40	UI	5.90 (2.40; 14.60)*

Bold - multivariate odds ratios
* Significant difference

Table 40. Association between FI and pregnancy related risk factors

Author Sample	Age	Risk Factors	Time from Exposure to Outcome	Odds Ratio (95% CI)
AI				
Casey, 2005[202] N = 3,887		3rd or 4th degree laceration vs. no laceration	Within 7 months of delivery, at or before their 6-month contraceptive followup after delivery	**1 (0.5; 2)**
		Birth weight >4,000g vs. <4,000g		**2.4 (1.3; 4.4)***
		Cesarean delivery vs. vaginal		**0.6 (0.2; 2)**
		Epidural analgesia vs. no analgesia		**1.2 (0.7; 1.9)**
		Episiotomy vs. no episiotomy		**1 (0.4; 2.3)**
		Forceps delivery vs. vaginal		**1.2 (0.5; 2.9)**
		Oxytocin augmentation vs. no oxytocin augmentation		**0.7 9 (0.3; 1.6)**
		Second stage >2 hours vs. <2 hours		**0.4 (0.2; 1.1)**
Frudinger, 2002[692] N = 134	22-39	Birth weight of baby (increment - 1kg)		**1.31 (0.34; 4.99)**
		Head circumference of baby (increment cm)		**1.11 (0.74; 1.67)**
		Narrow subpubic arch angle vs. normal		**8.69 (3.15; 23.94)***
		Caesarean delivery vs. vaginal		**0.31 (0.06; 1.62)**
		Forceps delivery vs. no forceps		**1.36 (0.35; 5.29)**
		Second stage (hours)		**0.89 (0.57; 1.39)**
		Ultrasonic evidence of injury, perineal scar vs. no scar		**2.69 (0.7; 10.33)**
		Ultrasonic evidence of injury, sphincter scar vs. no injury		**2.26 (0.69; 7.36)**
Eason, 2002[228] N = 252		Episiotomy without extension into anal sphincter perineal injury vs. no episiotomy	3 months postpartum	**1.3 (0.9; 1.8)**
		FI - degree tear perineal injury vs. no perineal injury		**1.2 (0.8; 1.7)**
		Forceps delivery vs. vaginal		**1.4 (1; 2.1)**
		3rd or 4th-degree tear perineal injury vs. no injury		**2.1 (1.4; 3.1)***
		Vacuum delivery vs. vaginal		**1.3 (0.9; 1.8)**
		% of days perineal massage performed ≥67 days vs. <33 days		**0.8 (0.6; 1.1)**
		% of days perineal massage performed 33-66 days vs. <33 days		**1 (0.8; 1.3)**
		Episiotomy vs. no episiotomy		**1.1 (0.8; 1.4)**
		Infant birth weight, ≥4,000g vs. <4,000g		**1.2 (0.9; 1.6)**
		Length of second stage of labor, ≥1.5 hour (vaginal delivery only) vs. <0.5 hour		**0.9 (0.7; 1.2)**
		Length of second stage of labor, 0.5-0.9 hour (vaginal delivery only) vs. <0.5 hour		**0.8 (0.6; 1.2)**
		Length of second stage of labor, 1-1.4 hour (vaginal delivery only) vs. <0.5 hour		**0.8 (0.6; 1.2)**
Faltin, 2001[696] N = 100	15-93	External and internal anal sphincter defect vs. no defect	3 months after delivery	7.4 (1.7; 31.4)*
			30 months after delivery	5.3 (1.2; 24.1)*
		Isolated external anal sphincter defect vs. no defect	3 months after delivery	6.2 (1.2; 32)
			30 months after delivery	6.5 (1.3; 33.4)
		Isolated internal anal sphincter defect	3 months after delivery	1.9 (0.2; 18.7)

Table 40. Association between FI and pregnancy related risk factors (continued)

Author Sample	Age	Risk Factors	Time from Exposure to Outcome	Odds Ratio (95% CI)
		Anal sphincter tear (clinically diagnosed) vs. no tear	3 months after delivery	4.3 (1.9; 9.7)*
			30 months after delivery	3.4 (1.2; 9.8)*
		Baby weight >4,000g vs. <4,000g		**0.7 (0.4; 1.4)**
		Clinically occult anal sphincter tears vs. no tears	3 months after delivery	3.8 (0.8; 17.1)
			30 months after delivery	7.7 (1; 60.1)
		No subsequent delivery vs. delivery again		2.8 (1; 8.3)
		Operative delivery vs. no operative delivery		**1.6 (0.9; 2.7)**
		Parity vs. nulliparity		**3.1 (1.6; 6)***
		Sphincter defects diagnosed after endosonography 3 months after delivery vs. no defect	Transient shortly after delivery	2 (1.4; 2.8)*
			3 months after delivery	1.9 (1.4; 2.6)*
			30 months after delivery	1.9 (1.3; 2.8)*
Boreham, 2005[212] N = 457	18-64	Nulliparity vs. parity		0.63 (0.4; 0.99)
		Vaginal parity (per delivery)		1.16 (1; 1.35)
Zetterstrom, 1999[703] N = 349	30	10 years increase in maternal age	9 months postpartum	3.00 (1.40; 6.40)*
		Sphincter tear vs. no tear		2.40 (1.04; 4.90)*
Pollack, 2004[209] N = 349	30	AI at 5 months vs. anal continence	Five years after first vaginal delivery	**3.80 (2.00;** 7.30)*
		AI at 9 months vs. anal continence		**4.30 (2.20;** 8.20)*
		Sphincter tear vs. no tear		**2.30 (1.10; 5.00)***
		Subsequent childbirth		**2.40 (1.10; 5.60)***
Pregazzi, 2002[704] N = 218	2,143	Anal sphincter and rectal mucosa tears vs. intact perineum and superficial tears	Immediately after vaginal delivery	8.78 (2.60; 134.10)*
		Perineal muscle tears vs. intact perineum and superficial tears		1.48 (0.10; 14.60)
Lal, 2003[698] N = 184	28	Cesarean delivery vs. spontaneous vaginal delivery	10 months postpartum	0.61 (0.25; 1.53)
		Cesarean delivery with labor vs. vaginal delivery		1.66 (0.83; 3.32)
		Cesarean delivery without labor vs. vaginal delivery		1.62 (0.81; 3.23)
Huang, 2006[187]		History of 3rd or 4th degree vaginal tear vs. no tear, Asian American women		**2.41 (1.14; 5.1)***
Richter, 2005[208] N = 180	16-55	Number of Cesarean deliveries	Morbid obesity before laparoscopic weight loss surgery	0.84 (0.55; 1.29)
		Number of children		1.11 (0.86; 1.44)
		Number of vaginal deliveries		1.18 (0.92; 1.53)
Nichols, 2004[681] N = 100	57	Operative vaginal delivery vs. no operative		**3.75 (1.60; 8.70)***
Chen, 2003[213] N = 1,253	≥20	Parity ≥1 vs. nulliparity		**3.4 (1.2; 9.5)***
Peschers, 2003[694] N = 100	34	Vacuum vs. spontaneous vaginal delivery	6-24 weeks postpartum	0.83 (0.36; 1.93)
Ng, 2002[210] N = 320		Vaginal delivery vs. no vaginal delivery		**1.09 (0.34; 1.25)**

Table 40. Association between FI and pregnancy related risk factors (continued)

Author Sample	Age	Risk Factors	Time from Exposure to Outcome	Odds Ratio (95% CI)
FI				
McKinnie, 2005[657] N = 1,004	42.7	>1 pregnancy vs. no term pregnancy		2.26 (1.22; 4.19)*
		>1 pregnancy and >1 vaginal delivery vs. no vaginal delivery		2.15 (0.97; 4.77)
		>1 pregnancy and >1 vaginal delivery vs.>1 pregnancy, no vaginal delivery		**1.93 (0.81; 4.60)**
		>1 pregnancy and >1 vaginal delivery vs. no term pregnancy		2.41 (1.30; 4.49)*
		>1 pregnancy and vaginal delivery vs. no term pregnancy		1.13 (0.43; 2.96)
		>1 pregnancy vs. no term pregnancy		**1.35 (0.69; 5.74)**
De Leeuw, 2001[229] N = 250		Extent of perineal damage (per grade: grade-IV vs. grade-IIIb vs. grade-IIIa)	After anal sphincter damage during delivery	**2.54 (1.45; 4.45)***
		Mediolateral episiotomy, primiparity vs. no episiotomy		**0.17 (0.05; 0.61)**
		Primiparity, without episiotomy		**1.16 (0.41; 3.29)**
		Subsequent vaginal delivery		**2.32 (0.85; 6.33)**
		Mediolateral episiotomy, multiparity		**1.25 (0.27; 5.83)**
		Primiparity, with episiotomy		**0.15 (0.02; 0.98)***
Chiarelli, 2003[658] N = 568	15-44	Instrumental delivery vs. no instrumental delivery	At 12 months postpartum	0.83 (0.31; 2.2)
		Marked abdominal striae		2.34 (0.91; 6.02)
		Multiparity vs. nulliparity		1.42 (0.53; 3.83)
		Perineal trauma (tear with sutures and/or episiotomy)		1.67 (0.67; 4.14)
Melville, 2005[163] N = 6,888	30 - 90	Cesarean deliveries only		**0.87 (0.42; 1.8)**
		History of operative vaginal delivery vs. no history		**1.52 (1.09; 2.12)***
		Mixed/unknown delivery types vs. vaginal		**1.44 (0.82; 2.54)**
		Nulliparity		**1.35 (0.88; 2.08)**
Signorello, 2000[697] N = 626		2nd/3rd/4th degree tear vs. intact/1st degree tear	3 months postpartum	1.40 (0.40; 5.00)
			6 months postpartum	1.20 (0.20; 6.40)
van Brummen, 2006[662] N = 487	30	3rd/4th degree tear vs. no tear	1 year after delivery	6.82 (4.20; 11.00)*
Mazouni, 2005[689] N = 159	29.4	Age (years)	12 months instrumental delivery	1.00 (1.00; 1.00)
		Birth weight (g)	18 months instrumental delivery	**1.00 (1.00; 1.00)**
		Episiotomy vs. no episiotomy	16 months instrumental delivery	1.00 (1.00; 1.00)
		Length of labor	15 months instrumental delivery	1.00 (1.00; 1.00)
		3rd-degree tears	17 months instrumental delivery	1.00 (1.00; 1.00)
Sultan, 1993[705] N = 124	18-43	Any anal-sphincter defect after vaginal delivery vs. no defect		2.70 (1.97; 3.71)*
Sultan, 1993[699] N = 90		Forceps delivery		1.81 (0.12; 27.72)
Abramov, 2005[226]	26-86	At least 1 episiotomy		**1.03 (0.45; 2.32)**
		At least 1 forceps delivery		**0.98 (0.4; 2.41)**

Table 40. Association between FI and pregnancy related risk factors (continued)

Author Sample	Age	Risk Factors	Time from Exposure to Outcome	Odds Ratio (95% CI)
N = 274		At least 1 prolonged second stage of labor (>2 hrs)		**1.12 (0.49; 2.54)**
		At least 1 birth weight >4,000g		**1.19 (0.56; 2.53)**
Abramov, 2005[226] N = 346	26-86	Cesarean only		**0.39 (0.13; 1.04)**
Abramov, 2005[226] N = 542	26-86	Parity ≥2		**3.09 (1.25; 7.65)***
		Parity, 1		**1.32 (1; 2.3)**
van Brummen, 2006[662] N = 487	30	Birth weight g 3107 vs. >3,445	1 year after delivery	0.99 (0.99; 1.01)
		FI at 12 weeks gestation		2.60 (0.90; 12.10)
MacArthur, 2001[214] N = 7,879	42.9	Breech delivery vs. vaginal	3 months postpartum	**1.49 (0.42; 5.24)**
		Caesarean section vs. vaginal		**0.58 (0.35; 0.97)**
		Forceps delivery		**1.94 (1.30; 2.89)***
		Vacuum delivery		**1.26 (0.77; 2.07)**
Macarthur, 2005[215] N = 4,046		Number of births, ≥4	6 years postpartum	**2.12 (1.34; 3.35)***
		Number of births, 1		**1.00 (1.00; 1.00)**
		Number of births, 3		**1.61 (1.08; 2.41)***
		Number of births, 2		**1.23 (0.85; 1.78)**
		≥1 forceps		**1.48 (1.18; 1.87)***
		Only Caesarean section(s)		**1.04 (0.72; 1.50)**
Bharucha, 2006[225] N = 2,800	≥20	Cesarean section only, no surgery		**0.7 (0.3; 1.5)**
		Vaginal delivery with forceps or stitches, no surgery		**1.2 (0.9; 1.6)**
		Vaginal delivery without forceps or stitches, no surgery		**0.8 (0.5; 1.1)**
Signorello, 2000[697] N = 626		Episiotomy vs. 2nd/3rd/4th degree tear	3 months postpartum	3.20 (1.30; 7.90)*
			6 months postpartum	2.90 (0.70; 11.20)
		Episiotomy vs. intact/1st degree tear	3 months postpartum	5.50 (1.80; 16.20)*
			6 months postpartum	3.70 (0.90; 15.60)
Meyer, 2000[700] N = 107	29	Forceps delivery vs. spontaneous delivery	10 month after delivery	0.80 (0.75; 1.05)
Schraffordt Koops, 2003[701] N = 479		Forceps delivery vs. spontaneous delivery	Incident 3-4 years after delivery	1.25 (0.69; 2.27)
			3-4 years after delivery	0.80 (0.44; 1.44)
Mahony, 2007[230] N = 500	18-46	Instrumental delivery		**3.10 (1.20; 7.90)***
		Internal anal sphincter defect thickness; partial (1 quadrant)		**2.10 (0.50; 10.70)**
		Internal anal sphincter defect thickness; partial (>1 quadrant) or full thickness		**5.10 (1.50; 22.90)***
		Parity >3		**1.40 (0.30; 5.50)**
		Parity 2		**1.70 (0.60; 4.90)**
Ostbye, 2004[186] N = 8,949	>65	Number of children: ≥4	Prevalence	**0.81 (0.49; 1.36)**
			Incidence	**0.79 (0.55; 1.14)**
		Number of children: 3	Prevalence	**1.25 (0.73; 2.12)**

Table 40. Association between FI and pregnancy related risk factors (continued)

Author Sample	Age	Risk Factors	Time from Exposure to Outcome	Odds Ratio (95% CI)
			Incidence	**0.78 (0.51; 1.18)**
		Number of children: 2	Prevalence	**1.03 (0.62; 1.73)**
			Incidence	**0.89 (0.6; 1.31)**
		Number of children: 1	Prevalence	**1.07 (0.59; 1.95)**
			Incidence	**0.92 (0.58; 1.45)**
Borello-France, 2006[231] N = 721		Sphincter tear	At 6 weeks postpartum	**2.8 (1.8; 4.3)***
			At 6 months postpartum	**1.9 (1.2; 3.2)***
Borello-France, 2006[231] N = 472		Vaginal control	At 6 weeks postpartum	**1.1 (0.49; 2.5)**
			At 6 months postpartum	**1.01 (0.38; 2.71)**
Richter, 2006[706] N = 251		Sphincter tear vs. vaginal delivery without anal sphincter tear	6-12 months after delivery	4.40 (1.60; 12.30)*
		3rd vs. 4th degree tear of anal sphincter	6-12 months after delivery	2.00 (0.70; 5.80)
Schraffordt Koops, 2003[701] N = 479		Vacuum extraction vs. spontaneous delivery	Incident 3-4 years after delivery	0.85 (0.48; 1.51)
			3-4 years after delivery	1.18 (0.66; 2.09)
MacLennan, 2000[7] N = 3,010	42.9	Vaginal vs. caesarean delivery		**1.50 (0.50; 4.90)**
Fecal Soiling				
Peschers, 2003[694] N = 100	34	Vacuum vs. spontaneous vaginal delivery	6-24 weeks postpartum	0.68 (0.20; 2.32)
Flatus				
Chaliha, 1999[205] N = 549	17-46	Augmentation	3 months postpartum	0.8 (0.2; 2.8)
		Epidural analgesia	3 months postpartum	0.9 (0.7; 1.3)
		Fetal head circumference	3 months postpartum	0.9 (0.6; 1.2)
		Fetal weight	3 months postpartum	2.9 (0.8; 10.2)
		First stage (reference)	3 months postpartum	1
		Mode of delivery	3 months postpartum	1.1 (0.6; 2.2)
		Perineal trauma	3 months postpartum	1 (1; 1)
		Second stage (active)	3 months postpartum	1 (1; 1)
		Second stage (passive)	3 months postpartum	1 (1; 1)
Chaliha, 1999[205] N = 549	17-46	Didn't receive labor epidural	3 months postpartum	1 (1; 1)
Signorello, 2000[697] N = 626		2nd/3rd/4th degree tear v intact/1st degree tear	3 months postpartum	0.80 (0.50; 1.40)
			6 months postpartum	1.10 (0.50; 2.10)
Wagenius, 2003[693] N = 654		Anal sphincter rupture following vaginal delivery	4 years after delivery	2.71 (1.78; 4.15)*
Abramov, 2005[226] N = 274	26-86	At least 1 episiotomy		**1.22 (0.7; 2.11)**
		At least 1 forceps delivery		**0.76 (0.33; 1.21)**
		At least 1 prolonged second stage of labor (>2 hours)		**1.04 (0.58; 1.78)**
		At least 1 birth weight >4kg		**1.02 (0.63; 1.63)**
Abramov, 2005[226] N = 346	26-86	Cesarean only		**0.92 (0.52; 1.56)**
Abramov, 2005[226] N = 542	26-86	Parity ≥2		**2.72 (1.65; 4.51)***
		Parity, 1		**2.27 (1.28; 4.05)***
Borello-France, 2006[231] N = 472		Cesarean control	At 6 weeks postpartum	**1 (1; 1)**
			At 6 months postpartum	**1 (1; 1)**
Borello-France, 2006[231] N = 721		Sphincter tear	At 6 weeks postpartum	**1.6 (1.1; 2.4)***
			At 6 months postpartum	**1.7 (1.1; 2.7)***

Table 40. Association between FI and pregnancy related risk factors (continued)

Author Sample	Age	Risk Factors	Time from Exposure to Outcome	Odds Ratio (95% CI)
Borello-France, 2006[231]		Vaginal control, n = 721	At 6 weeks postpartum	**1 (1; 1)**
		Vaginal control, n = 472	At 6 weeks postpartum	**1.3 (0.67; 2.6)**
		Vaginal control, n = 721	At 6 months postpartum	**1 (1; 1)**
		Vaginal control, n = 472	At 6 months postpartum	**0.48 (0.24; 0.96)***
Uustal Fornell, 2004[185] N = 885	>40	Delivery by vacuum extractor		1.40 (0.50; 4.50)
		Large tear at delivery		1.80 (1.00; 3.30)
		Sphincter rupture		6.10 (2.30; 16.50)*
		3 or more births		0.90 (0.60; 1.40)
		Vaginal delivery		1.10 (0.40; 3.00)
				1.50 (0.80; 2.70)
Signorello, 2000[697] N = 626		Episiotomy vs. 2nd/3rd/4th degree tear	3 months postpartum	2.10 (1.30; 3.40)*
			6 months postpartum	2.10 (1.20; 3.70)*
		Episiotomy vs. intact/1st degree tear	3 months postpartum	1.70 (1.00; 2.80)
			6 months postpartum	2.30 (1.20; 4.30)*
van Brummen, 2006[662] N = 487	30	Flatus incontinence at 12 weeks gestation	1 years postpartum	6.82 (4.20; 11.00)*
Peschers, 2003[694] N = 100	34	Vacuum vs. spontaneous vaginal delivery	6-24 weeks postpartum	1 (0.375; 2.664)
MacLennan, 2000[7] N = 3,010	42.9	Vaginal vs. Caesarean delivery		**1.80 (0.80; 3.80)**
Liquid Feces Incontinence				
Uustal Fornell, 2004[185] N = 885	>40	Delivery by vacuum extractor		2.00 (0.70; 6.00)
		Large tear at delivery		2.70 (1.30; 5.50)*
		Sphincter rupture		4.20 (1.60; 11.30)*
		3 or more births		1.00 (0.70; 1.50)
		Vaginal delivery		0.80 (0.30; 2.10)
				1.00 (0.50; 1.80)
Peschers, 2003[694] N = 100	34	Vacuum vs. spontaneous vaginal delivery	6-24 weeks postpartum	1 (0.236; 4.241)
Wagenius, 2003[693] N = 654		Anal sphincter rupture following vaginal delivery	5 years after delivery	3.29 (1.93; 5.60)*
Solid Feces Incontinence				
Wagenius, 2003[693] N = 654		Anal sphincter rupture following vaginal delivery	6 years after delivery	1.91 (0.71; 5.17)
Uustal Fornell, 2004[185] N = 885	>40	Delivery by vacuum extractor		1.20 (0.00; 7.50)
		Large tear at delivery		2.90 (0.60; 14.60)
		Sphincter rupture		9.10 (3.00; 27.30)*
		3 or more births		1.10 (0.50; 2.30)
		Vaginal delivery		1.00 (0.30; 2.70)
Peschers, 2003[694] N = 100	34	Vacuum vs. spontaneous vaginal delivery	6-24 weeks postpartum	3.13 (0.31; 31.14)

Bold - multivariate odds ratios
* Significant difference

Table 41. Association between risk of FI and severity of FI and factors related to pregnancy and birth

Author Sample	Age	Fecal Incontinence	Factors Related to Pregnancy and Birth	Time From Exposure to Outcome	Odds Ratio (95% CI)
Chaliha, 1999[205] N = 549	17-46	Fecal urgency	Augmentation	3 months postpartum	0.6 (0.2;1.6)
			Epidural analgesia		0.4 (0.1; 1.4)
			Fetal head circumference		1 (0.7; 1.4)
			Fetal weight		1 (0.6; 6.8)
			First stage (reference)		1 (1; 1)
			Mode of delivery		0.8 (0.6; 1.2)
			No perineal trauma		1 (1; 1)
			Perineal trauma		0.9 (0.5; 1.8)
			Second stage (active)		1 (1; 1)
			Second stage (passive)	3 months postpartum	1 (1; 1)
Pregazzi, 2002[704] N = 218	21-43	Abnormal results of pelvic floor muscle assessment; digital test	Anal sphincter and rectal mucosa tears vs. intact perineum and superficial tears	Immediately after vaginal delivery	1.04 (0.24; 4.49)
		Abnormal results of pelvic floor muscle assessment; vaginal manometry	Anal sphincter and rectal mucosa tears vs. intact perineum and superficial tears	immediately after vaginal delivery	0.91 (0.18; 4.69)
Faltin, 2001[232] N = 1,228	15-93	Fecal urgency	Anal sphincter tear		**2.8(0.9; 9.1)**
			Baby weight, ≤4,000g		**1 (1; 1)**
			Baby weight, >4,000g		**1.5 (0.7; 3.1)**
Borello-France[231] N = 472		Fecal urgency	Cesarean control	6 weeks postpartum	**1 (1;1)**
Sultan, 1993[699] N = 90		Urgency	Forceps delivery		7.23 (0.85**;** 61.35)
Liebling, 2004[707] N = 393		Pain on opening bowels	Instrumental delivery vs. Cesarean	6 weeks postpartum	**1.34 (0.74; 2.42)**
		Constipation	Instrumental delivery vs. Cesarean	6 weeks postpartum	**0.85 (0.48; 1.49)**
		Increased passage of flatus	Instrumental delivery vs. Cesarean	6 weeks postpartum	**1.44 (0.87; 2.39)**
		Hemorrhoids	Instrumental delivery vs. Cesarean	6 weeks postpartum	**1.34 (0.80; 2.26)**
		Loss of control of bowels	Instrumental delivery vs. Cesarean	6 weeks postpartum	**1.25 (0.28; 5.63)**
		Pain on opening bowels		1 year postpartum	**1.53 (0.44; 5.36)**
		Constipation			**2.55 (1.02; 6.37)***
		Increased passage of flatus			**1.66 (0.88; 3.12)**
		Hemorrhoids			**1.70 (0.92; 3.14)**
		Loss of control of bowels			**1.74 (0.34; 8.87)**
Faltin, 2001[232] N = 1,228	15-93	Fecal urgency	Operative delivery		**1 (0.5; 2.2)**
			Parity		**2.7 (1.1; 6.8)***
Pregazzi, 2002[704]	21-43	Abnormal results of pelvic floor muscle assessment: digital test	Perineal muscle tears vs. intact perineum and superficial tears	Immediately after vaginal delivery	1.82 (0.90**;** 3.67)

Table 41. Association between risk of FI and severity of FI and factors related to pregnancy and birth (continued)

Author Sample	Age	Fecal Incontinence	Factors Related to Pregnancy and Birth	Time From Exposure to Outcome	Odds Ratio (95% CI)
N = 218		Abnormal results of pelvic floor muscle assessment: vaginal manometry			1.53 (0.73; 3.20)
Borello-France, 2006[231] N = 721,		Fecal urgency	Sphincter tear	At 6 weeks postpartum	**1.5 (1.1; 2.1)***
				At 6 months postpartum	**1.5 (1.02; 2.2)**
Peschers, 2003[694] N = 100	34	Fecal urgency	Vacuum vs. spontaneous vaginal delivery	6-24 weeks postpartum	1 (0.24; 4.24)
Borello-France, 2006[231] N = 472		Fecal urgency	Vaginal control	At 6 weeks postpartum	**0.67 (0.39; 1.13)**
				At 6 months postpartum	**1 (1; 1)**
				At 6 months postpartum	**0.53 (0.29; 0.93)***
Faltin, 2006[695] N = 240		Severity, at least 2 symptoms at least once a week or 3 symptoms (symptoms: incontinence to flatus, liquid or solid stool; need to wear a pad; lifestyle alteration)	Birth weight, >4,000g	18 years after rupture of anal sphincter tear during childbirth	1.21 (0.47; 3.14)
			Birth weight, 3,000-3,499g	18 years after rupture of anal sphincter tear during childbirth	0.74 (0.39; 1.4)
			Birth weight, 3,500-3,999g	18 years after rupture of anal sphincter tear during childbirth	0.86 (0.44; 1.68)
			No episiotomy	18 years after rupture of anal sphincter tear during childbirth	1 (1; 1)
			Episiotomy	18 years after rupture of anal sphincter tear during childbirth	1.04 (0.93; 1.15)
Guise, 2007[218] N = 8,774		Severity, incontinence of stool	Cesarean in this delivery		**0.94 (0.77; 1.15)**
			Cesarean in this delivery, labored without push		**0.81 (0.53; 1.25)**
			Cesarean in this delivery, never labored		**1 (1; 1)**
			Cesarean labored and pushed		**0.92 (0.56; 1.52)**
			Ever had Cesarean		**0.92 (0.76; 1.11)**
			Forceps use, ever		**1.29 (0.98; 1.7)**
Faltin, 2006[695] N = 240		Severity, at least 2 symptoms at least once a week or 3 symptoms (symptoms: incontinence to flatus, liquid or solid stool; need to wear a pad; lifestyle alteration)	Multiparity	18 years after rupture of anal sphincter tear during childbirth	0.99 (0.53; 1.85)
			Non Cesarean delivery	18 years after rupture of anal sphincter tear during childbirth	1 (1; 1)
			Non operative vaginal delivery	18 years after rupture of anal sphincter tear during childbirth	1 (1; 1)
			Primiparity	18 years after rupture of anal sphincter tear during childbirth	1 (1; 1)
Guise, 2007[218] N = 8,774		Severity, incontinence of stool	Pushing time ≥1 hour in this delivery		**1.22 (1.02; 1.47)**
			This infant weight, ≥4,000g		**0.92 (0.73; 1.15)**
			Vacuum only, ever		**1.12 (0.88; 1.42)**
			≥3 parity		**1.03 (0.84; 1.27)**

Table 41. Association between risk of FI and severity of FI and factors related to pregnancy and birth (continued)

Author Sample	Age	Fecal Incontinence	Factors Related to Pregnancy and Birth	Time From Exposure to Outcome	Odds Ratio (95% CI)
			1 parity		**1 (1; 1)**
			2 parity		**0.9 (0.75; 1.09)**
MacArthur, 2001[214] N = 7,879	42.9	Frequent FI	Caesarean section	3 months postpartum	**0.36 (0.14; 0.98)***
Macarthur, 2005[215] N = 4,046		Persistent FI	Caesarean section	6 years postpartum among primiparae at index delivery.	**0.56 (0.23; 1.37)**
		Persistent FI	Caesarean section	6 years postpartum	**1.07 (0.64; 1.81)**
Faltin, 2006[695] N = 240		Severity, at least 2 symptoms at least once a week or 3 symptoms (symptoms: incontinence to flatus, liquid or solid stool; need to wear a pad; lifestyle alteration)	Cesarean delivery	18 years after rupture of anal sphincter tear during childbirth	0.61 (0.16; 2.38)
Hojberg, 2000[227]	≥15	Severity, isolated flatus incontinence at least once a week	Episiotomy	At 16 weeks of gestation in the index-pregnancy	**1.9 (0.8, 4.2)**
Sultan, 1993[699] N = 90		Fecal and urgency	Forceps delivery		19.56 (1.12; 340.25)*
MacArthur, 2001[214] N = 7,879	42.9	Frequent FI	Forceps delivery	3 months postpartum	**1.94 (1.07; 3.54)***
Macarthur, 2005[215] N = 4,046		Persistent FI	Forceps delivery	6 years postpartum among primiparae at index delivery.	**2.50 (1.37; 4.59)***
				6 years postpartum	**2.06 (1.40; 3.04)***
Schraffordt Koops, 2003[701] N = 479		FI, Grade 2	Forceps delivery vs. spontaneous delivery	3-4 years after delivery	0.67 (0.22; 2.01)
		FI, Grade 3	Forceps delivery vs. spontaneous delivery	3-4 years after delivery	1.23 (0.46; 3.30)
		FI, Grade 4	Forceps delivery vs. spontaneous delivery	3-4 years after delivery	1.68 (0.74; 3.81)
Guise, 2007[218] N = 8,774		Severity, incontinence of stool	Forceps use, this delivery		**1.66 (1.1; 2.5)***
			Heaviest infant weight, ≥4,000g		**0.85 (0.69; 1.04)**
Hojberg, 2000[227]	≥15	Severity, isolated flatus incontinence at least once a week	infant weight, <4,000g	At 16 weeks of gestation in the index-pregnancy	**1 (1; 1)**
			Infant weight, ≥4,000g	At 16 weeks of gestation in the index-pregnancy	**2.4 (1.1; 5.1)***
Guise, 2007[218] N = 8,774		Severity, incontinence of stool	Laceration, cut/tear with anus injury in this delivery		**2.31 (1.61; 3.32)***
			Laceration, cut/tear with no/unknown anus injury in this delivery		**1.06 (0.89; 1.26)**
			Laceration, ever had cut/tear with anus injury		**1.61 (1.21; 2.15)***

Table 41. Association between risk of FI and severity of FI and factors related to pregnancy and birth (continued)

Author Sample	Age	Fecal Incontinence	Factors Related to Pregnancy and Birth	Time From Exposure to Outcome	Odds Ratio (95% CI)
			Laceration, ever had cut/tear with no/unknown anus injury		**1 (0.81; 1.23)**
Hojberg, 2000[227]	≥15	Severity, isolated flatus incontinence at least once a week	Length of second stage >90 minutes	At 16 weeks of gestation in the index-pregnancy	**0.5 (0.1; 2.4)**
Macarthur, 2005[215] N = 4,046		Persistent FI	Number of births, ≥4	6 years postpartum among primiparae at index delivery	**3.65 (0.80; 16.60)**
			Number of births, ≥4	6 years postpartum	**3.22 (1.34; 7.76)***
			Number of births -1	6 years postpartum among primiparae at index delivery	**1.00 (1.00; 1.00)**
			Number of births -1	6 years postpartum	**1.00 (1.00; 1.00)**
			Number of births -3	6 years postpartum among primiparae at index delivery	**2.57 (0.94; 6.99)**
			Number of births -3	6 years postpartum	**2.91 (1.32; 6.41)***
			Number of births -2	6 years postpartum among primiparae at index delivery	**2.15 (0.97; 4.79)**
			Number of births -2	6 years postpartum	**2.13 (1.00; 4.52)**
Nichols2005[679]2 N = 190	53	Bothersome FI	Operative delivery vs. vaginal delivery in stage II pelvic organ prolapse and/or UI		**4.50 (1.20; 17.10)***
			Operative vaginal delivery pelvic floor disorders vs. not operative delivery		3.60 (1.60; 8.80)*
Hojberg, 2000[227]	≥15	Severity, isolated flatus incontinence at least once a week	Outlet forceps	At 16 weeks of gestation in the index-pregnancy	**3.5 (0.4; 30.2)**
Faltin, 2006[695] N = 240		Severity, at least 2 symptoms at least once a week or 3 symptoms (symptoms: incontinence to flatus, liquid or solid stool; need to wear a pad; lifestyle alteration)	Overactive vaginal delivery	18 years after rupture of anal sphincter tear during childbirth	1.83 (1.11; 3.02)*
Hojberg, 2000[227]	≥15	Severity, isolated flatus incontinence at least once a week	Oxytocin stimulation	At 16 weeks of gestation in the index-pregnancy	**0.7 (0.4; 1.5)**
			Parity, ≥3 caesarean section only		N/A
			Parity, ≥3 vaginal delivery only		**1.3 (0.6; 2.4)**
			Parity, 0		**1 (1; 1)**
			Parity, 1, first delivery caesarean section		**0.7 (0.3; 1.6)**
			Parity, 2, caesarean section only		**2.5 (0.3; 20.7)**
			Parity, 2, vaginal delivery only		**0.8 (0.5; 1.3)**
			Parity, vaginal delivery		**0.9 (0.7; 1.2)**
			Pudendal block		**0.6 (0.3; 1.2)**

Table 41. Association between risk of FI and severity of FI and factors related to pregnancy and birth (continued)

Author Sample	Age	Fecal Incontinence	Factors Related to Pregnancy and Birth	Time From Exposure to Outcome	Odds Ratio (95% CI)
Guise, 2007[218] N = 8,774		Severity, incontinence of stool	Pushing time ever ≥1 hour		**1.07 (0.91; 1.26)**
Hojberg, 2000[227]	≥15	Severity, isolated flatus incontinence at least once a week	Spontaneous perineal rupture	At 16 weeks of gestation in the index-pregnancy	**1.2 (0.4; 3.8)**
			3rd degree anal sphincter tear		**6.3 (1.1; 37.4)***
			Time since last delivery ≤1 year		**0.5 (0.1; 4.3)**
			Time since last delivery >1 year		**1 (1; 1)**
MacArthur, 2001[214] N = 7,879	42.9	Frequent FI	Vacuum delivery	3 months postpartum	**1.29 (0.62; 2.71)**
Macarthur, 2005[215] N = 4,046		Persistent FI	Vacuum delivery	6 years postpartum among primiparae at index delivery	**0.41 (0.10; 1.75)**
				6 years postpartum	**0.47 (0.15; 1.53)**
Hojberg, 2000[227]	≥15	Severity, isolated flatus incontinence at least once a week	Vacuum extraction	At 16 weeks of gestation in the index-pregnancy	**1.5 (0.6; 3.9)**
Schraffordt Koops, 2003[701] N = 479		FI Grade 2	Vacuum extraction vs. spontaneous delivery	3-4 years after delivery	0.97 (0.39; 2.41)
		FI Grade 3			0.97 (0.37; 2.52)
Guise, 2007[218] N = 8,774		Severity, incontinence of stool	Vacuum only, this delivery		**1.12 (0.82; 1.53)**
Peschers, 2003[694] N = 100	34	Flatus incontinence >1/week	Vacuum vs. spontaneous vaginal delivery	6-24 weeks postpartum	1.741 (0.39; 7.713)
		Incontinence for liquid stood >1/week			7.442 (0.37; 147.9)
		Incontinence for solid stool >1/week			3.061 (0.12; 76.95)
Hojberg, 2000[227]	≥15	Severity, isolated flatus incontinence at least once a week	Vaginal rupture	At 16 weeks of gestation in the index-pregnancy	**0.8 (0.4; 1.8)**
Schraffordt Koops, 2003[701] N = 479		FI Grade 4	Vacuum extraction vs. spontaneous delivery	3-4 years after delivery	0.71 (0.29; 1.74)

Bold - multivariate odds ratios
* Significant difference

Table 42. Association between baseline FI, number of pregnancies, and FI

Author Sample	Definition of FI	Risk Factors	Time Since Exposure to FI	Odds Ratio (95% CI)
Zetterstrom, 1999[703] N = 349	AI	10 increase in maternal age	9 months postpartum	3.00 (1.40; 6.40)*
Mazouni, 2005[689] N = 159	FI	Incremental increase in maternal age	12 months after instrumental delivery	1.00 (1.00; 1.00)
Pollack, 2004[209] N = 349	AI	AI at 5 months of pregnancy	5 years after vaginal delivery	**3.80 (2.00; 7.30)***
		AI at 9 months of pregnancy		**4.30 (2.20; 8.20)***
		Subsequent childbirth		**2.40 (1.10; 5.60)***
van Brummen, 2006[662] N = 487	FI	FI at 12 weeks gestation	1 year after delivery	2.60 (0.90; 12.10)
	Flatus	Flatus incontinence at 12 weeks gestation	1 year postpartum	6.82 (4.20; 11.00)*
McKinnie, 2005[657] N = 1,004	FI	Any term pregnancy vs. no term pregnancy		2.26 (1.22; 4.19)*
		>1 pregnancy and >1 vaginal delivery vs. no vaginal delivery		2.15 (0.97; 4.77)
		>1 pregnancy and >1 vaginal delivery vs.>1 pregnancy, no vaginal delivery		**1.93 (0.81;** 4.60)
		>1 pregnancy and >1 vaginal delivery vs. no term pregnancy		2.41 (1.30; 4.49)*
		>1 pregnancy and vaginal delivery vs. no term pregnancy		1.13 (0.43; 2.96)
		>1 pregnancy vs. no term pregnancy		**1.35 (0.69; 5.74)**
Faltin, 2006[695] N = 240	Severity, at least 2 symptoms at least once a week or 3 symptoms (flatus, liquid or solid stool; pad use; lifestyle alteration)	Multiparity	18 years after rupture of anal sphincter tear during childbirth	0.99 (0.53; 1.85)
Faltin, 2001[696]	AI	Delivery again		1 (1; 1)
		No subsequent delivery		2.8 (1; 8.3)
Faltin, 2001[232] N = 1,228	FI	Parity		**3.1 (1.6; 6)***
	Fecal urgency	Parity		**2.7 (1.1; 6.8)***
Chiarelli, 2003[658] N = 568	FI	Multiparity	At 12 months postpartum	1.42 (0.53; 3.83)
Boreham, 2005[212] N = 457	AI	Nulliparity		0.63 (0.4; 0.99)*
De Leeuw, 2001[229] N = 250	FI	Primiparity, without episiotomy	After anal sphincter damage during delivery	**1.16 (0.41; 3.29)**
Melville, 2005[163] N = 6,888	FI	Nulliparity		**1.35 (0.88; 2.08)**
Guise, 2007[218] N = 8,774	Severity, incontinence of stool	≥3 parity		**1.03 (0.84; 1.27)**
	Solid feces	1 parity		**1 (1; 1)**
		2 parity		**0.9 (0.75; 1.09)**
Macarthur, 2005[215] N = 4,046	FI	Number of births: ≥4	6 years postpartum	**2.12 (1.34; 3.35)***
	Persistent FI		6 years postpartum among primiparae at index delivery	**3.65 (0.80; 16.60)**

Table 42. Association between baseline FI, number of pregnancies and FI (continued)

Author Sample	Definition of FI	Risk Factors	Time Since Exposure to FI	Odds Ratio (95% CI)
			6 years postpartum	**3.22 (1.34; 7.76)***
	FI	Number of births: 1	6 years postpartum	**1.00 (1.00; 1.00)**
	Persistent FI		6 years postpartum among primiparae at index delivery	**1.00 (1.00; 1.00)**
			6 years postpartum	**1.00 (1.00; 1.00)**
	FI	Number of births: 3	6 years postpartum	**1.61 (1.08; 2.41)**
	Persistent FI		6 years postpartum among primiparae at index delivery	**2.57 (0.94; 6.99)**
			6 years postpartum	**2.91 (1.32; 6.41)***
	FI	Number of births: 2	6 years postpartum	**1.23 (0.85; 1.78)**
	Persistent FI		6 years postpartum among primiparae at index delivery.	**2.15 (0.97; 4.79)**
			6 years postpartum	**2.13 (1.00; 4.52)**
Richter, 2005[208] N = 180	AI	Number of children	Morbid obesity before laparoscopic weight loss surgery	1.11 (0.86; 1.44)
		Number of vaginal deliveries	Morbid obesity before laparoscopic weight loss surgery	1.18 (0.92; 1.53)
Ostbye, 2004[186] N = 8,949	FI	Number of children: ≥4	Prevalence	**0.81 (0.49; 1.36)**
			Incidence	**0.79 (0.55; 1.14)**
		Number of children: 3	Prevalence	**1.25 (0.73; 2.12)**
			Incidence	**0.78 (0.51; 1.18)**
		Number of children: 2	Prevalence	**1.03 (0.62; 1.73)**
			Incidence	**0.89 (0.6; 1.31)**
		Number of children: 1	Prevalence	**1.07 (0.59; 1.95)**
			Incidence	**0.92 (0.58; 1.45)**
Uustal Fornell, 2004[185] N = 885	AI	1-2 births		1.00 (1.00; 1.00)
	Flatus	3 or more births		0.90 (0.60; 1.40)
	Liquid feces			1.00 (0.70; 1.50)
	Solid feces			1.10 (0.50; 2.30)
Chen, 2003[213] N = 1,253	AI	Parity ≥1		**3.4 (1.2; 9.5)***
Abramov, 2005[226] N = 542	FI	Parity ≥2		**3.09 (1.25; 7.65)***
	Flatus	Parity ≥2		**2.72 (1.65; 4.51)***
	FI	Parity, 1		**1.32 (1; 2.3)**
	Flatus	Parity, 1		**2.27 (1.28; 4.05)***
Mahony, 2007[230] N = 500	FI	Parity >3		**1.40 (0.30; 5.50)**
		Parity 2		**1.70 (0.60; 4.90)**
Hojberg, 2000[227]	Severity, isolated flatus incontinence at least once a week	Parity, ≥3 Caesarean section only		N/A
		Parity, ≥3 vaginal delivery only vs. parity, 0		**1.3 (0.6; 2.4)**
		Parity, 1, first delivery Caesarean section		**0.7 (0.3; 1.6)**
		Parity, 2; Caesarean section only		**2.5 (0.3; 20.7)**
		Parity, 2, vaginal delivery only		**0.8 (0.5; 1.3)**
		Parity, vaginal delivery		**0.9 (0.7; 1.2)**
		Time since last delivery ≤1 year	At 16 weeks of gestation in the index-pregnancy	**0.5 (0.1; 4.3)**

Table 42. Association between baseline FI, number of pregnancies and FI (continued)

Author Sample	Definition of FI	Risk Factors	Time Since Exposure to FI	Odds Ratio (95% CI)
		Time since last delivery >1 year	At 16 weeks of gestation in the index-pregnancy	**1 (1; 1)**
Frudinger, 2002[692] N = 134	AI	Narrow subpubic arch angle vs. normal subpubic arch angle		**8.69 (3.15; 23.94)***

Bold - multivariate odds ratios
* Significant difference

Table 43. Association between FI and birth related anal trauma

Author Sample	Risk Factor	Fecal Incontinence	Time from Exposure to FI	Odds Ratio (95% CI)
Borello-France, 2006[231] N = 721	Sphincter tear	FI	6 weeks postpartum	**2.8 (1.8; 4.3)***
			6 months postpartum	**1.9 (1.2; 3.2)***
		FI urgency	6 weeks postpartum	**1.5 (1.1; 2.1)***
			6 months postpartum	**1.5 (1.02; 2.2)***
		Flatus	6 weeks postpartum	**1.6 (1.1; 2.4)***
			6 months postpartum	**1.7 (1.1; 2.7)***
Casey2005[202] N = 3,887	3rd-or 4th-Degree laceration	AI	Within 7 months of delivery, at or before their 6-month contraceptive followup after delivery	**1 (0.5; 2)**
Chaliha, 1999[205] N = 549	Perineal trauma	FI urgency	3 months postpartum	0.9 (0.5; 1.8)
		Flatus	3 months postpartum	1 (1; 1)
Chiarelli, 2003[658] N = 568	No perineal trauma	FI	12 months postpartum	1 (1; 1)
	Perineal trauma (tear with sutures and/or episiotomy)	FI	12 months postpartum	1.67 (0.67; 4.14)
De Leeuw, 2001[229] N = 250	Extent of perineal damage (per grade: grade-IV vs. grade-IIIb vs. grade-IIIa)	FI	After anal sphincter damage during delivery	**2.54 (1.45; 4.45)***
	Primiparity, with episiotomy	FI	After anal sphincter damage during delivery	**0.15 (0.02; 0.98)**
Eason, 2002[228] N = 252	First-degree tear perineal injury	AI	3 months postpartum	**1.2 (0.8; 1.7)**
	3rd or 4th degree tear perineal injury			**2.1 (1.4; 3.1)***
Faltin[696] N = 100	External and internal anal sphincter defect	AI	3 months after delivery	7.4 (1.7; 31.4)*
			30 months after delivery	5.3 (1.2; 24.1)*
	Isolated external anal sphincter defect	AI	3 months after delivery	6.2 (1.2; 32)*
			30 months after delivery	6.5 (1.3; 33.4)*
			3 months after delivery	1.9 (0.2; 18.7)
Faltin, 2001[232]2 N = 1,228	Anal sphincter tear	FI urgency		**2.8 (0.9; 9.1)**
Faltin, 2001[696] N = 100	Anal sphincter tear (clinically diagnosed)	AI	3 months after delivery	4.3 (1.9; 9.7)**
			30 months after delivery	3.4 (1.2; 9.8)*
	Clinically occult anal sphincter tears		3 months after delivery	3.8 (0.8; 17.1)
			30 months after delivery	7.7 (1; 60.1)
	Sphincter defects diagnosed after endosonography 3 months after delivery	AI	Transient shortly after delivery	2 (1.4; 2.8)*
			3 months after delivery	1.9 (1.4; 2.6)*
			30 months after delivery	1.9 (1.3; 2.8)*
Frudinger, 2002[692] N = 134	No ultrasonic evidence of injury	AI		**1 (1; 1)**
	Ultrasonic evidence of injury, perineal scar			**2.69 (0.7; 10.33)**
	Ultrasonic evidence of injury, sphincter scar			**2.26 (0.69; 7.36)**
Guise, 2007[218] N = 8,774	Laceration, cut/tear with anus injury in this delivery	Severity, incontinence of stool		**2.31 (1.61; 3.32)***
	Laceration, cut/tear with no/unknown anus injury in this delivery			**1.06 (0.89; 1.26)**

Table 43. Association between FI and birth related anal trauma (continued)

Author Sample	Risk Factor	Fecal Incontinence	Time from Exposure to FI	Odds Ratio (95% CI)
	Laceration, ever had cut/tear with anus injury			**1.61 (1.21; 2.15)***
	Laceration, ever had cut/tear with no/unknown anus injury			**1 (0.81; 1.23)**
	Laceration, no cut/tear ever			**1 (1; 1)**
	Laceration, no cut/tear in this delivery			**1 (1; 1)**
Hojberg, 2000[227]	No spontaneous perineal rupture	Severity, isolated flatus incontinence at least once a week	At 16 weeks of gestation in the index-pregnancy	**1 (1; 1)**
	No vaginal rupture			**1 (1; 1)**
	Pudendal block			**0.6 (0.3; 1.2)**
	Spontaneous perineal rupture			**1.2 (0.4; 3.8)**
	3rd degree anal sphincter tear			**6.3 (1.1; 37.4)***
	Vaginal rupture			**0.8 (0.4; 1.8)**
Huang, 2006[187]	History of 3rd or 4th degree vaginal tear, Asian women	AI		**2.41 (1.14; 5.1)***
	No history of 3rd or 4th degree vaginal tear, Asian women			**1 (1; 1)**
Mahony, 2007[230] N = 500	Internal anal sphincter defect thickness; partial (1 quadrant)	FI		**2.10 (0.50; 10.70)**
	Internal anal sphincter defect thickness; partial (>1 quadrant) or full thickness			**5.10 (1.50; 22.90)**
Mazouni, 2005[689] N = 159	3rd-degree tears	FI	17 months instrumental delivery	1.00 (1.00; 1.00)
Pollack, 2004[209] N = 349	Sphincter tear	AI	5 years after delivery	**2.30 (1.10; 5.00)***
Pregazzi, 2002[704] N = 218	Anal sphincter and rectal mucosa tears vs. intact perineum and superficial tears	AI	Immediately after vaginal delivery	8.78 (2.60; 134.10)*
		Abnormal results of Pelvic Floor Muscle Assessment: digital test	Immediately after vaginal delivery	1.04 (0.24; 4.49)
		Abnormal results of Pelvic Floor Muscle Assessment: vaginal manometry		0.91 (0.18; 4.69)
	Perineal muscle tears vs. intact perineum and superficial tears	FI		1.48 (0.10; 14.60)
		Abnormal results of Pelvic Floor Muscle Assessment: digital test		1.82 (0.90; 3.67)
		Abnormal results of Pelvic Floor Muscle Assessment: vaginal manometry		1.53 (0.73; 3.20)

Table 43. Association between FI and birth related anal trauma (continued)

Author Sample	Risk Factor	Fecal Incontinence	Time from Exposure to FI	Odds Ratio (95% CI)
Richter[706] N = 251	Sphincter tear vs. vaginal delivery without anal sphincter tear	FI	6-12 months after delivery	4.40 (1.60; 12.30)*
	3rd vs. 4th-degree tear of anal sphincter	FI	6-12 months after delivery	2.00 (0.70; 5.80)
Signorello, 2000[697] N = 626	2nd/3rd/4th degree tear vs. intact/1st degree tear	FI	3 months postpartum	1.40 (0.40; 5.00)
			6 months postpartum	1.20 (0.20; 6.40)
		Flatus	3 months postpartum	0.80 (0.50; 1.40)
			6 months postpartum	1.10 (0.50; 2.10)
Sultan, 1993[705] N = 124	Any anal-sphincter defect after vaginal delivery	FI		2.70 (1.97; 3.71)*
Uustal Fornell, 2004[185] N = 885	Large tear at delivery	Flatus		1.80 (1.00; 3.30)
		Solid		2.90 (0.60; 14.60)
		Liquid		2.70 (1.30; 5.50)*
	Sphincter rupture	Flatus		6.10 (2.30; 16.50)*
		Liquid		4.20 (1.60; 11.30)
		Solid		9.10 (3.00; 27.30)*
van Brummen, 2006[662] N = 487	3rd/4th degree tear	FI	1 year after delivery	6.82 (4.20; 11.00)*
Wagenius[693] N = 654	Anal sphincter rupture following vaginal delivery	Flatus	4 years after delivery	2.71 (1.78; 4.15)*
		Liquid	5 years after delivery	3.29 (1.93; 5.60)*
		Solid	6 years after delivery	1.91 (0.71; 5.17)
Zetterstrom, 1999[703]	Sphincter tear	AI	9 months postpartum	2.40 (1.04; 4.90)*

Bold - multivariate odds ratios
* Significant difference

Question 3. What is the Evidence to Support Specific Clinical Interventions to Reduce the Risk of UI and FI?

Baseline mechanisms of incontinence include abnormal detrusor and sphincter functions. Detrusor muscle contraction is regulated by a complex pathway of cholinergic innervations by the pelvic nerves, prostaglandins, and calcium ions.[22,23] A hyperactive bladder would lead to urge UI. Urethral sphincter function is regulated by alpha-adrenergic activity and an anatomically correct position of the urethra in the abdominal cavity to transfer increased abdominal pressure to urethra. Poor urethral sphincter function can result in primary urethral incompetence and stress UI. Effective clinical interventions aim to improve control over bladder contractions, increase strengths of pelvic floor muscles supporting bladder, correct anatomic disposition of dispositional uterus in women, decrease atrophy of tissues and muscles related to estrogen deficiency, and treat injuries due to childbirth.

Effects of Clinical Interventions on UI in Adults in LTC Settings

Implementation of evidence-based guidelines. The implementation of guidance-driven continence care in nursing homes[238,708] did not improve the incontinence status of the residents (Appendix Table F58). The protocol included staff education and direct patient care implemented by advanced practice gerontological nurses in a consecutive cohort of newly admitted residents in three licensed proprietary nursing homes. A quasi-experimental study[708] evaluated UI using the Incontinence Monitoring Schedule with frequent observations for 3 days before and after the continence protocol was implemented (Appendix Table F58). The implementation resulted in a nonsignificant tendency to reduce the proportion of incontinence episodes and total prevalence of UI from 71 percent in patients after regular care to 64 percent in the intervention group (Appendix Table F59).[708] A multicenter uncontrolled intervention of a computerized quality management model in nursing homes, based on guidelines for medical assessment and individualized prompted voiding protocols of UI, was associated with a nonsignificant reduction in wet episodes among total checks by nurses from 31 to 17 percent.[238]

Conservative management programs. Conservative management programs in nursing homes[709,710] resulted in inconsistent improvement in UI in female residents (Appendix Table F60). Behavioral therapy included hourly wet checks, prompted and assisted toileting, positive reinforcement, and bladder training implemented by trained nursing research assistants. Nursing research assistants reported an improvement in UI in females after active intervention three times more often compared to usual care (26 percent vs. 8 percent, RR 3.1, 95 percent CI 1.3; 7.4) (Appendix Table F61)[710] However, the changes in urinary wet episodes were not statistically significant (Appendix Table F62).[709] Conservative management programs reduced the progression of UI in the majority of RCTs that included male and female residents of nursing homes (Appendix Table F63).[233-237] The effect size was small and differed depending on the definition of the outcomes. Integrated incontinence care that included fluid prompting, prompted toileting, and regular wet checks in combination with exercises reduced the frequency of UI by 1.6 percent (95 percent CI -2.5;-0.8) compared to regular care (Appendix Table F64).[235] Prompted voiding treatment increased the proportion of appropriate toileting to 60 percent compared to 17 percent after regular care (mean difference 1.7 percent, 95 percent CI 1.3; 2.2.[233] Individualized habit training for UI with verbal encouragement administered by nursing staff[237] significantly decreased the frequency of incontinence episodes by 19 percent in elderly residents

without neurological diseases but not in memory-impaired residents.[236] Individualized prompted voiding and intensive endurance and pelvic floor muscle training significantly reduced the proportion of wet checks by nurses among total checks to 25 percent compared to 50 percent after usual care.[234] One RCT[239] examined the effects of rehabilitation based on the Functional Independence Measure scale on risk of UI in 34 patients with acute hemispheric stroke (Appendix Table F65). The number cured at discharge was four times larger after active rehabilitation compared to a conventional rehabilitation program (RR 4.1, 95 percent CI 1.5; 11.2) (Appendix Table F66).

One RCT of 32 women examined the effects of oral estrogen (0.63 mg) combined with progesterone (2.5 mg) and regular toileting assistance (prompted voiding) by trained research and did not report significance on rates of positive cough test or appropriate toileting rate.[711]

Level of evidence. The evidence from nine RCTs[233-237,708-711] and one nonrandomized trial[238] was analyzed in relation to a variety of clinical outcomes in residents of nursing homes. One trial reported preplanned intention to treat analysis; four justified sample size;[234,237,709,710] allocation concealment was unclear in all open label trials. Baseline characteristics of the participants did not differ and confirmed adequacy of randomization in five trials.[234-236,708,711] Adherence of nursing staff to the protocol was not consistently analyzed, thus preventing valid comparisons of the treatment effects between the studies.

Summary. In conclusion, in contrast to numerous studies of the management of UI, only a few RCTs aimed at slowing progression in LTC settings. Individualized management programs that included prompted voiding, exercise, and positive feedback modestly improved the severity of symptoms. Active rehabilitation with self management of urinary symptoms resulted in continence in the majority of the patients after stroke. Fully powered RCTs would better estimate the effectiveness of individualized evidence-based conservative management programs. Cluster trials with randomization of nursing units, adequate allocation concealment, and preplanned intention to treat analysis are needed to provide valid results. The effectiveness of clinical interventions should be examined in subgroups of residents by cognitive and physical functioning, gender, and ethnicity. The effects of conservative management programs on the quality of life in these populations have not been investigated in RCTs. Staff participation in developing combined management protocols and adherence to protocols should be continuously measured as quality of care indicators in LTC facilities.

Effects of Clinical Interventions on UI in Community Dwelling Adults

Implementation of evidence-based guidelines (Appendix Table F67). National evidence-based guidelines were implemented in gynecology units in four district general hospitals across Scotland. Women were advised to follow the recommended appropriate protocol for 1 year. This intervention did not improve self-reported severity of UI and quality of life in women at 1 year of followup (Appendix Table F68).[712]

Conservative management programs. Urinary continence service delivered by specially trained nurses included advice on diet and fluids, bladder training, and pelvic floor muscle awareness[240] in a large, well designed RCT of 3,746 incontinent men and women living in private households (Appendix Table F69). The proportion of cured patients was 1.5 times higher after the continence service (RR 1.5, 95 percent CI 1.3; 1.7) (Appendix Table F70). More patients reported improvement in UI 6 months after active treatment (RR 1.2, 95 percent CI 1.1; 1.3). The continence service also reduced progression of urgency to very strong or overwhelming

by 30 percent (RR 0.7, 95 percent CI 0.7; 0.8). The complex rehabilitation program by nurse continence advisors and consulting urogynecologists including bladder training, gradual increase in fluid intake, pelvic floor muscle training, and transvaginal electrical stimulation resulted in urinary continence in 50 percent of women but with no statistically significant differences compared to usual care (Appendix Table F71).[510] Small significant improvement compared to usual care was detected in two quality of life measures, the Life Urogenital Distress Inventory (2.9 percent) and in the Short Form Urogenital Distress Inventory (16 percent) (Appendix Table F72). Community-based interventions, including education, bladder training, managing the urge to urinate, and pelvic floor muscle training, resulted in continence in 35 percent of women vs. 30 percent after usual care (RR 1.7, 95 percent CI 1; 2.9).[241] The majority of women reported more than 50 percent improvement in incontinence (RR 1.6, 95 percent CI 1.1; 2.2).[241] A continence management program implemented by nurse continence advisers with physician expertise included lifestyle modification sessions for 446 incontinent subjects.[242] Daily incontinence events were significantly reduced after active treatment with no changes in pad use (Appendix Table F73).[242] Educational programs about bladder health and recorded incontinence episodes in a voiding diary, in addition to listening to an audiotape daily, were examined in one RCT.[713] The combination of education and cognitive interventions significantly reduced the number of incontinent episodes (RR 1.7, 95 percent CI 1.1; 2.7) but did not improve perceived incontinence measured using the Urinary Incontinence and Frequency Comfort Questionnaire (Appendix Table F74).

Dietary and other lifestyle interventions in females (Appendix Table F75). A standard low calorie liquid diet, increased physical activity to 60 minutes per day, training by a nutritionist, and exercise supervised by a physiologist or behavioral therapist improved stress UI in 92 percent, urge UI in 70 percent, and overall UI in 60 percent of participating women (RR of improvement in overall UI 3.5, 95 percent CI 1.3; 9.1) (Appendix Table F76).[714] Self-selected diet with low fat and low cholesterol foods and 25g of soy protein (Appendix Table F75) did not reduce the risk of stress and urge UI in women compared to a diet without soy (Appendix Table F77).[715] Increasing fluid intake by 500cc did not change the frequency of UI.[716] Restriction in caffeine intake in combination with increasing decaffeinated fluids significantly reduced the number of UI episodes by 87 percent but did not change urine loss in the pad weight test (Appendix Table F77).[717] A significant decrease in daytime episodes of involuntary urine loss after caffeine restriction was reported in another RCT.[718] A positive insignificant tendency to reduce the risk of stress UI was observed after the lifestyle interventions associated with the Diabetes Prevention Program RCT (RR 0.9, 95 percent CI 0.7; 1) (Appendix Table F78).[245]

In adults, bladder training, fluid intake modification, and restricted caffeine intake to <100mg/day significantly decreased the number of voids by 6 percent, and daily urgency episodes by 21 percent, with random differences in daily leakage episodes compared to bladder training alone (Appendix Table F79).[719]

Attributable to conservative management program events. We analyzed the number of avoided/excessive events per 1,000 treated from RCTs that reported significant effects of conservative combined interventions on UI (Table 44). Compared to usual care, continence service resulted in 90 additional cases of resolved UI (continent) 1,000 treated community dwelling adults (95 percent CI 49; 136).[240] A specially designed rehabilitation program resulted in 722 additional cases of resolved UI (continent) per 1,000 treated adults with stroke (95 percent CI 121; 235).[239] With continence service, UI was improved in an additional 100 subjects per 1,000 subjects treated (95 percent CI 56; 146), quality of life improved in 90 subjects (95 percent

CI 52; 129), and satisfaction with present urinary symptoms in 110 (95 percent CI 66; 157).[240] A computerized quality management model for medical assessment and individualized prompted voiding would avoid progression of UI in 140 per 1,000 treated residents of nursing homes (95 percent CI 13; 216).[238]

Primary prevention of female UI related to pregnancy and birth was examined in eight large RCTs with more than 100 women[246-253] (two studies were published twice with different duration of followup[246,251]) and one smaller trial[254] (Appendix Table F80). Conservative advice about self-administered pelvic floor muscle training at 5, 7, and 9 months after delivery supplemented with bladder training did not change the risk of stress UI and tended to decrease the risk of severe UI at 12 months postpartum (Appendix Table F81).[251,252] No improvement was seen in women with severe (>1 week) UI at baseline.[252] Self-rated severity was significantly reduced by 87 percent (95 percent CI -93.0; -81.1) compared to usual postpartum care (Appendix Table F82). Pelvic floor muscle training that occurred within 48 hours of delivery reduced the risk of self-reported UI 3 months postpartum (RR 0.8, 95 percent CI 0.7; 1.0),[246] but the effect was attenuated at 12 months[248] (Appendix Table F83). Pelvic floor muscle training that started 1 month before delivery reduced the risk of postpartum stress incontinence (RR 0.6, 95 percent CI 0.4; 0.9).[247] Standardized instruction in pelvic floor muscle training started before delivery did not decrease the risk of stress UI compared to regular care in a small RCT without justified sample size.[254] In addition to visits and phone calls by community midwives, reminders, feedback to self measure squeeze pressure, and voiding diary, pelvic floor muscle training did not reduce the risk of incontinence 3 months postpartum in an RCT of 1,800 participants.[253] The combination of pelvic floor muscle training with biofeedback and intravaginal electrostimulation resulted in a continence rate of 19 percent vs. 2 percent after usual care (RR of continence 11.0, 95 percent CI 1.5; 82.8) with no significant improvement in urodynamic outcomes (Appendix Table F84).[249] Self-administered perineal massage daily from the 34th or 35th week of pregnancy until delivery did not improve the continence rate in a large sample of pregnant women with (n = 493) and without (n = 1,034) a previous vaginal birth.[250]

We estimated that assessment of UI by nurses with conservative advice on pelvic floor muscle training supplemented with bladder training could avoid 121 cases of UI (95 percent CI 7; 152) and 59 cases of severe incontinence (95 percent CI 5; 99) among 1,000 treated (Table 45).[251]

Pelvic floor muscle training for secondary prevention of UI in community dwelling females. Complex behavioral modification programs, including pelvic floor muscle training, bladder training, and individualized testing of knowledge, adherence, and skills, were implemented in 359 postmenopausal, continent women 55 years and older (Appendix Table F85).[243,244] Behavioral modification did not cure UI at 1 year of followup, although the improvement rate in urinary symptoms was 36 percent higher after intervention vs. standard care (RR 1.4, 95 percent CI 1.1; 1.7).[243]

The effects of behavioral interventions on UI in females were examined in 21 RCTs.[267-287] The effects of pelvic floor muscle training on stress UI in women were examined in 18 RCTs (Appendix Table F86).[288-290,292,299,316,720-731] The rates of cure of UI, improvement or progression of UI, continuous severity measures, and urodynamic outcomes after active treatments were compared to usual care or active controls.

Outcome - continence. Several RCTs reported subjective cure of UI[275,290,299] or objective continence during a stress test or urodynamic exam[268,299,721,731] (Appendix Table F87). Curative behavioral interventions included pelvic floor muscle training, bladder training, and

electromyography biofeedback. The rate of continence after treatment varied from less than 10 percent[253,299,730] to more than 75 percent.[288] Smaller trials tended to report greater continence rates.[275,288,731] The largest relative benefit on continence was observed after electromyography (EMG)-assisted biofeedback with pelvic floor muscle training compared to usual care in postmenopausal women with stress UI taking hormone replacement therapy (RR 17.3, 95 percent CI 1.1; 261.7).[288] Pelvic floor muscle training in groups with skilled physical therapists increased subjective cure from stress UI (RR 15.4, 95 percent CI 2.2; 110.3).[299] Women with stress UI experienced objective cure after this treatment six times more often compared to untreated controls (RR 6.1, 95 percent CI 1.5; 25.1).[299] Older women with sphincteric incompetence reported cure from stress UI eight times more often compared to regular care (RR 8.8, 95 percent CI 1.2; 66).[289] Individualized behavioral intervention with pelvic floor muscle training for stress UI or bladder training for urge UI resulted in continence in 19 percent of women with substantial relative benefit compared to regular care (RR 10.4, 95 percent CI 14; 78.3).[280] The trials with active controls reported comparable rates of continence without significant relative benefit on urinary continence.[268,269,271,274-276,721,727,730,731]

Outcome - Improvement in UI in community dwelling females. The majority of RCTs that examined behavioral interventions reported improvement in self-reported severity of UI and quality of life (Appendix Table F88).[243,268,269,278-281,283,286,288,289,292,299,724,725,727,730] The rates of improvement varied from 20 percent in improved pad test after pelvic floor muscle training with intravaginal EMG biofeedback[288] to 94 percent in improved stress test after pelvic floor muscle training.[725]

Individual pelvic floor muscle training and bladder training with delayed voiding resulted in self-reported improvement in 94 percent of women.[286] Behavioral training that included biofeedback-assisted pelvic floor muscle training, home exercises, bladder control strategies, and self monitoring with bladder diaries reduced weekly incontinence episodes by more than 50 percent in 86 percent of women ages 40-78 years with all types of UI.[268] The same consistent effect was observed after bladder training with positive reinforcement in older women with clinical and urodynamic UI >1 leakage/week.[281] Significant improvement in restriction of daily activities attributable to UI was reported after pelvic floor muscle training (RR 12.5, 95 percent CI 3.2; 48.6).[292] Two small RCTs of pelvic floor muscle training[292] and exercises with biofeedback[724] reported substantial relative benefits when no women reported improvement in UI after usual care. Other RCTs showed more than 25 percent relative benefit after biofeedback-assisted behavioral training (RR 1.6, 95 percent CI 1.1; 2.3[279] or after bladder training (RR 3.1, 95 percent CI 2.0; 4.9;[281] RR 3.4, 95 percent CI 1.9; 6.1[278]) compared to usual care. Women reported more than 50 percent reduction in UI episodes after bladder training (RR 3.1, 95 percent CI 2.0; 4.9) compared to usual care.[281] Two RCTs reported significantly larger benefits of behavioral training compared to self-administered behavioral changes using a booklet.[268,283]

Outcome - Progression of UI in community dwelling females. Severity of UI was estimated with self-reported frequency of leakage episodes, pad utilization, and bothersomeness of UI. Community-based intervention that included bladder training and performing pelvic floor muscle training among elderly women resulted in 30 percent reduction in pad use for UI (RR 0.7, 95 percent CI 0.6; 0.9). (Appendix Table F89)[291] Intensive pelvic floor muscle training with 8-12 maximum contractions in 3 series/day and 45 minutes/week group sessions among women with clinically and urodynamically proven stress UI reduced the prevalence of UI with sexual intercourse by 80 percent (10.5 percent vs. 41.7 percent RR 0.2, 95 percent CI 0.2; 0.8).[720] The adverse impact on quality of life was reduced by 30 percent (RR 0.7, 95 percent CI 0.6; 0.9)[291] to

40 percent (RR 0.6, 95 percent CI 0.4; 0.9)[720] The relative benefit of behavioral interventions was demonstrated when compared to usual care but not to active controls.

Clinical interventions for primary prevention of UI in community dwelling males.

Outcome - Continence. The behavioral interventions on UI in males with prostate diseases were examined in 12 RCTs (Appendix Table F90).[255-266] Pelvic floor rehabilitation programs resulted in continence rates from 77 percent[255] to 99 percent[257] (Appendix Table F91). The highest continence rate was reported in a large well designed RCT of early pelvic floor rehabilitation in patients who had radical retropubic prostatectomy for clinical stage T1 or T2 prostate cancer.[257] The majority of patients (99 percent) reported continence after the intervention that included verbal explanations, palpation, and Kegel exercises with a small significant relative benefit compared to usual care (RR 1.1, 95 percent CI 1.1; 1.2).[257] The relative effect in the same RCT was larger when continence status was measured with a scale specific for UI (RR 1.3, 95 percent CI 1.2; 1.5).[257] Continence rates in the control groups were more than 60 percent across all RCTs with no statistically significant differences compared to active treatments (Figure 29).

Outcome - UI in community dwelling males. The effects of behavioral interventions on severity of UI were inconsistent in direction and size compared to usual care (Appendix Table F92). Few RCTs reported significant benefits of behavioral treatments to reduce the risk of UI. The rate of self-reported UI was 70 percent less after verbal instruction and feedback on contractions of pelvic floor muscles in 63 patients with bladder outflow obstruction and diagnosis of symptomatic benign prostatic hyperplasia who undergo transurethral prostatectomy (RR 0.3, 95 percent CI 0.1; 0.9).[263] Pelvic floor muscle training, including a strong post-void "squeeze out" pelvic floor muscle contraction, biofeedback, and suggestions to change lifestyle, significantly reduced post micturition dribble and urine loss in men with erectile dysfunction.[266] One large trial showed a substantial benefit of a complex floor rehabilitation program including patient education, assessment of pelvic floor muscles strength, and visualization of Kegel pelvic floor muscle training compared to regular care with reduction in severity and pad utilization (RR of using two pads/day 0.1, 95 percent CI 0; 0.7).[257]

Behavioral clinical interventions for secondary prevention of urinary continence in adults. The effects of behavioral interventions in males and females were examined in four RCTs (Appendix Table F93).[43,732-734] One large RCT of pelvic floor muscle training and bladder retraining supervised by non-specialist nurses in 561 adults 35 years and older with regular UI reported a significant increase in cure (RR 15.5, 95 percent CI 2.1; 112.5) and improvement of UI (RR 12.6, 95 percent CI 6; 26.2) (Appendix Table F94).[43]

Effects of Behavioral Interventions on Severity of UI and Quality of Life

Surrogate outcomes.

Subjective measures of severity of UI and quality of life in females (continuous surrogate variables). The authors measured severity of UI using self-reported numbers of episodes of UI per time period. The effects of behavioral interventions on quality of life were estimated from questionnaires and scales expressing the effects as mean differences between active and control treatments (Appendix Table F95). We calculated the effect size as the percent change in outcome variables compared to the control group. Overall, behavioral interventions resulted in small random changes in outcomes compared to control groups. No consistent benefit was seen across

RCTs on severity or quality of life. The largest differences were reported in one RCT that showed a reduction in the number of daily leakages after pelvic floor muscle training in groups supervised with skilled physical therapists (mean difference -0.7, 95 percent CI -1.2;-0.2).[299] The same RCT reported a significant increase in the Social Activity Index (mean differences 0.6, 95 percent CI 0.1; 1.1).[299] The results were inconsistent within trials. Pelvic floor muscle training improved self-reported UI measured with the Visual Analog Scale of UI but also increased the number of stress incontinence episodes.[288] Behavioral interventions reduced the number of incontinence episodes by 0.5-1 per day.[282,292] The effect on quality of life was also small with less than 1 percent differences in scores on the Incontinence Impact Questionnaire (mean difference -0.5, 95 percent CI -0.9;-0.2).[284]

Objective measures of severity of UI in females (pad test, urodynamic cystometry, and perineometry). Few behavioral interventions improved objective severity compared to either regular care or other treatments (Appendix Table F96). Behavioral management for continence reduced urine loss per 24 hours in the pad weight test compared to regular care (mean difference -0.5, 95 percent CI -0.8; -0.2).[282] The same benefit (approximately 1 percent difference compared to the control group) was reported after bladder training.[281] The largest significant differences (44 percent compared to usual care) in the 1 hour pad test was shown after pelvic floor muscle training with digital biofeedback (mean difference -12.3, 95 percent CI -15.6; -9).[288] Several RCTs of behavioral interventions reported small significant reductions in vaginal pressure[274] and significant increase in peak pressure[285,729] and pelvic floor muscle training.[288,725]

One RCT examined the effects of contracting the pelvic floor muscles before and during a cough (Knack Maneuver) in 27 women with self-reported stress UI and did not show significant improvement in urine leakage during the cough paper towel test.[722]

Subjective measures of severity of UI in males. Self-reported urinary symptoms and pad use did not change after active treatments compared to regular care (Appendix Table F97). One RCT reported increased urine loss in the pad weight test after intensive pelvic floor muscle training conducted by a physiotherapist (Appendix Table F98).

Subjective measures of severity of UI in adults. The frequency of UI in adults after behavioral interventions was reported in two RCTs (Appendix Table F99).[732,733] The larger RCT showed reduced UI episodes/day (mean difference -0.6, 95 percent CI -1.0; -0.2) after biofeedback-assisted pelvic floor muscle training.[732]

Pooled estimates of behavioral interventions on urinary continence in adults. The differences in populations and treatments, including difference in training regimes and frequency, made a pooled analysis questionable. We compared the relative benefit of urinary continence after behavioral interventions to usual care (Table 46). Pelvic floor muscle training, biofeedback assisted pelvic floor muscle training, and a combination of pelvic floor muscle training with bladder training showed an inconsistent relative benefit across studies. Pooled relative benefits of pelvic floor muscle training in females (RR 7.1, 95 percent CI 2.8; 18)[280,288,289,299] and pelvic floor muscle training combined with biofeedback (RR 11.2, 95 percent CI 2.2; 56.4)[288,289] were sensitive to one small RCT[288] with 2 month followup (Figure 30). Pelvic floor muscle training combined with bladder training increased continence by 175 percent compared to usual care (pooled RR 1.8, 95 percent CI 1.1; 2.9).[241,243,280,290]

The majority of RCTs demonstrated significant improvement in UI after pelvic floor muscle training compared to regular care. An improvement was shown eight times more often after pelvic floor muscle training (RR 8.1, 95 percent CI 2.3; 28.4), twice as frequently after biofeedback assisted pelvic floor muscle training (RR 1.9, 95 percent CI 1.0; 3.5), and 2.5 times

more often after pelvic floor muscle training and bladder training (RR 2.5, 95 percent CI 1.4; 4.6) (Figure 31).

Attributable benefits of behavioral interventions. Few RCTs showed significant relative benefit of behavioral interventions on urinary continence (Table 47). The number of avoided stress UI cases per 1,000 varied from 170[249] to 749[288] when treated with behavioral interventions. The relative benefits on total UI was smaller.[43,257] Ignoring different definitions of improvements and possible attenuation of the improvement over time, weight reduction would result in improved stress UI in 990 adults per 1,000 treated (Table 48).[714]

Intensive lifestyle changes would avoid 54 cases of stress UI per 1,000 treated (Table 49).[245] Pelvic floor muscle training and strategies to improve adherence among pregnant women would avoid 390 cases of UI per 1,000 treated (Table 50).[246]

Level of evidence. The evidence from RCTs (level I) was analyzed to compare the effects of behavioral interventions on UI.

Summary. In conclusion, behavioral interventions resulted in improvement in UI across RCTs, but the estimation of the overall effect was difficult due to heterogeneity between studies. The long-term continence outcomes among subjects that experienced improvement while participating in RCTs are restricted to 1 year of followup. Several large well-designed RCTs reported a significant benefit of behavioral interventions on cure of incontinence with greater effects on stress UI in females and very limited evidence on urge incontinence and male incontinence. Weight reduction in combination with physical activity showed promising protection against incident UI. Preventive complex pelvic floor rehabilitation programs in specific populations, including males undergoing prostate surgery and pregnant women, demonstrated relative benefit on several measures of urinary continence. The effects on quality of life and objective instrumental outcomes are inconsistent and small. Active interventions provided better outcomes compared to usual care with no relative benefit compared to each other.

Effects of Physiotherapeutic Interventions on UI in Community Dwelling Adults

Electrical or magnetic stimulation of pelvic floor muscles were examined in 17 RCTs[293-295,297,298,300-302,512,735-742] and one large prospective cohort study,[304] and neuromodulation of sacral nerve roots in nine RCTs[296,303,305,306,743-747] (Appendix Table F100). One RCT examined the effects of massage and stretching of perineum during the second stage of labor with a water soluble lubricant[514] and one study examined the effects of acupuncture to improve UI.[748] The majority of RCTs included less than 100 subjects; only three RCTs included more than 100 patients.[302,736,746]

Patient outcomes.

Continence in community dwelling females. Urinary continence after electrical stimulation in females was reported in five RCTs (Appendix Table F101)[293-295,297,298] and the effects of neuromodulation in one RCT.[296] The rates of cure from urge UI were more than 70 percent in one RCT after functional magnetic stimulation.[298] Electrical stimulation resulted in continence in about 20 percent of women.[293,294] The significant relative benefit of active magnetic to sham stimulation was shown in only one trial (RR 3.5, 95 percent CI 1.6; 7.8).[298] Other RCTs did not demonstrate significant relative benefit of cure compared to Kegel exercises,[293] biofeedback

assisted training,[297] or placebo stimulation.[295] Magnetic stimulation of sacral roots did not provide better continence rates compared to sham neuromodulation.[296]

In community dwelling adults, implantation of a multiprogrammable neurostimulator cured 47 percent of adults with urge UI[305] with significant relative benefit compared to standard medical therapy (RR 43.5, 95 percent CI 2.7; 695).[305] Sacral root neuromodulation resulted in urge continence more than nine times more often than conservative management with medications or pelvic floor muscle training (RR 9.9, 95 percent CI 1.4; 71.4).[306]

Studies that examine the effects of electrical stimulation of pelvic floor failed to provide relative cure more often than control treatments.[300,301]

Improvement in UI in community dwelling females. Several RCTs reported improvement in UI after stimulation in females;[293-297,302,303,735,737,740,745] with an improvement rate from 8 percent after percutaneous neuromodulation[303] to 85 percent after intravaginal stimulation[737] (Appendix Table F102). The improvement after magnetic stimulation varied from 23 percent in urge UI after electrical[298] to 74 percent in stress UI after neuromodulation therapy.[296] The greatest improvement in urge UI (85 percent) was observed after intravaginal electrical stimulation in women with predominantly urge UI.[737] The greatest improvement in stress UI (74 percent) was reported in women with mild stress incontinence after magnetic stimulation of sacral roots.[296] The rates of quantitative improvement were less than qualitative from 38 percent after neuromodulation[303] to 46 percent after electrical stimulation[294] in rates of negative pad test and only 15 percent in daily pad usage.[303] Transvaginal electric stimulation for 40 minutes/day was more effective than sham stimulation in women with either UI due to detrusor instability or stress UI, or both (mixed incontinence) (RR 2.1, 95 percent CI 1.1; 4.1).[302] However, the superiority of electrical stimulation compared to placebo treatment or regular care was not confirmed in other RCTs.[294,737,740]

Magnetic neuromodulation of sacral roots compared to placebo improved UI twice as often in women with stress UI (RR 2.3, 95 percent CI 1.3; 4.0).[296] Magnetic stimulation of pelvic floor, in contrast, did not improve predominant urge UI.[740] However, abdominal pain related to urge UI was reported less often after magnetic stimulation compared to placebo (RR 8.1, 95 percent CI 1.1; 57.9).[740]

Electrical stimulation was not more effective than Kegel exercises.[293,735] Home-managed electrical stimulation with vaginal/anal stimulators for at least 3 months reduced the frequency of urine loss in a large prospective cohort of Norwegian women (RR 0.7, 95 percent CI 0.7; 0.8).[304]

Neuromodulation with surgical first stage lead placement compared to percutaneous needle electrode significantly improved refractory urge UI in women who failed medical, behavioral, and pelvic floor reeducation management.[303]

UI in community dwelling females. Electrical[302,739] and magnetic[740]stimulation of pelvic floor and neuromodulation[745] did not reduce the prevalence of urge UI and detrusor over-activity compared to sham treatment (Appendix Table F103). Intravaginal electrical stimulation did not decrease the progression of mixed UI compared to Kegel exercises.[735] One prospective cohort study showed a significant reduction in frequency of urine loss and self perceived severity of UI.[304]

One RCT of acupuncture in 85 women older than 18 years with symptoms of overactive bladder with urge UI did not significantly reduce self-reported severity of urge UI and did not improve the Urinary Distress Inventory scores or urodynamic outcomes compared to placebo acupuncture treatment designed to promote relaxation.[748] However, a small reduction in the number of total UI episodes (mean difference -0.6, 95 percent CI -1; -0.1) was detected compared to placebo treatment.

Continence in community dwelling adults. Electrical stimulation of pelvic floor[301] or neuromodulation [305,306,744] resulted in urinary continence in males and females in several RCTs (Appendix Table F104). The rates of continence varied from 8 percent after electrical[300] to 47 percent after neuromodulation.[305] The highest continence rate (>40 percent) was achieved with a sacral neurostimulator in patients with refractory urinary urge incontinence.[305,306] Electrical stimulation with intravaginal electrodes in women and anal in men resulted in continence in a small proportion of subjects with no relative benefit compared to sham treatment.[300] Larger cure rates were substantially higher after subcutaneous implantation of a multiprogrammable neurostimulator in the lower quadrant of the abdomen with the lead positioned to target sacral nerve compared to standard medical care (RR 43.5, 95 percent CI 2.7; 695.0).[305] Sacral root stimulation compared to prior conservative management, including medications and pelvic floor muscle training, cured urge UI (RR 9.9, 95 percent CI 1.4; 71.4).[306] Both trials showed a wide 95 percent CI because of zero[305] or only one case of improvement[306] after control interventions.

Improvement in UI in community dwelling adults. Stimulation improved UI with rates varying from 0.5 percent after electrical stimulation of pelvic floor[512] to 77 percent after neuromodulation of sacral nerve roots[305] (Appendix Table F105). Functional magnetic stimulation improved UI in 30 percent of 32 patients with UI due to detrusor overactivity.[512] The highest rate of improvement in urge UI (89.7 percent) was observed after combined therapy of Stoller afferent neuromodulation and 5mg of oral oxybutynin hydrochloride with no significant relative benefit compared to stimulation alone.[744] Implantation of a multiprogrammable sacral neurostimulator improved severe urge incontinence (RR 8.8, 95 percent CI 3.4; 22.8) and increased the proportion of patients who did not need to use absorbent pads (RR 23.0, 95 percent CI 3.2; 162.9) compared to standard care.[305] A significant reduction was also seen in daily urge incontinent episodes (>50 percent) (RR 6.6, 95 percent CI 1.6; 27.5).[305] Electrical stimulation did not show relative benefit compared to sham treatment in an underpowered RCT of 68 patients with UI due to detrusor overactivity.[301]

Surrogate outcomes.

Subjective measures of severity and quality of life of UI in community dwelling females. The effects of electrical stimulation on frequency and amount of urine loss were compared to sham treatment or behavioral interventions (Appendix Table F106). Only two RCTs reported significant relative differences in urinary leakage episodes after active compared to sham stimulation. Women with urodynamically proven stress incontinence reported a 12 percent reduction in incontinence episodes (mean difference -0.7, 95 percent CI -1.3; -0.1) and a 6 percent reduction in pad use compared to placebo treatment (mean difference -0.7, 95 percent CI -1.3; -0.1).[294] Women with stress, urge, or mixed UI experienced a 59 percent reduction in urinary leakage after transvaginal electrical stimulation with adjustable current intensity compared to inactive stimulation (mean difference -1.8, 95 percent CI -2.6; -0.9).[742]

The impact on quality of life of UI was measured using the Urogenital Distress Inventory scores, the Incontinence Impact Questionnaire, and the Visual Analog Scale of UI. Only one RCT showed a significant improvement in quality of life from the complex pelvic floor rehabilitation program that included electrical stimulation of the pelvic floor muscle combined with an assisted pelvic floor muscle training program in premenopausal women with persistent postnatal stress UI.[267]

Objective measures of severity of UI in community dwelling females. Severity of UI after electrical stimulation was estimated with the pad test and urodynamic cystometry (Appendix Table F107). Random changes or small improvements compared to control interventions were

reported in the majority of the RCTs. The largest improvement was seen in pelvic floor muscle maximum strength (mean difference 0.9, 95 percent CI 0.3; 1.6, 194 percent compared to control) and changes from baseline in maximum rate of force development (mean difference 0.9, 95 percent CI 0.3; 1.6, 201 percent compared to control) after a complex pelvic floor rehabilitation program in women with persistent postnatal stress UI compared to relaxation massage for the back and extremities.[267]

Subjective measure of severity of UI in community dwelling adults. The effects of electrical stimulation or neuromodulation on the frequency and amount of urine loss were compared to sham treatment or behavioral interventions (Appendix Table F108).

Sacral root neuromodulation with an implantable impulse generator reduced pad use for urge UI by 28 percent and leakage episodes of urge UI by 18 percent compared to the control group in patients with refractory urge incontinence.[306] The same effect was observed in another RCT after implantation of a multiprogrammable neurostimulator; severity rank of urge UI was decreased by 78 percent; pad use was decreased by 29 percent, and urge incontinence episodes by 14 percent compared to sham treatment.[305]

Objective measure of severity of UI in community dwelling adults. The effects of electrical stimulation or neuromodulation on the frequency and amount of urine loss were reported compared to sham treatments or active controls (Appendix Table F109).[300,301,746] Functional magnetic stimulation compared to electrical stimulation did not show differences in urodynamic outcomes in patients with UI due to detrusor overactivity.[512]

Events attributable to stimulation therapy. We estimated that functional magnetic stimulation would avoid 390 cases of urge UI per 1,000 treated women (Table 51). Transvaginal electric stimulation with individually adjusted intensity would result in improvement in UI in 180 women per 1,000 treated.[302] Home-managed electrical stimulation with vaginal/anal stimulators would avoid 50 cases of UI per 1,000 treated women (Table 52).[304]

Sacral nerve stimulation would avoid 385[306] to 460[305] cases of urge UI per 1,000 treated adults. Electrical stimulation with surgical first stage lead placement would improve UI in more than 400 women per 1,000 treated compared to placebo.[303]

Summary. In conclusion, evidence from several small RCTs (<100 subjects), three large RCTs, and one prospective cohort suggested that electrical and magnetic stimulation of pelvic floor and sacral nerve roots neuromodulation can improve predominantly urge UI in adults but the curative effects are not consistent.

Effects of Medical Devices on UI in Community Dwelling Females

Eight RCTs examined different devices to treat UI in females, including Hodge pessary,[311] disposable intravaginal devices,[312,313] urethral plug,[314] and vaginal cones[299,315,316] (Appendix Table F110).

Patient outcomes.

Continence and improvement of UI in community dwelling females. A new blocking leakage urethral sterile device with disposable applicator resulted in the highest continence rate (67 percent) in women with mixed or stress UI with no relative benefit compared to a sterile balloon device (Appendix Table F111).[313] Continence during physical activity was achieved in 36 percent of exercisers ages 33-73 with stress UI after using a Hodge pessary but there was no relative benefit compared to a super tampon.[311] A Conveen continence disposable intravaginal

device cured stress UI in 36 percent compared to 48 percent with a Contrelle continence tampon with no statistically significant difference between treatments.

The use of vaginal cones of 20, 40, and 70g for 20 minutes/day resulted in nonsignificant improvement in subjective and objective cure in women with clinically and urodynamically proven stress UI.[299] Use of vaginal cones showed no improvement in UI compared to pelvic floor muscle training and functional electrical stimulation biofeedback.[315]

Severity of UI and quality of life with UI in community dwelling females. A continence disposable intravaginal device and tampon reduced urine loss during the 24-hour pad weight test compared to no treatment.[312]

Vaginal cones did not improve the results of the stress pad test and the 24-hour pad weight test compared to no treatment but improved the leakage index.[299] Vaginal cones were not more effective in reducing self-reported severity of UI than biofeedback assisted pelvic floor muscle training[315] or regular care[299] (Appendix Table F112). The effects of vaginal cones on restricting exercise and avoiding places due to incontinence were less than those of biofeedback-assisted pelvic floor muscle training.[315]

UI in community dwelling males. Two RCTs examined medical devices on UI in males (Appendix Table F113).[317,318] One small RCT did not show a relative benefit of a UroLume sphincteric stent inserted cystoscopically to conventional external sphincterotomy in 57 men with spinal cord injury and electromyographic and manometric evidence of external detrusor-sphincter dyssynergia (Appendix Table F114).[317] A second small crossover RCT compared penile compression devices in men 6 months after radical prostatectomy[318] and did not show differences in resistance index and urine loss during the 4-hour pad test compared to no device (Appendix Table F115).

In conclusion, limited evidence suggests that medical devices result in modest improvement in UI in women with a tendency to provide relative benefit compared to no treatments but not to other interventions.

Effects of Bulking Agents on UI in Community Dwelling Females

The effects of different bulking agents on female UI were examined in two RCTs with more than 100 females[307,749] and three smaller RCTs[309,310,750] with 6-24 months of followup (Appendix Table F116).

Outcomes.

Continence. Curative effects at 12 months of followup were shown after intraurethral collagen injection in women with stress UI (51.5 percent were dry during 24-hour pad test) (Appendix Table F117).[307] Transurethral porcine dermal implant injection resulted in negative pad test (cure) in 60 percent of women with urodynamically proven stress UI at 6 months of followup.[309] Peri-urethral injections of autologous fat from the anterior abdominal wall or buttock with up to three injections depending on individual response cured or improved UI at 24 months of followup in 17 percent of women with stress UI.[750] Transurethral injection of the bulking agent, dextran copolymer, resulted in objective cure at 12 months of followup in 15 percent of women with stress or mixed incontinence with minor and controlled urge component, who failed prior conservative treatments.[310]

Improvement in UI. Four RCTs reported improvement in UI after bulking agents. The highest rates of improvement (60 percent of women had an improved pad test) were reported after periurethral porcine dermal implant injection.[309] The same treatment improved the UI scores in

50 percent of women and the results of the Kings College Hospital Quality of Health Questionnaire in 56 percent.[309] Injection of the bulking agent Durasphere improved UI in 43 percent of women with refractory stress UI due to intrinsic sphincter deficiency.[749]

UI. The risk of complete urinary retention was lower after intraurethral collagen submucosal injection compared to surgical procedures, including needle bladder neck suspensions, Burch colposuspensions, and intravaginal slings (RR 0.1, 95 percent CI 0.0; 0.9). However, no RCTs showed a significant relative benefit of bulking agents compared to placebo[750] or other treatments.[307,309,310,749] The incidence of urgency was higher after the synthetic bulking agent compared to bovine collagen (RR 2.1, 95 percent CI 1.3; 3.3).[749] Bulking agents did not result in consistent improvement in urodynamic outcomes, pad weight test results, or quality of life measures (Appendix Table F118). We estimated that 119 patients would avoid complete urinary retention after collagen injection compared to surgical interventions (Table 53). In conclusion, no evidence suggests that bulking agents improve efficacy compared to placebo or effectiveness compared to other treatments in females.

Transurethral radiofrequency energy collagen micro-remodeling was examined in one RCT of 110 women with stress UI and showed no significant improvement in a quality of life questionnaire in women with stress UI and bladder outlet hypermobility compared to placebo injections.[751]

Clinical Effects of Obstetric Interventions on UI

Patient outcome - UI. The effects of different obstetric strategies to reduce the risk of UI were examined in seven large RCTs[386-389,391,752,753] and one smaller RCT[382] with justified sample size that evaluated surgical techniques for the primary repair of obstetric anal sphincter lacerations on UI (Appendix Table F119). Planned Cesarean delivery compared to vaginal birth reduced the risk of stress UI by 40 percent (RR 0.6, 95 percent CI 0.4; 0.9) at 3 months but not 2 years postpartum (Appendix Table F120).[389] Caesarean section was more protective against UI compared to vaginal delivery 3 months postpartum in the large RCT with no intention to treat and a 4.3 percent rate of cross treatments decided by the attending physician.[752] Caesarean section reduced the risk of any UI by 70 percent (RR 0.3, 95 percent CI 0.1; 0.7) in primiparous women and in the subgroup of primiparous women with a history of UI (RR 0.3, 95 percent CI 0.1; 0.9).[752] The risk of stress UI was reduced by 70 percent in primiparous women (RR 0.3, 95 percent CI 0.2; 0.5), with the same reduction in females with and without previous UI. The protective effect was not seen in multiparous women.

Restrictive vs. liberal policies for episiotomy[386,753] did not reduce the risk of UI 1.5-3 years postpartum. Mediolateral episiotomy compared to no episiotomy[387] did not decrease the risk of stress or urge UI 3 months after delivery. The same proportion of women requiring assisted vaginal delivery reported stress and urge UI after delivery with vacuum extractor or forceps delivery 5 years postpartum.[391] End-to-end repair compared to overlapping technique did not result in a lower risk of UI in 51 women with complete third or fourth degree anal sphincter laceration who underwent primary repair at the time of vaginal delivery.[382] Episiotomy did not affect urodynamic outcomes (Appendix Table F121).[386,387]

Effects of Hysterectomy on UI

Patient outcome - *UI*. Three powered RCTs[320,754,755] and two smaller RCTs with no justification for sample size[319,756] examined the effects of hysterectomy on the incidence and progression of UI (Appendix Table F122). Total abdominal hysterectomy was compared to subtotal supracervical hysterectomy in women with benign diseases of the uterus (Appendix Table 123). No differences in total, urge, or stress UI were detected between the two treatments. Intrafascial total abdominal hysterectomy significantly reduced the risk of urge UI compared to the extrafascial approach.[319]

Surrogate outcome - *Objective measures of severity of UI*. Two RCTs evaluated urodynamic outcomes and self-reported severity of UI and did not show differences between subtotal and total hysterectomy (Appendix Table F124).[754,756]

Effects of Vaginal Tapes and Sling Procedures on UI

The effects of vaginal tapes and sling procedures to reduce the progression of UI in women with predominantly stress UI were examined in 25 RCTs (Appendix Table F125).[325,327,331,338,749,757,758 323,324,326,329,332-337,339-342,485,488,491,759,760]

Patient outcomes.

Continence (curative effects). The majority of the RCTs (20/25) reported continence after vaginal tapes and sling procedures (Appendix Table F126).[323-342] The sample size included more than 100 women in nine RCTs.[325-327,331,332,334,340,341] The rate of continence was above 75 percent in the majority of RCTs; only two RCTs reported cure rates <75 percent,[334,337] All RCTs compared the effectiveness of vaginal tapes and sling procedures to active controls; no efficacy trials were identified. Cure rates were comparable after all tested procedures with no significant relative benefits. Only two RCTs reported significant relative increase in objective cure.[330,331] Tension-free vaginal tape procedures increased the rate of negative postoperative cough provocation tests by 60 percent compared to plication of the endopelvic fascia (RR 1.6, 95 percent CI 1.1; 1.4) in a small trial that examined women with severe genital prolapse treated with vaginal hysterectomy, culdoplasty, and cystocele repair for pelvic floor defects.[330] Tension-free vaginal tape under local anesthesia with polypropylene mesh tape placed under the midurethra resulted in a negative stress test 50 percent more often than laparoscopic mesh colposuspension under general anesthesia (RR 1.5, 95 percent CI 1.1; 2.4).[331]

Improvement of UI in females. The majority of RCTs reported improvement in UI after vaginal tape and sling procedures (Appendix Table F127).[323,325-327,329,332,334,336,339,342,485,760] The rates of improvement differed from 2.2 percent after transobturator suburethral sling procedure[339] to 100 percent after transvaginal antimicrobial mesh synthetic mesh,[323] depending on definitions of improvement. The rates were higher for stress UI after transvaginal antimicrobial synthetic mesh,[323] vesicourethral suspension by allogenic sling,[485] and suprapubic arc sling.[760] The rates were lower (19.4 percent) after the same procedure on quantitative improvement in stress UI defined as a decrease of >50 percent in urine loss.[336] The largest rate of improvement in urge UI (71.1 percent) was reported after intra-vaginal sling procedures.[760] A significant relative benefit was shown in one RCT that compared suburethral slingplasty with the suprapubic arc to intravaginal sling in 195 patients with urodynamic UI refractory to conservative management. Improvement in urge UI occurred 2.7 times more often after suprapubic arc compared to intravaginal sling (RR 2.7, 95 percent CI 1.3; 5.5).[334]

UI in females. The effects of vaginal tape and sling procedures were evaluated on self-reported incontinence and quality of life and objective measures of severity of UI including the pad weight test (Appendix Table F128). Few trials reported significant reduction in the progression of stress UI. Persistent subjective symptoms of stress UI were reported less often after tension-free vaginal tape than suprapubic urethral support sling in one trial (RR 0.5, 95 percent CI 0.3; 0.9).[341] Tension-free vaginal tape reduced stress UI by 90 percent compared to plication of the endopelvic fascia in one trial (RR 0.1, 95 percent CI 0; 0.8.[330] Women after tension-free vaginal tape reported subjective treatment failure less often (RR 0.6, 95 percent CI 0.3; 0.9) compared to suprapubic urethral support sling in one trial.[341]

Surrogate outcomes.

Subjective measure of severity of UI. RCTs compared self-reported frequency and severity of UI and quality of life of UI after tape and sling procedures compared to other active treatments (Appendix Table F129). Inconsistent progression in UI was reported in one RCT after tension-free vaginal tape under local anesthesia compared to laparoscopic mesh colposuspension under general anesthesia (mean difference in UI Severity Score 1.6, 95 percent CI 0.27; 2.94, mean difference in Visual Analog Scale of UI 1.3, 95 percent CI 0.7; 2.1).[331] One RCT reported improvement in global discomfort related to UI after suburethral sling procedure with retropubic routes compared to transobturator routes (mean difference 0.5, 95 percent CI 0.1; 0.9).[342]

Objective measure of severity of UI. Inconsistencies in direction and effect size in urodynamic cystometry after tested treatments were found in the majority of RCTs (Appendix Table F130).

Effects of Surgical Interventions on UI in Community Dwelling Women

(Appendix Table F131)

Six RCTs examined the effects of surgical treatments of prolapse to prevent UI.[322,330,486,487,761,762] One well designed RCT tested the effects of preoperative physiotherapy on UI.[763] The majority of RCTs included women with stress UI and compared different surgical techniques to treat UI.[321,343-350,353-362,764-778]

Patient outcomes.

Continence. Forty RCTs reported continence rates after different surgical procedures (Table 54).[319,345-351,353,355-362,486,487,764,767-770,772-774,777,778 321,343,344,491,757,766,771,775,776] The definitions varied from subjective cure with no symptoms or complaints, and need for pad use to objective cure during urodynamic evaluation and stress test. The continence rates demonstrated a substantial variability after the same procedures from 3.1 percent[770] to 85.1 percent[346] after laparoscopic colposuspension and from 8.7 percent[777] to 93.3 percent[490] after laparoscopic Burch procedures. Burch retropubic urethropexy resulted in continence in more than 90 percent of women and provided the largest relative benefit compared to modified anterior colporrhaphy (RR 5.1, 95 percent CI 1.8; 14.1)[353] and anterior colporrhaphy with Kelly plication (RR 1.4, 95 percent CI 1.1; 1.8).[345] The relative benefit of continence after Burch urethropexy was larger in another RCT that examined the same procedures (RR 2.3, 95 percent CI 1.3; 3.8).[774] Burch colposuspension with abdominal hysterectomy compared to anterior colporrhaphy with vaginal hysterectomy resulted in higher continence rates (RR 1.6, 95 percent CI 1.1; 2.3) in women undergoing surgery for primary stress incontinence and a concurrent grade 2 or 3 cystocele.[362] The relative benefit of the same procedure differed depending on the definition of cure. For example, the same trial that showed a 60 percent relative benefit for urinary continence with the

Burch procedure compared to anterior colporrhaphy reported a 300 percent relative benefit on cure defined as a negative cotton swab test (RR 3.2, 95 percent CI 1.6; 6.4).[362] The largest relative benefit of Burch retropubic suspension or pubovaginal sling was shown when compared with Oxybutynin 5mg three times/day (RR 41.3, 95percent CI 2.6; 645).[769]

Improvement in UI. Improvement in self-reported UI and the pad weight test was reported in 12 RCTs (Appendix Table F132).[346,347,354-356,766-768,771,775,776,778] One RCT reported improvement in more than 80 percent of women after laparoscopic colposuspension and Burch open colposuspension.[346] No significant relative benefit was detected when different treatments were compared.

Incidence of UI. The incidence of UI was 3.8 times higher after sacropexy combined with a Burch colposuspension compared to sacropexy alone (RR 3.8, 95 percent CI 1.2; 12.1) in continent women with advanced prolapse and a negative stress test before and after prolapse reduction (Appendix Table F133).[321] Another RCT demonstrated the opposite association with a lower incidence of stress UI after sacrocolpopexy with Burch colposuspension vs. sacrocolpopexy alone (RR 0.5, 95 percent CI 0.3; 0.7).[761] A large well-designed RCT also reported a significant reduction in severe stress UI after prophylactic surgery (RR 0.3, 95 percent CI 0.1; 0.5).[761] The sling procedure resulted in a significant reduction in stress UI 2 years after surgery compared to the Burch procedure in 665 women with predominant stress UI.[343]

Surrogate outcomes.

Subjective measures of UI. Burch retropubic urethropexy decreased the frequency of incontinent episodes and pad use compared to modified anterior colporrhaphy (Appendix Table F134).[353] Three RCTs reported improvement in quality of life after Burch colposuspension compared to other treatments.[353,761,765] The comparative effectiveness of different surgical procedures was not consistent in direction and effect size.

Objective measures of UI. Inconsistent differences in urodynamic outcomes with less than 10 percent of control levels were reported in all RCTs (Appendix Table F135).

Possible predictors of better effect. The trials used stratified randomization by a surgeon[761] and by participating centers[343,771,779] to estimate valid treatment effects independent of provider differences. Patient age, previous bladder neck surgery,[771] and concomitant rectocele repair for symptomatic rectocele[779] were balanced between treatment groups with stratified randomization to avoid effect measure modification. One trial reported the incidence of UI after sarcopexy combined with a Burch colposuspension compared to colposacropexy without prophylactic colposuspension in subgroups with baseline maximum urethral closure pressure above and below 35cmH_20.[321] No evidence suggested a significant effect modification by patient baseline conditions.

We analyzed the comparative effectiveness of different surgical procedures on urinary continenc***e*** in females (Table 55). The laparoscopic Burch procedure with sutures did not provide significant benefit compared to staples.[361,777] The laparoscopic Burch procedure compared to open Burch surgery resulted in higher continence rates in one RCT, lower in another, and random differences in three RCTs. Sling procedures were compared to Burch colposuspension with significant relative benefit of continence in one RCT and random differences in four RCTs. The Burch procedure compared to the tension-free tape procedure did not result in higher cure rates in four RCTs. An increase in continence was observed after the Burch procedure compared to colporrhaphy in two RCTs. One RCT reported higher continence rates after Burch operation vs. retropubic urethropexy with random differences in two other RCTs. No significant differences in cure were observed in two RCTs that compared retropubic urethrocystopexy and

pelvic floor repair. Tension-free tape procedures resulted in a very small relative benefit in continence compared to the sling procedure in five RCTs, while six RCTs reported random differences.

We estimated that different surgical procedures may result in a large number of avoided stress and total UI in women with no consistent benefit of one procedure over others (Tables 56-58).

Summary. In conclusion, a large body of evidence suggests that surgical procedures of stress UI in women result in continence and improvement in UI in more than 75 percent of treated women. Different surgical procedures have comparable effectiveness with no differences in incident urge incontinence. The absolute risk of de novo urgency and urge incontinence after surgery for stress UI requires an RCT, powered to estimate the balance between benefits and harms in continent women with prolapse and patients with stress incontinence. The comparative effectiveness of behavioral interventions and surgery are not known. Individual patient factors that may modify the effects of different procedures also require future research.

Reducing the Adverse Effects of Clinical Interventions Done for Other Purposes

Effects of clinical interventions on UI in adults with adenocarcinoma of the rectum. One large RCT of 1,861 patients with histologically confirmed adenocarcinoma of the rectum compared the effects of surgery and adjuvant radiotherapy on UI (Appendix Table F136). The incidence of UI and incontinence that required pad use was the same among patients after total mesorectal excision and adjuvant radiotherapy before surgery (Appendix Table F137).

Effects of clinical interventions on UI in males with urological diseases. Eleven RCTs examined clinical interventions to prevent UI in patients with prostate cancer[780-790] and three RCTs included patients with benign prostate diseases[489,791-793] (Appendix Table F138).

Patient outcome - Continence. Urinary continence was reported in four RCTs.[782,783,785] The highest rate of urinary continence (>92 percent) was reported after radical retropubic prostatectomy with bladder neck preservation (Appendix Table F139).[783]

Artificial urethral sphincter implantation and macroplastique injection in the sphincter region of the urethra resulted in continence in 80 percent and 91 percent of patients with minimal baseline incontinence, respectively.[785] The rates of "social continence" were lower and differed substantially depending on baseline incontinence.[785] Only one RCT reported continence (77 percent) after combined therapy of prostate cancer.[782] No evidence showed a significant relative benefit of continence between compared interventions.

Patient outcome - Incidence of UI. The highest rates of UI were reported in one RCT that examined the effects of bladder neck mucosal eversion during retropubic radical prostatectomy (Appendix Table F140).

Almost all patients with benign prostate diseases were continent after transurethral resection of the prostate with the thick vapor resection loop[792] and transurethral resection of the prostate.[793] In contrast, Holmium laser enucleation resulted in 50 percent of UI in the same population of men with bladder outflow obstruction secondary to benign prostatic hyperplasia.[489]

Patients with prostate cancer reported different rates of UI depending on the type and definition. Retropubic radical prostatectomy and vesico-urethral anastomosis with and without bladder neck eversion resulted in UI in more than 90 percent of patients.[781] The highest rate of urge UI (44 percent) was shown after radiation therapy with a four-field box technique to a dose of 70Gy.[780] The same treatment resulted in only 7 percent of self-reported stress UI in this

trial.[780] The lowest incidence of UI among patients with prostate cancer was reported after supplemental beam radiation with I-125 (144Gy) (1 percent).[784]

Indirect comparisons showed inconsistent relative risks of UI after surgical treatments and radiotherapy. The largest relative differences were observed in the risk of transient stress incontinence after transurethral resection of the prostate compared electro vaporization in patients with benign hypertrophy of prostate (0.1 percent vs. 18.6 percent respectively.[793] The rates of UI were substantially higher after adjuvant hormone therapy and surgery (300mg of diethylstilbestrol diphosphate/day) compared to adjuvant hormone therapy and external beam radiation (RR 35.5, 95 percent CI 2.2; 569.3). Patients with total baseline incontinence for >6 months after radical retropubic prostatectomy, transvesical prostatectomy, or transurethral prostatectomy reported cure more often after macroplastique injection to the sphincter region of the urethra compared to artificial urethral sphincter implantation (RR 0.3, 95 percent CI 0.1; 0.9.[785] Pad utilization was higher after radiotherapy compared to active surveillance (RR 8.3, 95 percent CI 1.1; 62.6).[790]

Surrogate outcome - Subjective measures of quality of life. Few RCTs examined the effects of clinical interventions on quality of life specific for UI (Appendix Table F141).[489,784,790,791] Two regimens of radiotherapy resulted in different urinary scores of the American Urologic Association and Radiation Therapy Oncology Group criteria (mean difference 11.0, 95 percent CI 9.5; 12.5).[784] Bother from urinary difficulties was greater after transurethral resection of prostate compared to watchful waiting (mean difference 0.7 on a scale of 100 for least impairment, 95 percent CI 0.5; 0.9) in patients with benign prostate hypertrophy.[791] No differences in quality of life were seen in patients with prostate cancer after radiotherapy compared to active surveillance.[790]

Surrogate outcome - Objective measures of UI. No differences in urodynamic outcomes were reported after different treatments of benign prostate diseases (Appendix Table F142).[489,791,793]

Summary. In conclusion, some limited evidence suggests that UI as a secondary outcome related to both baseline diseases and treatments is more severe after surgery and radiotherapy compared to active surveillance. The baseline level of incontinence may modify the effects of the treatments. Bladder preservation surgical techniques did not provide consistent and significant benefit on UI. No consistent evidence across RCTs suggests that different treatments for prostate cancer and benign hyperplasia can provide better long-term outcomes. The reproducibility of large relative differences in outcomes in several RCTs requires future confirmation.

Effects of hormone therapy on UI in community dwelling women. The effects of systemic oral hormone therapy on continence status in postmenopausal women were examined in 19 RCTs (Appendix Table F143).[352,365-367,369,513,794-806] The effects of transdermal and intravaginal estrogen therapy to improve continence status in postmenopausal women were administered in 10 RCTs (Appendix Table F144).[363,364,368,370,490,807-811]

Patient outcome - Continence. The preventive effects of systemic hormone replacement therapy in postmenopausal women were examined in several large RCTs (Appendix Table F145).[797,801,806] Only two RCTs reported positive significant effects of oral hormone therapy compared to baseline levels or placebo.[364,797] The administration of 2mg 17β-oestradiol combined with either 2.5, 5, 10, or 15mg dydrogesterone, orally once a day for 6 months cured incontinence in 23 percent of healthy postmenopausal nonhysterectomized women (RR 47.0, 95 percent CI 2.9; 763.5).[797] Oral hormone administration was less effective in achieving continence compared to local estrogen therapy (RR 0.4, 95 percent CI 0.3; 0.6).[368]

Urinary continence was reported in RCTs that examined the curative effects of local therapy among incontinent women.[364,368-370] The highest rates of continence were reported after transdermal administration of an estrogen patch (100 percent) and gel 1.25g/day (90 percent) among postmenopausal women with self-reported urinary symptoms (Appendix Table F145).[368] Local estrogen in vagitories or jelly combined with physiotherapy and electrostimulation cured 22 percent of women 50-74 years of age with regular mild incontinence (>2 leakage episodes per month) compared to 0 percent after no hormone treatment (RR 20.7, 95 percent CI 1.2; 346.5).[364]

Patient outcome - Improvement of UI. Several RCTs reported improvement in UI after local and oral hormone use[363,364,794,797,798,802,806,808] with the rates varying from 7 percent[794] to 68 percent,[363] depending on the route of the administration and the definition of the improvement (Appendix Table F146). The highest rate of improvement (68 percent) was reported after 6 months of intravaginal estrogen administration in incontinent postmenopausal women.[363] Combined estrogen and progesterone therapy cured nocturia, one of the risk factors of UI, in 65 percent of women.[797] Self-reported improvement in incontinence symptoms occurred in 45 percent of women after combined therapy of estrogen with alpha-adrenoreceptor agonist and in 40 percent after estrogen alone.[802]

The combination of local estrogen administration with physiotherapy and electrostimulation reduced the frequency of wet episodes in 39 percent of incontinent women.[364]

Hormone therapy improved UI compared to placebo treatments, but the effects were not consistent across RCTs. Intravaginal estrogen administration resulted in cure or improvement four times more often compared to placebo suppositories (RR 4.3, 95 percent CI 2.1; 8.7).[363] The same relative effect was reported after the combination of intravaginal estrogen with electrical stimulation (RR 4.3, 95 percent CI 1.5; 11.9).[364] In contrast, only one RCT showed a greater reduction in the number of incontinent episodes after placebo vs. ultra low dose of transdermal estrogen (RR 0.7, 95 percent CI .5; 0.9).[808]

Patient outcome - UI. The investigations that were designed to evaluate protective effects of hormone therapy on postmenopausal UI reported either random differences or relative increase in UI after estrogen therapy compared to placebo controls (Appendix Table F147).[363,365-367,513,794-796,798,801,806,808,809]Only one RCT showed a reduction in subjective complaints of stress UI after intravaginal estrogen administration (RR 0.4, 95 percent CI 0.2; 0.6).[363] The majority of RCTs demonstrated a consistent significant relative increase in UI across different routes of administration and definitions of UI. Incident mixed UI was increased by 50 percent (RR1.5, 95 percent CI 1.1; 2.2) and incident stress UI by 80 percent (RR 1.8, 95 percent CI 1.6; 2.2) after estrogen therapy.[365] Incident urge UI increased by 30 percent and total UI by 40 percent (RR 1.4, 95 percent CI 1.3; 1.6) after estrogen combined with progestin (RR 1.3, 95 percent CI 1.2; 1.5).[366] Oral estrogen alone without progestin increased incident stress UI by 210 percent (RR 2.1, 95 percent CI 1.7; 2.5)[365] and worsened UI by 530 percent (RR 5.3, 95 percent CI 1.2; 23.5).[367]

Patient outcome - Subjective progression of UI. Several RCTs obtained self-reported changes in severity after hormone therapy[364,367,794,796,801,808] and did not demonstrate differences compared to placebo (Appendix Table F148). One RCT reported a reduction in worsening of UI after transdermal estrogen (RR 0.2, 95 percent CI 0.1; 0.6).[808]

Surrogate outcome - Subjective measures of severity of UI. No differences were found after hormone therapy compared to placebo treatments (Appendix Table F149).[369,794,800,801,803,805,807] One RCT reported an increase in daily incontinence episodes after estrogen (mean difference 0.9, 95 percent CI 0.3; 1.4).[801]

Surrogate outcome - Objective measures of severity. There were no differences compared to controls or demonstrated small inconsistent changes (Appendix Table F150).

Summary. In conclusion, consistent evidence suggests that system hormone therapy increased the risk and progression of UI in postmenopausal females (Table 59). The relative harm varied from 42 to 106 percent for stress UI, 129 to 906 percent for any, and differed substantially for trials that measured urge UI.

Few RCTs demonstrated relative benefits of local estrogen administration for treatment of stress UI by 64 percent[363] and urge by 55 percent.[364]

The effective clinical interventions that resulted in long-term stress urinary continence in more than 75 percent of participating females (Table 60) included Burch colposuspension techniques and sling and tension-free tape procedures. Total urinary continence in more than 75 percent of women was observed in several RCTs after tension-free tape and sling procedures (Table 60). The effective clinical interventions that resulted in long-term urinary continence in males with prostatic diseases included pelvic floor muscle training, electrical stimulation with biofeedback, radical retropubic prostatectomy with bladder neck preservation, and implantation of an artificial urethral sphincter (Table 61). Overall, consistent evidence from RCTs suggests that pelvic floor muscle training augmented with biofeedback, Burch colposuspension, and tension-free tape and sling procedures are effective to reduce the absolute risk of stress UI in women (Tables 62 and 63).

Tension-free tape and sling procedures decreased the absolute risk of total UI. No clinical interventions demonstrated consistent reduction in absolute risk of urge UI.

The largest relative benefits with more than 300 excessive cases of resolved stress incontinence were reported in RCTs per 1,000 females treated with pelvic floor muscle training, Burch colposuspensions, and tension-free vaginal tape compared to usual care or other treatments (Table 64). Few RCTs reported large relative benefits on total urinary continence in females with local estrogen, Burch colposuspension with abdominal hysterectomy, and pubovaginal sling. Few small RCTs reported more than 300 cases of resolved urge incontinence in males and females after electrical or magnetic stimulation.

Effects of pharmacological agents on UI. Three systematic Cochrane reviews reported UI after drug administration. The reviews analyzed randomized trials of anticholinergic drugs on overactive bladder,[812] of adrenergic drugs for urinary incontinence,[813] and of serotonin and noradrenaline reuptake inhibitors for stress UI in adults.[642] We estimated attributable events of cure, improvement, or progression from the RCTs published after 1990. Adrenergic drugs were better than placebo in two of five RCTs (Table 65). Continence rates after pelvic floor muscle exercise were comparable with rate after adrenergic drugs. A combination of phenylpropanolamine that was withdrawn from the market when it was linked to intracerebral hemorrhage with estrogen resulted in continence in 0-40 percent of women. No trials included males. Clenbuterol resulted in continence 2 to 4.6 times more often than placebo in two trials but was not more effective compared to pelvic floor muscle training.

The Cochrane review of 61 trials of adults with overactive bladder syndrome that compared anticholinergic drugs with placebo treatment or no treatment reported the combined outcome of cure or improvement in UI from eight RCTs (Table 66). The other 53 RCTs did not report patient outcomes. No trials were conducted in men. Administration of propiverine (two RCTs) or extended release tolteradine (two RCTs) for 2-12 weeks resulted in greater rates of cure or improvement compared to placebo. Pooled analysis of six RCTs of different drugs resulted in 139 percent higher rates of cure of improvement (RR 1.4, 95 percent CI 1.3; 1.5).[812] The authors

also reported significant reduction in daily leakage episodes (mean difference -0.5, 95 percent CI -0.7; -0.4) after drug administration.

The review of eight RCTs of duloxetine administered for 3-12 weeks in patients with predominantly stress UI concluded that the drug failed to show better curative effects than placebo (Table 67). However, improvement rates and quality of life scores were better after active duloxetine compared to placebo. The long-term effects of pharmacological agents on UI are not clear. The effects on surrogates reported in many trials may not reflect patient outcomes. The comparative effectiveness of drugs compared to other conservative interventions remains unclear.

One multicenter RCT of 695 males 40 years or older with overactive bladder examined the effects of alpha 1 adrenoreceptor blocker tamsulosin for treatment of benign prostatic hyperplasia.[814] Men were treated with 0.4mg of tamsulosin, 4mg of tolterodine ER, both tolterodine ER plus tamsulosin, or placebo for 12 weeks. Urge incontinence rates were the same after tamsulosin (RR 1.1, 95 percent 0.8; 1.6), tolterodine (RR 1.1, 95 percent CI 0.8; 1.7), or the combinations of both drugs (RR 1.1, 95 percent CI 0.8; 1.6) compared to placebo.

Summary. Clenbuterol was more effective than a placebo in achieving continence in females with stress UI but not compared to pelvic floor muscle training. Extended release tolteradine for 2-12 weeks resulted in greater rates of cure or improvement compared to placebo in adults with overactive bladder syndrome. Duloxetin administered for 3-12 weeks in patients with predominantly stress UI improved UI, but the rates of continence did not differ from placebo. Long-term effects of medications combined with pelvic floor training on continence are unknown. Comparative effectiveness of combined treatments, including medication, requires future research.

Table 44. Comparative effectiveness of combined conservative management interventions on UI (significant relative benefit of continence shown from individual studies)

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Williams, 2005[240] N = 3,746 60% female 6 month followup	Continence service that included advice on diet and fluids; bladder training; pelvic floor awareness and lifestyle advice	Existing primary care including GP+ continence advisory services in the area. Outcome: continence	828/2958	150/788	28.00	19.00	**1.47 (1.26; 1.72)**	11 (7; 20)	90 (49; 136)E
		Outcome: Satisfied with current urinary symptoms for rest of life	1,893/2958	418/788	64.00	53.00	**1.21 (1.12; 1.30)**	9 (6; 15)	110 (66; 156)E
Wikander, 1998[239]* N = 34 56% female 3 month followup	Specially designed rehabilitation program to increase patient independent management of incontinence	Conventional rehabilitation program Outcome: continence	20/21	3/13	95.24	23.08	**4.13 (1.52; 11.19)**	1 (0; 8)	722 (121; 235)E
		Outcome: Number discharged to a nursing home due to incontinence	2/21	8/13	9.52	61.54	**0.15 (0.04; 0.62)**	2 (2; 4)	520 (234; 592)A

Table 44. Comparative effectiveness of combined conservative management interventions that significantly reduced the risk of UI in adults (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Schnelle, 1995[238]* N = 85 6 month followup	After gradual implementation of computerized quality management model for medical assessment and individualized prompted voiding protocols of incontinence	Before implementation of quality management model. Outcome: proportion of wet residents	14/85	26/85	17.00	31.00	**0.54 (0.30; 0.96)**	7 (5; 77)	140 (216; 13)A

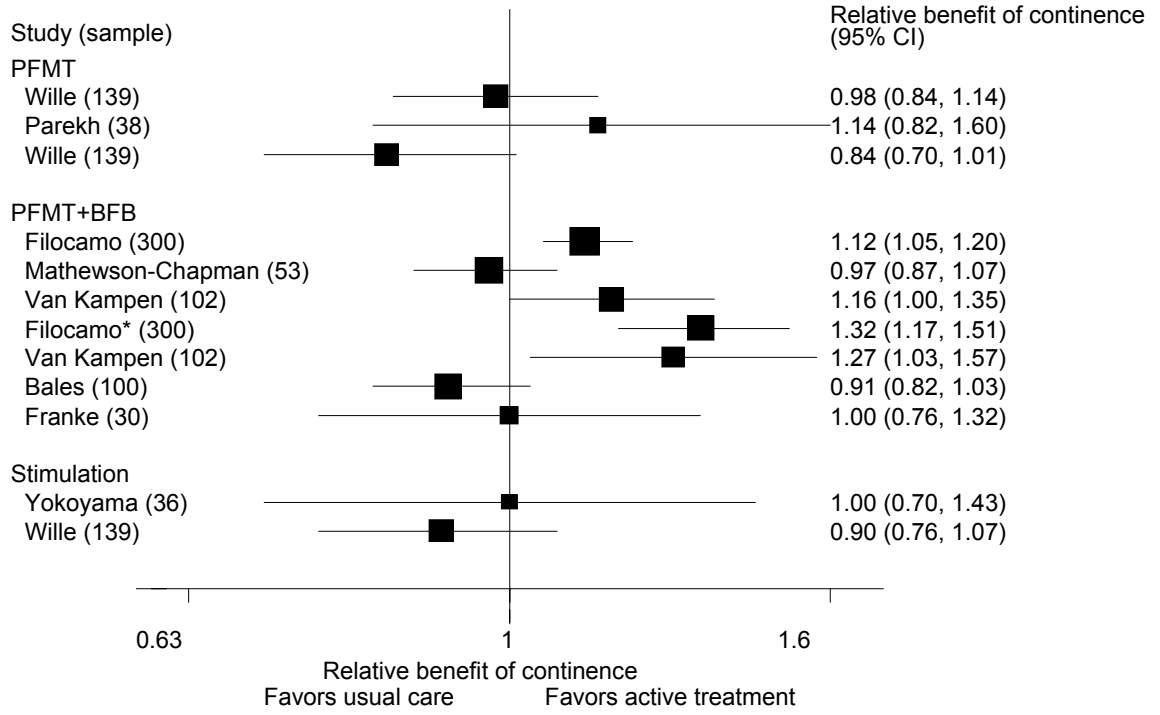
*Long-term care settings; Bold - significant differences in outcomes at 95% confidence level; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement in incontinence) or to harm one patient for negative patient outcomes (incontinence); E - number of excessive events per 1,000 treated, A - number of avoided events per 1,000 treated

Table 45. Comparative effectiveness of combined conservative management intervention on female UI related to pregnancy and birth (primary prevention)

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Glazener, 2001[251] N = 747 100% female 12 month followup	Assessment by nurses of urinary incontinence with conservative advice on pelvic floor exercises supplemented with bladder training	Outcome: severe incontinence (at least once a week) at 12 months postpartum	55/371	78/376	14.82	20.74	**0.71 (0.52; 0.98)**	17 (10; 220)	59 (5; 99)A
		Outcome: severe incontinence in women with high initial severity (>1/week)	43/371	65/376	11.59	17.29	**0.67 (0.47; 0.96)**	18 (11; 140)	57 (7; 92)A

Bold - significant differences in outcomes at 95% confidence level; A - number of avoided events per 1,000 treated. Number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence)

Figure 29. Relative benefit of urinary continence after active treatment compared to usual care in males with urological diseases (efficacy RCTs, primary prevention)



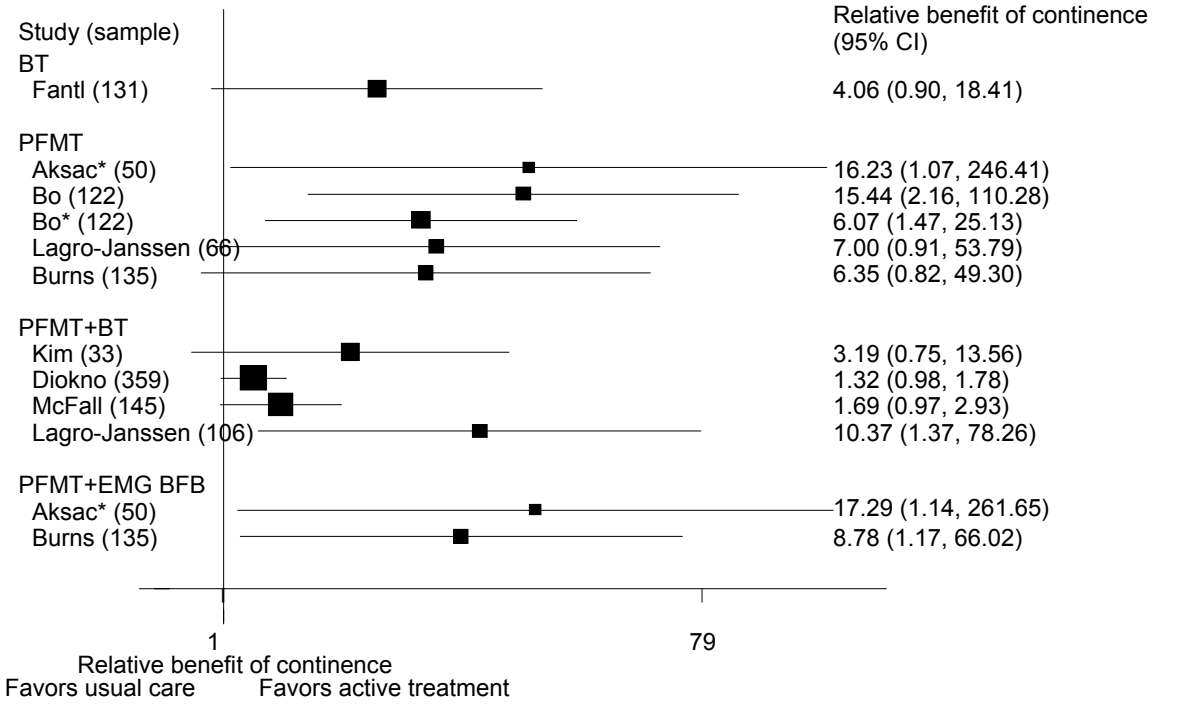
PFMT pelvic floor muscle training; PFMT + BFB pelvic floor muscle training with biofeedback; Stimulation = electrical stimulation

* incontinence was measured using International Continence Society male questionnaire

Table 46. Relative benefit of urinary continence after behavioral interventions in adults compared to regular care (random effects models, secondary prevention)

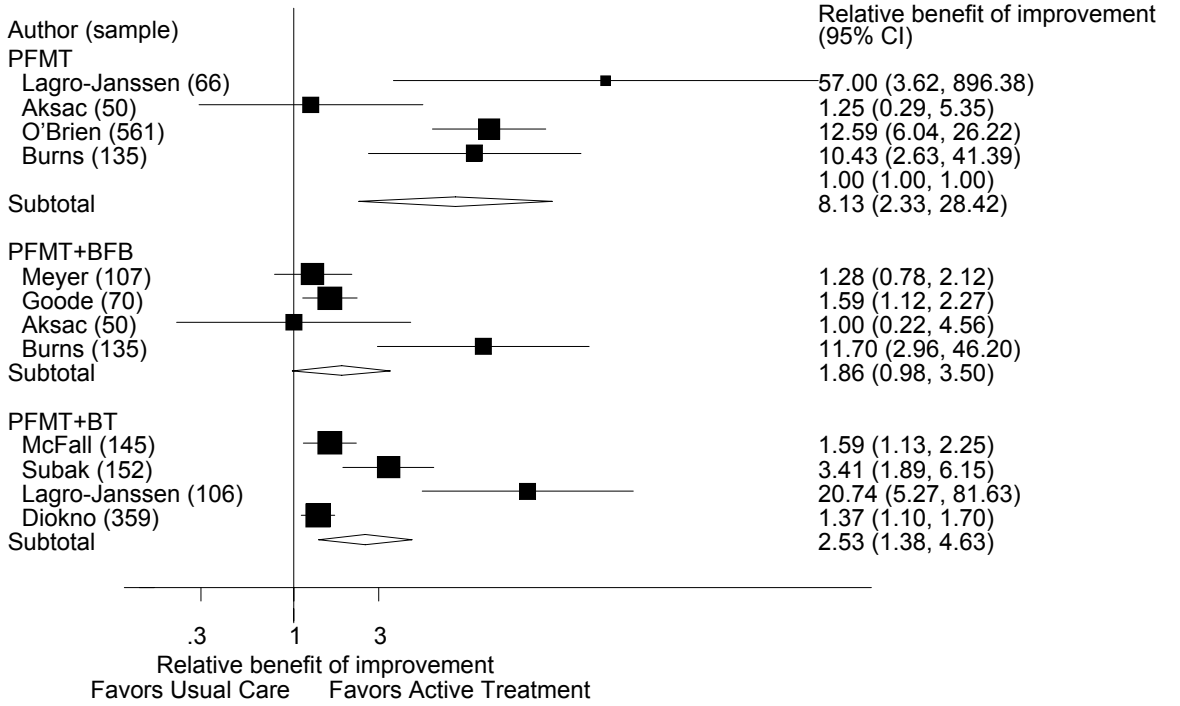
Author Sample; Followup	Relative Risk (95% CI)
Pelvic Floor Muscle Training	
Parekh, 2003[265] N = 38; 0% female; 12 month followup	1.07 (0.79; 1.44)
O'Brien, 1991[43] N = 561; 76% female; 3 month followup	15.49 (2.13; 112.49)
Aksac, 2003[288] N = 50; 100% female; 2 month followup	16.24 (1.07; 246.51)
Burns, 1993[289] N = 135; 100% female; 39 month followup	6.35 (0.82; 49.32)
Lagro-Janssen, 1992[280] N = 66; 100% female; 3 month followup	7.00 (0.91; 53.78)
Sleep, 1987[253] N = 1,800; 100% female; 3 month followup	0.96 (0.53; 1.72)
Kim, 2001[290] N = 33; 100% female; 3 month followup	3.19 (0.75; 13.55)
Biofeedback-assisted Pelvic Floor Muscle Training	
Filocamo, 2005[257] N = 300; 0% female; 12 month followup	1.12 (1.05; 1.19)
Mathewson-Chapman, 1997[259] N = 53; 0% female; 3 month followup	0.97 (0.87; 1.07)
Franke, 2000 [264] N = 30; 0% female; 6 month followup	1.00 (0.76; 1.32)
Williams, 2005[240] N = 3,746; 60% female; 6 month followup	1.47 (1.26; 1.72)
Meyer, 2001[249] N = 107; 100% female; 10 month followup	10.98 (1.46; 82.8)
Aksac, 2003[288] N = 50; 100% female; 2 month followup	17.29 (1.14; 261.69)
Burns, 1993[289] N = 135; 100% female; 6 month followup	8.78 (1.17; 66.04)
Pelvic Floor Muscle Training and Bladder Training	
Diokno, 2004[243] N = 359; 100% female; 12 month followup	1.32 (0.98; 1.78)
Lagro-Janssen, 1991[292] N = 106; 100% female; 3 month followup	10.37 (1.37; 78.28)
McFall, 2000[241] N = 145; 100% female; 3 month followup	1.69 (0.97; 2.93)

Figure 30. Relative benefit of urinary continence after active treatment compared to usual care in females (efficacy RCTs, secondary prevention)



PFMT pelvic floor muscle training; BT bladder training; PFMT+BT pelvic floor muscle training combined with bladder training; PFMT+ EMG BFB pelvic floor muscle training with electromyography biofeedback; * continence was defined as negative pad test

Figure 31. Relative benefit of improvement in UI after active treatment compared to usual care (pooled results RCTs, random effects model)



PFMT pelvic floor muscle training; PFMT + BFB pelvic floor muscle training with biofeedback; PFMT + BT - pelvic floor muscle training with bladder training

Table 47. Comparative effectiveness of behavioral interventions on urinary continence in adults from the community (significant results from individual RCTs)

Author Sample Followup	Active Treatment	Control Treatment	Number Continent After Active Treatment/ Number Randomized	Number Continent After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events per 1,000 treated (95% CI)
Continence in Patients with Stress UI									
Meyer, 2001[249]* N = 107 100% female 10 month followup	12 sessions of PFMT with 20 minutes of biofeedback and 15 minutes of electro stimulation	Usual care	10/51	1/56	19.00	2.00	**10.98 (1.46; 82.80)**	6 (1; 110)	170 (9; 1,636)E
Bo, 2005[275] N = 47 100% female Acute	PFMT with 8-12 max contractions for 6-8 seconds 3 series/day under the supervision of physical therapist	Home exercise groups	13/21	4/26	60.00	17.00	**4.02 (1.54; 10.53)**	2 (1; 11)	430 (91; 1,620)E
Aksac, 2003[288] N = 50 100% female 2 month followup	PFMT (contractions for 10 seconds and relaxation for 20 seconds, 10 times/ session, 3 sessions/day) BFB digital palpation at home	Usual care	15/20	0/10	75.00	0	**16.24 (1.07; 246.51)**	1	749 E
	The same PFMT+ EMG BFB via vaginal probe		16/20	0/10	80.00	0	**17.29 (1.14; 261.69)**	1	799E

Table 47. Comparative effectiveness of behavioral interventions on urinary continence in adults from the community (significant results from individual RCTs) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number Continent After Active Treatment/ Number Randomized	Number Continent After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events per 1,000 treated (95% CI)
Burns, 1993[289] N = 135 100% female 6 month followup	PFMT (contraction for 10 seconds and relaxations for 10 seconds 10 times in each weekly session)+ vaginal EMG BFB	Usual care	9	1	23.00	3.00	**8.78 (1.17; 66.04)**	5 (1;201)	200 (5; 1,951)E
Bo, 1999[299] N = 122 100% female 6 month followup	PFMT with 8-12 contractions 3 times/day, in groups with skilled physical therapists 1/week	Untreated control group offered the use of continence guard. Objective cure as <2g leakage on the pad test with standardized bladder volume	11/29	2/32	37.93	6.25	**6.07 (1.47; 25.12)**	3 (1; 34)	317 (29; 1,507)E
		Subjective cure (number of women stating that the condition was "unproblematic" after the treatment)	14/29	1/32	48.28	3.13	**15.45 (2.16; 110.28)**	2 (0; 27)	452 (36; 3,415)E

Table 47. Comparative effectiveness of behavioral interventions on urinary continence in adults from the community (significant results from individual RCTs) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number Continent After Active Treatment/ Number Randomized	Number Continent After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events per 1,000 treated (95% CI)
Continence in Patients with Any UI									
Janssen, 2001[286] N = 530 100% female 12 month followup	Individual PFMT 5 times/day and bladder training with delay voiding, training with 11 30-minute sessions.	Group PFMT 5 times/day and bladder training with delay voiding, training with 9 2-hour sessions	28/126	57/404	22.00	14.00	**1.58 (1.05; 2.36)**	13 (5; 143)	80 (7; 191)E
O'Brien, 1991[43] N = 561 76% female 3 month followup	Four sessions of PFMT and BT supervised by non-specialist nurse	Usual care	32/378	1/183	8.47	0.55	**15.49 (2.13; 112.49)**	13 (2; 161)	79 (6; 609)E
Lagro-Janssen, 1992[280] N = 106 100% female 3 month followup	PFMT alone (stress) or BT (urge) or its combination (mixed)	Usual care	10/54	1/56	18.52	1.79	**10.37 (1.37; 78.28)**	6 (1; 150)	167 (7; 1,380)E
Filocamo, 2005[257]* N = 300 0% female 12 month followup	Early pelvic floor rehabilitation program with verbal explanation, PFMT +BFB (digital anal control, visualization: 3 sets of 10 contractions for 5 seconds and 10 seconds of muscular relaxation	No formal training on PFMT Outcome: Self-reported urinary continence	148/150	132/150	98.70	88.00	**1.12 (1.05; 1.19)**	9 (6; 21)	107 (47; 170)E
		Outcome: International Continence Society (ICS)-male questionnaire: completely dry	134/150	101/150	89.33	67.33	**1.33 (1.17; 1.50)**	5 (3; 9)	220 (115; 338)E

Table 47. Comparative effectiveness of behavioral interventions on urinary continence in adults from the community (significant results from individual RCTs) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number Continent After Active Treatment/ Number Randomized	Number Continent After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events per 1,000 treated (95% CI)
Van Kampen, 2000[261] N = 102 0% female 12 month followup	Pelvic-floor re-education program with PFMT+BFB for as long as patients were incontinent.	Placebo electrotherapy (a false interferential current) via four skin electrodes	44/50	36/52	88.00	70.00	**1.27 (1.03; 1.57)**	6 (3; 44)	180 (23; 396)E

*Sampling of continent adults at baseline (primary prevention); PFMT - pelvic floor muscle training, BFB - biofeedback; BT - bladder training;
Bold - significant differences in outcomes at 95% confidence level; E - number of excessive events per 1,000 treated; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence)

Table 48. Comparative effectiveness of behavioral interventions to improve UI in adults (significant results from individual RCTs)

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events per 1,000 Treated (95% CI)
Improvement in Stress UI									
Subak, 2005[714] N = 48 100% female 3 month followup	Weight reduction intervention	Delayed weight reduction intervention	22/24	0/24	92.00	0	**45.00 (2.89; 701.85)**	1	919E
Burns, 1993[289] N = 135 100% female 6 month followup	PFMT (contraction for 10 seconds and relaxations for 10 seconds 10 times in each weekly session)+vaginal EMG BFB	Usual care	24/40	2/39	61.00	6.00	**11.70 (2.96; 46.20)**	2 (-8; 0)	550 (118; 2,712)E
	PFMT with 4 sets of 20 increasing by 10/set until maximum 200 sets/day		23/40	2/39	54.00	6.00	**10.43 (2.63; 41.39)**	2 (0; 10)	480 (98; 2,424)E
Wells, 1991[725] N = 157 100% female 6 month followup	PFMT with contractions for 10 seconds and relaxation for 10 seconds 90-160 times/day	Phenylpropanolamine hydrochloride in a dose of 50mg/ day, increasing to 50mg 2 times/day	17/82	29/75	21.00	39.00	**0.54 (0.32; 0.89)**	6 (4; 24)	180 (264; 42)A
Bo, 1999[299] N = 122 100% female 6 month followup	PFMT with 8-12 contractions 3 times/day in groups with skilled physical therapists 1/week	Untreated control group offered the use of a continence guard	12/29	1/32	41.38	3.13	**13.24 (1.83; 95.63)**	3 (0; 38)	383 (26; 2,957)E
Lagro-Janssen, 1999[292] N = 66	Instructions in PFMT 5-10 sessions of 10 pelvic muscle contractions for 6	No therapy. Outcome: improvement in urinary incontinence	28/33	0/33	85.00	0	**57.00 (3.62; 896.38)**	1	849 E

Table 48. Comparative effectiveness of behavioral interventions to improve UI in adults (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events per 1,000 Treated (95% CI)
100% female 3 month followup	seconds each day	Outcome: improvement in psychological impact of urinary incontinence	23/33	0/33	70.00	0	**47.00** **(2.97; 742.97)**	1	699E
		Outcome: improvement in restriction of activities	25/33	2/33	75.00	6.00	**12.50** **(3.22; 48.56)**	1 (0; 8)	690 (133; 2,854)E
Improvement in Any UI									
Janssen, 2001[286] N = 530 100% female 12 month followup	Individual PFMT 5 times/day and bladder training with delay voiding, training with 11 30-minute sessions	Group PFMT 5 times/day and bladder training with delay voiding, training with 9 2-hour sessions	118/126	347/404	94.00	86.00	**1.09** **(1.03; 1.16)**	13 (7; 447)	80 (23; 136)E
Subak, 2005[714] N = 48 100% female 3 month followup	Weight reduction intervention	Delayed weight reduction intervention	14/24	4/24	60.00	15.00	**3.50** **(1.35; 9.11)**	2 (19; 1)	450 (52; 1,216)E
Diokno, 2004[243]* N = 359 100% female 12 month followup	Behavioral modification program: PFMT+BT	Usual care	92/164	80/195	56.00	41.00	**1.37** **(1.10; 1.70)**	7 (3; 24)	150 (42; 286)E
Goode, 2003[268] N = 200 100% female 2 month followup	Behavioral training (PFMT+BFB, home exercises, bladder control strategies, and self-monitoring with bladder diaries) and pelvic floor electrical stimulation	Self-administered behavioral training administered with a self-help booklet	58/67	38/67	86.00	57.00	**1.53** **(1.21; 1.92)**	3 (2; 8)	290 (122; 524)E

Table 48. Comparative effectiveness of behavioral interventions to improve UI in adults (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events per 1,000 Treated (95% CI)
O'Brien, 1991[43] N = 561 76% female 3 month followup	Four sessions of PFMT+BT supervised by non-specialist nurse	Usual care	182/378	7/183	48.15	3.83	**12.59 (6.04; 26.22)**	2 (1; 5)	443 (193; 965)E
Subak, 2002[278] N = 152 100% female 1.5 month followup	6 weekly 20-minute group instructional sessions on BT by nurse educators and followed individualized voiding schedules	Usual care	39/77	11/75	50.00	15.00	**3.41 (1.89; 6.15)**	3 (1; 7)	350 (134; 772)E
Lagro-Janssen, 1992[280] N = 106 100% female 3 month followup	PFMT alone (stress) or BT (urge) or its combination (mixed)	Usual care	40/54	2/56	74.00	3.00	**20.74 (5.27; 81.63)**	1 (0; 8)	710 (128; 2,419)E
McFall, 2000[241] N = 145 100% female 3 month followup	Community-based intervention: BT, managing the urge to urinate, and PFMT	Usual care	44/72	28/73	61.00	38.00	**1.59 (1.13; 2.25)**	4 (2; 20)	230 (49; 474)E
Fantl, 1991[281] N = 131 100% female 1.5 month followup	BT using 6 weekly visits included patient education; voiding schedule to have micturition from every 30-60 minutes to every 2.5-3 hours; and positive reinforcement.	Usual care	49/65	16/66	75.00	24.00	**3.11 (1.99; 4.87)**	2 (1; 4)	510 (237; 929)E
Burgio, 2002[283] N = 222 100% female 2 month followup	BFB+PFMT+ behavioral training implemented by nurse practitioners	Self-administered behavioral treatment using a self-help booklet to advice PFMT	33/73	20/75	45.21	26.67	**1.70 (1.08; 2.66)**	5 (2; 48)	185 (21; 444)E
	4 visits of		36/74	20/75	48.65	26.67	**1.82**	5	220

Table 48. Comparative effectiveness of behavioral interventions to improve UI in adults (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events per 1,000 Treated (95% CI)
	behavioral training without BFB (verbal feedback based on vaginal palpation). PFMT with 10 second contractions and 10 second relation for 45 minutes/day	and bladder control					**(1.17; 2.84)**	(2; 22)	(46; 490)E
Hu, 1990[710] N = 143 100% female 3 month followup	Behavioral therapy program in nursing homes implemented by the project-trained NRAs.	Usual care	19/72	6/71	26.00	8.00	**3.12** **(1.32; 7.36)**	6 (2; 38)	180 (26; 509)E
Dorey, 2004[266] N = 55 0% female 3 month followup	PFMT including a strong post-void "squeeze out" pelvic floor muscle contraction, BFB, and suggestions for lifestyle changes.	Advice on lifestyle changes	14/28	1/27	50.00	3.70	**13.50** **(1.90; 95.71)**	2 (0; 30)	463 (33; 3,508)E
Burns, 1990[724] N = 128 100% female 6 month followup	Kegel PFMT 4 times/day	Usual care	21/38	0/40	54.00	0	**45.21** **(2.83; 720.96)**	2	539 E
Goode, 2003[268] N = 200 100% female 2 month followup	Behavioral training (BFB+PFMT, home exercises, bladder control strategies, and self-monitoring with bladder diaries)	Self-administered behavioral training administered with a self-help booklet	53/66	38/67	80.00	57.00	**1.42** **(1.11; 1.80)**	4 (2; 16)	230 (64; 457)E

Table 48. Comparative effectiveness of behavioral interventions to improve UI in adults (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events per 1,000 Treated (95% CI)
Improvement in Urge UI									
Subak, 2005[714] N = 48 100% female 3 month followup	Weight reduction intervention	Delayed weight reduction intervention	17/24	3/24	70.00	11.00	**5.67** **(1.91; 16.84)**	2 (1; 10)	590 (100; 1,742)E
Goode, 2002[279] N = 70 100% female 2 month followup	Four sessions (over 8 weeks) of biofeedback-assisted behavioral training by nurse practitioners	Usual care	27/35	19/37	82.30	51.50	**1.59** **(1.12; 2.27)**	3 (2; 16)	308 (62; 652)E

* Sampling of continent adults at baseline, interventions to reduce the risk of incontinence
Bold - significant differences in outcomes at 95% confidence level; PFMT - pelvic floor muscle training, BFB - biofeedback; BT - bladder training; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence); E - number of excessive events per 1,000 treated; A - number of avoided events per 1,000 treated.

Table 49. Comparative effectiveness of behavioral interventions on UI in adults

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Outcome - Stress UI									
Brown, 2006[245]* N = 1,957 100% female 34.8 month followup Primary prevention	Intensive lifestyle therapy to lose and maintain at least 7% of initial body weight through a low-fat diet and to engage in moderate-intensity physical activity for at least 150 minutes each week	Placebo twice daily	206/659	242/660	31.30	36.70	**0.85 (0.73; 0.99)**	19 (10; 329)	54 (3; 98)A
Reilly, 2002[247]* N = 268 100% female 5 month followup Primary prevention	Supervised by physiotherapist PFMT 1/month before delivery	Verbal advice on PFMT	23/120	36/110	19.20	32.70	**0.59 (0.37; 0.92)**	7 (5; 40)	135 (25; 205 25)A
Bo, 2000[720] N = 59 100% female 6 month followup	PFMT with 8-12 maximum contractions in 3 series/day and 45 minute/week group sessions	Untreated control group	3/29	13/30	10.50	41.70	**0.24 (0.08; 0.75)**	3 (3; 10)	312 (385; 104)A
Outcome - Any UI									
Chiarelli, 2002[246]* N = 720 100% female 3 month followup Primary prevention	Training in PFMT and incorporated strategies to improve adherence	Usual postpartum care	115/370	134/350	31.00	38.40	**0.81 (0.66; 0.99)**	14 (8; 390)	74 (3; 129)A

Table 49. Comparative effectiveness of behavioral interventions on UI in adults (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Filocamo, 2005[257]* N = 300 0% female 12 month followup Primary prevention	Early pelvic floor rehabilitation program with verbal explanations, Kegel PFMT: 3 sets of 10 contractions for 5 seconds and 10 seconds of muscular relaxation under digital BFB	No formal training Outcome: occasional leakage in International Continence Society (ICS) - male questionnaire	14/150	29/150	9.33	19.33	**0.48 (0.27; 0.88)**	10 (7; 42)	100 (142; 24)A
		Outcome ICS - male questionnaire: 2 pads/day	1/150	11/150	0.67	7.33	**0.09 (0.01; 0.70)**	15 (14; 45)	67 (22; 72)A
		Outcome: self-reported urinary incontinence	2/150	18/150	1.33	12.00	**0.11 (0.03; 0.47)**	9 (9; 16)	107 (64; 117)A
Porru, 2001[263]* N = 58 0% female 1 month followup Primary prevention	Verbal instruction, BFB+PFMT, and verbal reinforcement to teach selective contractions of anal sphincter muscles and relaxation of abdominal muscles 45 times/day	Standard care without instruction on PFMT	4/30	12/28	13.33	42.86	**0.31 (0.11; 0.85)**	3 (3; 16)	295 (63; 380)A

* Sampling of continent adults at baseline; Bold - significant differences in outcomes at 95% confidence level; PFMT - pelvic floor muscle training, BFB - biofeedback; BT - bladder training; A - number of avoided events per 1,000 treated; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence)

Table 50. Comparative effectiveness of behavioral interventions on severity of UI in adults

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Outcomes - Severity of Stress UI									
Bo, 2000[720] N = 59 100% female 6 month followup	PFMT with 8-12 maximum contractions in 3 series/day and 45 minutes/week group sessions	Untreated control group. Outcome: problems with interference with social life	1/29	12/30	3.70	40.70	**0.09 (0.01; 0.62)**	3 (2; 6)	370 (154;402)A
		Outcome: problem with interference with physical activity	13/29	24/30	43.50	79.30	**0.56 (0.36; 0.87)**	3 (2; 10)	358 (507; 102)A
Outcomes -Severity of Any UI									
Lagro-Janssen, 1992[280] N = 106 100% female 3 month followup	PFMT alone (stress) or BT (urge) or its combination (mixed)	Usual care Outcome-severe UI	4/54	23/56	7.41	41.07	**0.18 (0.07; 0.49)**	3 (3; 5)	337 (211; 383)A
McFall, 2000[291] N = 145 100% female 3 month followup	Community-based intervention: BT, managing the urge to urinate, and PFMT	Usual care. Outcome: self-reported bothersomeness of UI	42/72	62/73	58.90	85.20	**0.69 (0.55; 0.85)**	4 (3; 8)	263 (124; 381)A
		Outcome: use absorbent pads for UI	39/72	56/73	54.00	77.00	**0.71 (0.55; 0.90)**	4 (3; 14)	230 (74; 345)A
Fantl, 1991[281] N = 131 100% female 1.5 month followup	BT (6 weekly visits) included patient education; voiding schedule and positive reinforcement	Usual care Outcome: increase in episodes of UI	5/65	28/66	8.00	43.00	**0.18 (0.07; 0.44)**	3 (3; 4)	350 (241; 398)A

Table 50. Comparative effectiveness of behavioral interventions on severity of UI in adults (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Chiarelli, 2002[246]* N = 720 100% female 3 month followup	Training in PFMT and incorporated strategies to improve adherence	Usual postpartum care outcome: severe mixed UI	37/370	59/350	10.10	16.80	**0.59 (0.40; 0.87)**	15 (10; 46)	67 (22; 100)A

* Sampling of continent adults at baseline; Bold - significant differences in outcomes at 95% confidence level; PFMT - pelvic floor muscle training, BFB - biofeedback; BT - bladder training; A - number of avoided events per 1,000 treated; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence)

Table 51. Comparative effectiveness of electrical stimulation or neuromodulation on UI in adults

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Urge specific Continence									
But, 2003[298] N = 52 100% female 2 month followup	Functional magnetic stimulation with Pulsegen device, which produced a pulsating magnetic field of B = 10 microT intensity and a frequency of 10Hz	Placebo treatment with sham not active device. Outcome: success of treatment	24/30	5/22	79.00	22.00	**3.52** **(1.60; 7.76)**	2 (1; 8)	570 (131; 1,488)E
		Outcome: Cured from urge UI	12/30	0/22	40.00	0	**18.55** **(1.16; 297.42)**	3	390 E
Schmidt, 1999[305] N = 98 81% female 5 month followup	Neuromodulation Therapy: Implantation of multiprogrammable neurostimulator subcutaneously in lower quadrant of the abdomen with lead positioned to target sacral nerve and anchored in place.	Standard medical therapy Outcome: cured from urge UI	24/52	0/46	47.00	0	**43.45** **(2.72; 695.03)**	2	460E
Weil, 2000[306] N = 44 91% female 36 month followup	Neuromodulation Therapy: Sacral root neuromodulation with an implantable impulse generator	Prior conservative management: medications or PFMT Outcome: cured from urge UI	9/21	1/23	42.86	4.35	**9.86** **(1.36; 71.36)**	3 (0; 64)	385 (16; 3,059)E

Table 51. Comparative effectiveness of electrical stimulation on UI in adults (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Improvement in Stress UI									
Fujishiro, 2000[296] N = 62 100% female 1 week followup	Neuromodulation Therapy: Magnetic stimulation of sacral roots with 15Hz frequency, 50% intensity output for 5 seconds per minute for 30 minutes	Sham stimulation with inactive device Outcome: improved stress UI	23/31	10/31	74.00	32.00	**2.30 (1.33; 3.99)**	2 (1; 10)	420 (57;104)E
Improvement in UI									
Brubaker, 1997[302] N = 148 100% female 2 month followup	Transvaginal electric stimulation for 20 minutes 2 times/day using frequency of 20Hz, a 2-second - 4-second work-rest cycle with a range of stimulation intensities, from 0 to 100mA	Sham inactive device Outcome: improved UI	21/61	10/60	35.00	17.00	**2.14 (1.10; 4.14)**	6 (2; 59)	180 (17; 535)E
Borawski, 2007[303] N = 30 100% female 2 week followup	Neuromodulation Therapy: Electrical stimulation with percutaneous needle electrode (22-G spinal needle) placement	Electrical stimulation with surgical first stage lead placement: >50% improvement in 24 hour pad weight	4/13	13/17	30.77	76.47	**0.40 (0.17; 0.95)**	2 (2; 25)	457 (40; 634)A
		>50% Improvement in 24 hour pad usage	2/13	11/17	15.38	64.71	**0.24 (0.06; 0.89)**	2 (2; 14)	493 (70; 606)A
		>50% Improvement in daily incontinence episodes	1/13	14/17	7.69	82.35	**0.09 (0.01; 0.62)**	1 (1; 3)	747 (311; 812)A

Table 51. Comparative effectiveness of electrical stimulation on UI in adults (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Improvement in Urge UI									
But, 2003[298] N = 52 100% female 2 month followup	Functional magnetic stimulation with Pulsegen device, which produced a pulsating magnetic field of B = 10 microT intensity and a frequency of 10Hz	Placebo treatment with sham not active device. Outcome- Less abdominal pain related to urge UI	11/30	1/22	36.70	5.00	**8.07 (1.12; 57.95)**	3 (0; 163)	317 (6; 2,847)E
Schmidt, 1999[305] N = 98 81% female 5 month followup	Neuromodulation Therapy: Implantation of multiprogrammable neurostimulator subcutaneously in lower quadrant of the abdomen with lead positioned to target sacral nerve and anchored in place	Standard medical therapy. Improvement in severity: heavy urge incontinence at baseline and none at 5 months	40/52	4/46	77.00	8.00	**8.85 (3.43; 22.83)**	1 (1; 5)	690 (194; 1,747)E
		Significant reduction in daily urge UI episodes (>50%)	15/52	2/46	29.00	5.00	**6.63 (1.60; 27.48)**	4 (1; 33)	240 (30; 1,324)E
		No need of absorbent pads or diapers for urge UI	26/52	1/46	50.00	2.00	**23.00 (3.25; 162.88)**	2 (0; 22)	480 (45; 3,238)E

Bold - significant differences in outcomes at 95% confidence level; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence); A - number of avoided and E - number of excessive events per 1,000 treated.

Table 52. Comparative effectiveness of electrical stimulation on any UI in adults

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Analyzed	Number of Cases After Control Treatment/ Number Analyzed	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Outcome - UI									
Spruijt, 2003[735] N = 51 100% female 2 month followup	Intravaginal electrical stimulation of the pelvic floor using stimulator generated biphasic current pulses with a duration of 1ms and a frequency of 50Hz (stress) or 20Hz (urge)	Kegel PFMT with verbal instructions on how to exercise at home	6/25	7/12	25.00	54.50	**0.41 (0.18; 0.96)**	3 (2; 44)	295 (23; 449)A
Progression of UI									
Indrekvam, 2001 N = 3,008 100% female 3 month followup	Home-managed electrical stimulation with vaginal/anal stimulators (20-50Hz)	Baseline data. Outcome: substantial amounts of usual leakage	331/3008	451/3008	11.00	15.00	**0.73 (0.64; 0.84)**	25 (19; 41)	40 (24; 54)A
		Pad use >5 during 24 hours	391	632	13.00	21.00	**0.62 (0.55; 0.69)**	13 (11; 16)	80 (64; 94)A

Bold - significant differences in outcomes at 95% confidence level; PFMT - pelvic floor muscle training; A - number of avoided events per 1,000 treated

Table 53. Comparative effectiveness of bulking agents on UI in females

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 treated (95% CI)
Outcome - Urgency									
Lightner2001[749] N = 355 100% female 12 month followup	Injection of bulking agent 1.0ml durasphere maximum 5 times with a minimum 7 day interval	Injection of bulking agent bovine collagen maximum 5 times with a minimum 7 day interval	43/176	22/188	24.70	11.90	**2.09 (1.30; 3.34)**	8 (4; 28)	128 (36; 279)E
Outcome - Complete Retention									
Corcos, 2005[307] N = 133 100% female 12 month followup	Intraurethral collagen sub mucosal injection	Surgery (needle bladder neck suspensions, Burch, and slings)	1/66	9/67	1.52	13.43	**0.11 (0.01; 0.87)**	8 (8; 55)	119 (18; 132)A

Bold - significant differences in outcomes at 95% confidence level; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence); E - number of excessive events per 1,000 treated; A - number of avoided events per 1,000 treated

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Table 54. Effects of surgical interventions on urinary continence in females (secondary prevention) (sorted by rate of urinary continence after active treatment, from highest to lowest)

Author Sample Followup	Active	Control	Definition of Continence	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Colombo, 1996[348] N = 36 6 month followup	Burch colposuspension with placement of two couples of permanent polybutylate-coated polyester sutures	Abdominal paravaginal defect repair with 5-7 pairs of permanent braided silicone-coated polyester suture.	Cure as no incontinence episodes and no urine loss at stress test	18/18	13/18	100.0	72.2	1.4 (1.0; 1.8)		
Laurikainen, 2007[491] N = 273 2 month followup	Retropubic tension-free vaginal polypropylene tape procedure by Ulmsten	Transobturator tension-free vaginal polypropylene tape procedure by de Leval	Objective cure as negative stress test	134/136	125/132	98.5	94.7	1.0 (1.0; 1.1)		
Kammerer-Doak, 1999[353] N = 35 12 month followup	Burch retropubic urethropexy	Modified anterior colporrhaphy	Subjective cure as no self-reported urinary incontinence	18/19	3/16	94.7	18.8	**5.1 (1.8; 14.1)**	1 (0; 7)	760 (152; 2,454)E
Sand, 2000[358] N = 36 3 month followup	Burch procedures with four 2-0 polytetrafluoroethylene sutures and tension placed on the periurethral sutures (modified Tanagho method)	Suburethral sling with continuous polytetraflouroethylene strip from rectus fascia into retropubic space and beneath urethra at urethrovesical junction level	Subjective cure	18/19	17/17	94.7	100.0	1.0 (0.8; 1.1)	.	

Table 54. Effects of surgical interventions on urinary continence in females (secondary prevention) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample Followup	Active	Control	Definition of Continence	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Zullo, 2001[361] N = 60 12 month followup	Transperitoneal laparoscopic Burch procedure using nonabsorbable sutures	Transperitoneal laparoscopic Burch procedure using Prolene mesh fixed with tacks or staples	Subjective cure (visual analog scale)	28/30	26/30	93.3	86.7	1.1 (0.9; 1.3)		
Schraffordt Koops, 2006[757] N = 809 2-36 month followup	Previous surgery for prolapse/ incontinence +TVT performed with Ulmsten's method	No prior surgery + TVT performed with Ulmsten's method.	Cured - no leakage during physical activity, coughing or sneezing	122/131	628/378	92.9	92.6	1.0 (1.0; 1.1)		
Gilja1998, [351] N = 204 36 month followup	Burch retropubic urethropexy	Modified bladder neck suspension by Raz	Subjective cure from stress urinary incontinence as no leakage episodes and symptoms.	52/56	39/46	92.9	84.8	1.1 (0.9; 1.3)		
Colombo, 1994[347] N = 80 24-84 month followup	Burch colposuspension	Modified Marshall-Marchetti-Krantz urethropexy	Subjective cure as no incontinence symptoms	37/40	34/40	92.5	85.0	1.1 (0.9; 1.3)		
Bergman, 1989[345] N = 127 12 month followup	Burch urethropexy	Modified Pereyra needle urethropexy	Objective cure as no urine loss on cough profile during urodynamic evaluation at maximum cystometric capacity	35/38	24/35	91.0	72.0	**1.3** **(1.0; 1.7)**	5 (2; 46)	190 (22; 470)E

Table 54. Effects of surgical interventions on urinary continence in females (secondary prevention) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample Followup	Active	Control	Definition of Continence	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
	Burch urethropexy	Anterior colporrhaphy with Kelly plication	Objective cure as no urine loss on cough profile during urodynamic evaluation at maximum cystometric capacity	35/38	23/35	91.0	65.0	**1.4 (1.1; 1.8)**	4 (2; 18)	260 (55; 528)E
Gilja, 1998[351] N = 204 36 month followup	Transvaginal Burch procedure	Modified bladder neck suspension by Raz	Subjective cure from stress urinary incontinence as no leakage episodes and symptoms	40/44	39/46	90.9	84.8	1.1 (0.9; 1.3)		
Schraffordt Koops, 2006[757] N = 809 2-36 month followup	Previous surgery for prolapse/ incontinence +TVT performed with Ulmsten's method	No prior surgery + TVT performed with Ulmsten's method	Cured. As no leakage during physical activity, coughing or sneezing	119/131	636/378	90.5	93.8	1.0 (0.9; 1.0)		
Zullo, 2001[361] N = 60 12 month followup	Transperitoneal laparoscopic Burch procedure using nonabsorbable sutures	Transperitoneal laparoscopic Burch procedure using Prolene mesh fixed with tacks or staples	Objective cure no urine loss during cough and Valsalva maneuver in standing position with bladder filled to maximal cystometric capacity	27/30	23/30	90.0	76.7	1.2 (0.9; 1.5)		

Table 54. Effects of surgical interventions on urinary continence in females (secondary prevention) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample Followup	Active	Control	Definition of Continence	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Sand, 2000[358] N = 36 3 month followup	Burch procedures with four 2-0 polytetrafluoroethylene sutures and tension placed on the periurethral sutures (modified Tanagho method)	Suburethral sling with continuous polytetraflouroethylene strip from rectus fascia into Retropubic space and beneath urethra at urethrovesical junction level	Objective cure	17/19	17/17	89.5	100.0	0.9 (0.7; 1.1)		
Gilja, 1998[351] N = 204 36 month followup	Burch retropubic urethropexy	Modified bladder neck suspension by Raz	Objective cure as no urine loss in urodynamic exam	50/56	37/46	89.3	80.4	1.1 (0.9; 1.3)		
Bai, 2005[344] N = 92 12 month followup	Burch colposuspension	Pubovaginal sling using autologous rectus muscle fascia	Cure from stress urinary incontinence	29/33	26/28	87.9	92.9	0.9 (0.8; 1.1)		
		Tension-free vaginal tape	Cure from stress urinary incontinence	29/33	27/31	87.9	87.1	1.0 (0.8; 1.2)		
Gilja, 1998[351] N = 204 36 month followup	Transvaginal Burch procedure	Modified bladder neck suspension by Raz	Objective cure as no urine loss in urodynamic exam	38/44	37/46	86.4	80.4	1.1 (0.9; 1.3)		
Liapis, 2002[355] N = 71 24 month followup	Burch colposuspension	Tension-free vaginal tape procedure	Objective cure as pad weight difference <1g	30/35	30/36	86.0	84.0	1.0 (0.8; 1.3)		

Table 54. Effects of surgical interventions on urinary continence in females (secondary prevention) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample Followup	Active	Control	Definition of Continence	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Fatthy, 2001[350] N = 74 18 month followup	Laparoscopic Burch colposuspension	Open Burch colposuspension	Cure from stress urinary incontinence (no symptoms, negative stress test and urodynamic continence)	29/34	34/40	85.3	85.0	1.0 (0.8; 1.2)		
Cheon, 2003[346] N = 90 12 month followup	Laparoscopic colposuspension	Burch open colposuspension	Objective cure as dry during severe cough on urodynamic testing	40/47	37/43	85.1	86.0	1.0 (0.8; 1.2)		
Culligan, 2003[349] N = 36 72.6 month followup	Burch colposuspension (Tanagho)	Suburethral sling (Horbach) with polytetrafluororthylene strip from rectum fascia beneath urethra under minimal tension	Objective cure: negative stress test and negative pad-weight test	16/19	17/17	84.6	100.0	0.8 (0.7; 1.1)		
Persson, 2002[770] N = 79 12 month followup	Laparoscopic colposuspension	Tension-free vaginal tape by Ulmsten	Objective cure: Cured	27/32	33/38	84.4	86.8	1.0 (0.8; 1.2)		
Kammerer-Doak, 1999[353] N = 35 12 month followup	Burch retropubic urethropexy	Modified anterior colporrhaphy	Objective cure: negative cough and Valsalva test in the supine and standing positions, with the bladder filled to maximal cystometric capacity	16/19	5/16	84.2	31.3	**2.7** **(1.3; 5.7)**	2 (1; 12)	530 (84; 1,475)E

Table 54. Effects of surgical interventions on urinary continence in females (secondary prevention) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample Followup	Active	Control	Definition of Continence	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Ustun, 2003[360] N = 46 18 month followup	Laparoscopic Burch colposuspension	Tension-free vaginal tape procedure	Cure as no pad use and no urinary leakage in urodynamic exam	19/23	19/23	82.6	82.6	1.0 (0.8; 1.3)		
Fatthy, 2001[350] N = 74 18 month followup	Laparoscopic Burch colposuspension	Open Burch colposuspension	Negative stress test	28/34	31/40	82.4	77.5	1.1 (0.8; 1.3)		
Colombo, 2000[362] N = 71 12 month followup	Burch colposuspension with abdominal hysterectomy	Anterior colporrhaphy with vaginal hysterectomy	Subjective cure as no incontinence episodes	30/37	17/34	81.1	50.0	**1.6 (1.1; 2.3)**	3 (1; 17)	311 (60; 674)E
Su, 1997[359] N = 92 12 month followup	Laparoscopic colposuspension	Open Burch colposuspension	Objective cure as no leakage during urodynamic exam	37/46	44/46	80.4	95.6	0.8 (0.7; 1.0)		
Osman, 2003[769] N = 75 6 month followup	Burch retropubic suspension or pubovaginal sling	Oxybutynin hydrochloride 5mg 3 times/day	Complete urinary continence	40/50	0/25	80.0	0.0	**41.3 (2.6; 645.0)**	1	800E
Quadri, 1999[357] N = 30 12 month followup	Burch colposuspension	Marshall-Marchetti-Krantz urethropexy with video urethroscopic control	Objective cure	12/15	15/15	80.0	100.0	0.8 (0.6; 1.1)		
Colombo, 1994[347] N = 80 24-84 month followup	Burch colposuspension	Modified Marshall-Marchetti-Krantz urethropexy	Objective cure as no urine loss at stress test	32/40	26/40	80.0	65.0	1.2 (0.9; 1.6)		

Table 54. Effects of surgical interventions on urinary continence in females (secondary prevention) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample Followup	Active	Control	Definition of Continence	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Lalos, 1993[354] N = 36 12 month followup	Retropubic urethrocystopexy	Pubococcygeal repair	Subjective cure as self-reported urinary continence	17/22	11/14	77.3	78.6	1.0 (0.7; 1.4)		
Ankarda, 2005[775] N = 211 12 month followup	Open Burch colposuspension using sutures	Laparoscopic colposuspension using mesh and staples	Subjectively dry	58/79	45/53	73.4	84.9	0.9 (0.7; 1.0)		
Berglund, 1996[768] N = 45 12 month followup	Retropubic urethrocystopexy	Pubococcygeal repair	Subjective cure as self-reported urinary continence	22/30	12/15	73.3	80.0	0.9 (0.7; 1.3)		
El-Barky, 2005[766] N = 50 6 month followup	Burch colposuspension	Tension-free vaginal tape procedure	Cured from urinary stress incontinence	18/25	18/25	72.0	72.0	1.0 (0.7; 1.4)		
Bergman, 1995[774] N = 127 60 month followup	Burch urethropexy	Anterior colporrhaphy with Kelly plication	Objective cure as no urine loss on cough profile during urodynamic evaluation at maximum cystometric capacity	27/38	11/35	71.1	31.4	**2.3** **(1.3; 3.8)**	3 (1; 10)	396 (104; 893)E
		Modified Pereyra needle urethropexy		27/38	13/35	71.1	37.1	**1.9** **(1.2; 3.1)**	3 (1; 14)	339 (70; 773)E
Ankardal, 2004[776] N = 240 12 month followup	Open Burch colposuspension using sutures	Laparoscopic transperitoneal colposuspension using polypropylene mesh and staples	Subjectively dry	85/120	64/120	70.8	53.3	**1.3** **(1.1; 1.6)**	6 (3; 22)	175 (45; 334)E

Table 54. Effects of surgical interventions on urinary continence in females (secondary prevention) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample Followup	Active	Control	Definition of Continence	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Colombo, 2000[362] N = 71 12 month followup	Burch colposuspension with abdominal hysterectomy	Anterior colporrhaphy with vaginal hysterectomy	Objective cure as negative stress test result	26/37	14/34	70.3	41.2	**1.7 (1.1; 2.7)**	3 (1; 29)	291 (35; 694)E
Demirci, 2001[764] N = 46 12-13 month followup	Burch colposuspension (Tanagho), 9 patients had abdominal hysterectomy with or without bilateral salpingo-oopherectomy.	McGuire's free-rectus fascial sling from inferior leaf of rectus fascia; 8 patients had abdominal hysterectomy with or without bilateral salpingo-oopherectomy	Urinary continence (dry)	16/23	15/23	69.6	65.2	1.1 (0.7; 1.6)		
Berglund, 1996[768] N = 45 12 month followup	Retropubic urethrocystopexy	Pubococcygeal repair	Objective cure as negative pad test	20/30	7/15	66.7	46.7	1.4 (0.8; 2.6)		
Quadri, 1999[357] N = 30 12 month followup	Burch colposuspension	Marshall-Marchetti-Krantz urethropexy with video urethroscopic control	Subjective cure	10/15	15/15	66.7	100.0	**0.7 (0.5; 1.0)**	3 (2; 42)	333 (24; 530)A
Kitchener, 2006[771] N = 291 24 month followup	Laparoscopic colposuspension	Open abdominal retropubic colposuspension	Objective cure (<1g pad test)	98/147	82/144	66.7	56.9	1.2 (1.0; 1.4)		
Colombo, 2000[362] N = 71 12 month followup	Burch colposuspension with abdominal hysterectomy	Anterior colporrhaphy with vaginal hysterectomy	Negative cotton swab test	24/37	7/34	64.9	20.6	**3.2 (1.6; 6.4)**	2 (1; 9)	443 (116; 1,102)E

Table 54. Effects of surgical interventions on urinary continence in females (secondary prevention) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample Followup	Active	Control	Definition of Continence	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Persson, 2000[356] N = 161 12 month followup	Laparoscopic Burch colposuspension using one double-bite of polytetrafluoro-ethylene sutures	Laparoscopic Burch colposuspension using two single-bite sutures of polytetrafluoroethylene sutures	Subjective cure	50/78	72/83	64.1	86.7	**0.7 (0.6; 0.9)**	4 (3; 10)	226 (95; 335)A
Wang, 2003[767] N = 98 12 month followup	Modified Burch colposuspension	Tension-free vaginal taping	Objective cure as pad weight<2g and negative stress urodynamic test	31/49	40/49	63.3	81.6	0.8 (0.6; 1.0)		
Colombo, 1997[486] N = 109 6 month followup	Posterior pubourethral ligament placation	Pereyra suspension	Negative postoperative cotton swab test (maximum straining angle <30 degrees)	34/55	46/54	61.8	85.2	**0.7 (0.6; 0.9)**	4 (3; 14)	234 (69; 363)A
Klarskov, 1986[778] N = 40 4 month followup	Surgery: Burch colposuspension when patients had anterior suspension defect. Vaginal repair when patients had posterior bladder descent	Pelvic floor training program 5 times in weekly lessons guided by trained physiotherapists	Self-reported cure from urinary incontinence	16/26	3/24	61.5	12.5	**4.9 (1.6; 14.8)**	2 (1; 13)	490 (80; 1,726)E
Lalos, 1993[354] N = 36 12 month followup	Retropubic urethrocystopexy	Pubococcygeal repair	Objective cure-negative pad test	13/22	6/14	59.1	42.9	1.4 (0.7; 2.8)		
German, 1994[772] N = 50 24 month followup	Modified needle suspension procedure	Vagina/obturator shelf procedure	Urinary continence	15/26	17/24	57.7	70.8	0.8 (0.5; 1.2)		

Table 54. Effects of surgical interventions on urinary continence in females (secondary prevention) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample Followup	Active	Control	Definition of Continence	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Persson, 2000[356] N = 161 12 month followup	Laparoscopic Burch colposuspension using one double-bite of polytetrafluoroethylene sutures	Laparoscopic Burch colposuspension using two single-bite sutures of polytetrafluoroethylene sutures	Objective cure-negative pad test	43/78	62/83	55.1	74.7	**0.7 (0.6; 0.9)**	5 (3; 20)	196 (49; 312)A
Quadri, 1999[357] N = 30 12 month followup	Burch colposuspension	Marshall-Marchetti-Krantz urethropexy with video urethroscopic control	Negative stress test	8/15	14/15	53.3	93.3	**0.6 (0.3; 0.9)**	3 (2; 16)	400 (61; 607)A
Costantini, 2007[321] N = 66 40 month followup	Sacropexy combined with a Burch colposuspension	Colposacropexy, no prophylactic colposuspension	Urinary continence in those with MUCP>35cm/ H2O	17/34	20/32	50.0	62.5	0.8 (0.5; 1.2)		
Persson, 2002[770] N = 76 12 month followup	Laparoscopic colposuspension	Tension-free vaginal tape by Ulmsten	Subjective cure: cured	16/32	21/38	50.0	55.3	0.9 (0.6; 1.4)		
Colombo, 1997[486] N = 109 6 month followup	Posterior pubourethral ligament placation	Pereyra suspension	Negative stress test	24/55	37/54	44.0	68.0	**0.6 (0.4; 0.9)**	4 (3; 15)	240 (375; 65)A
Persson, 2002[770] N = 76 12 month followup	Laparoscopic colposuspension	Tension-free vaginal tape by Ulmsten	Subjective cure: much improved	14/32	10/38	43.8	26.3	1.7 (0.9; 3.2)		
Ankardal, 2004[776] N = 240 12 month followup	Open Burch colposuspension using sutures	Laparoscopic transperitoneal colposuspension using polypropylene mesh and staples	No leakage, no bother	52/120	26/120	43.3	21.7	**2.0 (1.3; 3.0)**	5 (2; 13)	217 (75; 428)E
			No leakage, no bother (visual analog scale)	33/120	18/120	41.8	34.0	1.2 (0.8; 1.9)		

Table 54. Effects of surgical interventions on urinary continence in females (secondary prevention) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample Followup	Active	Control	Definition of Continence	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Albo, 2007[343] N = 655 24 month followup	Burch colposuspension	Pubovaginal sling, using autologous rectus fascia	No symptoms of urinary incontinence, an increase <15g in pad weight during a 24-hour pad test, no incontinence episodes recorded in a 3-day diary, a negative stress test and not treatment for any urinary incontinence	141/329	187/326	42.9	57.4	**0.7 (0.6; 0.9)**	7 (5; 14)	145 (73; 207)A
Kitchener, 2006[771] N = 291 24 month followup	Laparoscopic colposuspension	Open abdominal retropubic colposuspension	Subjective cure	60/147	48/144	40.8	33.3	1.2 (0.9; 1.7)		
Colombo, 1997[486] N = 109 6 month followup	Posterior pubourethral ligament placation	Pereyra suspension	Objective continence	20/55	25/54	36.4	46.3	0.8 (0.5; 1.2)		
Persson, 2002[770] N = 79 12 month followup	Laparoscopic colposuspension	Tension-free vaginal tape by Ulmsten	Objective cure: improved	4/32	2/38	12.5	5.3	2.4 (0.5; 12.1)		
Bump, 1996[487] N = 36 6 month followup	Needle colposuspension	Bladder neck endopelvic fascia plication	Genuine stress incontinence 6 months after operation	2/16	1/16	12.5	6.3	2.0 (0.2; 19.9)		

Table 54. Effects of surgical interventions on urinary continence in females (secondary prevention) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample Followup	Active	Control	Definition of Continence	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Costantini, 2007[321] N = 66 40 month followup	Sacropexy combined with a Burch colposuspension	Colposacropexy, no prophylactic colposuspension	Urinary continence in those with – MUCP <35cm/H_20	4/34	8/32	11.8	25.0	0.5 (0.2; 1.4)		
Zullo, 2002[773] N = 60 12 month followup	Transperitoneal laparoscopic retropubic urethropexy using nonabsorbable sutures	Transperitoneal laparoscopic retropubic urethropexy using polypropylene mesh fixed with tacks or staples	Objective cure as no leakage during cough and Valsalva maneuvre in standing position with bladder filled to maximum cystometric capacity during multichannel urodynamic exam.	3/30	7/30	10.0	23.3	0.4 (0.1; 1.5)		
Ross, 1996[777] N = 69 12 month followup	Laparoscopic Burch procedure with sutures for bladder neck elevation	Laparoscopic Burch procedure with mesh and staples for bladder neck elevation	Objective cure as negative stress test	3/35	2/34	8.6	5.9	1.5 (0.3; 8.2)		
Zullo, 2002[773] N = 60 12 month followup	Transperitoneal laparoscopic retropubic urethropexy using nonabsorbable sutures	Transperitoneal laparoscopic retropubic urethropexy using polypropylene mesh fixed with tacks or staples	Subjective cure as self-reported continence in visual analog scale (0=dry sensation, 10=severe leakage).	2/30	4/30	6.7	13.3	0.5 (0.1; 2.5)		

Table 54. Effects of surgical interventions on urinary continence in females (secondary prevention) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample Followup	Active	Control	Definition of Continence	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Persson, 2002[770] N = 79 12 month followup	Laparoscopic colposuspension	Tension-free vaginal tape by Ulmsten	Subjective cure: little improved	1/32	3/38	3.1	7.9	0.4 (0.0; 3.6)		

Bold - significant differences in outcomes at 95% confidence level; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence); E - number of excessive events per 1,000 treated; A – number of avoided events per 1,000 treated

Table 55. Comparative effectiveness of surgical procedures on urinary continence in females (results from RCTs)

Author Sample	Continence	Relative Risk (95%CI)
Burch Colposuspension vs. Abdominal Paravaginal Defect Repair		
Colombo, 1996(224) N = 36 12 month followup	U	**1.37 (1.02; 1.84)**
Burch Colposuspension vs. Anterior Colporrhaphy		
Bergman, 1989(179) N = 127 12 month followup	U	**1.40 (1.08; 1.81)**
Bergman, 1995(180) N = 127 60 month followup	U	**2.26 (1.33; 3.84)**
Kammerer-Doak, 1999(178)	U	**2.69 (1.27; 5.72)**
N = 35	SR	**5.05 (1.81; 14.09)**
12 month followup		
Colombo, 2000(181)	U	**1.71 (1.08; 2.68)**
N = 71	SR	**1.62 (1.12; 2.35)**
168 month followup		
Burch Colposuspension vs. Sling Procedures		
Sand, 2000(228)	SR	0.95 (0.82; 1.10)
N = 36	U	0.90 (0.75; 1.08)
3 month followup		
Bai, 2005(229) N = 92 12 month followup	SR	0.95 (0.80; 1.11)
Culligan, 2003(82) N = 36 73 month followup	U+PT	0.85 (0.68; 1.05)
Demirci, 2001(230) N = 46 12 month followup	SR	1.07 (0.71; 1.60)
Albo, 2007(88) N = 655 24 month followup	SR+U+PT	**0.75 (0.64; 0.87)**
Burch Colposuspension vs. TVT		
Bai, 2005(229) N = 92 12 month followup	SR	1.01 (0.84; 1.21)
Liapis, 2002(196) N = 71 24 month followup	PD	1.03 (0.84; 1.26)
El-Barky, 2005(200) N = 50 6 month followup	SR	1.00 (0.71; 1.41)
Wang, 2003(197)	U	0.78 (0.60; 1.00)
N = 98	PT	**0.80 (0.67; 0.97)**
12 month followup	SR	0.87 (0.67; 1.12)
Laparoscopic Burch Colposuspension vs. TVT		
Persson, 2002(174)	U	0.97 (0.80; 1.18)
N = 79	SR	0.90 (0.58; 1.42)
12 month followup		
Ustun, 2003(84) N = 46 18 month followup	SR+U	1.00 (0.77; 1.30)
Valpas, 2004(158)	PT	0.81 (0.62; 1.05)
N = 128	U	**0.66 (0.51; 0.85)**
12 month followup		

Table 45. Comparative effectiveness of surgical procedures on urinary continence in females (results from RCTs) (continued)

Author Sample	Continence	Relative Risk (95%CI)
Burch Colposuspension vs. Urethropexy		
Colombo, 1994(192)	SR	1.09 (0.93; 1.27)
N = 80	U	1.23 (0.93; 1.62)
36 month followup		
Quadri, 1999(226)	U	0.81 (0.61; 1.06)
N = 30	SR	**0.68 (0.47; 0.98)**
12 month followup	U	**0.57 (0.35; 0.93)**
Laparoscopic Burch Colposuspension vs. Burch Colposuspension		
Kitchener, 2006(201)	PT	1.17 (0.98; 1.40)
N = 291	SR	1.22 (0.91; 1.66)
24 month followup		
Su, 1997(231)	U	0.84 (0.72; 0.98)
N = 92		
12 month followup		
Fatthy, 2001(83)	U	1.00 (0.83; 1.21)
N = 74		
18 month followup		
Cheon, 2003(175)	U	0.99 (0.83; 1.17)
N = 90		
12 month followup		
Sling vs. TVT Procedures		
Arunkalaivanan, 2003(153)	SR	1.05 (0.92; 1.19)
N = 142		
12 month followup		
Rechberger, 2003(154)	SR	0.91 (0.76; 1.08)
N = 100		
14 month followup		
Abdel-Fattah, 2004(159)	SR	0.97 (0.81; 1.16)
N = 142		
36 month followup		
Lim, 2005(161)	SR	0.93 (0.79; 1.09)
N = 195		
12 month followup		
Andonian, 2005(162)	PT	0.87 (0.75; 1.01)
N = 84		
12 month followup		
Tseng, 2005(163)	PT	0.93 (0.74; 1.15)
N = 62		
24 month followup		
Wadie, 2005(165)	U	0.99 (0.85; 1.16)
N = 53		
0.5 month followup		
Meschia, 2006(85)	SR+U	**0.85 (0.73; 0.99)**
N = 190	U	**0.82 (0.70; 0.97)**
24 month followup	PT	**0.81 (0.68; 0.96)**
Lord, 2006(167)	U	1.00 (0.96; 1.04)
N = 313	SR	**0.88 (0.79; 0.98)**
1.5 month followup		

Bold- significant differences in outcomes at 95% confidence level; PT – negative pad test; U - urodynamic continence; SR - Self reported continence

Table 56. Comparative effectiveness of surgical interventions on urinary continence in females (secondary prevention)

Author Sample Followup	Active Treatment	Control Treatment	Number Continent After Active Treatment/ Number Randomized	Number Continent After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Continence in Patients with Stress UI									
Meshcia, 2004[330] N = 50 100% female 6 month followup	Tension-free vaginal tape	Plication of the endopelvic fascia	23/25	14/25	92.00	56.00	**1.64** **(1.14; 2.37)**	3 (1; 13)	360 (78; 767)E
Valpas, 2004[331] N = 128 100% female 12 month followup	Tension-free vaginal tape under local anesthesia with polypropylene mesh tape placed under the midurethra	Laparoscopic mesh colposuspension under general anesthesia (Hannah and Chin)	60/70	29/51	85.71	56.86	**1.51** **(1.17; 1.95)**	3 (2; 11)	289 (94; 540)E
Lord, 2006[341] N = 313 100% female 1.5 month followup	Tension-free vaginal tape	Suprapubic urethral support sling	134/154	122/159	87.10	76.50	**1.13** **(1.02; 1.26)**	9 (5; 63)	106 (16; 199)E
Meschia, 2006[340] N = 190 100% female 24 month followup	Tension-free vaginal tape under local or epidural anesthesia	Intravaginal slingplasty under local or epidural anesthesia	80/95	68/95	84.21	71.58	**1.18** **(1.01; 1.37)**	8 (4; 159)	126 (6; 266)E
Colombo, 1997[486] N = 109 100% female 6 month followup	Posterior pubourethral ligament placation	Pereyra suspension	24/55	37/54	44.00	68.00	**0.64** **(0.45; 0.90)**	4 (3; 15)	240 (65; 375)A
Klarskov, 1986[778] N = 40 100% female 4 month followup	Surgery: Burch colposuspension when patients had anterior suspension defect. Vaginal repair when patients had posterior bladder descent	Pelvic floor training program 5 times/week, lessons guided by trained physiotherapists	16/26	3/24	61.54	12.50	**4.92** **(1.64; 14.81)**	2 (1; 13)	490 (80; 1,726)E

Table 56. Comparative effectiveness of surgical interventions on urinary continence in females (secondary prevention) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number Continent After Active Treatment/ Number Randomized	Number Continent After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Colombo, 1996[348] N = 36 100% female 6 month followup	Burch colposuspension with placement of two couples of permanent polybutylate-coated polyester sutures	Abdominal paravaginal defect repair with 5-7 pairs of permanent braided silicone-coated polyester suture	18/18	13/18	100.00	72.22	**1.37 (1.02; 1.84)**	4 (2; 73)	278 (14; 609)E
Su, 1997[359] N = 92 100 % female 12 month followup	Laparoscopic colposuspension	Open Burch colposuspension	37/46	44/46	80.40	95.60	**0.84 (0.72; 0.98)**	7 (4; 59)	152 (17; 268)A
Colombo, 2000[362] N = 71 100% female 12 month followup	Burch colposuspension with abdominal hysterectomy	Anterior colporrhaphy with vaginal hysterectomy	26/37	14/34	70.27	41.18	**1.71 (1.08; 2.68)**	3 (1; 291)	291 (35; 694)E
Quadri, 1999[357] N = 30 100% female 12 month followup	Burch colposuspension	Marshall-Marchetti-Krantz urethropexy with video urethroscopic control. Outcome: subjective cure	10/15	15/15	66.67	100.00	**0.68 (0.47; 0.98)**	3 (2; 42)	333 (24; 530)A
		Outcome: negative stress test	8	14	53.33	93.33	**0.57 (0.35; 0.93)**	3 (2; 16)	400 (607; 61)A
Bergman, 1995[774] N = 127 100 % female 60 month followup	Burch urethropexy	Anterior colporrhaphy with Kelly plication	27/38	11/35	71.05	31.43	**2.26 (1.33; 3.84)**	3 (1; 10)	396 (104; 893)E
	Burch urethropexy	Modified Pereyra needle urethropexy	27/38	13/35	71.05	37.14	**1.91 (1.19; 3.08)**	3 (1; 14)	339 (70; 773)E

Table 56. Comparative effectiveness of surgical interventions on urinary continence in females (secondary prevention) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number Continent After Active Treatment/ Number Randomized	Number Continent After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Kammerer-Doak, 1999[353] N = 35 100% female 12 month followup	Burch retropubic urethropexy	Modified anterior colporrhaphy Outcome: subjective cure as no self-reported urinary incontinence	18/19	3/16	94.74	18.75	**5.05 (1.81; 14.09)**	1 (0; 7)	760 (152; 2,454)E
		Outcome: objective cure negative cough and Valsalva test in the supine and standing positions	16/19	5/16	84.21	31.25	**2.69 (1.27; 5.72)**	2 (1; 12)	530 (84; 1,475)E
Bergman, 1989[345] N = 127 100% female 12 month followup	Burch urethropexy	Anterior colporrhaphy with Kelly plication	35/38	23/35	91.00	65.00	**1.40 (1.08; 1.81)**	4 (2; 182)	260 (55; 528)E
		Modified Pereyra needle urethropexy	35/38	24/35	91.00	72.00	**1.30 (1.03; 1.65)**	5 (2; 46)	190 (22; 470)E
Persson, 2000[356] N = 161 100% female 12 month followup	Laparoscopic Burch colposuspension using one double-bite of polytetrafluoroethylene sutures	Laparoscopic Burch colposuspension using two single-bite sutures of polytetrafluoro-ethylene sutures Outcome: objective cure - negative pad test	43/78	62/83	55.13	74.70	**0.74 (0.58; 0.93)**	5 (3; 20)	196 (49; 312)A
		Outcome: subjective cure	50/78	72/83	64.10	86.75	**0.74 (0.61; 0.89)**	4 (3; 10)	226 (95; 335)A
Albo, 2007[343] N = 655 100% female 24 month followup	Burch colposuspension	Pubovaginal sling, using autologous rectus fascia	141/329	187/326	42.86	57.36	**0.75 (0.64; 0.87)**	7 (5; 14)	145 (73; 207)A

Table 56. Comparative effectiveness of surgical interventions on urinary continence in females (secondary prevention) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number Continent After Active Treatment/ Number Randomized	Number Continent After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Continence in Patents with any UI									
Meschia, 2006[340] N = 190 100% female 24 month followup	Tension-free vaginal tape under local or epidural anesthesia	Intravaginal slingplasty under local or epidural anesthesia	78/95	63/95	82.11	66.32	**1.24** **(1.04; 1.47)**	6 (3; 35)	158 (29; 311)E
Maher,2005 [337] N = 45 100% female 60 month followup	Pubovaginal sling	Transurethral Macroplastique	2/22	17/23	9.09	73.91	**0.12** **(0.03; 0.47)**	2 9 (1; 3)	648 (715; 391)A
Colombo, 1997[486] N = 109 100% female 6 month followup	Posterior pubourethral ligament placation	Pereyra suspension	34/55	46/54	61.82	85.19	**0.73** **(0.57; 0.92)**	4 (3; 14)	234 (69; 363)A
Osman, 2003[769] N = 75 100% female 12 month followup	Burch retropubic suspension or Pubovaginal sling	Oxybutynin hydrochloride 5mg 3 times/day	40/50	0/25	80.00	0.00	**41.29** **(2.64; 645.03)**	1	800E
Colombo, 2000[362] N = 71 100% female 12 month followup	Burch colposuspension with abdominal hysterectomy	Anterior colporrhaphy with vaginal hysterectomy. Outcome: negative cotton swab test	24/37	7/34	64.86	20.59	**3.15** **(1.56; 6.35)**	2 (1; 9)	443 (116; 1,102)E
		Outcome: subjective cure as no incontinence episodes	30/37	17/34	81.08	50.00	**1.62** **(1.12; 2.35)**	3 (1; 17)	311 (60; 674)E

Table 56. Comparative effectiveness of surgical interventions on urinary continence in females (secondary prevention) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number Continent After Active Treatment/ Number Randomized	Number Continent After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Ankardal, 2004[776] N = 240 100% female 12 month followup	Open Burch colposuspension using sutures	Laparoscopic transperitoneal colposuspension using polypropylene mesh and staples. Outcome: subjectively dry	85/120	64/120	70.83	53.33	**1.33 (1.08; 1.63)**	6 (3; 22)	175 (45; 334)E
		Outcome: no leakage, no bother	52/120	26/120	43.33	21.67	**2.00 (1.34; 2.97)**	5 (2; 13)	217 (75; 428)E
Albo, 2007[343] N = 655 100% female 24 month followup	Burch colposuspension	Pubovaginal sling, using autologous rectus fascia	94/329	140/326	28.57	42.94	**0.67 (0.54; 0.82)**	7 (5; 13)	144 (76; 198)A

Bold - significant differences in outcomes at 95% confidence level; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence); E - number of excessive events per 1,000 treated; A - number of avoided events per 1,000 treated

Table 57. Comparative effectiveness of surgical interventions on improvement of urinary continence in adults

Author Sample Followup	Active Treatment	Control Treatment	Number Improved After Active Treatment/ Number Randomized	Number Improved After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Improvement in Stress UI									
Dietz, 2005[760] N = 196 100% female 23 month followup	Suprapubic arc sling	Intravaginal sling	42/47	35/45	95.45	77.78	**1.23 (1.04; 1.45)**	6 (3; 35)	177 (28; 352)E
Klarskov, 1986[778] N = 40 100% female 4 month followup	Surgery: Burch colposuspension when patients had anterior suspension defect. Vaginal repair when patients had posterior bladder descent	Pelvic floor training program 5 times in weekly lessons guided by trained physiotherapists	7/26	14/24	26.92	58.33	**0.46 (0.23; 0.95)**	3 (2; 32)	314 (452; 31)A
Kammerer-Doak, 1999[353] N = 35 100% female 12 month followup	Burch retropubic urethropexy	Modified anterior colporrhaphy	15/19	6/16	78.95	37.50	**2.11 (1.07; 4.13)**	2 (1; 36)	414 (27; 1,174)E
Persson, 2000[356] N = 161 100% female 12 month followup	Laparoscopic Burch colposuspension using one double-bite of polytetrafluoroethylene sutures	Laparoscopic Burch colposuspension using two single-bite sutures of polytetrafluoroethylene sutures Outcome: Improved pad test	20/78	9/83	25.64	10.84	**2.36 (1.15; 4.87)**	7 (2; 63)	148 (16; 420)E
		Outcome: subjective improvement	25/78	6/83	32.05	7.23	**4.43 (1.92; 10.23)**	4 (1; 15)	248 (67; 667)E
Improvement in Any UI									
Colombo, 1996[322] N = 107 100% female 24 month followup	Cystopexy alone	Cystopexy with posterior pubourethral ligaments plication	23/54	40/53	42.59	75.47	**0.56 (0.40; 0.80)**	3 (2; 7)	329 (453; 153)A

Table 57. Comparative effectiveness of surgical interventions on improvement of urinary continence in adults (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number Improved After Active Treatment/ Number Randomized	Number Improved After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Imamoglu, 2005[785] N = 24 0% female 60 month followup	Macroplastique injection (polydimethylslioxane elastomer implants as the solute component and hydrogel as the carrier) of 5–7.5cc above or around the striated sphincter region of the urethra submucosally	Artificial urethral sphincter implantation	3/13	8/11	23.10	72.70	**0.32 (0.11; 0.91)**	2 (2; 16)	496 (64; 647)A
Akakura, 1999[789] N = 100 0 % female 58.5 month followup	Radical prostatectomy with pelvic lymph node dissection with 300mg of diethylstilbestrol diphosphate/day 8 weeks before surgery or radiation, and continued thereafter	External beam radiation by linear accelerator with 40 to 50Gy to the whole pelvis and a 20Gy boost to the prostatic area and with 300mg of diethylstilbestrol diphosphate/day 8 weeks before surgery or radiation, and continued thereafter	22/56	0/44	40.00	0	**35.53 (2.21; 569.82)**	3	390E
Ankardal, 2005[775] N = 211 100% female 12 month followup	Open Burch colposuspension using sutures	Laparoscopic colposuspension using mesh and staples. Outcome: leakage <8g/24 hours at 48-hour pad test	56/79	51/53	70.89	96.23	**0.74 (0.63; 0.86)**	4 (3; 7)	253 (138; 353)A
		Outcome: Improvement in Visual analog scale	24/79	41/53	30.38	77.36	**0.39 (0.27; 0.57)**	2 (2; 3)	470 (336; 563)A

Table 57. Comparative effectiveness of surgical interventions on improvement of urinary continence in adults (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number Improved After Active Treatment/ Number Randomized	Number Improved After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Ankardal, 2004[776] N = 240 100% female 12 month followup	Open Burch colposuspension using sutures	Laparoscopic transperitoneal colposuspension using polypropylene mesh and staples	37/120	62/120	30.83	51.67	**0.60 (0.43; 0.82)**	5 (3; 11)	208 (92; 293)A
Improvement in Urge UI									
Lim, 2005[334] N = 195 100% female 12 month followup	Suburethral slingplasty with the Suprapubic Arc Sling macroporous monofilament threads	Suburethral slingplasty with the Intravaginal sling multifilament threads. Outcome: free of symptoms of urge UI	23/58	32/54	39.66	59.26	**0.67 (0.45; 0.99)**	5 (3; 115)	196 (323; 9)A
		Outcome: improved but not cured urge UI	23/58	8/54	39.66	14.81	**2.68 (1.31; 5.47)**	4 (2; 22)	248 (46; 662)E
	Suburethral slingplasty with the tension-free vaginal tape macroporous monofilament threads	Suburethral slingplasty with the Intravaginal sling multifilament threads	22/58	9/54	37.93	16.67	**2.28 (1.15; 4.50)**	5 (2; 40)	213 (25; 583)E

Bold - significant differences in outcomes at 95% confidence level
Number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence); E - number of excessive events per 1,000 treated; A - number of avoided events per 1,000 treated

Table 58. Comparative effectiveness of surgical interventions on urinary continence in adults

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Outcome - Stress UI									
Meshcia, 2004[330] N = 50 100% female 6 month followup	Tension-free vaginal tape	Plication of the endopelvic fascia	1/25	9/25	4.00	36.00	**0.11 (0.02; 0.81)**	3 (3; 15)	320 (355; 67)A
Brubaker, 2006[761] N = 322 100% female 3 month followup	Sacrocolpopexy with Burch colposuspension	Sacrocolpopexy alone. Outcome: stress incontinence	35/157	67/165	23.80	44.10	**0.55 (0.39; 0.78)**	5 (4; 10)	203 (99; 270)A
		Outcome: symptoms of stress incontinence	29/157	60/165	19.00	39.70	**0.51 (0.35; 0.75)**	5 (4; 10)	207 (100; 260)A
Gallucci, 1998[793] N = 150 0% female 12 month followup	Transurethral resection of the prostate	Transurethral electro vaporization of the prostate	0/80	13/70	0.10	18.60	**0.03 (0.00; 0.54)**	5 (5; 12)	185 (86; 186)A
Osman, 2003[769] N = 75 100% female 12 month followup	Burch retropubic suspension or Pubovaginal sling	Oxybutynin hydrochloride 5mg 3 times/day	1/50	12/25	2.00	48.00	**0.04 (0.01; 0.30)**	2 (2; 3)	460 (335; 477)A
Costantini, 2007[321] N = 66 100% female 40 month followup	Sacropexy combined with a Burch colposuspension	Colposacropexy, no prophylactic colposuspension	9/34	1/32	26.47	3.13	**8.47 (1.14; 63.14)**	4 (1; 235)	233 (4; 1,942)E
Outcome - Any UI									
Costantini, 2007[321] N = 66 100% female 40 month followup	Sacropexy combined with a Burch colposuspension	Colposacropexy, no prophylactic colposuspension	12/34	3/32	35.29	9.38	**3.76 (1.17; 12.12)**	4 (1; 63)	259 (16; 1,043)E

Table 58. Comparative effectiveness of surgical interventions on risk of urinary continence in adults (continued)

Author Sample Followup	Active Treatment	Control Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Albo, 2007[343] N = 655 100% female 24 month followup	Burch colposuspension	Pubovaginal sling, using autologous rectus fascia Outcome: Voiding with residual volume <100m	319/329	280/326	97.00	86.00	**1.13 (1.08; 1.18)**	9 (6; 15)	110 (65; 159)E
		Outcome: voiding dysfunction	7/329	46/326	2.00	14.00	**0.15 (0.07; 0.33)**	8 (8; 11)	120 (130; 94)A
Risk of Urge UI									
Zullo, 2005[490] N = 59 100% female 6 month followup	Tension-free vaginal tape procedure plus postoperative vaginal estrogen 1 estrogen ovule (1mg/day) for 1 month, then 2 ovules once weekly for 5 months	Tension-free vaginal tape procedure alone	1/28	8/28	4.00	29.00	**0.13 (0.02; 0.93)**	4 (4; 53)	250 (285; 19)A

Bold - significant differences in outcomes at 95% confidence level; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence); E - number of excessive events per 1,000 treated; A - number of avoided events per 1,000 treated

Table 59. Comparative effectiveness of hormone therapy compared to placebo on risk of UI in females

Author Sample Followup	Active Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Systemic Hormone Therapy								
Jackson, 1999[801] N = 67 6 month followup	Post oestradiol valerate 2mg/day	24/33	16/34	73.00	47.00	**1.55** **(1.02; 2.34)**	4 (2; 95)	260 (10; 628)E
Steinauer, [366] N = 1,208 50.4 month followup	Oral conjugated estrogen (0.625mg) and medroxy progesterone acetate (2.5mg) in 1 pill/day	322/597	232/611	54.00	38.00	**1.42** **(1.25; 1.61)**	6 (4; 10)	160 (96; 232)E
Hendrix, 2005[365] N = 5,182 12 month followup	0.625mg of CEE plus 2.5mg of medroxyprogesterone acetate	429/ 2675	218/ 2507	16.00	8.70	**1.84** **(1.58; 2.15)**	14 (10; 20)	73 (51; 100)E
	Estrogen alone: 0.625 mg of conjugated equine estrogen Outcome-incident Stress UI	266/2675	131/2507	17.40	8.50	**2.06** **(1.69; 2.51)**	11 (8; 17)	89 (59; 128)E
	Outcome-incident mixed UI	76/2675	50/2507	5.00	3.20	**1.54** **(1.09; 2.19)**	56 (26; 363)	18 (3; 38)E
Steinauer, [366] N = 1,208 50.4 month followup	Oral conjugated estrogen (0.625mg) and medroxy progesterone acetate (2.5mg) in 1 pill/day	382/597	302/611	64.00	49.00	**1.29** **(1.17; 1.43)**	7 (5; 12)	150 (84; 211)E
Goldstein, 2002[513] N = 2,924 10 month followup	Levormeloxifene 0.5 mg/day	338/978	37/970	17.00	4.00	**9.06** **(6.53; 12.57)**	8 (2; 5)	130 (221; 463)E

Table 59. Comparative effectiveness of hormone therapy compared to placebo on risk of UI in females (continued)

Author Sample Followup	Active Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Steinauer, 2005[366] N = 1,208 50.4 month followup	Oral conjugated estrogen (0.625mg) and medroxy progesterone acetate (2.5mg) in 1 pill/day	287/597	220/611	48.00	36.00	**1.34 (1.17; 1.53)**	8 (5; 17)	120 (60; 190)E
Hendrix, 2005[365] N = 5,182 12 month followup	Estrogen plus progestin (E + P): 0.625mg CEE plus 2.5mg medroxyprogesterone acetate					**1.20 (1.06; 1.36)**		
	Estrogen alone: 0.625mg conjugated equine estrogen					**1.59 (1.39; 1.82)**		
Goldstein, 2005[367] N = 619 13 month followup	Conjugated equine estrogen 0.625mg/day	11/152	2/152	7.00	1.30	**5.29 (1.19; 23.48)**	18 (3; 400)	57 (3; 292)E
Non systemic Hormone Therapy								
Dessole, 2004[363] N = 88 6 month followup	Intravaginal estriol ovules: 1 ovule/day (1mg) for 2 weeks, then 2 ovules/week for 6 months	14/44	37/44	31.82	84.09	**0.38 (0.24; 0.59)**	2 (2; 3)	523 (638; 341)A
Lose, 2000[809] N = 251 6 month followup	Oestradiol-releasing ring, 7.5mg oestradiol vs. estrogen pessaries 0.5mg every second day	44/134	0/117	33.00		**77.79 (4.84; 1,249.40)**	3	330E
Waetjen, 2005[808] N = 417 24 month followup	14mg transdermal E2/day for 2 years Unchanged stress incontinence	151/208	129/209	72.60	61.80	**1.18 (1.03; 1.35)**	9 (5; 60)	108 (17; 214)E

Table 59. Comparative effectiveness of hormone therapy compared to placebo on risk of UI in females (continued)

Author Sample Followup	Active Treatment	Number of Cases After Active Treatment/ Number Randomized	Number of Cases After Control Treatment/ Number Randomized	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
	Unchanged incontinence	116/208	94/209	56.00	44.90	**1.24 (1.02; 1.50)**	9 (4; 98)	111 (10; 226)E
	Unchanged urge incontinence	178/208	162/209	85.70	77.30	**1.10 (1.01; 1.21)**	12 (6; 182)	84 (5; 163)E
	Worsened urge incontinence	5/208	21/209	2.40	10.20	**0.24 (0.09; 0.62)**	13 (11; 26)	78 (39; 93)A
Holtedahl, 1998[364] N = 90 6 month followup	Local estrogen in vagitories or jelly plus physiotherapy and electro stimulation	10/36	27/44	28.00	61.00	**0.45 (0.25; 0.81)**	3 (2; 8)	330 (119; 455)A

Bold - significant differences in outcomes at 95% confidence level; E - number of excessive events per 1,000 treated; A - number of avoided events per 1,000 treated; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence)

Table 60. Clinical interventions that resulted in stress urinary continence in more than 75% of participating females

Author Sample	Treatment	Followup (months)	Rate (%) of Stress Urinary Continence
Bai,2005[344] N = 92	Burch colposuspension	12	87.88
Colombo, 1994[347] N = 80	Burch colposuspension	36	92.50
Liapis, 2002[355] N= 71	Burch colposuspension	24	86.00
Culligan, 2003[349] N = 36	Burch colposuspension	72.6	84.60
Quadri, 1999[357] N = 30	Burch colposuspension	12	80.00
Colombo,1996[348] N = 36	Burch colposuspension with placement of two couples of permanent polybutylate-coated polyester sutures	12	100.00
Sand, 2000[358] N = 36	Burch procedures with four 2-0 polytetrafluoroethylene sutures and tension placed on the periurethral sutures (modified Tanagho method)	3	94.74
Gilja, 1998[351] N = 204	Burch retropubic urethropexy	37	92.86 (subjective continence)
		39	89.29 (objective continence)
Kammerer-Doak, 1999[353] N = 35	Burch retropubic urethropexy	12	94.74 (subjective continence)
		12	84.21 (objective continence)
Bergman, 1989[345] N = 127	Burch urethropexy	12	91.00
Fathy, 2001[350] N = 74	Laparoscopic Burch colposuspension	18	85.29 (subjective continence)
		18	82.35 (objective continence)
Ustun, 2003[360] N = 46	Laparoscopic Burch colposuspension	18	82.60
Persson, 2000[356] N = 161	Laparoscopic Burch colposuspension using two single-bite sutures of polytetrafluoroethylene sutures placed on each side of the urethra under transperitoneal video laparoscopy	12	86.75
Su, 1997[359] N = 92	Open Burch colposuspension	12	95.60
Fathy, 2001[350] N = 74	Open Burch colposuspension	18	85.00 (subjective continence)
		18	77.50 (objective continence)
Cheon, 2003[346] N = 90	Open Burch colposuspension	12	86.05
Lalos, 1993[354] N = 36	Retropubic urethrocystopexy	13	77.27
Zullo, 2001[361] N = 60	Transperitoneal laparoscopic Burch procedure using nonabsorbable sutures	12	93.33 (subjective continence)
		12	90.00 (objective continence)
	Transperitoneal laparoscopic Burch procedure using Prolene mesh fixed with tacks or staples	12	86.67 (subjective continence)
		12	76.67 (objective continence)
Gilja, 1998[351] N = 204	Transvaginal Burch procedure	36	90.91 (subjective continence)
		38	86.36 (objective continence)
Ishiko, 2001[352] N = 73	Combination of estriol (1mg/d) and pelvic floor muscle exercise		78.13
Su, 1997[359] N = 92	Laparoscopic colposuspension	12	80.40
Cheon, 2003[346] N = 90	Laparoscopic colposuspension	12	85.11

Table 60. Clinical interventions that resulted in stress urinary continence in more than 75% of participating females (continued)

Author Sample	Treatment	Followup (months)	Rate (%) of Stress Urinary Continence
Quadri, 1999[357] N = 30	Marshall-Marchetti-Krantz urethropexy with video urethroscopic control	12	100.00 (subjective continence)
		16	93.33 (objective continence)
Colombo, 1994[347] N = 80	Modified Marshall-Marchetti-Krantz urethropexy	36	85.00
Choe, 2000[323] N = 40	Transvaginal antimicrobial mesh synthetic mesh	6	95.00
Gilja, 1998[351] N = 204	Modified bladder neck suspension by Raz	36	84.78 (subjective continence)
		38	80.43 (objective continence)
Berglund, 1996[768] N = 45	Pubococcygeal repair	12	80.00
Lalos, 1993[354] N = 36	Pubococcygeal repair	13	78.57
Cholhan, 2004[333] N = 48	Conventional sub urethral sling	3	92.00
Wadie, 2005[338] N = 53	Fascial sling with free ends of flap fixed by a 1-zero polyglactin suture and the sling is fixed to the underlying periurethral fascia using 4-zero polyglactin sutures	0.5	92.00
Cholhan, 2004[333] N = 48	Modified sling placed at the mid-urethra without tension	3	89.00
Abdel-Fattah, 2004[332] N = 142	Pelvic pubovaginal sling	36	75.68
Arunkalaivanan, 2003[326] N = 142	Porcine dermal sling (pelvic implant) by Barrington	12	89.19
Kuo, 2001[324] N = 50	Pubovaginal sling procedure using polypropylene mesh	6	100.00
	Pubovaginal sling procedure using rectus fascia	6	95.80
Bai, 2005[344] N = 92	Pubovaginal sling using autologous rectus muscle fascia	12	92.86
David-Montefiore, 2006[339] N = 88	Retropubic sub urethral sling procedure	1	92.86
Culligan, 2003[349] N = 36	Sub urethral sling (Horbach) with polytetrafluororthylene strip from rectum fascia beneath urethra under minimal tension	72.6	100.00
Sand, 2000[358] N = 36	Sub urethral sling with continuous polytetrafluororthylene strip from rectus fascia into retropubic space and beneath urethra at urethrovesical junction level	3	100.00
Lim, 2005[334] N = 195	Sub urethral slingoplasty with the intravaginal sling multifilament threads	12	87.04 (subjective continence)
		12	81.48 (objective continence)
	Sub urethral slingoplasty with the suprapubic arc sling macroporous monofilament threads	12	77.59
	Sub urethral slingoplasty with the tension-free vaginal tape macroporous monofilament threads	12	87.93 (subjective continence)
		12	82.76(objective continence)
Tseng, 2005[336] N = 62	Suprapubic arch sling procedure	24	80.65
Andonian, 2005[335] N = 84	Suprapubic arch sling procedure	12	83.00
Lord, 2006[341] N = 313	Suprapubic urethral support sling	1.5	76.50
David-Montefiore, 2006[339] N = 88	Transobturator suburethral sling procedure	1	93.48

Table 60. Clinical interventions that resulted in stress urinary continence in more than 75% of participating females (continued)

Author Sample	Treatment	Followup (months)	Rate (%) of Stress Urinary Continence
deTayrac, 2004[329] N = 61	Transobturator suburethral tape	12	86.67
Laurikainen, 2007[491] N = 273	Transobturator tension-free vaginal polypropylene tape procedure by de Leval	2	94.70
Rechberger, 2003[327] N = 100	Monofilament tape inserted at the midurethra using the tension-free vaginal tape delivery instrument	13.5	88.00
	Multifilament tape using the Intravaginal slingoplasty delivery instrument	13.5	80.00
Laurikainen, 2007[491] N = 273	Retropubic tension-free vaginal polypropylene tape procedure by Ulmsten	2	98.53
Wadie, 2005[338] N = 53	Tension-free vaginal polypropylene tape	0.5	92.86
Meshcia, 2004[330] N = 50	Tension-free vaginal tape procedure		92.00
Bai, 2005[344] N = 92	Tension-free vaginal tape procedure	12	87.10
Abdel-Fattah, 2004[332] N = 142	Tension-free vaginal tape procedure	36	77.94
Lord, 2006[341] N = 313	Tension-free vaginal tape procedure	1.5	97.30 (Subjective continence)
		1.5	87.10 (Objective continence)
Ustun, 2003[360] N = 46	Tension-free vaginal tape procedure	18	82.60
Liapis, 2002[355] N = 71	Tension-free vaginal tape procedure	24	84.00
deTayrac, 2004[329] N = 61	Tension-free vaginal tape procedure	12	90.00
Wang, 2003[767] N = 98	Tension-free vaginal tape procedure	12	81.63
Adamiak, 2002[325] N = 103	Tension-free vaginal tape with spinal analgesia (0.5% bupivacaine hydrochloride administered at L_3–L_4 or L_4–L_5 interspace)	6	97.14
Adnonian, 2005[335] N = 84	Tension-free vaginal tape by Ulmsten	12	95.00
Arunkalaivanan, 2003[326] N = 142	Tension-free vaginal tape by Ulmsten	12	85.29
Tseng, 2005[336] N = 62	Tension-free vaginal tape by Ulmsten	24	87.10
Meschia, 2006[340] N = 190	Tension-free vaginal tape under local or epidural anesthesia	24	84.21
Valpas, 2004[331] N = 128	Tension-free vaginal tape under local anesthesia with polypropylene mesh tape placed under the midurethra	12	85.71
Adamiak, 2002[325] N = 103	Tension-free vaginal tape with local analgesia (injection of 0.5–0.75% lidocaine hydrochloride in subcutaneous tissue)	6	93.85

Table 61. Clinical interventions that resulted in urinary continence in more than 75% of participating males

Author Sample	Treatment	Followup (months)	Rate (%) of Urinary Continence
Bales, 2000[262] N = 100	Pelvic muscle exercises without biofeedback	6	96.00
	Graded pelvic muscle exercise training with biofeedback 2 to 4 weeks before surgery 4 times/day until surgery and to resume exercises when the urethral catheter was removed following surgery radical retropubic prostatectomy	6	88.00
Yokoyama, 2004[256] N = 36	Extracorporeal magnetic innervation (ExMI) using Neocontrol system was used with 20 min treatment sessions, 2/week for 2 months. The frequency of the pulse field was 10 Hz for 10 min, followed by a second treatment at 50 Hz for 10 minutes	6	91.70
	Functional electrical stimulation (FES) using anal electrode and pulses of 20-Hz square waves at a 300-μs pulse duration were used for 15 minutes twice daily for 1 month after retropubic radical prostatectomy	6	83.30
	Pelvic floor muscle exercises after retropubic radical prostatectomy	6	83.30
Wille, 2003[255] N = 139	Instructions after radical retropubic prostatectomy on electrical stimulation (ES) for 15 minutes twice daily and biofeedback (BFB) 15 minutes twice daily with stimulation time of 5 seconds, and contracting and relaxing time of 5 and 15 seconds	12	90.50 (objective continence)
		12	88.60 (subjective continence)
	Instructions after radical retropubic prostatectomy about postoperative pelvic muscle exercises	12	88.00 (subjective continence)
	Instructions about postoperative after radical retropubic prostatectomy electrical stimulation (ES) for 15 minutes twice daily with frequency 27 Hz, biphasic pulse shape with 1-sec bursts, a 5-second pulse width and 2-second pulse trains	12	81.00
	Instructions about postoperative after radical retropubic prostatectomy pelvic muscle exercises	12	76.70
Deliveliotis, 2005[786] N = 60	10ml of betamethasone cream 0.1% was applied locally to both neurovascular bundles after radical retropubic prostatectomy	12	93.00
	Usual neurovascular bundles with no corticoid cream after radical retropubic prostatectomy	12	90.00
Srougi, 2001[783] N = 70	Radical retropubic prostatectomy with bladder neck preservation according to the technique described by Malizia	6	96.77
	Radical retropubic prostatectomy with bladder neck resection according to that of Walsh, et al.	6	92.31
Imamoglu, 2005[785] N = 21	Artificial urethral sphincter implantation after radical retropubic prostatectomy	48	90.90
	Macroplastique injection (polydimethylslioxane elastomer implants as the solute component and hydrogel as the carrier) of 5–7.5cc above or around the striated sphincter region of the urethra submucosally after radical retropubic prostatectomy	48	80.00
Van Cangh, 1998[782] N = 100	Radical prostatectomy alone	24	83.00
	60Gy external radiotherapy with 18MV photon beams between 12 and 16 weeks after radical prostatectomy	24	77.00

Bold - significant differences in outcomes at 95% confidence level

Table 62. Clinical interventions that resulted in urinary continence at 6 or more months of followup (results from RCTs sorted by treatments and rates of continence after active treatments [from highest to lowest])

Author Sample Followup	Active Treatment	Control Treatment	Continence	Cases (Active Treatment) [Control Treatment]	% Continent (Active Treatment) [Control Treatment]	Relative Risk (95% CI)	Number Needed to Treat to Benefit One Case of Continence (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Pelvic Floor Exercise								
Bo, 2005[275] N = 47; 100% female 180 month followup	Intensive PEM under the supervision of physical therapist	Home exercise groups	SR	(13) [4]	(60.00) [17.00]	**4.02** **(1.54; 10.53)**	2 (1; 11)	430 (91; 1,620)E
Mørkved, 2002[815] N = 103; 100% female 6 month followup	PEM individually supervised by a physical therapist and at home with BFB	PEM individually supervised by a physical therapist and at home without BFB	PT	(28) [21]	(52.83) [42.00]	1.26 (0.83; 1.90)		
			SR	(19) [14]	(35.85) [28.00]	1.28 (0.72; 2.27)		
Alewijnse, 2003[271] N = 129; 100% female 14 month followup	PEM with reminder and self-help guide	Bladder training and PEM	SR	(17) [21]	(32.70) [41.20]	0.79 (0.48; 1.32)		
Bo, 2005[275] N = 47; 100% female 180 month followup	Intensive PEM under the supervision of physical therapist	Home exercise groups	SR	(6) [4]	(28.57) [15.38]	1.86 (0.60; 5.73)		
Wells, 1991[725] N = 157; 100% female 6 month followup	PEM	Phenylpropanolamine hydrochloride (50 mg/ day- 50 mg 2 times/day)	SR	(22) [11]	(27.00) [14.00]	1.85 (0.96; 3.56)		
Wyman, 1998[269] N = 204; 100% female 6 month followup	BT+PEM	BT	SR	(16) [10]	(27.00) [16.00]	1.62 (0.79; 3.32)		
Janssen, 2001[286] N = 530; 100% female 12 month followup	Individual BT+PEM	Group BT+PEM	SR	(28) [57]	(22.00) [14.00]	**1.58** **(1.05; 2.36)**	13 (5; 143)	80 (7; 191)E
Wyman, 1998[269] N = 204; 100% female 6 month followup	PEM with BFB	BT	SR	(13) [10]	(20.00) [16.00]	1.28 (0.60; 2.72)		
Pelvic Floor Exercise in Males with Urological Diseases								
Wille, 2003[255] N = 139; 0% female 12 month followup	Postoperative (after radical prostatectomy) PEM	Postoperative PEM+BFB, electrical stimulation	SR	(41) [41]	(88.00) [88.60]	0.98 (0.84; 1.14)		

Table 62. Clinical interventions that resulted in urinary continence at 6 or more months of followup (results from RCTs sorted by treatments and rates of continence after active treatments [from highest to lowest]) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Continence	Cases (Active Treatment) [Control Treatment]	% Continent (Active Treatment) [Control Treatment]	Relative Risk (95% CI)	Number Needed to Treat to Benefit One Case of Continence (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Bales, 2000[262] N = 100; 0% female 6 month followup	PEM with BFB 4 weeks before and after radical prostatectomy	PEM	SR	(44) [48]	(88.00) [96.00]	0.92 (0.82; 1.03)		
Yokoyama, 2004[256] N = 36; 0% female 6 month followup	Functional electrical stimulation after retropubic radical prostatectomy	PEM	SR	(10) [10]	(83.30) [83.30]	1.00 (0.70; 1.43)		
Wille, 2003[255] N = 139; 0% female 12 month followup	Postoperative (after radical prostatectomy) PEM	Postoperative PEM+BFB, electrical stimulation	SR	(37) [41]	(81.00) [88.60]	0.90 (0.76; 1.07)		
			PT	(36) [42]	(76.70) [90.50]	0.84 (0.70; 1.01)		
Behavioral Interventions in Pregnant Women								
Meyer, 2001[249] N = 107; 100% female 10 month followup	PEM with BFB and electro stimulation	Usual care	SR	(10) [1]	(19.00) [2.00]	**10.98** **(1.46; 82.80)**	6 (1; 110)	170 (9; 1,636)E
Electrical Stimulation								
Bo, 1999[299] N = 122; 100% female 6 month followup	Electrical stimulation	Use of a continence guard	PT	(7) [2]	(21.88) [6.25]	3.50 (0.79; 15.58)		
Smith, 1996[293] N = 57; 100% female 48 month followup	Anticholinergic propantheline bromide (7.5 to 45 mg 2-3 times/day)	Electrical stimulation	SR	(3) [4]	(16.67) [11.00]	0.38 (0.11; 1.33)		
Bo, 1999[299] N = 122; 100% female 6 month followup	Electrical stimulation	Use of a continence guard	SR	(3) [1]	(9.38) [3.13]	3.00 (0.33; 27.33)		
Neuromodulation								
Schmidt, 1999[305] N = 98; 81% female 5 month followup	Implantation of multiprogrammable neurostimulator	Standard medical therapy	SR	(24) [0]	(47.00) [1.00]	**43.45** **(2.72; 695.03)**	2 (0; 58)	460 (17; 6,940)E
Weil, 2000[306] N = 44; 91% female 6 month followup	Sacral root neuromodulation with an implantable impulse generator	Conservative management: medications or PEM	SR	(9) [1]	(42.86) [4.35]	**9.86** **(1.36; 71.36)**	3 (0; 64)	385 (16; 3,059)E

Table 62. Clinical interventions that resulted in urinary continence at 6 or more months of followup (results from RCTs sorted by treatments and rates of continence after active treatments [from highest to lowest]) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Continence	Cases (Active Treatment) [Control Treatment]	% Continent (Active Treatment) [Control Treatment]	Relative Risk (95% CI)	Number Needed to Treat to Benefit One Case of Continence (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Bulking Agents								
Strasser, 2007[308] N = 63; 100% female 12 month followup	Transurethral ultrasonography-guided injections of autologous myoblasts and fibroblasts	Conventional endoscopic injections of collagen	SR	(38) [2]	(90.48) [9.52]	**9.50** **(2.53; 35.63)**	1 (0; 7)	810 (146; 3,298)E
Bano, 2004[309] N = 50; 100% female 6 month followup	Peri or transurethral porcine dermal implant injection (Permacol)	Transurethral silicone injection (Macroplastique)	PT	(15) [9]	(60.00) [36.00]	1.67 (0.90; 3.08)		
Corcos, 2005[307] N = 133; 100% female 13 month followup	Intraurethral collagen sub mucosal injection	Surgery (needle bladder neck suspensions, Burch, and slings)	PT	(34) [37]	(51.52) [55.22]	0.93 (0.68; 1.28)		
Schulz, 2004[310] N = 40; 100% female 12 month followup	Periurethral route of injection of bulking agent-dextran copolymer	Transurethral route of injection of bulking agent-dextran copolymer	PT	(1) [3]	(5.00) [15.00]	0.33 (0.04; 2.94)		
Devices								
Bo, 1999[299] N = 122; 100% female 6 month followup	Vaginal cones of 20, 40, and 70g for 20 minutes/day	Use of a continence guard	PT	(4) [2]	(13.79) [6.25]	2.21 (0.44; 11.17)		
			SR	(2) [1]	(6.90) [3.13]	2.21 (0.21; 23.08)		

PT - negative pad test; SR - self-reported continence; Bold - significant relative risk at 95% confidence level; E - number of excessive events per 1,000 treated

Table 63. Surgical interventions that resulted in significant difference in urinary continence at 6 or more months of followup (results from RCTs)

Author Sample Followup	Active Treatment	Control Treatment	Continence	Cases (Active) [Control] Treatment	% Continent (Active) [Control] Treatment	Relative Risk (95% CI)	Number Needed to Treat to Benefit One Case of Continence (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Gynecologic Surgery								
Kaya, 2004[319] N = 90; 100% female 12 month followup	Extrafascial total abdominal hysterectomy	Intrafascial total abdominal hysterectomy	SR	(4) [14]	(8.89) [31.11]	**0.29** **(0.10; 0.80)**	5 (4; 16)	222 (62; 279)A
Surgery for Prolapse and UI								
Colombo, 1996[348] N = 36; 100% female 12 month followup	Burch colposuspension	Abdominal paravaginal defect repair	U	(18) [13]	(100.00) [72.22]	**1.37** **(1.02; 1.84)**	4 (2; 73)	278 (14; 609)E
Kammerer-Doak, 1999[353] N = 35; 100% female 12 month followup	Burch retropubic urethropexy	Modified anterior colporrhaphy	SR	(18) [3]	(94.74) [18.75]	**5.05** **(1.81; 14.09)**	1 (0; 7)	760 (152; 2,454)E
Meshcia, 2004[330] N = 50; 100% female 6 month followup	Tension-free vaginal tape	Plication of the endopelvic fascia	U	(23) [14]	(92.00) [56.00]	**1.64** **(1.14; 2.37)**	3 (1; 13)	360 (78; 767)E
Bergman, 1989[345] N = 127; 100% female 12 month followup	Burch urethropexy	Anterior colporrhaphy with Kelly plication	U	(35) [23]	(91.00) [65.00]	**1.40** **(1.08; 1.81)**	4 (2; 18)	260 (55; 528)E
		Modified Pereyra needle urethropexy	U	(35) [24]	(91.00) [72.00]	**1.30** **(1.03; 1.65)**	5 (2; 46)	190 (22; 470)E
Valpas, 2004[331] N = 128; 100% female 12 month followup	Tension-free vaginal tape under local anesthesia	Laparoscopic mesh colposuspension under general anesthesia	U	(60) [29]	(85.71) [56.86]	**1.51** **(1.17; 1.95)**	3 (2; 11)	289 (94; 540)E
Meschia, 2006[340] N = 190; 100% female 24 month followup	Tension-free vaginal tape	Intravaginal slingplasty	SR+U	(80) [68]	(84.21) [71.58]	**1.18** **(1.01; 1.37)**	8 (4; 159)	126 (6; 266)E
Kammerer-Doak, 1999[353] N = 35; 100% female 12 month followup	Burch retropubic urethropexy	Modified anterior colporrhaphy	U	(16) [5]	(84.21) [31.25]	**2.69** **(1.27; 5.72)**	2 (1; 12)	530 (84; 1,475)E
Meschia, 2006[340] N = 190; 100% female 24 month followup	Tension-free vaginal tape	Intravaginal slingplasty	U	(79) [65]	(83.16) [68.42]	**1.22** **(1.03; 1.43)**	7 (3; 46)	147 (22; 295)E

Table 63. Surgical interventions that resulted in significant difference in urinary continence at 6 or more months of followup (results from RCTs) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Continence	Cases (Active) [Control] Treatment	% Continent (Active) [Control] Treatment	Relative Risk (95% CI)	Number Needed to Treat to Benefit One Case of Continence (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Meschia, 2006[340] N = 190; 100% female 24 month followup	Tension-free vaginal tape	Intravaginal slingplasty	PT	(78) [63]	(82.11) [66.32]	**1.24** **(1.04; 1.47)**	6 (3; 35)	158 (29; 311)E
Colombo, 2000[362] N = 71; 100% female 168 month followup	Burch colposuspension with abdominal hysterectomy	Anterior colporrhaphy with vaginal hysterectomy	SR	(30) [17]	(81.08) [50.00]	**1.62** **(1.12; 2.35)**	3 (1; 17)	311 (60; 674)E
Osman, 2003[769] N = 75; 100% female 6 month followup	Burch retropubic suspension or pubovaginal sling	Oxybutynin hydrochloride 5 mg 3 times/day	SR	(40) [0]	(80.00) [0.00]	**41.29** **(2.64; 645.03)**		0 (0; 217)E
Bergman, 1995[774] N = 127; 100% female 60 month followup	Burch urethropexy	Anterior colporrhaphy with Kelly plication	U	(27) [11]	(71.05) [31.43]	**2.26** **(1.33; 3.84)**	3 (1; 10)	396 (104; 893)E
		Modified Pereyra needle urethropexy	U	(27) [13]	(71.05) [37.14]	**1.91** **(1.19; 3.08)**	3 (1; 14)	339 (70; 773)E
Ankardal, 2004[776] N = 240; 100% female 12 month followup	Open Burch colposuspension using sutures	Laparoscopic transperitoneal colposuspension using polypropylene mesh and staples	SR	(85) [64]	(70.83) [53.33]	**1.33** **(1.08; 1.63)**	6 (3; 22)	175 (45; 334)E
Colombo, 2000[362] N = 71; 100% female 168 month followup	Burch colposuspension with abdominal hysterectomy	Anterior colporrhaphy with vaginal hysterectomy	U	(26) [14]	(70.27) [41.18]	**1.71** **(1.08; 2.68)**	3 (1; 29)	291 (35; 694)E
Quadri, 1999[357] N = 30; 100% female 15 month followup	Burch colposuspensions	Marshall-Marchetti-Krantz urethropexy with video urethroscopic control	SR	(10) [15]	(66.67) [100.00]	**0.68** **(0.47; 0.98)**	3 (2; 42)	333 (24; 530)A
Colombo, 2000[362] N = 71; 100% female 168 month followup	Burch colposuspension with abdominal hysterectomy	Anterior colporrhaphy with vaginal hysterectomy	CST	(24) [7]	(64.86) [20.59]	**3.15** **(1.56; 6.35)**	2 (1; 9)	443 (116; 1, 102)E
Persson, 2000[356] N = 161; 100% female 12 month followup	Laparoscopic Burch colposuspension using one double-bite of sutures	Laparoscopic Burch colposuspension using two single-bite sutures of sutures	SR	(50) [72]	(64.10) [86.75]	**0.74** **(0.61; 0.89)**	4 (3; 10)	226 (95; 335)A

Table 63. Surgical interventions that resulted in significant difference in urinary continence at 6 or more months of followup (results from RCTs) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Continence	Cases (Active) [Control] Treatment	% Continent (Active) [Control] Treatment	Relative Risk (95% CI)	Number Needed to Treat to Benefit One Case of Continence (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Ward, 2004[816] N = 344; 100% female 24 month followup	Tension-free tape procedure	Colposuspension	PT	(111) [86]	(63.43) [50.89]	**1.25** **(1.03; 1.50)**	8 (4; 56)	125 (18; 255)E
Colombo, 1997[486] N = 109; 100% female 6 month followup	Posterior pubourethral ligament plication	Pereyra suspension	CST	(34) [46]	(61.82) [85.19]	**0.73** **(0.57; 0.92)**	4 (3; 14)	234 (69; 363)A
Persson, 2000[356] N = 161; 100% female 12 month followup	Laparoscopic Burch colposuspension using one double-bite of sutures	Laparoscopic Burch colposuspension using two single-bite sutures of sutures	PT	(43) [62]	(55.13) [74.70]	**0.74** **(0.58; 0.93)**	5 (3; 20)	196 (49; 312)A
Quadri, 1999[357] N = 30; 100% female 16 month followup	Burch colposuspensions	Marshall-Marchetti-Krantz urethropexy with video urethroscopic control	U	(8) [14]	(53.33) [93.33]	**0.57** **(0.35; 0.93)**	3 (2; 16)	400 (61; 607)A
Colombo, 1997[486] N = 109; 100% female 6 month followup	Posterior pubourethral ligament placation	Pereyra suspension	U	(24) [37]	(44.00) [68.00]	**0.64** **(0.45; 0.90)**	4 (3; 15)	240 (65; 375)A
Ankardal, 2004[776] N = 240; 100% female 12 month followup	Open Burch colposuspension using sutures	Laparoscopic transperitoneal colposuspension using polypropylene mesh and staples	SR	(52) [26]	(43.33) [21.67]	**2.00** **(1.34; 2.97)**	5 (2; 13)	217 (75; 428)E
Albo, 2007[343] N = 655; 100% female 24 month followup	Burch colposuspension	Pubovaginal sling, using autologous rectus fascia	SR+U+PT	(141) [187]	(42.86) [57.36]	**0.75** **(0.64; 0.87)**	7 (5; 14)	145 (73; 207)A
Maher, 2005[337] N = 45; 100% female 12 month followup	Pubovaginal sling	Transurethral macroplastique	U	(2) [17]	(9.09) [73.91]	**0.12** **(0.03; 0.47)**	2 (1; 3)	648 (391; 715)A

CST - negative cotton swab test; PT - negative pad test; U - urodynamic continence; SR - self-reported continence; Bold - significant relative risk at 95% confidence level; E - number of excessive events per 1,000 treated; A - number of avoided events per 1,000 treated

Table 64. Clinical interventions that resulted in a larger number of attributable events of urinary continence in adults from the community (number of additional continence cases >300 per 1,000 treated)

Author Sample Followup	Active Treatment	Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Number of Attributable Events/1,000 Treated (95% CI)
Stress Continence					
Aksac, 2003[288] N = 50; 100% female 2 month followup	Pelvic floor muscle exercise (contractions for 10 seconds and relaxation for 20 seconds) via biofeedback (vaginal probe in EMG pressure mode) 3 times/week	Usual care	80.00	0.10	799 (0; 261)E
Bo, 1999[299] N = 122; 100% female 6 month followup	Pelvic floor exercise with 8-12 contractions 3 times/day and in groups with skilled physical therapists 1/week	Untreated control group offered the use of a continence guard	48.28	3.13	452 (36; 3,415)E
Bo, 2005[275] N = 47; 100% female Acute	Intensive pelvic floor exercise with 8-12 maximum contractions for 6-8 seconds 3 series/day under the supervision of physical therapist for 6 months	Home exercise groups	60.00	17.00	430 (91; 1,620)E
Kammerer-Doak, 1999[353] N = 35; 100% female 12 month followup	Burch retropubic urethropexy	Modified anterior colporrhaphy	94.74	18.75	760 (152; 2,454)E
Klarskov, 1986[778] N = 40; 100% female 4 month followup	Surgery: Burch colposuspension when patients had anterior suspension defect. Vaginal repair when patients had posterior bladder descent	Pelvic floor training program 5 times in weekly lessons guided by trained physiotherapists	61.54	12.50	490 (80; 1,726)E
Bergman, 1995[774] N = 127; 100% female 60 month followup	Burch urethropexy	Anterior colporrhaphy with Kelly plication	71.05	31.43	396 (104; 893)E
		Modified Pereyra needle urethropexy	71.05	37.14	339 (70; 773)E
Meshcia, 2004[330] N = 50; 100% female 6 month followup	Tension-free vaginal tape	Plication of the endopelvic fascia	92.00	56.00	360 (78; 767)E
Quadri, 1999[357] N = 30; 100% female 12 month followup	Burch colposuspensions	Marshall-Marchetti-Krantz urethropexy with video urethroscopic control	66.67	100.00	333 (24; 530)A
Urinary Continence					
Akhila, 2006[368] N = 116; 100% female 12 month followup	Conjugated equine estrogen 0.625mg/day orally	Transdermal patch with 50mg/day estrogen	40.00	100.00	600 (420; 708)A
Colombo, 2000[362] N = 71; 100% female 12 month followup	Burch colposuspension with abdominal hysterectomy	Anterior colporrhaphy with vaginal hysterectomy	64.86	20.59	443 (116; 1,102)E

Table 64. Clinical interventions that resulted in a larger number of attributable events of urinary continence in adults from the community (number of additional continence cases >300 per 1,000 treated) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Number of Attributable Events/1,000 Treated (95% CI)
Maher, 2005[337] N = 45; 100% female 60 month followup	Pubovaginal sling	Transurethral Macroplastique	9.09	73.91	648 (391; 715)A
Urge Continence					
But, 2003[298] N = 52; 100% female 2 month followup	Functional magnetic stimulation with Pulsegen device, which produced a pulsating magnetic field of B = 10 microT intensity and a frequency of 10Hz.	Placebo treatment with sham inactive device	79.00	22.00	570 (131; 1,488)E
Schmidt, 1999[305] N = 98; 81% female 5 month followup	Implantation of multiprogrammable neurostimulator subcutaneously in lower quadrant of the abdomen with lead positioned to target sacral nerve and anchored in place	Standard medical therapy	47.00	1.00	460 (17; 6,940)E
Weil, 2000[306] N = 44; 91% female 6 month followup	Sacral root neuromodulation with an implantable impulse generator	Prior conservative management: medications or pelvic floor exercise	42.86	4.35	385 (16; 3,059)E

E - number of excessive events per 1,000 treated; A - number of avoided events per 1,000 treated

Table 65. Effects of adrenergic drugs on self-reported urinary continence in females (results from RCTs)[813]

Author*	Active Treatment	Control Treatment	Cases After (Active) [Control] Treatment	Rate (%) After (Active) [Control] Treatment	Relative Risk (95% CI)	Number Needed to Treat	Number of Attributable Events per 1,000 Treated (95% CI)
Yasuda, 1993	Clenbuterol	Placebo	(8) [2]	(2.27) [10.39]	**4.57** **(1.00; 20.88)**	12	81 (0; 452)E
Lose, 1988	Norepinephrine	Placebo	(6) [3]	(14.29) [26.09]	1.83 (0.52; 6.39)	8	118E
Hilton, 1990	Phenylpropanolamine	Placebo	(0) [2]	(18.18) [0.00]	0.24 (0.01; 4.44)	6	182A
Lehtonen, 1986	Phenylpropanolamine	Placebo	(15) [8]	(36.36) [71.43]	**1.96** **(1.06; 3.63)**	3	351 (22; 958)E
Yasuda, 1993	Clenbuterol	Placebo	(36) [21]	(23.86) [46.75]	**1.96** **(1.26; 3.05)**	4	229 (62; 489)E
Wells, 1991	Phenylpropanolamine	PFMT	(54) [42]	(51.22) [72.00]	**1.41** **(1.09; 1.81)**	5	208 (46; 416)E
Ishiko, 2000	Clenbuterol	PFMT	(10) [10]	(52.63) [66.67]	1.27 (0.73; 2.21)	7	140E
		Clenbuterol + PFMT	(10) [17]	(77.27) [66.67]	0.86 (0.56; 1.32)	9	106A
Wells, 1991	Phenylpropanolamine	PFMT	(2) [9]	(26.47) [3.85]	**0.15** **(0.03;, 0.63)**	4	226 (97; 256)A
			(22) [16]	(47.06) [42.31]	0.90 (0.56; 1.45)	21	48A
Walter, 1990	Phenylpropanolamine + estrogen	Estrogen	(2) [2]	(14.29) [13.33]	0.93 (0.15; 5.76)	105	10A
Hilton, 1990	Phenylpropanolamine + estrogen	Estrogen	(13) [3]	(15.79) [44.83]	2.84 (0.93; 8.65)	3	290E
Walter, 1990	Phenylpropanolamine + estrogen	Estrogen	(4) [6]	(42.86) [26.67]	0.62 (0.22; 1.75)	6	162A
Hilton, 1990	Phenylpropanolamine + estrogen	Placebo	(13) [2]	(18.18) [44.83]	2.47 (0.66; 9.20)	4	266E
			(12) [2]	(18.18) [60.00]	3.30 (0.90; 12.15)	2	18E
	Phenylpropanolamine	Estrogen	(12) [0]	(0.00) [60.00]	11.90 (0.78; 181.54)	2	600E

* These studies were part of the systematic review; PFMT- pelvic floor muscle training; Bold - significant relative risk at 95% confidence level; E - number of excessive events per 1,000 treated; A - number of avoided events per 1,000 treated; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence)

Table 66. Effects of anticholinergic drugs compared to placebo on self-reported urinary continence or improvement in UI in adults with overactive bladder (results from RCTs)[812]

Author*	Active Treatment	Cases After (Active) [Control] Treatment	Rate (%) After (Active) [Control] Treatment	Relative Risk(95% CI)	Number Needed to Treat	Number of Attributable Events per 1,000 Treated (95% CI)
Abrams, 1998	Tolterodine 2mg bid or oxybutynin 5mg tid	(117) [27]	(47.37) [49.58]	1.05 (0.77; 1.42)		
Burgio, 1998	Oxybutynin 2.5-5mg tid	(45) [34]	(65.38) [81.82]	1.25 (0.99; 1.58)		
Dorschner, 2000	Propiverine 15mg tid	(43) [26]	(53.06) [87.76]	**1.65 (1.25; 2.20)**	3	347 (130; 634)E
Freeman, 2003	Tolteradine ER 4 mg once a day	(173) [118]	(31.55) [43.47]	**1.38 (1.14; 1.66)**	8	119 (45; 208)E
Halaska, 1994	Propiverine 15mg tid	(34) [18]	(47.37) [89.47]	**1.89 (1.33; 2.69)**	2	421 (155; 799)E
Millard,, 1999	Tolterodine 1- 2mg bid	(126) [24]	(37.50) [50.00]	1.33 (0.95; 1.87)		
Szonyi 1995	Oxybutynin 2.5mg bid	(22) [16]	(55.17) [78.57]	1.42 (0.97; 2.08)		
VanKerrebroeck, 2001	Tolterodine extended release 2- 4mg qid	(313) [218]	(42.83) [60.89]	**1.42 (1.26; 1.61)**	6	181 (111; 260)E

* These studies were part of the systematic review; Bold - significant relative risk at 95% confidence level; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence); E - number of excessive events per 1,000 treated; A - number of avoided events per 1,000 treated

Table 67. Effects of serotonin and noradrenaline reuptake inhibitor duloxetine on stress UI (results from RCTs)[642]

Author*	Daily Dose of Duloxetine	Control Treatment	Outcomes	Cases After (Active) [Control] Treatment	Rate (%) After (Active) [Control] Treatment	Relative Risk (95% CI)	Number Needed to Treat	Number of Attributable Events per 1,000 Treated (95% CI)
Dmochowski, 2003	80mg	Placebo NT	Failure to cure	(308) [319]	94.10 89.53	0.95 (0.91; 1.00)		
Millard, 2003	80mg	Placebo or NT	Failure to cure	(211) [217]	93.94 92.95	0.99 (0.94; 1.04)		
Norton, 2002	80mg	Placebo or NT	Failure to cure	(100) [112]	84.85 81.30	0.96 0.86; 1.07)		
	40mg	Placebo or NT	Failure to cure	(93) [112]	84.85 75.61	0.89 (0.79; 1.01)		
	20mg	Placebo or NT	Failure to cure	(107) [112]	84.85 83.59	0.99 (0.89; 1.09)		
Cardozo, 2004	0mg	Placebo or NT	Failure to improve	(16) [45]	86.54 34.78	**0.40** **(0.27; 0.61)**	2	518 (341; 635)A
Dmochowski, 2003	80mg	Placebo or NT	Failure to improve	(167) [225]	66.37 48.55	**0.73** **(0.64; 0.84)**	6	178 (109; 239)A
Millard, 2003	80mg	Placebo or NT	Failure to improve	(92) [100]	43.29 40.53	0.94 (0.75; 1.16)		
Van Kerrebroeck, 2004	80mg	Placebo or NT	Failure to improve	(119) [164]	66.40 48.18	**0.73** **(0.62; 0.85)**	5	182 (100; 252)A
Zinner, 1998	40mg	Placebo or NT	Failure to improve	(18) [29]	85.29 54.55	**0.64** **(0.45; 0.90)**	3	307 (86; 465)A
Mulcahy, 1996	20mg	Placebo or NT	Failure to improve	(13) [19]	51.35 23.64	**0.46** **(0.26; 0.81)**	4	277 (96; 380)A
Zinner, 1998	20mg	Placebo or NT	Failure to improve	(18) [29]	85.29 52.94	**0.62** **(0.44; 0.88)**	3	324 (104; 478)A
	30mg	Placebo or NT	Failure to improve	(10) [29]	85.29 38.46	**0;45** **(0.27, 0.75)**	2	468 (215; 621)A
Norton, 2002	80mg	Placebo or NT	Failure to cure (objective - SPT)	(69) [72]	63.16 61.06	0.97 (0.79; 1.18)		
	40mg	Placebo or NT	Failure to cure (objective - SPT)	(63) [72]	63.16 56.76	0.90 (0.73; 1.11)		
	20mg	Placebo or NT	Failure to cure (objective - SPT)	(75) [72]	63.16 68.18	1.08 (0.89; 1.30)		
	80mg	Placebo or NT	Failure to cure (objective - CST)	(96) [103]	87.29 84.21	0.96 (0.87; 1.07)		
	40mg	Placebo or NT	Failure to cure (objective - SPT)	(86) [103]	87.29 76.79	**0.88** **(0.78; 0.99)**	10	105 (5; 194)A

Table 67. Effects of serotonin and noradrenaline reuptake inhibitor duloxetine on stress UI (results from RCTs){Mariappan, 2005 #11555} (continued)

Author*	Daily Dose of Duloxetine	Control Treatment	Outcomes	Cases After (Active) [Control] Treatment	Rate (%) After (Active) [Control] Treatment	Relative Risk (95% CI)	Number Needed to Treat	Number of Attributable Events per 1,000 Treated (95% CI)
	20mg	Placebo or NT	Failure to cure (objective - CST)	(101) [103]	87.29 90.18	1.03 (0.94,;1.13)		
Dmochowski, 2003	80mg	Placebo or NT	Failure to cure (objective - diary)	(308) [319]	94.10 89.53	0.95 (0.91; 1.00)		
Millard, 2003	80mg	Placebo or NT	Failure to cure (objective - diary)	(211) [217]	93.94 92.95	0.99 (0.94; 1.04)		
Norton, 2002	80mg	Placebo or NT	Failure to cure (objective - diary)	(100) [112]	84.85 81.30	0.96 (0.86; 1.07)		
	40mg	Placebo or NT	Failure to cure (objective - diary)	(93) [112]	84.85 75.61	0.89 (0.79; 1.01)		
	20mg	Placebo or NT	Failure to cure (objective - diary)	(107) [112]	84.85 83.59	0.99 (0.89; 1.09)		
Cardozo, 2004	80mg	Placebo or NT	Status ('very much better,' 'much better,' or 'a little better' from PGI-I)	(17) [4]	7.69 33.33	**4.33 (1.57; 12.00)**	4	256 (43; 846)E
Kinchen, 2005	80mg	Placebo or NT	Status ('very much better,' 'much better,' or 'a little better' from PGI-I)	(110) [93]	40.97 49.11	1.20 (0.98; 1.47)		
Millard, 2003	80mg	Placebo or NT	Status ('very much better,' 'much better,' or 'a little better' from PGI-I)	(167) [148]	64.07 73.57	1.15 (1.01; 1.30)		
Norton, 2002	80mg	Placebo or NT	Status ('very much better,' 'much better,' or 'a little better' from PGI-I)	(62) [37]	26.81 44.29	**1.65 (1.18; 2.30)**	6	175 (49; 249)E
Van Kerrebroeck, 2004	80mg	Placebo or NT	Status ('very much better,' 'much better,' or 'a little better' from PGI-I)	(139) [119]	48.18 56.28	1.17 (0.99; 1.38)		
Norton, 2002	40mg	Placebo or NT	Status ('very much better,' 'much better,' or 'a little better' from PGI-I)	(51) [37]	26.81 37.23	1.39 (0.98; 1.97)		
	20mg	Placebo or NT	Status ('very much better,' 'much better,' or 'a little better' from PGI-I)	(43) [37]	26.81 31.16	1.16 (0.80; 1.68)		

Table 67. Effects of serotonin and noradrenaline reuptake inhibitor duloxetine on stress UI (results from RCTs){Mariappan, 2005 #11555} (continued)

Author*	Daily Dose of Duloxetine	Control Treatment	Outcomes	Cases After (Active) [Control] Treatment	Rate (%) After (Active) [Control] Treatment	Relative Risk (95% CI)	Number Needed to Treat	Number of Attributable Events per 1,000 Treated (95% CI)
	80mg	Duloxetine 40 mg	Failure to cure (quantification of symptoms)	(100) [93]	75.61 81.30	1.08 (0.94; 1.23)		
	80mg	Duloxetine 20 mg	Failure to cure (quantification of symptoms)	(100) [107]	83.59 81.30	1.08 (0.94; 1.23)		
	80mg	Duloxetine 20 mg	Failure to cure (quantification of symptoms)	(100) [107]	83.59 81.30	0.97 (0.87; 1.09)		
	40mg	Duloxetine 20 mg	Failure to cure (quantification of symptoms)	(93) [107]	83.59 75.61	0.90 (0.80; 1.03)		
Zinner, 1998	30mg	Duloxetine 20 mg	Failure to cure (quantification of symptoms)	(10) [18]	52.94 38.46	0.73 (0.41; 1.30)		
	40mg	Duloxetine 20 mg	Failure to cure (quantification of symptoms)	(18) [18]	(52.94) [54.55]	1.03 0.66; 1.61)		
	40mg	Duloxetine 30 mg	Failure to cure (quantification of symptoms)	(18) [10]	(38.46) [54.55]	1.42 (0.80; 2.53)		
Norton, 2002	80mg	Duloxetine 40 mg	Failure to cure (objective - SPT)	(6) [63]	(56.76) [5.31]	1.08 (0.86; 1.34)		
	80mg	Duloxetine 20 mg	Failure to cure (objective - SPT)	(69) [75]	(68.18) [61.06]	0.90 (0.74; 1.09)		
	40mg	Duloxetine 20 mg	Failure to cure (objective - SPT)	(63) [75]	(68.18) [56.76]	0.83 (0.68; 1.02)		
	80mg	Duloxetine 40 mg	Failure to cure (objective - CST)	(96) [86]	(76.79) [84.21]	1.10 (0.96; 1.25)		
	80mg	Duloxetine 20 mg	Failure to cure (objective - CST)	(96) [101]	(90.18) [84.21]	0.93 (0.84; 1.03)		
	40mg	Duloxetine 20 mg	Failure to cure (objective - CST)	(86) [101]	(90.18) [76.79]	**0.85 (0.76; 0.96)**	7	134 (37; 220)A
	80mg	Duloxetine 40 mg	Failure to cure (objective - diary)	(100) [93]	(75.61) [81.30]	1.08 (0.94; 1.23)		
	80mg	Duloxetine 20 mg	Failure to cure (objective - diary)	(100) [107]	(83.59) [81.30]	0.97 (0.87; 1.09)		
	40mg	Duloxetine 20 mg	Failure to cure (objective - diary)	(93) [107]	(83.59) [75.61]	0.90 (0.80; 1.03)		

Table 67. Effects of serotonin and noradrenaline reuptake inhibitor duloxetine on stress UI (results from RCTs){Mariappan, 2005 #11555} (continued)

Author*	Daily Dose of Duloxetine	Control Treatment	Outcomes	Cases After (Active) [Control] Treatment	Rate (%) After (Active) [Control] Treatment	Relative Risk (95% CI)	Number Needed to Treat	Number of Attributable Events per 1,000 Treated (95% CI)
	80mg	Duloxetine 40 mg	General Health Status ('very much better,' 'much better,' or 'a little better' from PGI-I)	(62) [51]	(37.23) [44.29]	1.19 (0.89; 1.58)		
	80mg	Duloxetine 20 mg	General Health Status ('very much better,' 'much better,' or 'a little better' from PGI-I)	(62) [43]	(31.16) [44.29]	**1.42 (1.04; 1.94)**	8	131 (-292; -13)E
	40mg	Duloxetine 20 mg	General Health Status ('very much better,' 'much better,' or 'a little better' from PGI-I)	(51) [43]	(31.16) [37.23]	1.19 (0.86; 1.66)		

* These studies were part of the systematic review; Bold - significant relative risk at 95% confidence level; NT- no treatment; SPT - stress pad test; PCT - positive cough stress test; PGI-I - Patient Global Impression of Improvement; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence); E - number of excessive events per 1,000 treated; A - number of avoided events per 1,000 treated

Effects of Clinical Interventions on FI

Baseline mechanisms of FI comprise loss of structural and functional integrity of pudendal nerve activity, of pelvic floor muscles, of rectal compliance and of the anal sphincter and loss of rectal sensation.[17,20,23,24] Disposition of the rectum into the anus (rectal prolapse) or protrusion of the rectum through the vagina (rectocele) also can result in FI. Clinical types of FI include urge incontinence (discharge of feces despite active attempts to retain bowel contents), passive incontinence (involuntary discharge of stool or flatus without awareness), and fecal seepage (leakage of small amount of stool without awareness or staining of undergarments following an otherwise normal evacuation). The aim of effective clinical intervention is to restore the structure and function of these mechanisms, improve the strength and coordination between the pelvic floor and the anal sphincter muscles during voluntary squeeze and following rectal perception, enhance anorectal sensory perception and control, regulate pudendal nerve activity, and provide normal anatomical positioning of the rectum.

Clinical Interventions to Reduce Progression of FI in Adults in Nursing Homes and LTC Settings

Conservative management of FI in nursing homes. Consistent benefits of combined nurse led interventions on the severity of incontinence were reported in three RCTs that examined the effects of conservative management of FI in nursing homes (Appendix Table F151).[233-235] The largest improvement (10 percent increase in appropriate toileting) was achieved after prompted voiding treatment, including checks for incontinence, offering toileting assistance, prompted voiding, and social reinforcement of appropriate toileting (Appendix Table F152).[233] The percentage of incontinent wet checks among total checks by nurses was reduced by 3 percent.[233] Integrated incontinence care and frequent exercises showed a significant reduction of 6 percent in the proportion of wet episodes.[235] Functional incidental training that included prompted voiding combined with individualized endurance and strength-training exercises reduced the number of wet stool checks among total checks by 1.2 percent.[234]

Pharmacological interventions on FI in LTC settings. One RCT examined the effects of laxative agents in elderly patients with FI associated with chronic fecal impaction (Appendix Table F151).[817] The number of FI episodes per patient day did not differ when an osmotic agent with a rectal stimulant and weekly tap-water enemas were compared to single osmotic laxative (Appendix Table F153).[817]

Evidence-based conservative management of FI included the assessment of patient history and rectal examination, patient education on regular toilet habits, pelvic floor and sphincter-strengthening exercises, and individualized doses of laxatives.[509] Implementation of this program did not reduce the frequency of self-reported fecal episodes (Appendix Table F154) and did not improve quality of life (Appendix Table 155) in stroke patients with constipation and FI (Appendix Tables F156 and F157).

Summary. In conclusion, very few well-designed RCTs examined the clinical interventions on FI in nursing homes and LTC settings. A small improvement in severity of FI was reported after integrated care in nursing homes that included prompted toileting and exercise. The effects of conservative management of FI in subgroups by gender, race, and ethnicity remain unknown. Clinical interventions that can reduce the risk of incidence and progression of FI in LTC settings have not beet tested in RCTs.

Dietary Interventions on FI in Community Dwelling Adults

One small placebo-controlled RCT examined the effects of fiber supplements on FI. A usual diet supplemented with 7.1g of soluble fiber psyllium reduced the rate of incontinent stools to 17 percent compared to 50 percent after placebo treatments, but the relative risk was not significant (RR 0.3, 95 percent CI 0.1; 1.2) (Appendix Table F158).[371]

Supplementation with 25g of gum Arabic increased stool weight by 3 percent compared to placebo with no difference in water content and holding capacity (Appendix Table F159). The effects of dietary fiber on FI need future investigation in a large clinical trial.

Effects of Conservative Management of Postnatal FI in Females

In an RCT of 747 women with postnatal UI (Appendix Table F151)[251,252] intensive pelvic floor muscle training reinforced by visiting nurses within 9 months after delivery significantly reduced the rate of any FI to 4.4 percent compared to 10.5 percent after standard care (RR 0.5, 95 percent CI 0.3; 1.0) at 1 year but not 6 years of followup (Appendix Table F159 and F160). However, severe FI did not differ between groups either at 1 or at 6 years.

Summary. The effects of behavioral changes supervised by health care providers that would provide long-term protection from postnatal FI require further investigation.

Behavioral Interventions on FI in Females

Self-administered behavioral interventions in females were examined in three RCTs.[250,372,511]

Patient outcomes.

Continence. Sensory biofeedback training with a vaginal perineometer and standard Kegel pelvic floor muscle training produced continence twice as often in women with FI after obstetric and sphincter trauma as augmented biofeedback pelvic floor muscle training with audiovisual feedback and electric stimulation (RR 2.0, 95 percent CI 1.1; 3.9) (Appendix Table F161).[372] We estimated that 382 cases of FI would be prevented per 1,000 women with FI after obstetric and sphincter trauma treated with augmented biofeedback and electrostimulation (95 percent CI 27; 1,055). Pelvic floor muscle training with visual and verbal biofeedback therapy using a radial catheter with a latex balloon cured no more women with frequent idiopathic FI than pelvic floor muscle training (Appendix Table F162).[511]

FI. In an RCT of 493 pregnant women with and 1,034 women without previous vaginal birth, self-administered perineal massage during pregnancy until delivery did not improve postnatal FI at 3 months postpartum (Appendix Table F163).[250]

Surrogate outcome - O*bjectively measured mean maximum resting pressure* was increased by 5 percent and squeeze pressure by 3 percent compared to the control intervention (Appendix Table F164).[372]

Effects of Behavioral Interventions on FI in Community Dwelling Adults

The effects of behavioral interventions on FI in Community dwelling adults (secondary prevention) were examined in six RCTs[373-376,502,818] and one nonrandomized controlled trial[501] (Appendix Table F151).

Patient outcomes.

Continence. Continence was reported in one large RCT of 171 patients with FI of different causes.[376] Bowel training with instructions on sphincter exercises with and without biofeedback was no better than standard care (Appendix Table F165).

Improvement of FI. A nonrandomized controlled clinical trial examined the effects of telephone-assisted biofeedback treatment for patients with refractory FI living in rural areas.[501] Improvement in self-reported Pascatori and St Mark scores and in anal manometry outcomes was not greater compared to the standard face-to-face protocol (Appendix Table F166).Rates of improvement in FI (45 to 55 percent) were the same after hospital-based computer-assisted sphincter pressure biofeedback with and without electrostimulation, as well as after receiving advice on diet, fluid intake, and bowel training (Appendix Table F167).[376] Education and biofeedback therapy using a radial catheter resulted in nonsignificant improvement in FI in 50 percent of patients with idiopathic FI.[511] Standard care combined with pelvic floor muscle training improved symptoms of FI in 45 percent of the patients.[511] Pelvic floor muscle training with manometry and ultrasound improved FI in 43 percent of the patients.[501]

In conclusion, a few tested behavioral interventions cured 5 to 10 percent and improved FI in more than 40 percent of the patients but with no statistically significant differences compared to standard care.

FI. The effects of behavioral clinical interventions were examined on self-reported frequency of incontinent episodes and severity scores as well as on objective instrumental outcomes (Appendix Table F168). Progression of FI was three times more frequent after telephone-assisted biofeedback compared to individualized biofeedback.[501]

Surrogate outcome - S*ubjectively measure severity of FI and quality of life with FI.*

Hospital-based training and biofeedback services combined with sphincter exercises and electromyelogram biofeedback devices significantly reduced the number of fecal accidents per week by 47 percent.[376] The same intervention without the device reduced fecal episodes by 52 percent.[376] In a small crossover RCT of 23 patients with idiopathic FI associated with abnormal perineal descent and frequent irritable bowel syndrome, pelvic floor muscle training with active sensory retraining reduced FI episodes by 37 percent compared to exercises with no instructions.[373] One RCT reported a significant reduction in weekly pad use for FI by 78 percent after hospital biofeedback in combination with an electromyelogram device, by 61 percent after hospital-based computer-assisted sphincter pressure biofeedback, and by 89 percent after lifestyle changes and sphincter exercises.[376]

Behavioral interventions did not improve total FI scores in the majority of the trials.[375,376,502,818] Only one RCT reported a small significant improvement in St Mark FI scores by 9 percent.[375] One RCT showed significant improvement in quality of life after pelvic floor muscle training and biofeedback compared to baseline levels by 4 percent in Pescatori scores of family and relationship and by 16 percent in Pescatori scores of travel restriction.[374]

Summary. In conclusion, four RCTs of behavioral treatments of FI reported small (<40 percent) improvement in severity and quality of life (Appendix Table F169).[372-375] Limited

evidence suggested a significant reduction in FI after complex behavioral interventions, including lifestyle changes and exercises augmented with biofeedback (Appendix Table F170).[376]

Effects of Electrical Stimulation and Neuromodulation on FI

Several RCTs examined the effects of electrical stimulation or neuromodulation on FI (Appendix Table F151).[377,819-821]

Patient outcomes.

Continence. Active anal stimulation did not produce better cure (Appendix Table F171), significant, or small improvement in FI compared to sham stimulation (Appendix Table F172).[819]

Improvement. Individualized sacral nerve continuous stimulation improved FI in 89 percent of patients with severe baseline FI compared to 17 percent after sham stimulation.[377] We estimated that 720 additional patients among 1,000 treated would experience an improvement in symptoms of FI after individualized sacral nerve stimulation.

Surrogate outcomes.

Subjective measures of quality of life. However, the treatments did not improve quality of life with random differences after active and sham stimulation (Appendix Table F173). Electrical stimulation of the anal sphincter in addition to intra-anal EMG biofeedback did not change FI compared to standard training of the pelvic floor.[821] Active stimulation therapy using an anal plug with a pulse generator did not improve patient satisfaction with bowel habits of the incomplete evacuation score.[820]

Objective measures of severity of FI. All RCTs reported small inconsistent differences in anal manometry outcomes after active stimulation compared to the control (Appendix Table F174).

Summary. In conclusion, electrical stimulation did not improve FI in the majority of the RCTs. The significant relative improvement after sacral nerve stimulation in patients with severe baseline FI requires future confirmation in a large well designed RCT with long-term followup.

Effects of Massage on FI

One RCT did not show significant differences in risk of FI 3 months postpartum from massage and stretching of the perineum during the second stage of labor with a water soluble lubricant.[514]

Effects of Pharmacological Agents on FI in Community Dwelling Adults

Pharmacological agents on FI in community dwelling adults were examined in 12 RCTs (Appendix Table F151).[378-380,403-405,822-827]

Botulinum toxin.

Outcome - FI. Four RCTs examined the effects of botulinum toxin in patients with constipation and symptoms of outlet obstruction.[380,822,826,827] The incidence of FI was not significantly higher after Botox compared to lateral internal anal sphincterotomy.[380] All patients were continent after local injection of Botox to the each side of the puborectalis or to the posterior aspect of this muscle (Appendix Table F175).[822]

Surrogate outcome - Subjective measures of severity of FI. Self-reported modified Wexner Fecal Continence scores[826] were not improved after Botox administration (Appendix Table F176).

Surrogate outcome - Objective measure of severity of FI. Anal manometry outcomes[827] were not improved after Botox administration (Appendix Table F176).

Loperamide.

Two RCTs examined the effects of loperamide in patients after restorative proctocolectomy for ulcerative colitis[378] and in patients with chronic diarrhea and FI.[823]

Surrogate outcome - Subjective measure of severity of UI. Neither treatment resulted in better outcomes. Frequency of FI episodes and use of pads at night were the same after loperamide or placebo (Appendix Table F177).[378] Loperamide reduced fecal urgency in patients with chronic diarrhea and FI (mean difference -1.0, 95 percent CI -1.9; -0.1)[823]

Surrogate outcome - Objective measures of severity of FI. Loperamide in patients after restorative proctocolectomy for ulcerative colitis[378] and in patients with chronic diarrhea and FI[823] did not improve anal manometry outcomes[378,823] (Appendix Table F176).

Synthesizing the evidence from all available clinical trials, few interventions[378-380] resulted in fecal continence in more than 50 percent of patients but were not statistically better than placebo[378,379]or surgery[380] (Appendix Tables F178-F180). Chemical sphincterotomy with isosorbide-5-mononitrate,[404] glycerine trinitrate, and Botox resulted in 100 percent continence rate.[405] Chemical sphincterotomy with phenylephrine demonstrated significant efficacy compared to placebo.[824] Reproducibility of the significant effects of chemical sphincterotomy using different agents should be confirmed in the large RCTs.

Effects of Chemical Sphincterotomy

Three RCTs analyzed the effects of chemical sphincterotomy (primary prevention) in patients with chronic anal fissure.[403-405]

Patient outcomes - C*ontinence*. All patients were continent after rectal administration of isosorbide-5-mononitrate[404] and after glycerine trinitrate ointment[405] (Appendix Table F177). Healing of anal fissures was observed four times more often after isosorbide-5-mononitrate compared to placebo (RR 4, 95 percent CI 1; 13).[404] We estimated that rectal administration of isosorbide-5-mononitrate would result in 580 healed patients among 1,000 treated.

Surrogate outcome - S*ubjective and objective measures of severity of FI*. Chemical sphincterotomy with oral nifedipine[403] or rectal administration of isosorbide-5-mononitrate[404] did not result in consistent improvement in the Wexner scores and anal manometry outcomes (Appendix Table F176).

Effects of Alpha-Adrenergic Agonist on FI

Patient outcome - *Improvement in FI.* Topical 10 percent phenylephrine, alpha-adrenergic agonist increasing anal sphincter pressure, applied to the anus improved FI symptoms three times more often than placebo in patients with dysfunctional anal sphincter (RR 3, 95 percent CI 1; 13).[824]

Surrogate outcome - *Subjective measures of severity of FI.* Anal administration of phenylephrine significantly improved FI scores and FI symptom scores[503] but not the Wexner scale scores[824] (Appendix Table F176).

Effects of Nonabsorbable Basic Aluminum Salt on Late Rectal Injury Related to Radiotherapy

Patient outcome - *FI.* Oral sucralfate did not prevent FI in prostate cancer patients treated with radiotherapy at a 3 month followup.[379]

Effects of Medical Bowel Confinement on FI

Patient outcome - *Improvement in FI.* Medical bowel confinement and regular diet did not improve FI after anorectal reconstructive surgery at 13 months of followup.[825]

Summary. Synthesizing the evidence from all available clinical trials, a few interventions[378-380] resulted in fecal continence in more than 50 percent of patients but were not statistically better than placebo[378,379] or surgery[380] (Appendix Tables F158 and F159s). Chemical sphincterotomy with isosorbide-5-mononitrate,[404] glycerine trinitrate, and Botox resulted in 100 percent continence rate.[405] Administration of phenylephrine to improve sphincter function in patients with FI after ileoanal pouch construction demonstrated significant efficacy compared to placebo.[824] Reproducibility of the significant effects of chemical sphincterotomy using different agents should be confirmed in the large RCTs.

Effects of Different Techniques to Repair External Anal Sphincter after Acute Obstetric Trauma

Four RCTs compared end-to-end technique to overlapping repair of obstetric anal sphincter lacerations (Appendix Table F151).[381-384]

Patient outcome - *FI.* Defects of internal or external sphincter did not differ after two techniques (Appendix Table F181).[383] The rates of self-reported fecal and flatus incontinence were the same after both interventions.[382] Only one RCT reported a significant reduction in fecal urgency at 6 and 12 months postpartum after end-to-end technique compared to overlapping repair.[381] We estimated that 250 per 1,000 treated women would not experience fecal urgency at 6 months and 283 at 12 months postpartum.

Surrogate outcome - *Subjective and objective measures of FI.* Self-reported symptoms of FI and anal manometry were comparable after overlap or end-to-end anal sphincter repair (Appendix Tables F182 and F183).[828] FI scores and instrumental outcomes did not differ after two interventions (Appendix Table F184).[383,384]

Effects of Clinical Interventions to Prevent FI after Delivery

The effects of episiotomy were examined in two RCTs,[386,387] the effects of Cesarean or vaginal delivery were compared in two RCTs,[388,389] the effects of delayed or immediate pushing in the second stage of labor with epidural analgesia in one RCT,[390] and the effects of delivery by forceps or vacuum extractor in three RCTs[391-393] (Appendix Table F151).

Patient outcome - *FI.* Self-reported FI 18 months postpartum was the same after restrictive or liberal episiotomy.[386] The same proportion of women after mediolateral episiotomy or vaginal birth experienced FI (Appendix Table F185).[387]

Cesarean vs. vaginal delivery resulted in the same rates of fecal and flatus incontinence at 3 months and 2 years postpartum.[388,389] However, only 43 percent of women randomized to vaginal delivery underwent Cesarean section.

Delayed or immediate pushing in the second stage of labor with epidural analgesia demonstrated the same rates of FI and sphincter defects in ultrasound at 3 months postpartum.[390]

Delivery with a vacuum extractor tended to increase the risk of anal (RR 3.5, 95 percent CI 1.0; 12.2) [393] or FI (RR 1.8) [391] compared to forceps delivery with borderline significance of the differences (Appendix Table F185).

Surrogate outcome - *Subjective and objective measures of FI*. Self-reported FI scores and instrumental outcomes did not differ after all tested treatments.(Appendix Table F186)

Summary. No evidence suggested that Cesarean section or instrumental delivery can prevent FI postpartum compared to vaginal delivery.

Effects of Early Ultrasound Diagnosis of Anal Obstetric Trauma

Clinical and ultrasound examination of the anal sphincter to diagnose tears followed by immediate surgical repair were examined in one well-designed RCT of 752 nulliparous women with second-degree perineal tear (Appendix Table F187).[385]

Patient outcomes - *FI.* Self-reported FI and fecal urgency at 3 months and 1 year of followup did not differ among women who underwent ultrasound examinations compared to clinical examinations alone. Severe FI was reduced by 60 percent after ultrasound examination at 3 months (RR 0.4, 95 percent CI 0.2; 0.7) with no differences at 1 year of followup.

In conclusion, effective clinical interventions to reduce the risk of FI related to obstetric trauma are not well known and require future investigation.

Effects of Surgical Interventions on FI in Females with Rectal Prolapse

The effects of surgical procedures on FI in women with full-thickness rectal prolapse were evaluated in two small and underpowered RCTs.[413,414] Abdominal resection rectopexy was compared to perineal rectosigmoidectomy and pelvic floor repair in 20 elderly female patients with FI who were followed up for 17 months.[413]

Patient outcome - *Continence*. Both treatments resulted in continence rate of 40 percent (Appendix Table F188). Marlex mesh posterior rectopexy alone cured 56 percent and sigmoidectomy combined with a sutured posterior rectopexy cured 46 percent of 29 women with full-thickness rectal prolapse with no significant differences between treatments.[414]

Effects of Surgical Interventions on Females with FI

The effects of surgical interventions on neuropathic FI in community dwelling women were examined in several RCTs.[428,829-831]

Patient outcome - *Continence*. Gluteus maximus transposition failed to cure 33 percent and total pelvic floor postanal repair with anterior levatoroplasty failed to cure 42 percent of women with post obstetric FI (Appendix Table F189).[428] Total pelvic floor repair cured 75 percent, postanal repair cured 33 percent, and anterior levatoroplasty and sphincter plication cured 33 percent of 36 women 28-75 years with neuropathic FI with no statistically significant differences

between groups.[829] Adjuvant biofeedback following anal sphincter repair and anterior overlapping sphincter repair cured <6 percent of 38 females with persistent FI and external anal sphincter defect with no statistically significant differences between groups.[830]

Surrogate outcome - *Subjective and objective measures of severity of FI.* Self-reported FI scores, patient satisfaction, and quality of life were comparable after the tested interventions (Appendix Table F190).[385,428] Surgeries resulted in random differences in instrumental outcomes inconsistent in the direction and effect size (Appendix Table F191). Small changes in maximum resting pressure were observed after adjuvant internal anal sphincter plication in pelvic floor repair compared to pelvic floor repair alone in 33 women with severe neuropathic FI related to vaginal delivery.[831]

Patient outcome - *FI.* FI did not differ at 12 months after total abdominal or subtotal abdominal hysterectomy in a well-designed RCT of 279 women with benign uterine diseases.[754]

Summary. Overall, limited evidence from small RCTs suggested that surgical procedures result in comparable risk of FI and quality of life. The effect size varied depending on the definition of FI and baseline cause and severity of FI. The effectiveness of the interventions in the subgroups of different age and severity categories require future investigation.

Effects of Clinical Interventions in Men with Prostate Diseases on the Risk of FI

Patient outcomes.

Continence. The effects of radiotherapy on FI in men with prostate diseases were examined in three RCTs (Appendix Table F151).[780,788,790] Both regimes of radiation resulted in more than an 80 percent continence rate.[780]

FI. Three-dimensional conformal radiotherapy with a dose of 68Gy reduced rates of FI with frequent pad use in 7 percent compared to 12 percent after a dose of radiation of 78Gy at 4 years (RR 0.5, 95 percent CI 0.3; 0.9) but not at 5 years of followup (Appendix Table F192).[788] Patients with prostate cancer reported the same use of sanitary shields for stool leakage after radiotherapy or active surveillance.[790]

Surrogate outcome - *Subjective measure of severity of FI*. Self-reported stool leakage tended to be greater after radiotherapy compared to active surveillance (Appendix Table F193).[790]

Effects of Bowel Management on FI in Patients with Spinal Cord Injury

Surrogate outcomes - *Subjective measures of severity of FI.* Transanal irrigation showed a small positive effect compared to conservative bowel management in 87 patients after spinal cord injury and symptoms of neurogenic bowel dysfunction (Appendix Table F194).[832] Neurogenic bowel dysfunction scores were reduced by 3 percent, St Mark's FI scores by 7 percent, and Cleveland Clinic constipation scores by 6 percent. The other incontinence outcomes, including the American Society of Colon and Rectal Surgeons FI scores, influence of FI on daily activities, and the number of episodes of clothes change, however, showed no differences (Appendix Table F194).

Effects of Different Techniques of Hemorrhoidectomy on FI

The effects of hemorrhoidectomy on FI in adults were examined in nine RCTs (Appendix Table F151).[394-402]

Patient outcomes.

Continence. Several interventions resulted in fecal continence in all patients, including stapled and excision hemorrhoidectomy,[394] ligature and open diathermy hemorrhoidectomy,[396] submucosal hemorrhoidectomy with radiofrequency bistouries and Conventional Parks' hemorrhoidectomy,[399] excisional hemorrhoidectomy with ultrasonically activated scalpel, and closed excisional hemorrhoidectomy assisted by electrocautery[401] (Appendix Table F195). The rates of continence were not consistent across RCTs; for example, all patients were continent after ligature haemorrhoidectomy in one,[396] but only 67 percent in another trial.[398] The rates of FI after open haemorrhoidectomy varied from 0.1 percent in a small RCT (N=42)[397] to 7 percent in an RCT with 250 patients.[400]

Improvement in FI. Improvement in FI did not differ after open or closed hemorrhoidectomy.[400] However, no statistical differences in outcomes after the tested procedures were shown. Self-reported increase in FI was observed in 15 percent of patients after ligature and in 25 percent of patients after open diathermy haemorrhoidectomy (RR not significant) (Appendix Table F196).[396]

Surrogate outcome - *Objective measure of severity of FI.* Anorectal outcomes demonstrated inconsistent changes across four RCTs,[397,400-402] with significant differences in one.[397] (Appendix Table F197).

Effects of Clinical Interventions in Patients with Colorectal Diseases on FI (FI-Secondary Outcome)

The effects of surgical interventions on FI were compared in patients with anorectal abscesses,[415] fistula-in-ano,[416-418] anal fissure,[419-423] and adenocarcinoma of the rectum[424-426] (Appendix Table F151).

Patient outcome - *FI.* Incision, drainage, and fistulectomy with primary partial internal sphincterectomy compared to incision and drainage alone did not reduce the risk of flatus incontinence and soiling in patients with anorectal abscesses (Appendix Table F198).[415] Special fibrin sealant combined with intra-adhesive cefoxitin, surgical closure of primary opening, or both modifications resulted in fecal continence in all patients with chronic anal fistula.[416] Adjuvant radiotherapy before total excision in patients with rectal cancer consistently increased the risk of FI in three RCTs, by 60 percent during the day (RR 1.6, 95 percent CI 1.4; 1.9), by 90 percent during the night (RR 1.9, 95 percent CI 1.4; 2.6), by 70 percent in utilization of pads (RR 1.7, 95 percent CI 1.4; 2.1) compared to mesorectal excision,[424] and by 220 percent (RR 2.2, 95 percent CI 1.2; 4.2) compared to the low anterior resection.[424] The harm of adjuvant radiotherapy reported in an RCT of 171 patients who survived for a minimum of 5 years after treatment with an increased relative risk of incontinence of liquid stool (RR 2.1, 95 percent CI 1.3; 3.2), incontinence of solid stool (RR 4.1, 95 percent CI 1.2; 14.2), and utilization of pads (RR 2.2, 95 percent CI 1.4; 3.5) [425] was larger. We estimated that surgery without adjuvant radiation would avoid 240 cases of daytime FI per 1,000 treated,[424] 310 cases of self-reported FI,[424] 260 cases of

loose stool, and 110 cases of loose solids.[425] Adjuvant radiation also restricted social activities almost three time more often compared to surgery (RR 2.9, 95 percent CI 1.4; 5.8).[425]

Surrogate outcome - *Subjective measures of severity of FI*. Postoperative radiotherapy, in addition to intensive daily pelvic floor muscle training with intra-anal biofeedback, improved the modified Cleveland Incontinence Scores at 1 year by 5.6 percent (mean difference -0.6, 95 percent CI -1.0; -0.2) compared to behavioral treatments without radiation (Appendix Table F199).[426]

The clinical effects of glyceril trinitrate application were compared to lateral sphincterotomy with no significant difference in FI among patients with chronic anal fissure.[419-423] Quality of life was the same after both treatments.[422]

The trial that compared dermal island flap anoplasty with cutaneous advancement flap into the rectum to conventional open fistulotomy or seton insertion in 20 patients with fistula-in-ano reported comparable FI scores (Appendix Table F199).[418] Another RCT did not show difference in FI Wexner scores after internal sphincterotomy compared to the application of 0.25 percent nitroglycerin tid to perianal area in 90 patients with symptomatic chronic anal fissures (Appendix Table F199).[422]

A trial that compared dermal island flap anoplasty with cutaneous advancement flap into the rectum with conventional open fistulotomy or section in 20 patients with fistula-in-ano reported comparable FI scores.[418] Another RCT did not show differences in FI. Wexner scores after internal sphincterotomy compared the application of 0.25 percent nitroglycerin tid to the perineal area in 90 patients with symptomatic chronic anal fissures[422] (Appendix Table F199).

Effects of Clinical Interventions in Patients with Rectal Prolapse on FI

The effects of clinical interventions in patients with rectal prolapse on FI were examined in seven RCTs (Appendix Table F151).[406-412]

Patient outcome - *FI*. The risk of complete FI was reduced by 60 percent (RR 0.4, 95 percent CI 0.2; 0.7) after posterior sutured abdominal rectopexy combined with sigmoidectomy and end-to-end stapled anastomosis compared to polyglycolic acid mesh rectopexy without sigmoidectomy (Appendix Table F200).[406]

Surrogate outcome - *Subjective and objective measures of severity of FI*. Surgical procedures did not reduce the risk of FI, self-reported severity scores, or instrumental outcomes (Appendix Table F201).

Effects of Surgical Treatments of Anal Sphincter on FI

The effects of surgical treatments of anal sphincter on FI related to chronic anal fissure, fistulas, or neurogenic causes were examined in several RCTs (Appendix Table F151).[427,833-839]

Patient outcomes.

Continence. Open lateral internal sphincterotomy, as well as the anal administration of isosorbide dinitrate, resulted in fecal continence in all 63 patients with chronic anal fissure (Appendix Table F202).[834]

FI. Implantation of artificial bowel sphincter reduced urge FI by 80 percent (RR 0.2, 95 percent CI 0.2; 0.3), pad utilization by 40 percent (RR 0.6, 95 percent CI 0.5; 0.7), and restrictions in physical activities by 60 percent (RR 0.4, 95 percent CI 0.3; 0.5) compared to baseline levels (Table 68 and Appendix Table F202).[427]

Progression of FI was reduced by 80 percent (RR 0.2, 95 percent CI 0.1; 0.9) after closed compared to open lateral sphincterotomy.[833] Improvement in FI was increased by 40-50 percent after anterior levatorplasty with mobilization of external sphincter compared to anal (and vaginal in women) plug electrostimulation of the pelvic floor[837] in patients with idiopathic severe refractory FI. Physical restrictions were reduced by 50 percent (RR 0.5, 95 percent CI 0.2;0.9).

Surrogate outcome - *Subjective and objective measures of severity of FI.* Artificial bowel sphincter reduced FI scores (0-120 for complete FI) from 106 to 48 (mean difference -1.7, 95 percent CI -1.4;-2.0) or by 2 percent compared to the baseline condition.[427] Artificial bowel sphincters reduced the Cleveland Clinic Scoring and the American Medical Systems quality of life questionnaire specific to FI compared to usual supportive care.[839](Appendix Table F203).

Guidance by endoanal ultrasound of injections of silicon biomaterial into inter-sphincteric space and internal anal sphincter improved the Wexner and visual analog scores and FI Quality of Life Index compared to injections without a guide (Appendix Table F204).[838]

All procedures resulted in small inconsistent changes in anal manometry outcomes (Appendix Table F204).

Surrogate outcome - *Dynamic graciloplasty.* One multicenter noncontrolled nonramdomized clinical trial (Dynamic Graciloplasty Therapy Study Group) reported significant improvements quality of life (Medical Outcomes Study Short Form 36 physical function and social functioning). The majority of nonstoma patients (56 to 62 percent) at 12-24 months had continent stools/total number of stools ≥50 percent. In the stoma patients 37.5 percent at 12 months to 43 percent at 24 months reported having continent stools.[429,430]

Summary. In conclusion, implanting an artificial bowel sphincter demonstrated some consistent effects to reduce the risk of FI. Adjuvant radiation in patients with prostate cancer resulted in a consistent significant increase in FI compared to surgery alone. The protective effects on FI of surgeries for hemorrhoids, rectal prolapse, rectal cancer, and anal fissures are not replicable across RCTs and require future confirmation in well-designed long-term RCTs.

Surgical Interventions (Restorative Proctocolectomy) on FI in Adults (FI as Secondary Outcome)

Surgical interventions (restorative proctocolectomy) on FI in adults (FI as secondary outcome) were examined in patients with cancer in 13 RCTs,[840-852] in patients with ulcerative colitis in four RCTs,[431-434]and one retrospective cohort,[853] in patients with rectal prolapse in one RCT,[854] and in patients with sphincter damage in one RCT[855] (Appendix Table F151).

Patient outcome - *Continence*. The majority of patients with cancer were continent after standardized resection with J pouch anastomosis or straight coloanal anastomosis across RCTs (Table 69). Rates of FI did not differ between treatment groups. Abdominal colectomy with hand sewing or double stapling the pouch to the anal canal provided the highest rates of continence in patients with ulcerative colitis with no differences between the two surgeries.[431] All patients were continent after duplicated or quadruplicated ileal reservoirs in restorative proctocolectomy with no differences between them.[432,433] Abdominal rectopexy with or without sigmoidectomy resulted in the same continence rates in patients with rectal prolapse.[854]

Fecal continence was reported in 75 percent of 1,885 patients operated for chronic ulcerative colitis at 1 year and gradually decreased to 59 percent after 20 years of followup (Appendix Table F205).[853] The proportion of patients continent after surgery increased during the last decades from 57 percent in 1981-1985 to 70 percent from 1996-2000 (Appendix Table F206).[853]

Surrogate outcome - *Subjective and objective measures of severity of FI.* Severity of FI differed between types of surgical anastomosis in patients with cancer (Appendix Table F207). Low anterior resection with straight anastomosis increased FI scores by 61 percent compared to J pouch anastomosis (mean difference in a scale from 0 to18 for complete FI, 1.2, 95 percent CI 0.8; 1.7).[844] In contrast, another RCT showed a significant increase in the Wexner FI scores after J anastomosis (mean difference 1.3, 95 percent CI 0.5; 2.0),[841] The Fecal Incontinence Severity Index decreased after J anastomosis (mean difference -4.6, 95 percent CI -5.6; -3.5) and the FI quality of life scale improved (mean difference 0.7, 95 percent CI 0.1; 1.3).[856] Severity of FI did not differ after the tested interventions in patients with ulcerative colitis or rectal prolapse.

Anal manometry outcomes demonstrated random changes after surgical interventions with inconsistent direction and effect size. Smaller RCTs reported greater differences (Appendix Table F208).

Summary. In conclusion, different types of anastomosis (J-pouch-anal or straight) combined with resection of cancer resulted in comparable fecal continence rates across the RCTs. Surgical interventions in patients with ulcerative colitis were comparable between active treatments for fecal continence in the majority of the patients during the first 10 years after surgery with an increased risk of FI during longer period of followup. The effects of treatments on quality of life were inconsistent in direction and effect size.

Clinical interventions resulted in comparable incidence and progression of FI in the majority of the RCTs. Significant relative benefits on fecal continence were reported in small trials of <100 subjects (Table 70). Definite harm of adjuvant radiotherapy compared to surgery alone was shown in RCTs of 597 patients[424] and 171 patients[425] with rectal cancer. Short-term benefits of pelvic floor muscle training supplemented with bladder training and supervised by nurses was reported in RCTs of 747 pregnant women.[251] Early detection of anal sphincter tears after vaginal delivery, followed by immediate surgical repair, significantly reduced the risk of FI 3 months and 1 year postpartum in RCTs of 752 pregnant women.[385] The significant results of small RCTs need future confirmation in well-designed long-term trials.

Table 68. Comparative effectiveness of surgical interventions in anal sphincter on FI in adults (events)

Author Sample Followup	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment/ Number Treated	Number of Cases After Control Treatment/ Number Treated	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Wiley, 2004[833] N = 79 54% female 12 month followup	Closed lateral internal sphincterotomy (Hoffman and Goligher) using a short stab incision and blind division of internal sphincter guided by the surgeon finger	Open lateral sphincterotomy (Parks) via a 1cm radial incision with division of internal sphincter under direct vision	Self-reported deterioration in FI	2/38	10/41	5.3	24.4	**0.2 (0.1; 0.9)**	5 (4; 53)	191 (19; 232)A
Wong, 2002[427] N = 112 75% female 12 month followup	Implantation of Acticon trade mark artificial bowel sphincter - solid silicone elastomer device	Baseline condition	Using pad for FI	60/112	99/112	54.0	88.0	**0.6 (0.5; 0.7)**	3 (2; 4)	340 (238; 437)A
			Using diapers for FI	19/112	57/112	17.0	51.0	**0.3 (0.2; 0.5)**	3 (2; 4)	340 (244; 401)A
			Avoiding physical activities due to FI	32/112	91/112	29.0	81.0	**0.4 (0.3; 0.5)**	2 (2; 2)	520 (423; 600)A
Osterberg, 2004[837] N = 70 79% female 12 month followup	Anterior levatorplasty with mobilization of external sphincter	Anal (and vaginal in women) plug electrostimulation of the pelvic floor with stimulation frequency was 25 Hz and the duration 1.5 seconds, with a pulse-train interval of 3 seconds	Self-reported improvement in FI at 3 months	28/35	19/35	80.0	54.3	**1.5 (1.0; 2.1)**	4 (2; 43)	257 (23; 588)E
			Self-reported improvement in FI at 24 months	26/35	19/35	74.3	54.3	1.4 (1.0; 2.0)		
			Use of pads for FI at 1 year	10/35	15/35	28.6	42.9	0.7 (0.3; 1.3)		
			Physical handicap due to FI at 1 year	9/35	19/35	25.7	54.3	**0.5 (0.2; 0.9)**	4 (2; 18)	286 (55; 407)A

Bold - significant difference in outcomes at 95% confidence level**;** E - number of excessive events per 1,000 treated; A - number of avoided events per 1,000 treated; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence)

Table 69. Effects of restorative proctocolectomy on FI in adults (events)

Author Sample Followup	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment/ Number Treated	Number of Cases After Control Treatment/ Number Treated	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Patients with Cancer										
Seow-Choen, 1995[840] N = 40 35% female 12 month followup	Ultra-low anterior resection with total mesorectal excision and 8cm J colonic pouch-anal anastomosis (median distance of anastomosis from the anal verge 3cm)	Ultra-low anterior resection with total mesorectal excision and straight coloanal anastomosis (median distance of anastomosis from the anal verge 3.25cm)	Fecal continence	19/20	14/20	95.0	70.0	**1.4 (1.0; 1.8)**	4 (2; 1,046)	250 (1; 588)E
Ho, 2001[841] N = 42 60% female 24 month followup	Standardized ultra-low anterior resection with J pouch anastomosis by folding the descending colon to the form of a `J', 6cm in length	Standardized ultra-low anterior resection with straight coloanal anastomosis, the descending colon was connected to the anorectal stump	FI	0/16	1/19	0	5.0	0.4 (0.0; 9.0)		
			Incontinence to gas	0/16	3/19	0	16.0	0.2 (0.0l; 3.0)		

Table 69. Surgical interventions (diversion) on FI in adults (events) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment/ Number Treated	Number of Cases After Control Treatment/ Number Treated	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Ho, 2002[842] N = 12 17% female 12 month followup	Standardized ultra-low anterior resection with J pouch anastomosis by folding the descending colon to the form of a `J', 6cm in length	Standardized ultra-low anterior resection with straight coloanal anastomosis, the descending colon was connected to the anorectal stump	Self-reported fecal continence	6/6	6/6	100.0	100.0			
Soliani, 1992[843] N = 57 32% female .5 months followup	Conceal Colostomy Plug fit with a two-piece Conceal system	Conceal Colostomy Plug fit with a one-piece Conceal system	Improved fecal continence	5/36	7/57	13.9	12.3	1.1 (0.4; 3.3)		
Hallbook, 1996[844] N = 100 45% female 12 month followup	Low anterior resection with total mesorectal excision with straight anastomosis 6 to 8cm in length	Low anterior resection with total mesorectal excision colonic J pouch anastomosis 6 to 8cm in length	Symptomatic anastomotic fecal leakage	8/52	1/45	15.0	2.0	6.9 (0.9; 53.3)		
			Proportion with frequent nocturnal bowel movements	12/52	3/45	24.0	7.0	**3.5** **(1.0; 11.5)**	6 (1; 340)	170 (3; 735)E
			Ability to always defer defecation >30 minutes (%)	8/52	22/45	15.0	49.0	**0.3** **(0.2; 0.6)**	3 (2; 6)	340 (178; 414)A
			Ability to always evacuate the bowel <15 minutes (%)	29/52	15/45	55.0	34.0	**1.7** **(1.0; 2.7)**	5 (2; 81)	210 (12; 578)E

Table 69. Surgical interventions (diversion) on FI in adults (events) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment/ Number Treated	Number of Cases After Control Treatment/ Number Treated	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
			Never a sensation of incomplete evacuation (%)	5/52	10/45	9.0	22.0	0.4 (0.2; 1.2)		
			Bowel function does not affect well-being at all	14/52	29/45	26.0	65.0	**0.4 (0.3; 0.7)**	3 (2; 5)	390 (203; 485)A
Seow-Choen, 1995[840] N = 40 35% female 12 month followup	Ultra-low anterior resection with total mesorectal excision and 8cm J colonic pouch-anal anastomosis (median distance of anastomosis from the anal verge 3cm)	Ultra-low anterior resection with total mesorectal excision and straight coloanal anastomosis (median distance of anastomosis from the anal verge 3.25cm)	Bowel urgency < 15 minutes	2/20	4/20	10.0	20.0	0.5 (0.1; 2.4)		
			Bowel urgency > 15 minutes	17/20	16/20	85.0	80.0	1.1 (0.8; 1.4)		
			Nocturnal fecal leakage	1/20	5/20	5.0	25.0	0.2 (0.0; 1.6)		
			Use of pads for FI	1/20	3/20	5.0	15.0	0.3 (0.0; 2.9)		
Ho, 2001[841] N = 42 60% female 24 month followup	Standardized ultra-low anterior resection with J pouch anastomosis by folding the descending colon to the form of a `J', 6 cm in length	Standardized ultra-low anterior resection with straight coloanal anastomosis. Descending colon was anastomosed to the anorectal stump	FI - need to wear pad	0/16	3/19	0	16.0	0.2 (0.0; 3.0)		
			FI with alterations in life style	4/16	5/19	25.0	26.3	1.0 (0.3; 3.0)		
			Nocturnal fecal leakage	0/16	1/19	0	5.0	0.4 (0.0; 9.0)		
Ho, 2002[842] N = 12 17% female	Standardized ultra-low anterior resection with J pouch	Standardized ultra-low anterior resection with	Rectosphincteric inhibitory reflex present, %	2/6	3/6	33.3	50.0	0.7 (0.2; 2.7)		

Table 69. Surgical interventions (diversion) on FI in adults (events) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment/ Number Treated	Number of Cases After Control Treatment/ Number Treated	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
12 month followup	anastomosis by folding the descending colon to the form of a `J', 6cm in length	straight coloanal anastomosis, the descending colon was anastomosed to the anorectal stump	Presence of technetium TC 99m tin-colloid liquid in descending colon 56 hours after the test	3/6	2/6	50.0	33.3	1.5 (0.4; 6.0)		
Ho, 2005[845] N = 88 40% female 12 month followup	Standardized total mesorectal excision with at least 2cm of distal tumor clearance. J-pouch was constructed from descending colon 6cm in length using an Autosuture ILA 75 linear cutting stapler	Standardized total mesorectal excision with at least 2cm of distal tumor clearance. Coloplasty pouch was anastomosed to stapled anorectal stump	Nocturnal fecal leak	7/44	4/44	15.6	8.3	1.8 (0.6; 5.6)		
			Soiling at passing flatus	8/44	5/44	18.8	11.1	1.6 (0.6; 4.5)		
			Toilet dependency	4/44	6/44	9.4	13.9	0.7 (0.2; 2.2)		
			Incomplete evacuation	21/44	17/44	46.9	38.9	1.2 (0.8; 2.0)		
			Internal anal sphincter fragmentation	3/44	4/44	6.3	8.3	0.8 (0.2; 3.2)		
Machado, 2005[846] N = 71 22% female 24 month followup	Low anterior resection and total mesorectal excision with a colonic J-pouch anastomosis	Low anterior resection and total mesorectal excision with a colonic J-pouch or a side-to-end anastomosis.	Defer defections for >30 minutes	25/36	16/35	69.0	46.0	1.5 (1.0; 2.3)		
			Sensation of incomplete evacuation	8/36	11/35	21.0	31.0	0.7 (0.3; 1.5)		
			Regular use of pad for FI	12/36	14/35	33.0	40.0	0.8 (0.5; 1.5)		
Laurent, 2005[847]	Total mesorectal excision and	Total mesorectal	Fecal urgency	1/16	3/20	6.0	15.0	0.4 (0.0; 3.6)		

Table 69. Surgical interventions (diversion) on FI in adults (events) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment/ Number Treated	Number of Cases After Control Treatment/ Number Treated	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
N = 37 19% female 24 month followup	hand sewn colonic J-pouch-anal anastomosis (6cm)	excision and stapled colonic J-pouch-anal anastomosis (6cm) using PI-30 stapling instrument	No pad requirement for FI	16/16	17/20	100.0	85.0	1.2 (0.9; 1.4)		
Lazorthes, 1997[848] N = 47 60% female 24 month followup	Complete rectal excision with coloanal anastomosis 6cm J-pouch group	Complete rectal excision with coloanal anastomosis 10cm J-pouch group	Bowel urgency	1/23	2/24	4.3	8.3	0.5 (0.1; 5.4)		
Jiang, 2005[849] N=48\44% female 24 month followup	Side-to-end anastomosis after low anterior resection	Colonic J-pouch reconstruction after low anterior resection	Urgency	1/24	1/24	4.2	4.2	1.0 (0.1; 15.1)		
			Fecal leakage	2/24	2/24	8.3	8.3	1.0 (0.2; 6.5)		
			Use of pad for FI	1/24	2/24	4.2	8.3	0.5 (0; 5.2)		
Patients with Ulcerative Colitis										
Reilly, 1997[431] N = 41 34% female 6 month followup	Abdominal colectomy excising anal transition zone and hand sewing the pouch to the anal canal (Ileal Pouch-Anal Anastomosis)	Abdominal colectomy preserving anal transition zone and double stapling the pouch to the anal canal (Ileal Pouch-Anal Anastomosis)	Complete fecal continence during days	12/15	14/17	77.0	84.0	1.0 (0.7; 1.4)		

Table 69. Surgical interventions (diversion) on FI in adults (events) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment/ Number Treated	Number of Cases After Control Treatment/ Number Treated	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Johnston, 1996[432] N = 60 57% female 12 month followup	Duplicated (J) pelvic ileal reservoirs in restorative proctocolectomy constructed with 30-40cm of ileum	Quadruplicated (W) reservoir pelvic ileal reservoirs in restorative proctocolectomy, constructed with 30-40cm of ileum	Bowel frequency at night	4/31	5/29	12.9	17.2	0.7 (0.2; 2.5)		
			Leakage of mucus (no patients reported fecal loss or pad use)	4/31	4/29	12.9	13.8	0.9 (0.3; 3.4)		
			Ability to defer defecation >30 minutes	27/31	25/29	87.1	86.2	1.0 (0.8; 1.2)		
			Ability to defer defecation >15 minutes	28/31	29/29	90.3	100.0	0.9 (0.8; 1.0)		
Selvaggi, 2000[433] N = 24 58% female 12 month followup	Ileal pouch-anal anastomosis including total colectomy, total rectal excision, and two-limb J reservoir	Ileal pouch-anal anastomosis including total colectomy, total rectal excision, and four-limb W reservoir	Number with scores <11 in fecal continence scale from 0-continence to 24 - complete incontinence	10/11	12/13	90.9	92.3	1.0 (0.8; 1.3)		
			Absence of rectoanal inhibitory reflex	1/11	1/13	9.1	7.7	1.2 (0.1; 16.8)		

Table 69. Surgical interventions (diversion) on FI in adults (events) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment/ Number Treated	Number of Cases After Control Treatment/ Number Treated	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Reilly, 1997[431] N = 41 34% female 6 month followup	Abdominal colectomy excising anal transition zone and hand sewing the pouch to the anal canal (Ileal Pouch-Anal Anastomosis)	Abdominal colectomy preserving anal transition zone and double stapling the pouch to the anal canal (Ileal Pouch-Anal Anastomosis)	Complete fecal continence during nights	5/15	11/17	36.0	62.0	0.5 (0.2; 1.1)		
			Wearing a pad for FI	1/15	4/17	7.0	26.0	0.3 (0.0; 2.3)		
Patients with Rectal Prolapse										
McKee, 1992[854] N = 18 50% female 20 month followup	Abdominal rectopexy without sigmoidectomy	Abdominal rectopexy with sigmoidectomy of redundant sigmoid colon and end-to-end anastomosis of colon and rectum made in pelvic brim	FI using saline solution infusion test	1/9	3/9	11.1	33.3	0.3 (0.0; 2.6)		

Bold - significant difference in outcomes at 95% confidence level; E - number of excessive events per 1,000 treated; A - number of avoided events per 1,000 treated; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence)

Table 70. Comparative effectiveness of clinical interventions on FI in community dwelling adults (significant differences only shown)

Author Sample Followup	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment/ Number Treated	Number of Cases After Control Treatment/ Number Treated	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Fecal Continence								
Fynes, 1999[372] N = 40 100% female 3 month followup	Augmented biofeedback training of pelvic floor with audiovisual feedback and electric stimulation of slow and fast twitch fibers for 12 weeks	Sensory biofeedback training with a vaginal perineometer and standard Kegel pelvic floor exercise for 12 weeks	Cured (became asymptomatic)	15/20	7/19	**2.04 (1.07; 3.86)**	3 (1; 37)	382 (27; 1,055)E
Seow-Choen, 1995[840] N = 40 35% female 12 month followup	Ultra-low anterior resection with total mesorectal excision and 8cm J colonic pouch-anal anastomosis (median distance of anastomosis from the anal verge 3cm)	Ultra-low anterior resection with total mesorectal excision and straight coloanal anastomosis (median distance of anastomosis from the anal verge 3.25cm)	Fecal continence	19/20	14/20	**1.36 (1.00; 1.84)**	4 (2; 1,046)	250 (1; 588)E
Peeters, 2005[424] N = 597 38% female 60 month followup	Radiotherapy with total dose of 25Gy administered in 5 fractions over 5 to 7 days before total mesorectal excision	Total mesorectal excision	Complete fecal continent (fecal incontinent at baseline)	116/306	180/291	**0.61 (0.52; 0.73)**	4 (3; 6)	240 (299; 170)A
			Always fecal incontinent	43/306	15/291	**2.73 (1.55; 4.80)**	11 (5; 36)	90 (27; 190)E

Table 70. Comparative effectiveness of clinical interventions on FI in community dwelling adults (significant differences only shown) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment/ Number Treated	Number of Cases After Control Treatment/ Number Treated	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Fernando, 2006[381] N = 64 100% female 12 month followup	Primary overlap. 1st row of sutures inserted ~1.5cm from one side of torn edge of external anal sphincter and carried through to within 0.5cm of other edge. 2nd row of sutures inserted to attach loose end of overlapped muscle	End-to-end repair of the external anal sphincter	Fecal continence	32/32	24/32	**1.33 (1.08; 1.63)**	4 (2; 16)	240 (61; 478)E
Luukkonen, 1992[406] N = 30 33% female 22 month followup	Posterior sutured abdominal rectopexy combined with sigmoidectomy complete rectal prolapse and end-to-end anastomosis made with a circular stapler	Polyglycolic acid mesh rectopexy without sigmoidectomy for complete rectal prolapse anterior rectal wall free	Complete anal continence	9/33	11/15	**0.37 (0.20; 0.70)**	2 (2; 5)	461 (589; 219)A
Improvement in Fecal Continence								
Leroi, 2005[377] N = 34 91% female 1 month followup	Active sacral nerve continuous stimulation with pulse width of 210 microseconds, frequency 14 pulses/second, and amplitude adapted to the patient's perception of perineal and anal sphincter muscle contraction	Sham sacral nerve stimulation with lead turned off	Improvement in FI	30/34	6/34	**5.00 (2.39; 10.44)**	1 (1; 4)	720 (237; 1,605)E

Table 70. Comparative effectiveness of clinical interventions on FI in community dwelling adults (significant differences only shown) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment/ Number Treated	Number of Cases After Control Treatment/ Number Treated	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Osterberg, 2004[837] N = 70 79% female 12 month followup	Anterior levatorplasty with mobilization of external sphincter	Anal (and vaginal in women) plug electrostimulation of the pelvic floor with stimulation frequency was 25Hz and the duration 1.5 seconds, with a pulse-train interval of 3 seconds	Self-reported improvement in FI Improvement in Incontinence at 3 months	28/35	19/35	**1.47 (1.04; 2.08)**	4 (2; 43)	257 23; 588)E
Davis, 2004[830] N = 38 100% female 12 month followup	Anterior overlapping sphincter repair using interrupted nonabsorbable sutures and levatorplasty using absorbable sutures	Anterior overlapping sphincter repair plus visual or auditory biofeedback with dual-balloon pressure system during pelvic floor exercise 2 times/day	Symptomatic improvement in FI	13/20	17/18	**0.69 (0.49; 0.97)**	4 (2; 33)	281 (30;474)A
Tjandra, 2004[838] N – 82 78% female 3 month followup	PTP injection into intersphincteric space and internal anal sphincter with guidance by endoanal ultrasound	PTP injection into intersphincteric space and internal anal sphincter without guidance by endoanal ultrasound	>50 percent improvement in Wexner's continence score	29/12	16/11	**1.73 (1.12; 2.65)**	3 (2; 20)	290 (49; 662)E
Dahlberg, 1998[425] N = 171 51% female 60 month followup	Preoperative high-dose radiotherapy with 25Gy given in 5 fractions for 5-7 days followed by anterior resection of rectal cancer	Anterior resection of rectal cancer alone	Excellent operation with respect to bowel function	12/84	28/87	**0.44 (0.24; 0.81)**	6 (4; 17)	180 (60; 243)A

Table 70. Comparative effectiveness of clinical interventions on FI in community dwelling adults (significant differences only shown) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment/ Number Treated	Number of Cases After Control Treatment/ Number Treated	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Risk of FI								
Glazener, 2001[251] N = 747 100% female 12 month followup	Assessment by nurses of urinary incontinence with conservative advice on pelvic floor exercises supplemented with bladder training	Usual peripartum preparation	Any FI (to motions)	12/371	25/376	**0.49 (0.25; 0.95)**	16 (13; 206)	61 (5; 79)A
Dahlberg, 1998[425] N = 171 51% female 60 month followup	Preoperative high-dose radiotherapy with 25Gy given in 5 fractions for 5-7 days followed by anterior resection of rectal cancer	Anterior resection of rectal cancer alone	Fecal urgency, toilet dependence	25/84	5/87	**5.18 (2.08; 12.89)**	4 (1; 15)	240 (65; 714)E
			Bowel emptying difficulties	44/84	31/87	**1.47 (1.04; 2.08)**	6 (3; 74)	160 (14; 390)
			Incontinence of gas	57/84	44/87	**1.34 (1.04; 1.73)**	6 (3; 49)	170 (20; 373)E
			Incontinence of loose stool	42/84	21/87	**2.07 (1.35; 3.18)**	4 (2; 12)	260 (84; 524)E
			Incontinence of solid stool	12/84	3/87	**4.14 (1.21; 14.16)**	9 (3; 157)	110 (6; 395)E
Peeters, 2005[424] N = 597 38% female 60 month followup	Radiotherapy with total dose of 25Gy administered in 5 fractions over 5 to 7 days before total mesorectal excision	Total mesorectal excision	FI during day	190/306	111/291	**1.63 (1.37; 1.93)**	4 (3; 7)	240 (142; 354)E
			FI during night	98/306	49/291	**1.90 (1.40; 2.58)**	7 (4; 15)	150 (69; 268)E
Peeters, 2005[424] N = 64 50% female 60 month followup	Radiotherapy with total dose of 25Gy was administered with 5Gy fractions to rectum, perirectal tissues, anal sphincters, and regional lymph nodes before low anterior resection of rectal cancer	Low anterior resection of rectal cancer without preoperative radiotherapy	Self-reported FI	12/21	11/43	**2.23 (1.19; 4.19)**	3 (1; 20)	310 (49; 831)E
			Self-reported gas incontinence	15/21	20/43	**1.54 (1.01; 2.34)**	4 (2; 226)	250 (4; 615)E

Table 70. Comparative effectiveness of clinical interventions on FI in community dwelling adults (significant differences only shown) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment/ Number Treated	Number of Cases After Control Treatment/ Number Treated	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Fernando, 2006[381] N = 64 100% female 12 month followup	Primary overlap. 1st row of sutures inserted ~1.5cm from one side of torn edge of external anal sphincter and carried through to within 0.5cm of other edge. 2nd row of sutures inserted to attach loose end of overlapped muscle.	End-to-end repair of the external anal sphincter	Fecal urgency	1/32	10/32	**0.10 (0.01; 0.74)**	4 (3; 12)	283 (316; 84)A
	End-to-end technique to repair obstetric anal sphincter	Overlap technique to repair obstetric anal sphincter	Fecal urgency 12 months postpartum	8/32	1/32	**8.00 (1.06; 60.32)**	4 (0; 443)	283 (2; 2,195)E
			Fecal urgency 6 months postpartum	9/32	2/32	**4.50 (1.05; 19.22)**	4 (1; 262)	250 (4; 1,293)E
Parellada, 2004[834] N = 63 96% female 24 month followup	Surgical: open lateral internal sphincterotomy and mucose closure with chromic catgut.	Chemical: local 0.2% isosorbide dinitrate - pea-size quantity applied manually at the entrance of the anus, 3 times/day immediately after a warm bath, for 6 weeks.	Self-reported gas incontinence and fecal soiling	9/30	0/33	**20.84 (1.26; 343.32)**	3	299 E
Wong, 2002[427] N = 112 75% female 12 month followup	Implantation of Acticon trade mark artificial bowel sphincter - solid silicone elastomer device	Baseline condition	Urge fecal incontinence	22/112	100/112	**0.22 (0.15; 0.32)**	1 (1; 2)	690 (604; 756)A
Johanson, 1999[391] N = 607 100% female 60 month followup	Delivery with vacuum extractor	Forceps delivery	Self-reported FI, sometimes	28/296	16/311	**1.84 (1.02; 3.33)**	23 (8; 1,221)	43 (1; 120)E

Table 70. Comparative effectiveness of clinical interventions on FI in community dwelling adults (significant differences only shown) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment/ Number Treated	Number of Cases After Control Treatment/ Number Treated	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Faltin, 2005[385] N = 752 100% female 12 month followup	Clinical and ultrasound examination of the anal sphincter	Clinical examination alone	Self-reported severe fecal incontinence 3 months postpartum (Wexner scores >4)	12/376	31/376	**0.39 (0.20; 0.74)**	19 (14; 45)	54 (22; 69)A
			Self-reported severe fecal incontinence 1 year postpartum (Wexner scores >4)	11/376	23/376	**0.48 (0.24; 0.97)**	29 (20; 454)	35 (2; 51)A
Lundby, 2005[857] N = 494 50% female 15-20 year followup	Postoperative radiotherapy after anterior resection	Anterior resection alone	FI	9/244	1/250	**9.22 (1.18; 72.24)**	30 (4; 1,411)	33 (1; 285)E
Severity of FI								
Osterberg, 2004[837] N = 70 90% female 12 month followup	Anterior levatorplasty with mobilization of external sphincter	Anal (and vaginal in women) plug electrostimulation of the pelvic floor with stimulation frequency was 25Hz and the duration 1.5 seconds, with a pulse-train interval of 3 seconds	Physical handicap due to FI at 1 year	9/35	19/35	**0.47 (0.25; 0.90)**	4 (2; 18)	286 (55; 407)A
Dahlberg, 1998[425] N = 171 51% female 60 month followup	Preoperative high-dose radiotherapy with 25Gy given in 5 fractions for 5-7 days followed by anterior resection of rectal cancer	Anterior resection of rectal cancer alone	Use of pad for FI	41/84	19/87	**2.23 (1.42; 3.52)**	4 (2; 11)	270 (92; 554)E
			Restriction in social life because FI	25/84	9/87	**2.88 (1.43; 5.80)**	5 (2; 23)	200 (43; 480)E

Table 70. Comparative effectiveness of clinical interventions on FI in community dwelling adults (significant differences only shown) (continued)

Author Sample Followup	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment/ Number Treated	Number of Cases After Control Treatment/ Number Treated	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of Attributable Events/1,000 Treated (95% CI)
Peeters, 2005[424] N = 597 38% female 60 month followup	Radiotherapy with total dose of 25Gy administered in 5 fractions over 5 to 7 days before total mesorectal excision	Total mesorectal excision	Use of pads for fecal incontinence	171/306	96/291	**1.69 (1.40; 2.05)**	4 (3; 8)	230 (132; 347)E
Wiley, 2004[833] N = 79 54% female 12 month followup	Closed lateral internal sphincterotomy (Hoffman and Goligher) using a short stab incision and blind division of the internal sphincter guided by surgeon's finger	Open lateral sphincterotomy (Parks) via a 1cm radial incision with division of the internal sphincter under direct vision	Self-reported deterioration in FI	2/38	10/41	**0.22 (0.05; 0.92)**	5 (4; 53)	191 (232; 19)A
Wong, 2002[427] N = 112 75% female 12 month followup	Implantation of Acticon trade mark artificial bowel sphincter - solid silicone elastomer device	Baseline condition	Self reported using pad for FI	60/112	99/112	**0.61 (0.50; 0.73)**	3 (2; 4)	340 (238; 437)A
			Self reported using diapers for FI	19/112	57/112	**0.33 (0.21; 0.52)**	3 (2; 4)	340 (244; 401)A
			Avoiding physician activities due to FI	32/112	91/112	**0.35 (0.26; 0.48)**	2 (2; 2)	520 (423; 600)A
Peeters, 2006[788] N = 669 0% female 12 month followup	Three-dimensional conformal radiotherapy 68Gy	Three-dimensional conformal radiotherapy 78Gy	FI as use of incontinence pads for rectal loss of blood, mucus, or stools (requiring use of pads more than twice a week)	21/326	40/330	**0.53 (0.32; 0.88)**	18 (12; 69)	57 (15; 83)A

Bold - significant differences at 95% confidence level; number needed to treat to benefit one patient for positive patient outcomes (continence and improvement) or to harm one patient for negative patient outcomes (incontinence); A - number of avoided events per 1,000 treated; E - number of excessive events per 1,000 treated

Question 4. What are the Strategies to Improve the Identification of Persons at Risk and Patients who have UI and FI?

Strategies to Improve the Identification of Persons at Risk and Patients who have UI

Evidence from large observational studies suggests that a substantial proportion of community dwelling adults have undiagnosed UI. Prevalence varied across gender and age groups. The majority (66.2 percent) of women with UI after pregnancy did not report the symptoms to their nurses or doctors.[858] Healthcare professionals did not assess bladder control in 77 percent and did not examine pelvic floor muscles during routine vaginal examination in 94 percent of pregnant women.[859] The majority of young women 18-23 years old (77 percent) with symptoms of UI never sought medical help, and only 11.5 percent received care they were satisfied with.[860] The prevalence of undiagnosed UI was consistent across Western countries: 55 percent for mid-age and older women from a large Australian Longitudinal Study on Women's Health,[860] 56 percent in an Austrian cohort,[139] 62 percent in the Netherlands,[122] and higher in Turkey (85 percent)[861] and in the United Arab Emirates (69.1 percent).[862] The prevalence of undiagnosed UI is higher in recent studies. For example, 75 percent of Swedish women with UI had not sought professional help,[155] 75 percent in Spain, 67 percent in France, 60 percent in Germany,[112] and 75 percent[112] to 86 percent[478] in the United Kingdom.

The prevalence of undiagnosed UI is also high in men; only one third of American men[863] and 46 percent of Swedish men[583] with UI received professional care for UI, and only 33 percent obtained information about UI from the health service.[61] Only 55 percent of men 45-75 years old with bothersome urinary symptoms contacted general practitioners, and only 40 percent of those were referred to a urologist for a specialized exam and advice.[598] Specialized care was given to 11 percent of adults with UI in Belgium.[587] Among males with overactive bladder symptoms living in 11 Asian countries, only 6 percent discussed this condition with a physician.[864]

The proportion of older community dwelling adults with undiagnosed UI varied from 25 percent of men and 40 percent of women in Spain,[35] to 91 percent in Thailand,[865] and 82 percent in Japan.[63] Primary care providers in the United States assessed UI in 21 percent of older incontinent women and 10 percent of older incontinent men.[521] The prevalence of undiagnosed UI was highest in Black women and in Hispanic men.[146]

The diagnostic pathway to detect persons at risk and patients with UI includes population-based epidemiologic surveys with validated questionnaires and scales,[866] clinical history, and simple self-administered diagnostic tests. Treatment decisions are made based on instrumental methods, including ultrasound and multi-channel urodynamics, considered as a "gold standard," essential to decide the most effective intervention.[867]

Valid questionnaires to assess UI (Appendix Table F209). The Symptom and Quality of Life Committee of the International Consultation on Incontinence (ICI) systematically reviewed available questionnaires and scales to diagnose UI and evaluate quality of life in patients with UI.[866] The committee highly recommended the questionnaires with rigorous validity, reliability, and responsiveness in several clinical studies graded with the highest level of evidence (level A) (Appendix Table F210).[866] The ICI Questionnaire combined symptoms of UI and impact on life for both genders.[868] The Bristol Female Lower Urinary Tract Symptoms Questionnaire[869] and the

Stress and Urge Incontinence and Quality of Life Questionnaire (SUIQQ)[870] are recommended to estimate the severity and impact on life of stress and urge UI in women (Appendix Table F211).[866] The ICS male questionnaire measures voiding patterns, stress, urge UI, and impact on quality of life related to UI.[871] The overactive bladder questionnaire demonstrated validity and reliability to measure symptoms of overactive bladder in males and females.[872] Most of the questionnaires are gender specific and include UI and other symptoms of lower urinary tract problems in females (Urogenital Distress Inventory;[873] Urogenital Distress Inventory-6;[874] Incontinence Severity Index;[875] Bristol Female Lower Urinary Tract Symptoms Questionnaire[876] and in males ICS Male, Lower Urinary Tract Symptoms[877] and Danish Prostatic Symptom Score, Lower Urinary Tract Symptoms[878]). The questionnaires on Quality of Life in Persons with UI[879] and the Incontinence Classification System[880] estimate perceived UI, social interactions, personal strain, impact on sexual life, and overall health in both genders. Several scales are recognized as valid tools to measure quality of life in incontinent women: King's Health Questionnaire;[881] Incontinence Impact Questionnaire;[882] Incontinence Impact Questionnaire-7; UI Severity Score (UISS);[883,884] and CONTILIFE-Urinary Incontinence-Specific Measure of Quality of Life.[885] The committee did not find good evidence to recommend scales of quality of life in males. Standard recommendations developed by the Symptom and Quality of Life Committee of the ICI did not include sensitivity, specificity, and positive predictive likelihood of different questionnaires compared to objective physician diagnosis or instrumental methods. The assessment of validity based on significant correlation coefficients can be biased by the sample size of the studies and the distribution of the responses.

Diagnostic value of questionnaires and scales for UI. Several studies examined the diagnostic value of questionnaires and validated scales compared to multichannel video urodynamic testing,[452,480,506,886-889] physician diagnosis based on medical history, urine analysis, and micturition charts and diaries and urodynamics,[447,890-892] detailed interviews with nurses,[893] or other objective tests including the pad test,[894] provocative cough stress test, and computerized urethra-cystometrogram (Table 71).[895] One study tested a simple screening tool to detect common geriatric problems in community dwelling adults including UI.[479] The scales included questions on the presence and severity of symptoms of UI and quality of life. The majority of studies examined females only; three studies included both males and females.[479,480,892] An epidemiologic survey could identify only 56 percent of women who had urge UI and 66 percent of women who had stress UI.[447] Survey questions for geriatric UI could identify only 60 percent of incontinent adults.[480] The highest sensitivity of 98 percent was reported in a nonrandomized multicenter study of 531 patients with overactive bladder and urge UI detected with a simple, five-item questionnaire.[892]

The sample size of the studies was not associated with the sensitivity of the scales to detect UI (Appendix Table F212). The specificity of the scales varied from 21 percent[480] to 100 percent.[895] The lowest specificity was demonstrated for a survey in elderly patients to detect urge UI.[480] The Medical, Epidemiologic, and Social Aspects of Aging Urinary Incontinence Questionnaire did not provide any false positive results of stress UI.[895] Such large variability in specificity of the scales could not be explained by differences in sample size (Appendix Table F212). The scales had comparable specificity for different types of UI; 95 percent for mixed UI,[479] 96 percent for stress UI,[480] and 96 percent for urge UI.[447]

Three scales suggested a greater likelihood of UI compared to urodynamic evaluations[480,895] and physician diagnosis[447,479] (Appendix Table F213). The same scale resulted in larger positive likelihood ratios for urge (positive LR 14) and lower for stress UI (positive LR 5.5).[447] The

majority of scales resulted in only a small (positive LR <4) probability of UI diagnosed with multichannel urodynamics,[452,480,506,887-889] pad test,[894] or physician diagnosis.[890,891] The moderate diagnostic value of the Urogenital Distress Inventory was reported in a systematic review with a pooled likelihood ratio of 2.2, 95 percent CI 1.5; 2.9.[452,888] Larger studies tended to report lower likelihood ratios, but the sample size could explain only small proportions of differences in ratios (Appendix Table F212). Across the studies, the consistent number needed to screen to detect one case of UI was two to three patients (Table 71).

Several studies estimated the validity of the questionnaires with correlation coefficients. One study of 384 older women reported a significant correlation (correlation coefficient ratio 0.2-0.7) between the Incontinence Impact Questionnaire and the Urogenital Distress Inventory with the clinical diagnosis of UI.[896] The Incontinence Severity Index was correlated with the 48-hour "pad weighing" test (correlation coefficient 0.6-0.6).[875,897]

A large RCT reported a significant correlation between the Incontinence Quality of Life Questionnaire, Patient Global Impression of Improvement and Severity Questionnaire, and stress pad test results.[507] Secondary analyses of three clinical drug trials reported a significant correlation between the Urgency Perception Scale and patient voiding diary variables and other patient assessments, including perception of bladder condition, perception of treatment benefit, the Medical Outcomes Study Short-Form 36 health survey, the King's Health Questionnaire, the OAB Questionnaire, and the Overall Treatment Effect scale.[898] The significance of correlation coefficients depends on the sample size of the studies. For example, a large RCT reported a correlation coefficient ratio of 0.2-0.4 as significant.[507]

In conclusion, two questionnaires demonstrated good diagnostic value compared to multichannel urodynamics to detect UI in epidemiologic surveys.[447,895] Two screening questionnaires may accurately detect UI in older adults.[479,480] Several questionnaires of severity and quality of life of UI that demonstrated rigorous validity and reliability were recommended for clinical practice and research. The clinical and economical value of self-reported perceived UI needs future research.

Diagnostic value of clinical history compared to multichannel urodynamic for stress UI in community dwelling adults. The diagnostic value of clinical history to detect stress UI compared to a "gold standard" multichannel urodynamics was examined in 24 studies with inconsistent results.[435-455,899] Most of the studies included females; one evaluated stress UI in men after radical prostatectomy[899] (Table 72). The authors used ICS criteria to define urodynamic UI, noted during filling cystometry as the involuntary leakage of urine during increased abdominal pressure, in the absence of a detrusor contraction.[483] Clinical history assessments varied but were poorly reported. The common assessment included duration and severity of involuntary urine leakage, exacerbating factors, baseline diseases, self management, and impact on quality of life.

The sensitivity of the clinical history compared to multichannel urodynamics varied from 44 percent in the largest study[437] to 100 percent in several studies in females[435,443,446] and males.[899] The larger study tended to report lower sensitivity; 20 percent of the variation in sensitivity was attributable to sample size (Appendix Figure F2).

Specificity also varied substantially from 13 percent in a study with elderly women[455] to 95 percent in the smallest study of 46 patients with complaints of UI or voiding disorders.[435] The largest study of 1,455 women reported specificity of 87 percent.[437] Clinical history resulted in 50 percent false positive results in males.[899] The variability in specificity could not be explained by the sample size of the studies; only 3 percent was attributable to the number of subjects

(Appendix Table F212). Positive predictive values as the proportion of true positives among all positives also varied from 66 percent in a study of 66 females[445] to 92 percent in a study of 566 patients.[453] Larger studies tended to report greater positive predictive values of clinical history (Appendix Figure F3); 22 percent of the differences in positive predictive values were attributable to the sample size of the study. Only one study of 46 women showed that clinical history was associated with a definite increase in the likelihood of disease (positive likelihood ratio of 20).[435] One study of 198 Japanese women reported a moderate increase in the likelihood of stress UI identified with clinical history compared to multichannel urodynamics (positive likelihood ratio of 7.7).[436] The majority of the studies found only small increases (positive likelihood ratios >2) in the likelihood of stress UI identified with clinical history[440-447,899] or minimal (positive likelihood ratios >1).[442,448-455] The differences in sample size could not explain the variability in positive likelihood ratios (Appendix Table F212). One systematic review reported a small positive likelihood ratio (2.09, 95 percent CI 1.83; 2.35) associated with the pooled sensitivity and specificity in females using studies published before 2003.[867] The review reported highly significant heterogeneity between studies ($p<0.0001$) in sensitivity and specificity with no clear explanations for substantial variability in diagnostic values of clinical history to detect stress UI.

Diagnostic value of clinical history compared to multichannel urodynamics for urge UI in community dwelling adults. The diagnostic value of clinical history to detect urge UI and detrusor overactivity compared to a "gold standard" multichannel urodynamic, was examined in 18 studies.[436,437,440-443,447,450,452,454,455,899-905] The majority of studies included females; two studies evaluated urge UI in men after radical prostatectomy[899] and in older males with persistent lower urinary tract symptoms.[904] The authors used the ICS criteria to define urodynamic urge UI during filling cystometry.[483] The sensitivity of clinical history to detect urge UI varied: it was 14 percent in one study of older women,[455] less than 50 percent in seven studies[437,443,450,452,454,905] to 50 to 80 percent in eight studies,[440-442,447,899,901,903,904] and more than 80 percent in two studies.[436,902] Large trials reported sensitivity of 28 percent[905] to 41 percent.[437] The sample size of the studies could explain only 7 percent of the differences in sensitivity (Appendix Table F212).

The specificity of clinical history varied from 13 percent in one comparative study of 1,000 females with lower urinary tract symptoms[442] to 45-80 percent in six studies, including two studies in men,[440,899-902,904] while the majority of the studies reported specificities greater than 85 percent.[436,437,441,443,447,450,452,454,455,903,905] Inconsistency in diagnostic values varied by study design to reduce bias in estimations. RCTs reported a specificity of 96 percent,[437] while a nonrandomized clinical trial of 4,500 women showed a lower specificity of 86 percent.[905] Substantial variability in specificity was not attributable to differences in sample size. Full cross-tabulations of the results were available in eight studies to calculate positive predictive values as the proportion of true positives among all positives that were detected with clinical history. One study in males reported the lowest positive predictive value (PPV) of 33 percent;[452] six studies showed PPV as 62 to 77 percent.[440,441,443,447,450,902] The highest PPV of 81 percent was reported in a comparative study of 198 Japanese women.[436] The sample size of the studies was not associated with differences in PPV. Several studies found that clinical history could increase the likelihood of urge UI with positive likelihood ratios between 10 and 22.[436,437,441,443,447,450] Two studies reported moderate probability of urge UI detected with clinical history with positive likelihood ratios between 5 and 9.[455,903] The majority of the studies showed only a small increase in likelihood of urge UI detected with clinical history.[440,452,454,899-902,904,905] One study of 1,000 women with symptoms of lower urinary tract dysfunction demonstrated a very low positive

likelihood ratio of clinical history (<1) to diagnose urge UI.[442] Larger studies tended to report lower positive predictive likelihood, but only 2 percent of the variability was attributable to the sample size of the studies. A systematic review of eight studies reported a small positive likelihood ratio of 4.69, 95 percent CI 4.05 to 5.33 associated with the pooled sensitivity and specificity to detect detrusor overactivity and urge UI in females.[867] Heterogeneity between studies was significant (p<0.0001) with no well defined reasons for such variability in diagnostic value of clinical history.

Two studies examined the diagnostic value of clinical history to detect mixed UI and reported sensitivity from 68 percent[437] to 91 percent,[442] specificity from 47 percent to 24 percent respectively, and a small positive predictive likelihood of 1.3 or 1.2 respectively.

Diagnostic values of different tests to detect persons at risk and patients with UI were examined in 23 studies with sample sizes varying from 20[906] to 981 adults[907] (Appendix Table F214). The diagnostic value of the tests varied substantially, depending on index methods, populations, and type of UI. Sensitivity differed from a low of 25 percent to detect outlet obstruction in males with ambulatory compared to conventional urodynamic testing[908] to 100 percent to detect female urge UI with cystometry by fetal cardiotocographic monitor for pressure recording[909] or stress UI by the fluid bridge test.[910] Specificity was the lowest (7 percent) for ambulatory urodynamic monitoring compared to multichannel urodynamics to detect stress UI in female soldiers.[911] The majority of studies demonstrated specificity of the index tests less than 90 percent. The fluid bridge test had a 76 percent probability (specificity of 24 percent) of false positive results. Urethral pressure profile examination had a specificity of more than 90 percent in two studies.[912,913] Cough stress test and single-channel medium-fill cystometry[914] and cystometry using a fetal monitor[909] also had a low probability of false positive results for urge UI compared to multichannel urodynamics (specificity 96 percent). The Resident Assessment Protocol included in the MDS demonstrated a specificity of 97 percent to detect stress UI in 123 randomly selected residents of 13 nursing homes in five states compared to multichannel urodynamics with definitions adjusted for impaired contractility in elderly patients.[481] The positive likelihood ratio was defined as the ratio of the probability of a patient with UI having a positive test to the probability of an individual without UI having a positive test was 25.3 to diagnose significant stress leakage in residents of these nursing homes.[481] Several studies examined diagnostic values of the urethral pressure profile; one nonrandomized clinical trial of 108 women reported a large predictive likelihood of 24.5 to detect stress UI.[913] Results were inconsistent across the same comparisons in other studies with small[915-917] or moderate positive likelihood[907,912] to diagnose UI. The majority of studies showed that tested diagnostic methods provided only a small likelihood of UI in adults (Appendix Table F214).

The majority of the studies that examined the diagnostic value of x-ray compared to multichannel urodynamics reported a small positive likelihood ratio to detect UI (Appendix Table F215).[456-459,461] One large study of 1,584 males and females showed a likelihood ratio of 10.11 for micturating cystourethrography to detect UI.[460] The full bladder clinical stress test had a conclusive diagnostic value with a likelihood ratio of 33.5 in one study[464] and moderate likelihood ratios between 5 and 10 in three studies.[465,918,919] Single channel urodynamics demonstrated inconsistent diagnostic value for stress and urge UI with likelihood ratios varying from 1.9 in the geriatric population[463] to 24.5 in younger women.[462]

Diagnostic value of ultrasound compared to UI in community dwelling adults. The diagnostic values of ultrasound exams to detect UI compared to multichannel urodynamics were examined in ten studies in community dwelling females to detect mixed[470,473] or stress

UI[471,472,474-477,920,921] with no studies conducted in males (Table 73). One study of 201 incontinent nursing home residents, which examined a portable ultrasound device to diagnose post-void residual volume confirmed with catheterization, showed the lowest sensitivity of 59 percent to detect post-void residual volume >150ml.[922] The same study reported a high sensitivity of 95 percent to detect low post-void residual volume (<100ml).[922]

The studies used different ultrasound techniques and definitions of UI including transrectal ultrasound[475,921] to detect a drop in urethrovesical junction pressure during stress as a criterion for stress UI; translabial[470,923] or vaginal[471] ultrasound to observe urine leakage during the stress test; or perineal ultrasound to examine the opening of bladder neck and rotational angle.[474,476,477]

Bladder neck funneling on ultrasonography had 60 percent sensitivity to detect low leak point pressure in a study of 320 women.[477] The highest sensitivity (>90 percent) was reported in two studies to observe urine leakage using translabial[470] or vaginal ultrasound.[471] Specificity ranged from 69 to 99 percent, depending on definitions of UI[922] and ultrasound techniques.[470,471,474,475,921,923] The PPV was lowest (19.8 percent) in a study to detect low leak point pressure in women with stress UI.[477] Three studies reported PPV >93 percent to detect urine leakage[470,471] or a drop in urethrovesical junction pressure.[475] An ultrasound exam with a portable device provided a definite diagnosis of post-void residual urine volume >200ml in nursing home residents with a positive likelihood ratio of 69.[922] Transrectal ultrasound conclusively detected a drop in urethrovesical junction pressure during stress tests in women with stress UI with a positive likelihood ratio of 21.5[475] and in women undergoing surgery for stress urinary incontinence of 9.4.[921] Ultrasound findings of urine leakage were associated with a moderate probability of UI in two studies with positive likelihood ratios >5.[470,471] The differences in sample size could explain only 2 percent of the variability in likelihood ratios.

In conclusion, clinical history of UI results in a small likelihood of urodynamic UI and in a moderate likelihood of urodynamic urge UI in females. Very limited evidence in males suggests that clinical history of UI is not accurate to predict urodynamic UI. Inconsistent evidence implied that diagnostic values of x-ray, single channel urodynamic, full bladder clinical test, and Q-tip test are similar to multichannel urodynamics. Ultrasound diagnosis of urinary leakage and bladder neck anatomy was comparable to urodynamic UI and urinary retention in community dwelling adults and residents of nursing homes. MDS algorithms accurately diagnosed UI in LTC settings.

To assess the effectiveness of diagnostic methods to detect UI in adults, we estimated the number needed to screen to detect one case of UI and the number of diagnostic tests needed to detect one case of UI using the recently published prevalence of undiagnosed UI in age, gender, race, and socioeconomic status categories.[146] The cost of different procedures was obtained from the systematic review and cost-effectiveness analysis of diagnostic tests of UI.[867] Despite substantial differences in positive predictive likelihood ratios, the number needed to screen and the number of needed tests was similar and consistent among the studies (Table 74). Epidemiologic surveys with self-completed scales and questionnaires would cost less than $70 to detect one case of UI. The professional assessment of clinical history would cost from $175 in males after radical prostatectomy[899] to nearly $400 in women with stress UI.[437] Health care providers would need to collect clinical history in five to 15 patients to detect one case of urodynamic UI; the cost would not be more than $250. Clinical history had the lowest cost to diagnose urge UI in males with persistent lower urinary tract symptoms[904] and the highest cost to detect detrusor overactivity in elderly women.[455] The detection of urge UI with professional assessment of clinical history would cost more than $300 in the majority of the studies. The cost

of ultrasound exams to detect one case of urodynamic UI varied from $600 to $900. The effectiveness of self-reported scales, professional assessment of clinical history, and ultrasound to detect UI in women was comparable and consistent across race, age, and socioeconomic groups; one to four women should be examined to detect one case of UI (Table 75). The number needed to screen males to detect one case of UI was also consistent in population groups (Appendix Table F216). The cost of different treatment options was beyond present analysis but may affect the cost of diagnostic pathways. One of the most expensive diagnostic methods, multichannel urodynamic evaluation, is an important step to diagnose intrinsic sphincter deficiency (urodynamic urinary incontinence and a maximum urethral closure pressure ≤20cm H_2O) in combination with hypermobility in women planning surgery for stress UI.[924] However, this costly invasive examination may not be necessary for women who prefer behavioral treatments including lifestyle changes, bladder training, and pelvic floor muscle training. The effects of population-based screening and educational programs on clinical outcomes, quality of life, and cost of available treatments need future investigations in well designed RCTs.

Table 71. Diagnostic value of validated questionnaires and scales to detect persons at risk and patients with UI

Author Sample	Level of Evidence	UI Type	Index Test (Scale)	Gold Standard	Sensitivity (%)	Specificity (%)	Predictive Likelihood Ratio	NNS: Women
Moore, 1996[479] N = 109; 66% female	II-2	Mixed	"Screen"	Blinded geriatricians' assessments	89	95	17.80	5
Kirschner-Hermanns, 1998[480] N = 132; 80% female	II-2	Stress	Questionnaire	Multichannel video urodynamic testing	60	96	15.00	8
Sandvik, 1995[447] N = 250; 100% female	II-2	Urge	Questionnaire	Physicians' diagnosis based on medical history, urine analysis, and micturition chart	56	96	14.00	9
		Stress	Questionnaire	Physicians' diagnosis based on medical history, urine analysis, and micturition chart	66	88	5.50	9
Seim, 2004[892] N = 531; 59% female	II-1	Overactive bladder	Questionnaire	Physicians' diagnosis based on medical history, urine analysis, and micturition chart	98	90	9.80	5
Rohr, 2004[893] N = 421; 100% female	II-2	Stress	Questionnaire	Open interview	91	86	6.50	5
		Urge	Questionnaire	Open interview	91	86	6.50	2
Contreras Ortiz, 1993[886] N = 217; 100% female	II-2	All	Bladder Instability Discriminant Index	Multichannel video urodynamic testing	88	83	5.18	5
Bradley, 2005[891] N = 117; 100% female	II-2	Urge	Questionnaire for Urinary Incontinence Diagnosis	Physicians' diagnosis based on medical history, urine analysis, a cough stress test, postvoid residual volume assessment, and multichannel urodynamic testing	79	79	3.76	6
		Stress	Questionnaire for Urinary Incontinence Diagnosis	Physicians' diagnosis based on medical history, urine analysis, a cough stress test, postvoid residual volume assessment, and multichannel urodynamic testing	85	71	2.93	6
Brown, 2006[890] N = 301; 100% female	II-2	Urge	3 incontinence questions	Physicians' diagnosis based on medical history, urine analysis, a cough stress test, postvoid residual volume assessment, and 3-day voiding diary	75	77	3.26	6
		Stress	3 Incontinence questions	Physicians' diagnosis based on medical history, urine analysis, a cough stress test, postvoid residual volume assessment, and 3-day voiding diary	86	60	2.15	6

Table 71. Diagnostic value of validated questionnaires and scales to detect persons at risk and patients with UI (continued)

Author Sample	Level of Evidence	UI Type	Index Test (Scale)	Gold Standard	Sensitivity (%)	Specificity (%)	Predictive Likelihood Ratio	NNS: Women
Gunthorpe, 2000[894] N = 89; 100% female	II-2	Stress	Incontinence screening questionnaire	Pad test	65	80	3.25	7
Klovning, 1996[887] N = 250; 100% female	II-2	Stress	Detrusor instability score	Multichannel video urodynamic testing	60	77	2.61	8
Lemack, 1999[888] N = 128; 100% female	II-1	Stress	The Urogenital Distress Inventory (UDI-6)	Multichannel video urodynamic testing	85	63	2.30	6
Fitzgerald, 2002[452] N = 293; 100% female	II-2	All	The Urogenital Distress Inventory (UDI-6)	Multichannel video urodynamic testing	88	55	1.96	5
Matharu, 2005[506] N = 490; 100% female	I	Urge	Questionnaire	Multichannel video urodynamic testing	63.1	65.1	1.81	8
		Stress	Questionnaire	Multichannel video urodynamic testing	76.9	56.3	1.76	6
Lemack, 1999[888] N = 128; 100% female	II-2	Urge	The Urogenital Distress Inventory (UDI-6)	Multichannel video urodynamic testing	83	50	1.66	6
Roongruangslip, 2005[889] N = 129; 100% female	II-2	All	Questionnaire	Multichannel video urodynamic testing	96	25	1.28	5
Kirschner-Hermanns, 1998[480] N = 132; 80% female	II-2	Urge	Questionnaire	Multichannel video urodynamic testing	84	21	1.06	8
Diokno, 1999[895] N = 118; 100% female	II-2	Stress	MESA	Provocative cough stress test, post-void residual urine measurement, and computerized urethrocystometrogram	62	100	62.00	8

NNS - number needed to screen or detect one case of UI

Table 72. Diagnostic value of clinical history compared to multichannel urodynamics – "gold standard" to detect persons at risk and patients with UI

Author Sample	True Positive	False Positive	False Negative	True Negative	Sensitivity (%)	Specificity (%)	Positive Predictive Value	Predictive Likelihood Ratio
Stress UI								
Porru, 1994[435] N = 46; 100% female					100	95		20.00
Ishiko, 2000[436] N = 198; 100% female	152	4	14	28	92	88	97	7.67
Yalcin, 2004[437] N = 1,455; 100% female					44	87		3.38
Diokno, 1990[438] N = 456; 100% female	65	14	30	52	68	79	82	3.24
Ramsay, 1993[439] N = 200; 100% female	72	28	19	81	79	74	72	3.04
Muylder, 1992[440] N = 408; 100% female	228	58	14	108	94.2	65.1	80	2.70
Lagro-Janssen, 1991[441] N = 103; 100% female	76	9	3	15	96	63	89	2.59
Clarke, 1997[442] N = 1,000; 100% female					96	63		2.59
					96.1	23.4		1.25
					70	35		1.08
Sand, 1988[443] N = 218; 100% female	114	43	0	66	100	61	73	2.56
Kujansuu, 1982[444] N = 121; 100% female	46	20	11	43	81	68	70	2.53
Niecestro, 1992[445] N = 66; 100% female	13	17	3	32	81	65	43	2.31
Sunshine, 1989[446] N = 109; 100% female	73	14	0	15	100	52	84	2.08
Sandvik, 1995[447] N = 785; 100% female	179	26	4	27	98	51	87	2.00
Ficazzola, 1998[899] N = 60; 0% female					100	50		2.00
Bergman, 1990[448] N = 154; 100% female					56	70		1.87
Weidner, 2001[449] N = 950; 100% female					66	63		1.78
Cundiff, 1997[450] N = 535; 100% female	416	60	17	42	96	41	87	1.63

Table 72. Diagnostic value of clinical history compared to multichannel urodynamics to detect persons at risk and patients with UI (continued)

Author Sample	True Positive	False Positive	False Negative	True Negative	Sensitivity (%)	Specificity (%)	Positive Predictive Value	Predictive Likelihood Ratio
Le Coutour, 1990[451] N = 154; 100% female					92	39		1.51
Fitzgerald, 2002[452] N = 293; 100% female	187	51	22	33	90	39	79	1.48
Korda, 1987[453] N = 566; 100% female	451	39	52	24	90	38	92	1.45
Ouslander, 1987[454] N = 135; 100% female	82	31	5	17	94	35	73	1.45
Diokno, 1987[455] N = 200; 100% female	145	40	9	6	94	13	78	1.08
Urge UI								
Ishiko, 2000[436] N = 198; 100% female	25	6	4	154	86	96	81	21.50
Sand, 1988[443] N = 218; 100% female	10	3	20	185	33	98	77	16.50
Sandvik, 1995[447] N = 785; 100% female	23	8	18	187	56	96	74	14.00
Lagro-Janssen, 1991[441] N = 103; 100% female	11	4	7	81	61	95	73	12.20
Cundiff. 1997[450] N = 242; 100 % female	42	17	60	416	41	96	71	10.25
Yalcin, 2004[437] N = 1,455; 100% female					41	96		10.25
van Waalwijk van Doorn, 1997[903] N = 228; 100% female					53	94		8.83
Diokno, 1987[455] N = 200; 100% female					14	97		4.67
Fitzgerald, 2002[452] N = 293; 100% female	10	21	27	235	27	92	32	3.38
Ouslander, 1987[454] N = 135; 100% female					32	90		3.20
Ficazzola, 1998[899] N = 60; 0% female					50	77		2.17
Digesu, 2003[905] N = 4,500; 100% female					28	86		2.00
Ding, 1997[904] N = 126; 0% female					73	60		1.83
Cantor, 1980[902] N = 214; 100% female	107	53	11	43	91	45	67	1.65

Table 72. Diagnostic value of clinical history compared to multichannel urodynamics to detect persons at risk and patients with UI (continued)

Author Sample	True Positive	False Positive	False Negative	True Negative	Sensitivity (%)	Specificity (%)	Positive Predictive Value	Predictive Likelihood Ratio
Kong, 1990[901] N = 269; 100% female					79	49		1.55
Petros, 1992[900] N = 113; 100% female					40	74		1.54
Muylder, 1992[440] N = 408; 100% female	147	91	89	81	62.3	47.1	62	1.18
Clarke, 1997[442] N = 1,000; 100% female					68	12.9		0.78
Mixed UI								
Yalcin, 2004[437] N =1455; 100% female					68	47		1.28
Clarke, 1997[442] N = 1,000; 100% female					91	23.8		1.19

Table 73. Diagnostic value of ultrasound exam compared to multichannel urodynamics - "gold standard" to detect persons at risk and patients with UI

Author Sample	Ultrasound Criteria to Detect Risk of Incontinence	Sensitivity (%)	Specificity (%)	Positive Predictive Value (%)	Positive Predictive Likelihood
Jolic, 1997[920] N = 66; 100% female	Vaginal probe <22mm			63	
	Vaginal probe <10mm			72	
	Abdominal probe			93	
Ouslander, 1994[922] N = 201; 74% female	Post-void residual urine volume <50ml	90	71		3.10
	Post-void residual urine volume <100ml	95	63		2.57
	Post-void residual urine volume ≥50ml	63	95		12.60
	Post-void residual urine volume ≥150ml	59	97		19.67
	Post-void residual urine volume >200ml	69	99		69.00
Dietz, 1999[923] N = 37; 100% female	Fluid leakage	63	86	77	4.50
Kuo, 1994[472] N = 102; 100% female	Bladder neck anatomy				
Dietz, 1998[473] N = 125; 100% female	Bladder neck anatomy	84	76	88	3.50
Dietz, 2001[470] N = 52; 100% female	Fluid leakage	94	88	94	7.83
Quinn, 1989[471] N = 124; 100% female	Fluid leakage	97	82	94	5.39
Chen, 1997[474] N = 65; 100% female	Bladder neck anatomy	73	77	64	3.17
Bergman, 1988[475] N = 91; 100% female	Bladder neck anatomy	86	96	95	21.50
Bergman, 1988[921] N = 61; 100% female	Bladder neck anatomy	94	90	91	9.40
Kiilhoma, 1994[476] N = 38; 100% female	Bladder neck anatomy	72			
Huang, 2003[477] N = 320; 100% female	Bladder neck anatomy	59.5	68.6	19.8	1.89

Table 74. Number needed to screen to detect one case of UI, number of tests to detect one case of UI, and cost to detect one case of UI (prevalence of undiagnosed UI[146] and cost of diagnostic tests[867])

Author	Positive Likelihood Ratio	Number Needed to Screen to Detect One Case of UI	Number of Tests to Detect One Case of UI	Cost to Detect One Case ($)	
				Cost of Screening to Detect One Case of UI	Costs of Tests to Detect One Case of UI
Scales to Diagnose UI					
Moore, 1996[479]	17.8	5	2	40.63	16.62
Kirschner-Hermanns, 1998[480]	15.0	8	2	60.27	16.92
	1.1	8	6	60.02	45.02
Sandvik, 1995[447]	14.0	9	2	64.58	17.05
	5.5	9	2	67.53	17.05
Seim, 2004[892]	9.8	5	2	36.90	17.93
Rohr, 2004[893]	6.5	5	3	39.74	19.42
Contreras Ortiz, 1993[886]	5.2	5	3	37.52	19.42
Bradley, 2005[891]	3.8	6	3	45.02	22.51
	2.9	6	3	45.02	22.51
Brown, 2006[890]	3.3	6	3	45.02	24.57
	2.2	6	3	45.02	26.12
Gunthorpe, 2000[894]	3.3	7	4	52.52	27.67
Klovning, 1996[887]	2.6	8	4	60.02	29.21
Lemack, 1999[888]	2.3	6	4	45.02	30.01
	1.7	6	4	45.02	30.81
Fitzgerald, 2002[452]	2.0	5	4	37.52	31.61
Matharu, 2005[506]	1.8	8	4	60.02	32.41
	1.8	6	4	45.02	33.21
Roongruangslip, 2005[889]	1.3	5	5	37.52	34.01
Diokno, 1999[895]	62.0	8	2	60.02	15.01
Clinical History to Diagnose Stress UI					
Porru, 1994[435]	20.0	5	2	175.22	77.73
Ishiko, 2000[436]	7.7	5	2	190.46	85.81
Yalcin, 2004[437]	3.4	11	3	398.23	102.37
Diokno, 1990[438]	3.2	7	3	257.68	103.72
Diokno, 1987[455]	1.1	5	5	186.40	165.64
Ramsay ,1993[439]l	3.0	6	3	221.80	105.75
DeMuylder, 1992[440]	2.7	5	3	186.01	109.91
Lagro-Janssen, 1991[441]	2.6	5	3	182.52	111.41
Clarke, 1997[442]	2.6	5	3	182.52	111.41
	1.3	5	4	182.33	152.74
	1.1	7	5	250.31	165.94

Table 74. Number needed to screen to detect one case of UI, number of tests to detect one case of UI, and cost to detect one case of UI (prevalence of undiagnosed UI{Harris, 2007 #11264} and cost of diagnostic tests{Versi, 1996 #11105}) (continued)

Author	Positive Likelihood Ratio	Number Needed to Screen to Detect One Case of UI	Number of Tests to Detect One Case of UI	Cost to Detect One Case ($)	
				Cost of Screening to Detect One Case of UI	Costs of Tests to Detect One Case of UI
Sand, 1988[443]	2.6	5	3	175.22	111.87
Kujansuu, 1982[444]	2.5	6	3	216.32	112.38
Niecestro, 1992[445]	2.3	6	3	216.32	116.09
Sunshine 1989[446]	2.1	5	3	175.22	120.90
Sandvik, 1995[447]	2.0	5	3	178.80	122.91
Ficazzola, 1998[899]	2.0	5	3	175.22	122.91
Bergman, 1990[448]	1.9	9	3	312.89	126.50
Weidner, 2001[449]	1.8	7	4	265.48	129.00
Cundiff, 1997[450]	1.6	5	4	182.52	134.42
Le Coutour, 1990[451]	1.5	5	4	190.46	139.28
Fitzgerald, 2002[452]	1.5	5	4	194.69	140.76
Korda, 1987[453]	1.5	5	4	194.69	141.88
Ouslander, 1987[454]	1.4	5	4	186.40	142.14
Clinical History to Diagnose Urge UI					
Ishiko, 2000[436]	21.5	6	2	203.74	77.38
Sand, 1988[443]	16.5	15	2	530.97	78.79
Sandvik, 1995[447]	14.0	9	2	312.89	79.88
Lagro-Janssen, 1991[441]	12.2	8	2	287.25	80.94
Cundiff, 1997[450]	10.3	12	2	427.36	82.50
Yalcin, 2004[437]	10.3	12	2	427.36	82.50
Van Waalwijk van Doorn, 1997[903]	8.8	9	2	330.60	84.08
Diokno, 1987[455]	4.7	34	3	1251.57	94.22
Fitzgerald, 2002[452]	3.4	18	3	648.96	102.46
Ouslander, 1987[454]	3.2	15	3	547.56	104.09
Ficazzola, 1998[899]	2.2	10	3	350.44	118.90
Digesu, 2003[905]	2.0	17	3	625.78	122.91
Ding, 1997[904]	1.8	7	4	240.03	127.73
Cantor, 1980[902]	1.7	5	4	192.55	133.39
Kong, 1990[901]	1.5	6	4	221.80	137.53
Petros, 1992[900]	1.5	12	4	438.05	137.97
DeMuylder, 1992[440]	1.2	8	4	281.25	157.97
Clarke, 1997[442]	0.8	7	6	257.68	201.32

Table 74. Number needed to screen to detect one case of UI, number of tests to detect one case of UI, and cost to detect one case of UI (prevalence of undiagnosed UI{Harris, 2007 #11264} and cost of diagnostic tests{Versi, 1996 #11105}) (continued)

Author	Positive Likelihood Ratio	Number Needed to Screen to Detect One Case of UI	Number of Tests to Detect One Case of UI	Cost to Detect One Case ($)	
				Cost of Screening to Detect One Case of UI	Costs of Tests to Detect One Case of UI
Clinical History to Diagnose Mixed UI					
Yalcin, 2004[437]	1.3	7	4	257.68	150.97
Clarke, 1997[442]	1.2	5	4	192.55	156.79
Ultrasound to Diagnose UI					
Ouslander, 1994[922]	3	5	3	602.39	325.07
	3	5	3	570.68	345.97
	13	8	2	860.55	249.63
	20	8	2	918.90	240.77
	69	7	2	785.72	229.47
Dietz, 1999[923]	5	8	3	860.55	294.01
Dietz, 1998[473]	4	6	3	645.42	313.73
Dietz, 2001[470]	8	5	2	576.75	264.63
Quinn ,1989[471]	5	5	3	558.92	282.62
Chen, 1997[474]	3	7	3	742.67	322.85
Bergman, 1988[475]	22	6	2	630.41	239.42
Bergman, 1988[921]	9	5	2	576.75	258.02
Kiilhoma, 1994[476]		7	6	752.98	656.45
Huang, 2003[477]	2	8	3	911.17	388.92

Number needed to screen to identify one undiagnosed incontinence case = [(prevalence of undiagnosed incontinence) (sensitivity of the diagnostic method)] -1.
Number of diagnostic tests to identify one undiagnosed incontinence case = 2 + number needed to screen (1 - prevalence of undiagnosed incontinence)(1 – specificity of the diagnostic test)[925].

Table 75. Number needed to screen and number of tests to detect one case of UI in women (pooled sensitivity and sensitivity of tests in comparison with multichannel urodynamic[867])

Prevalence of Undiagnosed UI		Clinical History to Diagnose Stress UI		Clinical History to Diagnose Urge UI		Ultrasound to Diagnose Stress UI		Scales to Diagnose Stress UI	
Population Categories		**Number Needed to Screen**	**Number of Tests**	**Number Needed to Screen**	**Number of Tests**	**Number Needed to Screen**	**Number of Tests**	**Number Needed to Screen**	**Number of Tests**
All	0.55	5	4	8	3	5	3	6	4
Race/Ethnicity									
Black	0.66	4	3	7	3	4	3	5	3
Hispanic	0.41	7	5	11	3	7	3	7	4
White	0.52	6	4	8	3	6	3	6	4
Age Group									
30–39	0.84	7	5	10	3	7	3	7	4
40–49	0.46	10	6	15	4	10	4	10	6
50–59	0.43	10	6	16	4	11	4	11	6
60–79	0.50	8	5	12	3	8	3	8	5
Socioeconomic Status									
Low	0.44	7	4	10	3	7	3	7	4
Middle	0.56	5	4	8	3	5	3	5	4
High	0.57	5	4	8	3	5	3	5	4
Medical Insurance									
Any private	0.57	5	4	8	3	5	3	5	4
Public only	0.52	6	4	8	3	6	3	6	4
None	0.55	5	4	8	3	5	3	6	4

Number needed to screen to identify one undiagnosed incontinence case = [(prevalence of undiagnosed incontinence) (sensitivity of the diagnostic method)] -1.
Number of diagnostic tests to identify one undiagnosed incontinence case = 2 + number needed to screen (1 - prevalence of undiagnosed incontinence) (1 – specificity of the diagnostic test)[925]

Strategies to Improve the Identification of Persons at Risk and Patients who have FI

The diagnostic pathway to detect persons at risk and patients with FI includes self-reported symptoms using questionnaires and scales,[866] clinical history of patients seeking help, anal manometry, sensory testing, anal endosonography, magnetic resonance imaging, and colonoscopy to detect baseline causes for FI.[17] Treatment decisions are made based on instrumental methods including ultrasound and anal manometry, but no consensus exists about which test is a "gold standard," essential to estimate the diagnostic values of other tests.[926] Treatment decisions are made based on clinical assessments and functional and anatomical evaluations of the anorectum.[17]

The Symptom and Quality of Life Committee of the International Consultation on Incontinence could not find sufficient evidence of psychometric properties to attain grade A status for the questionnaires and scales for FI and related quality of life (Appendix Table F217).[866] However, three questionnaires were recommended for evaluation of patients with FI, including the Fecal Incontinence Quality of Life Scale;[484] the Manchester Health Questionnaire,[927] and the Birmingham Bowel and Urinary Symptoms Questionnaire[928] (Appendix Table F218) The questionnaires assess the presence and severity of FI and the perceived quality of life including role and physical limitations, emotional impact of FI, personal relationships, and sexual restrictions related to FI. The American College of Gastroenterology Practice Parameters Committee advised using the Cleveland Clinic Grading system to evaluate the degree of incontinence and the efficacy of therapy,[17] but this was not recommended by the ICI committee. These guidelines do not provide sensitivity, specificity, or likelihood of FI as criteria to grade scales or to recommended questionnaires for research.

Very few studies examined the diagnostic values of scales to detect FI compared to physician diagnosis. The Epidemiology of Prolapse and Incontinence Questionnaire demonstrated 87 percent sensitivity, 70 percent specificity, 61 percent positive predictive value, and a small predictive likelihood ratio (2.9) to diagnose FI in 294 enrolled women with pelvic floor prolapse compared to examiner diagnosis.[929] The Bowel Symptom Questionnaire had a 48.5 percent sensitivity, a 79.2 percent specificity, a 43.2 percent positive predictive value, and a small likelihood ratio (2.3) to identify anal sphincter trauma related to vaginal delivery in 156 women.[930] The Bowel Symptom Questionnaire detected 57.1 percent of the cases of external anal sphincter disruption with specificity of 75.8 percent, positive predictive value of 21.6 percent, and positive likelihood ratio of 2.4.[930]

The American College of Gastroenterology Practice Parameters Committee described a detailed algorithm to evaluate patients with FI or risk factors of FI. However, diagnostic values of the recommended tests were not well documented. For example, when health care professionals did not actively ask questions about continence status, routine clinical history and physical examination identified only 8 percent of patients with constipation and 11 percent with FI, compared to complex diagnostic methods including anal manometry, cinedefecography, electromyography of the anal sphincter, and assessment of terminal motor latency of the pudendal nerve.[931] Self reported and professional evaluations of severity and quality of life related to FI showed agreement in a study of 118 patients with FI.[515] However, surgeons defined solid incontinence as more severe, while patients assigned more severity scores to liquid FI. Clinical values and the economical cost of self-reported questionnaires to detect patients with undiagnosed incontinence require future research.

Anal manometry with an asymmetry index >25 percent had an 81 percent sensitivity, 71 percent specificity, and only a 2.8 positive likelihood ratio to predict combined anal sphincter defect detected with ultrasonography in 61 women with previous vaginal delivery and no past anoperineal surgery.[932] Anal manometry compared to endoanal ultrasonography in patients with idiopathic FI with intact sphincters had different diagnostic value for manometry outcomes. Abnormal resting pressure gradient (<1.78) had 89 percent sensitivity, 96.3 percent specificity, and a large predictive likelihood ratio of 24 to identify FI; maximal mean resting pressure (<40mmHg) had 55 percent sensitivity, 98 percent specificity, and a predictive likelihood ratio of 22, while vector volume (<11.8) had 53 percent sensitivity, 88 percent specificity, and a small predictive ratio of 4.3.[933] A combination of anal manometry and the strength-duration curve had better diagnostic values than tests alone with sensitivity of 95 percent and specificity of 100 percent to predict female FI due to sphincter weakness.[934] Abnormal anal pressure identified only 70 percent of incontinent patients with 68 percent specificity and a 2.5 predictive ratio. Strength duration data demonstrated 77 percent sensitivity and 84 percent specificity with a predictive value of 4.8.[934] Anal manometry with low squeeze sphincter pressure had 52 percent sensitivity to detect FI, impaired rectal sensation could identify only 36 percent incontinent patients; pudendal neuropathy was present in 50 percent of patients with FI diagnosed by colonoscopy or sigmoidoscopy.[935] Anal manometry, rectal capacity measurement, and saline-infusion tests did not demonstrate significant association with FI and could not differentiate 350 incontinent and 80 continent patients.[936]

Endoanal ultrasound had 100 percent specificity and sensitivity to detect external sphincter defects and 100 percent sensitivity, 95 percent specificity, and a 20 predictive likelihood ratio to identify internal sphincter defects compared to morphological surgical findings in 40 women 26-80 years old with FI undergoing pelvic floor repair.[482]

Endoanal magnetic resonance had 56 percent sensitivity, 69 percent specificity, 71 percent predictive positive value, and a 1.8 predictive likelihood ratio to detect defects of anal sphincter compared to endoanal ultrasonography in 237 patients with FI undergoing anal sphincter repair.[937] Endoanal ultrasonography identified 90 percent of external anal sphincter defects with an 85 percent positive predictive value compared to surgical findings. Endoanal magnetic resonance detected 81 percent of external anal sphincter defects with 40 percent specificity, 89 percent positive predictive value, and a small 1.3 positive likelihood ratio.[937]

In conclusion, self-reported questionnaires and scales have unsatisfactory diagnostic clinical validity to diagnose anatomical or physiological causes of FI in adults. For tools using summary scores or scales, different ones are needed for FI and AI since these problems are defined differently. Anal ultrasonography has the highest diagnostic value to detect anal trauma in patients with FI. Patient complaints about FI assessed with a clinical history should be followed by the diagnostic procedures to diagnose primary conditions that may result in FI. Future research is needed to determine effective strategies to identify patients at risk of FI, including residents of LTC facilities.

Chapter 4. Discussion

The present report synthesizes the evidence following the clinical pathway of detection, clinical diagnosis, treatment, and prevention of incontinence in community dwelling adults in and in LTC settings.

Detection of UI

The first big challenge is to define what we call UI. Physiological and clinical self reports yield different results. A person with substantial symptoms despite no urodynamic signs of UI still has a substantial problem. The diagnostic detection rates from scales and clinical history for UI do not correlate closely to multichannel urodynamics.[16] The question is which should take precedence. Most of the evidence comes from women, with few studies for men.[899,904] The yield from screening is high, on average: two to four subjects should be screened to detect one case of UI.[146] A previous systematic review showed that in primary care settings clinical history and diaries are the most cost-effective methods to detect UI in women.[16] However, less than half the incontinent patients who actively sought health care for UI could provide clinical histories or use diaries.[112,155,478] Population-based surveys using validated scales[447,479,480] yielded predictive likelihood ratios and the number needed to screen to detect one case of UI comparable to clinical history[435,436] but at a lower cost ($36-$67 vs. $175-$255 respectively). Such population-based surveys can yield nationally representative valid estimations of prevalent and "bothersome" UI. Routine clinical examinations in high risk groups, including pregnant women and frail adults, should include assessment of UI.

The diagnostic value of the tests among different age, race, and socioeconomic status subgroups has not been well established; however, the prevalence of undiagnosed UI differed by 10-20 percent in such groups.[146] Therefore, screening programs should target patients at high risk of UI including aging and frail adults with functional dependency and cognitive impairment, patients with stroke, diabetes, obesity, poor general health, and comorbidities, pregnant females and women after vaginal birth or with vaginal prolapse, and males after urological surgery and radiation for prostate cancer. Limited evidence suggests that the Resident Assessment Protocol included in the MDS had a definitive predictive likelihood ratio to diagnose UI in nursing home residents.[481] Systematic evaluations of functional status of residents, including noninvasive examinations of incontinence without multichannel urodynamics, would be the preferable screening method in LTC settings.

Detection of FI

Few validated questionnaires[866] and instrumental methods were examined to detect the presence and baseline of causes for FI[17] with no consensus on which test is the "gold standard," essential to estimate the diagnostic values of other tests,[926] despite the tremendous impact of FI on quality of life and health care cost. [17 523] Patient reports do not correlate well with anatomical and physiological measures. Anal manometry does not correlate well with ultrasonography[932] or sigmoidoscopy.[935] Endoanal ultrasound demonstrated the highest predictive likelihood ratio,[482,937] but the use of this method is restricted to adults seeking medical treatment.[522,524] The severity and impact of incontinence on quality of life can be estimated from self-reported

frequency, amount of leakage, and restrictions on daily activities[8,9,32] but not from instrumental methods.[483] However, treatment decisions are made based on objective measures of incontinence.[17,21] Instrumental physiological measurements that are associated with patient outcomes and may reflect better effects of different interventions should be analyzed in well designed experiments.

Treatment

The present report confirmed the significant diversity of interventions used, sampling strategies and definitions, and measurement of outcomes.[17,21,25]

Sampling

Studies of UI and FI in LTC facilities were limited to those that agreed to participate in clinical trials.[233,234,238,708] Recruitment of residents was restricted by cognitive function or comorbidities.[709,710] The loss of followup was substantial in most studies in LTC.[233-235] Studies of behavioral interventions among community dwelling adults relied largely on patients in clinics,[250,372,501,510,712,714,716] with few studies that reported population based recruitment.[240,242,245] Clinic-based sampling was used for most RCTs of surgical treatments of UI and FI among patients who decided to undergo surgery. Selection criteria varied for the same interventions. For example, only women with intact uteri were included in some,[366,794,796,797] but not all, RCTs[367] of hormone therapy. Studies that included continent subjects reported baseline leakage[243,244] and previous surgery for incontinence;[761] few excluded patients with a positive stress test.[321,322] Baseline characteristics of the patients were balanced with stratified randomization in several RCTs.[379,400,712,771,788,800,803,808,837,938] However, some clinical trials reported significant differences at baseline among treatment groups despite randomization.[274,276,303,710,787,789] Pooling analysis was questionable due to sampling differences in the present report and previous systematic reviews.[529,536,539,546] Applicability of clinical interventions that demonstrated significant improvement in incontinence was restricted to the sampled population groups. Whether these effective interventions would result in the same clinical benefit in other populations requires future research.

Definitions of Incontinence and Measures of Success

Despite extensive efforts to standardize the definitions of incontinence,[483] the original studies measured self-reported symptoms and signs of incontinence, severity, and quality of life related to incontinence, and objective instrumental evidence of leakage inconsistently within and across the studies.The prevalence of stress (68.9 percent) was higher than the prevalence of any UI (45.5 percent) in the one report.[122] The Women's Health In the Lund Area study reported an increase in self-reported UI from 32 percent to an estimated 66 percent when the authors removed the restriction that the UI had to represent hygienic bother.[131] Another study estimated 20 cases of stress UI but 89 women answered positively to the question of urine leakges during coughing or sneezing.[61] Ratings of success including improvement in incontinence and in quality of life by doctors and patients were also different.[484] Objective measures of UI showed random changes in most RCTs. The objective improvements in selected physiological measures were not consistent after the same interventions and did not correlate with self-reported

continence and reduction in severity of UI.[322,330,485-491] A small proportion of RCTs reported significant improvements in quality of life[284] and social adaptation[288,299] after behavioral interventions. Severity of UI and discomfort due to UI were reduced after pelvic floor muscle training with biofeedback in one RCT.[729] One RCT of a complex behavioral program supervised by nurse advisors and a consulting urogynecologist demonstrated improvement in quality of life using several scales.[510] Sacrocolpopexy with Burch colposuspension compared to other active treatments resulted in a small improvement in medical, epidemiological, and social aspects of aging scores for stress incontinence[761] and overall quality of life.[353] The effects of treatments on quantitative measures of incontinence, including frequency and amount of leakage, were less compared to qualitative improvements in symptoms.

Other systematic reviews analyzed predominantly self-reported cure and improvement in UI, omitting objective measures of incontinence.[492-494] One review of two clinical trials with urodynamic tests concluded that the data is not sufficient to propose this invasive and costly testing as a measure of success.[495]

Previous reviews did not find anal manometry a good measure of success in reducing FI.[496-500] Anal manometry showed random changes between active and control interventions.[372,375,376,403,501-503] Improvement in self-reported FI was inconsistent with changes in anal manometry.[373,376,378,503] Few trials demonstrated the same direction and effect of treatment on improvement in FI and objective measures of FI.[372] Composite outcomes, including both self-reported changes in severity of incontinence and physiologic parameters in a common scale may offer a better choice to measure success of clinical interventions.[504,505]

Clinical Effectiveness to Reduce the Risk of Incontinence

Primary Prevention

Few studies that reported inclusion of continent women at baseline also reported baseline urinary leakage[243,244] or previous surgery for UI in some participants;[761] only two RCTs excluded patients with a positive stress test.[321,322] The RCTs with primary prevention of incontinence did not always assess the continence status of the subjects at baseline and therefore, they cannot provide valid estimations of the preventive effects of the treatments. In many cases baseline conditions (prostate diseases in males and pregnancy in females), as well as examined interventions including delivery modes or prostate surgery, were associated with higher risks of incontinence. Without objective assessment of baseline incontinence we assumed that some of the participants may have had incontinence at baseline. To avoid bias at baseline status, we reviewed RCTs that equally distributed patients with diagnosed or undiagnosed (not reported in the articles) incontinence between active and control groups and thus provide valid estimates of the treatment effects. We also emphasized the effects of the treatments on continence, where continence was a well defined outcome and there was a clear goal to reduce the risk of incontinence in patients with either diagnosed or undetected (and hence not reported) incontinence.

Many surgical interventions reviewed here aimed to treat baseline conditions, including rectal cancer, anal fissures, ulcerative colitis, and hemorrhoids, reported incontinence as a secondary outcome to complications of surgery. We focused on the continence status only, rather than the primary therapeutic outcomes and surgical complications previously analyzed.[557,939,940] Therefore, we had to estimate the relative benefits attributable to these surgical procedures on

reducing the risk of incontinence and improving quality of life. All clinically relevant outcomes should be taken into account when comparing the effectiveness of surgical procedures to treat cancer and other baseline diseases.

Secondary Prevention

Clinical effectiveness to reduce the risk of incontinence included self-managed behavioral changes (especially pelvic floor muscle exercises), physiotherapy, pharmacological administration, use of medical devices, and surgery for UI and FI. Considerable variations in dose and length of interventions and followup periods and modifications of surgical techniques made overall comparisons across trials difficult and imprecise. The present report found a significant increase in continence after pelvic floor muscle training by 250 percent (RR 2.5, 95 percent CI 1.2; 5.3). Substantial heterogeneity between RCTs of biofeedback assisted pelvic floor muscle training and pelvic floor muscle training combined with bladder training was demonstrated in both the present and previous reviews.[539,552] Implemented behavioral changes did not show significant improvement in UI among residents in LTC settings in the analyzed trials and in previous assessments.[528,529]

Despite substantial heterogeneity among studies, attributable benefit for public health can be estimated from individual RCTs. Compared to regular care, behavioral interventions could avoid 170-749 cases of stress UI per 1,000 treated.[249,288] Weight reduction would result in improved stress UI in 990 adults per 1,000 treated.[714] Intensive lifestyle changes would avoid 54 cases of stress UI per 1,000 treated.[245] Intensive supervised pelvic floor muscle training among pregnant women would prevent 390 cases of UI per 1,000 treated.[246]

The largest attributable benefit on stress UI was demonstrated from small RCTs of 40-127 participants (Table 64). The effect size of pelvic floor muscle training on continence was smaller but still significantly better compared to usual care in the pooled analysis. The Cochrane systematic review reported better effects from pelvic floor muscle training on cure from single studies with no overall estimation.[539]

This report confirms previous reviews of consistent significant benefits on female stress UI of laparoscopic and open colposuspension,[492,494,535] but inconsistent effects from containment products or mechanical devices to prevent urine leakage [493,941] and suburethral slings.[343,546] Future research may demonstrate more valid estimation of long-term benefits and harms after invasive treatments compared to early behavioral interventions when incontinence is minimal and does not affect the quality of life. We also attempted to review clinical interventions that could achieve total urinary continence (free from stress and urge UI) (Table 61). Limited evidence suggested that tension free vaginal tapes,[328,340,770] sling procedures,[334,342] and local estrogen therapy[368] can result in comparable benefits to colposuspension continence rates.[486,775] Not surprisingly, behavioral interventions provided the largest number of avoided cases of UI per 1,000 treated (Table 64). The role of early behavioral interventions to reduce the risk of incontinence in community dwelling adults has been intensively discussed in the medical literature.[483,942]

The role of self-motivation to manage UI was beyond the scope of this review; however, some evidence suggests that individualized focus group interviews,[943] self-confidence in treatment benefits[944] and personal efficacy[945] may be associated with better outcomes.

We uncovered few well-designed RCTs among case series of clinical interventions for FI that demonstrated significant improvements, with conclusions similar to previous systematic

analyses of evidence.[496-500,549-557] Conservative management of FI was effective in LTC.[233-235] Limited evidence suggests possible benefits from anal sphincter exercises and biofeedback therapy for women with obstetrically related FI.[497] Very few pharmacological interventions[378-380] resulted in fecal continence in more than 50 percent of patients and were not statistically better than placebo[378,379]or surgery.[380] Chemical sphincterotomy in patients with chronic anal fissure[404,405] resulted in a 100 percent continence rate. Different delivery modes and surgical techniques to repair obstetric anal sphincter lacerations demonstrated low clinical efficacy and comparable effectiveness. Surgeries for rectal prolapse achieved fecal continence in 40-56 percent with no significant differences between treatments.[413,414] The effect size of surgical procedures to treat FI varied depending on the definition of FI and baseline cause and severity of FI with no good evidence of the superior effectiveness of alternative surgical procedures.[945] Future well-designed research is necessary to examine surgical treatments of FI in different population groups.[496]

Strength of the Evidence

Studies of diagnostic methods had the lowest quality with few RCTs conducted.[437,462,506,507] Large-population-based surveys reported prevalence of incontinence in age, gender, and race subgroups.[8,9,50,67,508] The independent contribution of risk factors on UI and FI were analyzed with adjusted odds ratios in cross-sectional and retrospective cohort studies. Care must be taken to distinguish associations from actual risks. Moreover, many of the risks are immutable (e.g., age and gender) The temporality between these diseases and UI can be estimated from prospective cohort studies measuring the incidence of UI. Such studies have not yet been conducted. Observational studies cannot establish causality between comorbidities and UI. Adjusted odds ratio estimated probability of having incontinence among people with particular diseases compared to those without such diseases. The estimations are still valuable because they identify subgroups at higher probability of UI. However, multivariate models included different sets of risk factors. Since causality between risk factors and incontinence could not be determined from such studies, and the majority of risk factors are not modifiable, we hesitated to estimate events attributable to risk factors.

Efficacy and comparative effectiveness of clinical interventions to reduce the risk and progression of incontinence were analyzed from 365 RCTs. The quality of the RCTs was evaluated in terms of the preplanned intention to treat principle, masking of the treatment status, adequate allocation concealment, randomization scheme and adequacy, and justification for sample size. The majority of the RCTs showed good quality; did not exclude subjects from the analysis of the outcomes, and provided adequate randomization. However, allocation concealment was not adequate in a large proportion of RCTs.[258,261,266,277,286,372,375,376,502,509-512] The RCTs of interventions that are regulated by the FDA, including hormone replacement therapy, had the best quality.[240,245,253,304,365,366,389,513,514] Large RCTs, including the Diabetes Prevention Program,[245] complex conservative management of UI,[240] delivery management,[388,389] and early prevention of UI in postnatal care[253] had high quality.

RCTs remain a “gold standard” to establish causality of the treatments on the outcomes. Inadequate randomization and allocation concealment, exclusion of subjects from the analysis, and inadequate power to detect differences all threaten the validity of the results and waste time and resources. Central randomization, randomization of the clinics rather than patients, adequate allocation concealment, and preplanned intention to treat analysis are possible for all tested

treatments. Variations in populations, interventions, and measures of outcomes, rather than quality of RCTs, resulted in heterogeneity between studies.

We did not include case series that described the experience of individual institutions to treat UI and FI (Chapter 25).[21] Such publications may be useful to generate hypotheses for well-designed trials but have poor internal and external validity and do not provide good evidence about comparative effectiveness of different treatments.

Policy Implications

Public awareness of incontinence, its risk factors, and possible treatment options may reduce the burden on incontinence. The behavioral risk factor surveillance system may assess prevalence and annual incidence of incontinence in large nationally representative population groups. Routinely collected clinical history should include evaluation of the risk factors, symptoms, and signs of incontinence. Pregnant, obese, and aging women, males with prostate diseases, patients with vaginal and rectal prolapse, and frail elderly should be actively screened for incontinence. Quality indicators for nursing homes, including access to toilets and wet status of the residents, should be continuously monitored and analyzed. Instrumental methods, including multichannel urodynamics and anal manometry, cannot be recommended as outcomes to examine effectiveness of clinical interventions on incontinence. Early behavioral changes in weight, physical activity, and pelvic floor muscle training may reduce the incidence of incontinence in adults. Preventive strategies might include assessment and reduction of modifiable risk factors in early stages of incontinence when incontinence is minimal and does not affect the quality of life.

Question 5. What are the Research Priorities for Identifying Effective Strategies to Reduce the Burden of Illness in these Conditions?

Future research should examine the reproducibility of effective clinical interventions, including local estrogen therapy, weight reduction combined with increased physical activity, individualized electrical and magnetic stimulation, sphincteric stents, penile compression devices, and artificial bowel sphincter. Several of these interventions are being tested in ongoing clinical trials registered in www.clinicaltrials.gov (Table 76). Consistency in long-term results would provide a better basis for clinical and policy decisions.

Further investigation is needed on the long-term curative effects of self-reported continence of combined behavioral and drug therapies on clinical outcomes at 6 months or more followup rather than surrogate tests. The balance between the curative effects of surgical procedures for incontinence and adverse effects and costs should be further examined in well-designed RCTs. Administrative databases can provide useful information on comparative treatment effectiveness, but the results can be biased if provider characteristics are ignored.

The effectiveness of clinical interventions should be tested in subgroups of patients by race, comorbidities and concomitant treatments, and baseline functional conditions of the pelvic floor, including trauma and pelvic floor muscle strength. Better preplanned randomization schemes could yield sufficient numbers of patients among treatment groups to support subgroup analysis that would give valid estimations of treatment effects in different patient populations. The choice

of outcomes should reflect patient perception of cure and quality of life rather than solely provider evaluation and instrumental testing.

The effects of early behavioral interventions in high risk populations on incidence of incontinence should be examined in well-designed RCTs. Pregnant and pre-menopausal continent women should be the target population for future preventive RCTs of complex lifestyle modification. The large proportion of incontinent adults who do not seek care requires changes in the public perception of incontinence as an embarrassing condition with no cure.[946-949] Clinical examination of pregnant women should include assessment of continence status. Pregnancy and postpartum care should include a quality indicator for continence evaluation. Continence service should be a quality indicator for health care during pregnancy and postpartum. Early detection of incontinence in annual population-based surveys (the Behavioral Risk Factor Surveillance System) may improve public awareness of incontinence. Several ongoing studies will test different diagnostic strategies to detect incontinence (Table 77).

The pathophysiology of incontinence needs further investigation to develop effective preventive and curative treatments. Muscle-derived stem cells showed promising results in animal and in vivo studies.[950,951] Injections of myoblasts to bladder walls resulted in regeneration of myofibers and improved contractility.[952] Recombinant human insulin-like growth factor-I delivered with plasmid to denervated sphincter muscle improved recovery of sphincter function in animal models.[953] Gene transfer therapy with hMaxi-K was successfully tested in one Phase I clinical trial.[954] Another ongoing trial in patients with overactive bladder will examine the effects of gene therapy of the alpha subunit of the human smooth muscle Maxi-K channel (NCT00495053). Continence devices that work on demand, similar to cardiac pacemakers, may be developed in the future to prevent involuntary leakage of urine and feces.

An important continuing and unresolved problem is defining what is meant by either type of incontinence. The failure to resolve this issue impedes both prevalence and diagnostic and efficacy research. The inconsistencies between patient reports and physiological measures continue to pose a serious problem. For efficacy studies, some combined measure might be applied, but for prevalence assessments, such an approach would pose serious logistical problems. The differences are even more severe when one considers the implications of differences in utility weights applied to measures of incontinence between patients and clinicians.[484,515]

The pressures for finding effective treatments have increased as a result of advertising of medications to treat UI that is directed to patients. Expectations have been raised. The need for more and better studies of treatments for both types of incontinence (UI and FI) remains. Given the social problems caused by incontinence, enthusiasm for surgical treatment remains high for treating both UI and FI,[955-957] although future research is needed to examine the balance between benefits and harms related to surgery and the cost-effectiveness of surgical treatments compared to conservative preventive interventions.

Managing both types of incontinence in LTC settings remains problematic. Programs that work under experimental conditions have not been sustained because they are labor intensive and essentially unreimbursed. Indeed, case mix based payments for nursing homes create a disincentive to manage incontinence.

Several other specific areas have been identified as needing more research. They include:

- Interaction between age, race, and other risk factors for UI and FI in women and men
- Effective strategies to prevent UI in women and men in community and LTC settings
- Effective interventions to reduce risk of institutionalization due to UI or FI.

- Association between race and severity of FI and quality of life related to FI in men and women from the community and in LTC settings
- Strategies to reduce the risk of FI related to pregnancy and childbirth
- Effectiveness of clinical interventions for incontinence across subgroups by cognitive and physical functioning, gender, and ethnicity
- Long-term effectiveness of individual conservative therapies, conservative management programs including community-based nonmedical interventions, and mechanical devices for UI and FI
- Comparative long-term effectiveness of conservative interventions, pharmacological interventions, combined conservative and pharmacological interventions, mechanical devices, and surgery for UI
- Individual patient factors that may modify the effects of different procedures
- Effects on FI of surgeries for hemorrhoids, rectal prolapse, rectal cancer, and anal fissures
- Cost-effective strategies to identify patients at risk of FI, including residents of LTC settings
- Long-term effects of conservative management programs for FI in community dwelling adults and residents of LTC settings

Table 76. Ongoing clinical trials of the interventions for incontinence (registered in www.clinicaltrials.gov)

Sponsors	Clinical trials.gov Identifier	Incontinence	Intervention Arms				Phase
National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)	00212264	Postprostatectomy UI	Behavioral: behavior training	Device: biofeedback	Device: pelvic floor electrical stimulation	Behavioral: pelvic floor muscle exercise	
Department of Veterans Affairs	00292318	FI	Behavioral: biofeedback				
University of Pittsburgh	00177541	Urge UI	Behavioral: biofeedback, pelvic floor muscle training				
University of Michigan	00125177	Stress UI	Behavioral: knack therapy				I-II
NHS Health Technology Assessment Programme	00237029	UI after treatments for PC	Behavioral: pelvic floor muscle training	Behavioral: bladder training	Device: biofeedback	Behavioral: lifestyle changes	
Norwegian Foundation for Health and Rehabilitation	00271297	Pelvic organ prolapse	Behavioral: pelvic floor muscle training				
National Institute of Child Health and Human Development (NICHD)	00270998	UI	Behavioral: pelvic muscle training and exercises	Device: intravaginal incontinence pessary	Device: both pessary and pelvic muscle exercises		III
University of British Columbia	00323245	UI	Behavioral: physiotherapy for urinary incontinence				
Norwegian Fund for Postgraduate Training in Physiotherapy	00476567	Pregnancy-related diseases and complications during labor	Behavioral: regular exercise 45-60 minutes minimum three times per week				
Hospices Civils de Lyon	00387439	AI	Behavioral: standard medical treatment + anoperineal physiotherapy	Behavioral: standard medical treatment			
Queen's University	00427778	Stress UI	Device: incontinence ring (Milex)				IV
Solace Therapeutics, Inc.	00492596	Stress UI	Device: AttenueX IntraVesical System				III

Table 76. Ongoing clinical trials of the interventions for incontinence (registered in www.clinicaltrials.gov) (continued)

Sponsors	Clinical trials.gov Identifier	Incontinence	Intervention Arms			Phase
Contura	00333073	UI	Device: Bulkamid - bulking agent			
Ethicon, Inc.	00453739	Stress UI	Device: GYNECARE TVT-SECUR* System	Device: GYNECARE TVT* System	Device: GYNECARE TVT* Obturator System	
William Beaumont Hospitals	00441935	UI	Device: InterStim Neuromodulation			
CL Medical	00442078	UI	Device: I-STOP TOMS	Device: transobturator male sling		IV
Department of Veterans Affairs	00345397	FI in SCI	Device: percutaneous endoscopic colostomy tube			
The Cleveland Clinic	00475839	Stress UI	Device: tension-free vaginal tape		Device: Monarc subfascial hammock	III
Austrian Urogynecology Working Group (AUWG)	00441454	UI	Device: tension-free vaginal tape (retropubic vs. transobturator)			
South Glasgow University Hospitals NHS Trust	00136071	Stress UI	Device: transobturator tape-ARIS	Device: TVT-O		
National Institute of Child Health and Human Development (NICHD)	00460434	Pelvic organ prolapse	Device: TVT			
Uroplasty, Inc	00448175	Overactive bladder	Device: urgent PC			IV
Medstar Research Institute	00475540	Pelvic organ prolapse	Device: vaginal mesh			IV
Cellerix	00475410	Anal fistula	Drug: autologous adipose-derived stem cells (Cx 401)			III
Urological Sciences Research Foundation	00479596	Overactive bladder	Drug: Botox			II, III
National Institutes of Health (NIH)	00178191	UI	Drug: botulinum A toxin			
Allergan	00168454	Overactive bladder UI	Drug: botulinum toxin type A	Drug: placebo		II
Allergan	00439140	Overactive bladder	Drug: botulinum toxin type A			III

Table 76. Ongoing clinical trials of the interventions for incontinence (registered in www.clinicaltrials.gov) (continued)

Sponsors	Clinical trials.gov Identifier	Incontinence	Intervention Arms				Phase
Allergan	00311376	Overactive bladder	Drug: botulinum toxin type A				III
Allergan	00461292	Overactive bladder	Drug: botulinum toxin type A				III
University of Rochester	00345332	Severe urge UI	Drug: botulinum-A toxin				
Department of Veterans Affairs	00223821	UI	Drug: extended release oxybutynin chloride	Behavioral: behavior training			
Asset Hospital Systems	00498888	Urge UI	Drug: tolterodine	Procedure: bladder training	Procedure: pelvic floor rehabilitation	Procedure: pelvic floor muscle training	
Ion Channel Innovations	00495053	Overactive bladder	Gene Transfer: hMaxi-K				I
University of Pittsburgh	00177450	UI	Procedure: acupuncture				
National Center for Complementary and Alternative Medicine (NCCAM)	00297427	UI	Procedure: acupuncture				
University Hospital of North Norway	00303030	FI	Procedure: anal injection of bulking agent	Procedure: biofeedback			I
The Cleveland Clinic	00485355	Hysterectomy for benign indications	Procedure: conventional laparoscopic hysterectomy	Procedure: robotic assisted laparoscopic hysterectomy			
National Cancer Institute (NCI)	00238381	Colorectal cancer	Procedure: conventional surgery	Procedure: laparoscopic surgery	Procedure: surgery		III
University Hospital, Rouen	00213317	FI	Procedure: cortical and lumbar-sacral magnetic stimulation				
National Taiwan University Hospital	00270738	UI	Procedure: indirect training of the pelvic floor muscles via transversus abdominis				
Central Carolina Surgery, PA	00329862	UI after laparoscopic adjustable gastric banding for morbid obesity	Procedure: laparoscopic truncal vagotomy				
William Beaumont Hospitals	00378664	UI in SCI	Procedure: lumbar to sacral ventral nerve re-routing procedure				II

Table 76. Ongoing clinical trials of the interventions for incontinence (registered in www.clinicaltrials.gov) (continued)

Sponsors	Clinical trials.gov Identifier	Incontinence	Intervention Arms			Phase
Canadian Institutes of Health Research (CIHR)	00187369	Multiple pregnancy	Procedure: method of delivery (CS versus VB)			
William Beaumont Hospitals	00444730	UI in PC	Procedure: radical prostatectomy	Procedure: interstim implantation		
National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)	00325039	UI	Procedure: retropubic mid-urethral sling (TVT)	Procedure: transobturator mid-urethral sling (TVT-O and the Monarc)		IV
Assistance Publique - Hôpitaux de Paris	00472069	UI	Procedure: transplantation of the squeletic muscular cells	Procedure: surgery	Procedure: relation of the continence urinary	
University of Calgary	00234754	Stress UI	Procedure: trans-vaginal tape, trans-obturator tape			
Assistance Publique - Hôpitaux de Paris	00231491	Overactive bladder (OAB)	Drug: botulinum toxin A (Botox)			II
Women's Health Clinical Research Center at the University of California, San Francisco		UI	PRIDE (Program to Reduce Incontinence by Diet and Exercise) Diet, exercise, and weight loss	Regular care		
University of Rochester	00345332	Severe urge UI	Drug: botulinum-A toxin	Placebo		
Avera Pharmaceuticals	NCT00335660	Overactive bladder	Drug: AV608, a neurokinin 1 (NK-1) antagonist	Placebo		II
GlaxoSmithKline	00321477	Overactive bladder	Drug: GW679769	Placebo		II
University of L'Aquila	00441428	Overactive bladder and detrusor underactivity	Drug: solifenacin	Uncontrolled		II
University of Alabama at Birmingham	00465894	Overactive bladder postmenopausal	Drug: Detrol LA	Drug: estrace vaginal cream		

Table 77. Ongoing studies of diagnosis of incontinence

Sponsor	Clinicaltrials.gov Identifier	Condition	Examined Strategy
Rambam Health Care Campus	00437528	Overactive bladder without incontinence, urge incontinence and voiding difficulties	Novel heat flow sensor unit for measuring urinary bladder capacity
Hospital de Clinicas de Porto Alegre	00490438	Before and after surgeries for UI	Measurement of vaginal squeeze pressure in incontinent patients
Tripler Army Medical Center	00355433	Non-pregnant females referred to the urogynecology clinic for bladder testing	Body and room temperature saline in urodynamics
Pfizer	00481728	Sympathetic skin response or heart rate variability as an objective biomarker of bladder sensation	Bladder sensation and changes in skin electrical conductance and heart rate

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List of Acronyms/Abbreviations

ADL	Activities of daily living
AI	Anal incontinence
BMI	Body mass index
CI	Confidence interval
COPD	Chronic obstructive pulmonary disease
EMG	Electromyography
FI	Fecal incontinence
FIQL	Fecal incontinence quality of life
GI	Gastrointestinal
IBD	Inflammatory bowel disease
IBS	Irritable bowel syndrome
ICI	International consultation on incontinence
ICS	International Continence Society
LTC	Long-term care
MDS	Minimum data set
MMSE	Mini mental state examination
PPV	Positive predictive value
RCT	Randomized controlled trial
RR	Relative risk
SNRI	Serotonin norephinephine reuptake inhibitors
SSRI	Selective serotonin reuptake inhibitors
SUIQQ	Stress and urge incontinence and quality of life questionnaire
TEP	Technical expert panel
UI	Urinary incontinence
UISS	Urinary incontinence severity score

Appendix A. Analytic Framework

Appendix D contains details on analytical framework of the report: algorithm to define eligibility of the studies, definitions, hypotheses, and statistical models.

Conceptual and operational definitions of incontinence and risk factors of incontinence are presented below.

Conceptual Definitions

Fecal Incontinence—failure of voluntary control of the anal sphincters, with involuntary passage of feces and flatus (solid and liquid) and flatus[1]

Urinary Incontinence—complaint of any involuntary leakage of urine[2]
Urge urinary incontinence—involuntary urine leakage accompanied by or immediate preceded by urgency, usually related to the involuntary contractions of the detrusor muscle of the bladder (detrusor overactivity)[2]

Stress Urinary Incontinence—involuntary urine leakage as a result of physical effort or exertion that increases abdominal pressure on the urinary bladder in the absence of detrusor contraction [2]

Table 1. Operational definitions of incontinence

Variable	Definition
Symptoms of Urinary incontinence[2]	The complaint of any involuntary leakage of urine.
Signs of urinary Incontinence.	Urine leakage seen during examination: this may be urethral or extraurethral.
Extra-urethral incontinence	The observation of urine leakage through channels other than the urethra.
Uncategorized incontinence	The observation of involuntary leakage that cannot be classified into one of the above categories on the basis of signs and symptoms
Transient urinary incontinence[3,4]	A potentially reversible incontinence due to conditions that may resolve if the underlying cause is managed. These conditions include: delirium/confusional state; infection—urinary (symptomatic); atrophic urethritis/vaginitis; pharmaceuticals use; psychological conditions, especially depression; excessive urine output (e.g., CHF, hyperglycemia); restricted mobility; stool impaction
Established urinary incontinence[3,4]	Urinary incontinence that is attributed to bladder or urethral dysfunction such as: detrusor overactivity; detrusor underactivity; urethral obstruction; urethral incompetence
Stress urinary incontinence	Complaint of involuntary urine leakage on effort or exertion, or in sneezing or coughing
Urge urinary incontinence	Complaint of involuntary leakage accompanied by or immediately preceded by urgency
Overflow incontinence [5]	Urinary incontinence associated with: bladder overdistention; a contractile detrusor; hypotonic or underactive detrusor secondary to drugs, fecal impaction, diabetes, lower spinal cord injury, or disruption of the motor innervation of the detrusor muscle
Mixed urinary incontinence[2,6]	The complaint of involuntary leakage associated with urgency and also with exertion, effort, sneezing, or coughing
Situational urinary incontinence	The report of incontinence during sexual intercourse, or giggle incontinence.

Variable	Definition
Continuous urinary leakage	Complaint of continuous urinary leakage
Acute incontinence[7]	Sudden onset of symptoms related to an illness, treatment, or medication
Chronic incontinence	Persistent urinary incontinence includes disorders of storage (stress and urge), disorder of emptying (overflow), and functional and mixed incontinence.
Severity of incontinence	Incontinent episodes/unit time; pad changes/unit time; pad weight/unit time; number of micturitions/unit time; urinary pad test—measured loss; urodynamic-diagnosed detrusor overactivity; urodynamic stress incontinence
Sandvik's severity index[8]	Multiplied reported frequency (4 levels) by the amount of leakage (2 levels).
Slight incontinence	Leakage of drops a few times a month (~6g/24 hours, 95%CI 2-9)
Moderate incontinence	Daily leakage or drops (~17g/24 hours, 95%CI 13-22)
Severe incontinence	Leakage of large amount of urine at least once a week (~56g/24 hours, 95%CI 44-67)
Impact of incontinence	Actions patients have taken to ameliorate the incontinence including wearing pads, reducing activities, seeking medical treatment (visits to clinicians, prescriptions of medications, surgical procedures).
Impact of incontinence on quality of life	Measurement using a validated generic or condition-specific measure of quality of life developed to address issues related specifically to fecal incontinence or urinary incontinence
Remission of incontinence	Diminution of symptoms and signs of incontinence.
Contained Incontinence	Urine contained with pads or appliances
Dependent Continence	Dry with toileting assistance, behavioral treatment, and/pr medications
Independent Continence	Dry, not dependent on ongoing treatment
Symptoms of Incontinence[2,6]	The subjective indicator of incontinence or change in its severity as perceived by the patient, caregiver, or partner and may lead him/her to seek help from health care professionals.
Signs of Incontinence	Observed by the physician including simple means, to verify symptoms and quantify them.
Urodynamic observations	Observations made during urodynamic studies which have a number of possible underlying causes and do not represent a definitive diagnosis of a disease.
Measures of the frequency, severity and impact of urinary incontinence[2]	
Micturition time chart	Records of times of micturitions, day and night, for at least 24 hours.
Frequency volume chart (FVC)	Records of volumes voided as well as the time of each micturition, day and night, for at least 24 hours.
Bladder diary	Records of times of micturitions and voided volumes, incontinence episodes, pad usage, and other information such as fluid intake, the degree of urgency, and the degree of incontinence.
Daytime frequency	The number of voids recorded during waking hours and includes the last void before sleep and the first void after waking and rising in the morning.
24-hour frequency	The total number of daytime voids and episodes of nocturia during a specified 24-hour period
24-hour production	All urine produced during 24 hours
Maximum voided volume	The largest volume of urine voided during a single micturition and is determined either from the frequency/volume chart or bladder diary.
Pelvic floor muscle function	Measured during rectal examination by the tone at rest and the strength of a voluntary contraction, as strong, weak or absent. A pelvic muscle contraction may be assessed by visual inspection, by palpation, electromyography, or perineometry. Factors to be assessed include strength, duration, displacement, and repeatability
Pad testing	The amount of urine lost during incontinence episodes (a short provocative test to a 24-hour pad test)
Improvement in incontinence	Reduction frequency and severity of incontinence episodes. Reduction in restrictions of daily activities due to incontinence.
Progression of incontinence	Increase in frequency and severity of incontinence episodes. Increase in restrictions of daily activities due to incontinence. Failure of achieve continence. Failure to reduce frequency and severity of incontinent episodes.

Variable	Definition
Urodynamic Techniques[2,9-11]	
Conventional urodynamic studies	Urodynamic laboratory measurement of artificial bladder filling—filling the bladder, via a catheter, with a specified liquid at a specified rate.
Ambulatory urodynamic studies	A functional test of the lower urinary tract, utilizing natural filling (the bladder is filled by the production of urine rather than by an artificial medium), and reproducing the subject's every day activities
Intravesical pressure	The pressure within the bladder
Abdominal pressure	The pressure surrounding the bladder. In current practice it is estimated from rectal, vaginal or, less commonly, from extraperitoneal pressure or a bowel stoma. The simultaneous measurement of abdominal pressure is essential for the interpretation of the intravesical pressure trace.
Detrusor pressure	The component of intravesical pressure that is created by forces in the bladder wall (passive and active). It is estimated by subtracting abdominal pressure from intravesical pressure.
Filling cystometry	Urodynamic investigation of the filling phase of the micturition cycle. The method by which the pressure/volume relationship of the bladder is measured during bladder filling
Bladder function during filling.	The rate at which the bladder is filled.
Physiological filling rate	A filling rate less than the predicted maximum – predicted maximum body weight in kg divided by 4 expressed as ml/min
Nonphysiological filling rate	A filling rate greater than the predicted maximum filling rate –predicted maximum body weight in kg divided by 4 expressed as ml/min.
Bladder storage function	Bladder sensation, detrusor activity, bladder compliance, and bladder capacity.
Normal bladder sensation	Sensation judged by three defined points noted during filling cystometry and evaluated in relation to the bladder volume at that moment and in relation to the patient's symptomatic complaints.
First sensation of bladder filling	The feeling the patient has, during filling cystometry, when he/she first becomes aware of the bladder filling.
First desire to void	The feeling, during filling cystometry that would lead the patient to pass urine at the next convenient moment, but voiding can be delayed if necessary.
Strong desire to void	Persistent desire to void without the fear of leakage.
Increased bladder sensation	An early first sensation of bladder filling (or an early desire to void) and/or an early strong desire to void, which occurs at low bladder volume and which persists.
Reduced bladder sensation	Diminished sensation throughout bladder filling.
Absent bladder sensation	The absence of bladder sensation during filling cystometry.
Bladder pain	A self explanatory term and is an abnormal finding.
Urgency	A sudden compelling desire to void.
The vesical/urethral sensory threshold	The least current which consistently produces a sensation perceived by the subject during stimulation at the site under investigation.
Normal detrusor function	Bladder filling with little or no change in pressure. No involuntary phasic contractions occur despite provocation.
Detrusor overactivity	An urodynamic observation characterized by involuntary detrusor contractions during the filling phase which may be spontaneous or provoked.
Phasic detrusor overactivity	Defined by a characteristic wave form and may or may not lead to urinary incontinence
Terminal detrusor overactivity	A single, involuntary detrusor contraction, occurring at cystometric capacity, which cannot be suppressed and results in incontinence usually resulting in bladder emptying (voiding).
Detrusor overactivity incontinence	Incontinence due to an involuntary detrusor contraction.
Neurogenic detrusor overactivity	Detrusor overactivity caused by a relevant neurological condition.
Idiopathic detrusor overactivity	Detrusor overactivity with unknown cause.
Provocative maneuvers	Techniques used during urodynamics in an effort to provoke detrusor overactivity; for example, rapid filling, use of cooled or acid medium, postural changes and hand washing.

Variable	Definition
Bladder compliance during filling	
Cystometry	Description of the relationship between change in bladder volume and change in detrusor pressure; calculated by dividing the volume change (ΔV) by the change in detrusor pressure (Δpdet) during that change in bladder volume (C=V. Δpdet). It is expressed in ml/cm H2O. Two standard points: 1. The detrusor pressure at the start of bladder filling and the corresponding bladder volume (usually zero) 2. The detrusor pressure (and corresponding bladder volume) at cystometric capacity or immediately before the start of any detrusor contraction that causes significant leakage (and therefore causes the bladder volume to decrease, affecting compliance calculation). Both points are measured excluding any detrusor contraction.
Bladder capacity during filling cystometry	
Cystometric capacity	The bladder volume at the end of the filling cystometrogram, when "permission to void" is usually given. The end point should be specified, for example, if filling is stopped when the patient has a normal desire to void. The cystometric capacity is the volume voided together with any residual urine.
Maximum cystometric capacity	The volume at which the patient feels he/she can no longer delay micturition (has a strong desire to void).
Maximum anaesthetic bladder capacity	The volume to which the bladder can be filled under deep general or spinal anesthetic and should be qualified according to the type of anesthesia used and the speed, the length of time, and the pressure at which the bladder is filled.
Urethral function during filling cystometry	The urethral closure mechanism during storage
Normal urethral closure mechanism	A positive urethral closure pressure during bladder filling even in the presence of increased abdominal pressure, although it may be overcome by detrusor overactivity.
Incompetent urethral closure mechanism	Patho-physiologic condition which allows leakage of urine in the absence of a detrusor contraction.
Urethral relaxation incontinence	A leakage due to urethral relaxation in the absence of raised abdominal pressure or detrusor overactivity.
Urodynamic stress incontinence (genuine stress incontinence)	The involuntary leakage of urine during increased abdominal pressure, in the absence of a detrusor contraction
Assessment of urethral function during filling cystometry	
Urethral pressure measurement	The fluid pressure needed to just open a closed urethra.
The urethral pressure profile	A graph indicating the intraluminal pressure along the length of the urethra
The urethral closure pressure profile	Given by the subtraction of intravesical pressure from urethral pressure
Maximum urethral pressure	The maximum pressure of the measured profile.
Maximum urethral closure pressure (MUCP)	The maximum difference between the urethral pressure and the intravesical pressure.
Functional profile length	The length of the urethra along which the urethral pressure exceeds intravesical pressure in women.
Pressure "transmission" ratio	The increment in urethral pressure on stress as a percentage of the simultaneously recorded increment in intravesical pressure
Abdominal leak point pressure	The intravesical pressure at which urine leakage occurs due to increased abdominal pressure in the absence of a detrusor contraction.
Detrusor leak point pressure	The lowest detrusor pressure at which urine leakage occurs in the absence of either a detrusor contraction or increased abdominal pressure.

Variable	Definition
Pressure Flow Studies	The method by which the relationship between pressure in the bladder and urine flow rate is measured during bladder emptying.
Urine flow	Continuous, that is without interruption, or as intermittent urine flow, when an individual states that the flow stops and starts during a single visit to the bathroom in order to void. The continuous flow curve is defined as a smooth arc-shaped curve or fluctuating when there are multiple peaks during a period of continuous urine flow
Flow rate	The volume of fluid expelled via the urethra per unit time expressed in ml/s
Voided volume	The total volume expelled via the urethra
Maximum flow rate	The maximum measured value of the flow rate after correction for artifacts
Voiding time	Total duration of micturition, i.e., includes interruptions. When voiding is completed without interruption, voiding time is equal to flow time
Flow time	The time over which measurable flow actually occurs.
Average flow rate	Voided volume divided by flow time. The average does not reflect flow interruptions or terminal dribble.
Time to maximum flow	The elapsed time from onset of flow to maximum flow.
Pressure measurements during pressure flow studies (PFS)	
Premicturition pressure	The pressure recorded immediately before the initial isovolumetric contraction.
Opening pressure	The pressure recorded at the onset of urine flow.
Opening time	The elapsed time from initial rise in detrusor pressure to onset of flow.
Maximum pressure	The maximum value of the measured pressure
Pressure at maximum flow	The lowest pressure recorded at maximum measured flow rate.
Closing pressure	The pressure measured at the end of measured flow.
Minimum voiding pressure	The minimum pressure during measurable flow but is not necessarily equal to either the opening or closing pressures.
Flow delay	The time delay between a change in bladder pressure and the corresponding change in measured flow rate.
Detrusor function during voiding	
Normal detrusor function	Allows bladder filling with little or no change in pressure. No involuntary phasic contractions occur despite provocation
Detrusor underactivity	A contraction of reduced strength and/or duration, resulting in prolonged bladder emptying and/or a failure to achieve complete bladder emptying within a normal time span.
Acontractile detrusor	No contractility can be detected during urodynamic studies.
Post void residual (PVR)	The volume of urine left in the bladder at the end of micturition
Urethral function during voiding	
Normal urethra function	Urethra that opens and is continuously relaxed to allow the bladder to be emptied at a normal pressure.
Abnormal urethra function	Obstruction to urethral overactivity or the urethra cannot open due to anatomic abnormality, such as an enlarged prostate or a urethral stricture
Bladder outlet obstruction	Obstruction during voiding and is characterized by increased detrusor pressure and reduced urine flow rate diagnosed by studying the synchronous values of flow rate and detrusor pressure.
Dysfunctional voiding	An intermittent and/or fluctuating flow rate due to involuntary intermittent contractions of the periurethral striated muscle during voiding in neurologically normal individuals.
Detrusor sphincter dyssynergia	A detrusor contraction concurrent with an involuntary contraction of the urethral and/or periurethral striated muscle.
Non-relaxing urethral sphincter obstruction	Non-relaxing, obstructing urethra resulting in reduced urine flow in individuals with a neurological lesion

Long-term care—care over an extended period, usually for a chronic condition or disability, requiring periodic, intermittent, or continuous care

Conceptual definition of race—continental population groups of individuals whose putative ancestry is from native continental populations based on similarities in physical appearance

Conceptual definition of ethnicity—ethnic groups of people with a common cultural heritage that sets them apart from others in a variety of social relationships

Table 2. Operational definitions of patient race and ethnicity[12]

Variable	Definition
Race	
African Continental Ancestry Group	Individuals whose ancestral origins are in the continent of Africa.
Asian Continental Ancestry Group	Individuals whose ancestral origins are in the continent of Asia.
European Continental Ancestry Group	Individuals whose ancestral origins are in the continent of Europe
Ethnic Groups	
African Americans	Persons living in the United States having origins in any of the black groups of Africa
Arabs	Members of a Semitic people inhabiting the Arabian peninsula or other countries of the Middle East and North Africa. The term may be used with reference to ancient, medieval, or modern ethnic or cultural groups
Asian Americans	Persons living in the United States having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent.
Hispanic Americans	Persons living in the United States of Mexican (Mexican Americans), Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin. The concept does not include Brazilian Americans or Portuguese Americans.

Conceptual definitions of risk factors[12]—aspects of personal behavior or lifestyle, environmental exposure, or inborn or inherited characteristic, which, on the basis of epidemiologic evidence, is known to be associated with urinary and fecal incontinence considered important to prevent incontinence.

Prevalence of incontinence—probability of experiencing a symptom or having a disease within a defined population and at a defined time point.[1,6]

Incidence—probability of developing incontinence under study during a defined time period, usually reported for one, two-, or five-year interval.[1,6]

Relative risk estimation of the magnitude of an association between exposure and a condition, indicates the likelihood of having the condition in the exposed group relative to those who are not exposed.[1,6]

Odds ratio is the odds for having a risk factor in persons with a condition divided by the odds among those without the condition[1,6].

Table 3. Operational definitions of known risk factors of urinary and fecal incontinence

Variable	Definition
Age	Persons classified by age from birth to octogenarians and older Age categories: 19-44 years; 45-64 years, 65+ years; 80 and over
Elderly	Aged- person 65 through 79 years of age; 80 and over
Functional impairment (Frailty) [13]	Combination of three or more of five factors: unintentional weight loss (10 pounds or more in a year); general feeling of exhaustion; weakness (as measured by grip strength); slow walking speed; low levels of physical activity.
Prostate disorders[3,4]	Prostatic enlargement, urethral stricture, bladder neck contracture, or prostate cancer that may cause urethral obstruction
Pregnancy[12]	The status during which female mammals carry their developing young embryos, or fetuses in uteri before birth, beginning from fertilization to birth
Postpartum period	In females, 4 weeks after giving birth

Variable	Definition
Menopause	The last menstrual period. Permanent cessation of menses usually defined after 6 to 12 months of amenorrhea in a woman over 45 years of age.
Institutionalization	Caring for individuals in institutions and their adaptation to routines characteristic of the institutional environment, and/or their loss of adaptation to life outside the institution.
Dementia	An acquired organic mental disorder with loss of intellectual abilities of sufficient severity to interfere with social or occupational functioning. The dysfunction is multifaceted and involves memory, behavior, personality, judgment, attention, spatial relations, language, abstract thought, and other executive functions. The intellectual decline is usually progressive, and initially spares the level of consciousness.
Depression	Depressive states usually of moderate intensity in contrast with major depression present in neurotic and psychotic disorders
Depressive disorder	An affective disorder manifested by either a dysphoric mood or loss of interest or pleasure in usual activities. The mood disturbance is prominent and relatively persistent.
Depression, postpartum	Depression in postpartum women, usually within four weeks after giving birth. The degree of depression ranges from mild transient depression to neurotic or psychotic depressive disorders
Depressive disorder, major	Marked depression appearing in the involution period and characterized by hallucinations, delusions, paranoia, and agitation
Psychiatric disorders	Psychiatric illness or diseases manifested by breakdowns in the adaptational process expressed primarily as abnormalities of thought, feeling, and behavior producing either distress or impairment of function
Diabetes	A heterogeneous group of disorders characterized by hyperglycemia and glucose intolerance
Diabetes mellitus, Type 2	A subclass of diabetes that is not Insulin-responsive or dependent (NIDDM). It is characterized initially by insulin resistance and hyperinsulinemia; and eventually by glucose intolerance; hyperglycemia and overt diabetes. Patients often exhibit obesity
Diabetes mellitus, Type 1	A subtype of diabetes mellitus that is characterized by Insulin deficiency. It is manifested by the sudden onset of severe hyperglycemia, rapid progression to diabetic ketoacidosis, and death unless treated with insulin.
Obesity	A status with body weight that is grossly above the acceptable or desirable weight, usually due to accumulation of excess fats in the body. The standards may vary with age, sex, genetic or cultural background. In the body mass index, a BMI greater than 30.0 kg/m2 is considered obese, and a BMI greater than 40.0 kg/m2 is considered morbidly obese
Diet	Regular course of eating and drinking adopted by a person measured by a nutrient intake over a specific period of time
Irritable bowel syndrome	A disorder with chronic or recurrent colonic symptoms. This condition is characterized by chronic or recurrent abdominal pain, bloating, mucus in feces, and an erratic disturbance of defecation
Diarrhea	An increased liquidity or decreased consistency of feces, such as running stool. Fecal consistency is partially related to the ratio of water-holding capacity of insoluble solids to total water, rather than only the amount of water present. Diarrhea is not hyperdefecation or increased fecal weight
Constipation[14]	Presence of at least two symptoms, which must be present at least 25% of the time. Symptoms include: fewer than 3 bowel movements per week, hard or lumpy stools, straining with defecation, a sensation of incomplete evacuation, a sensation of anorectal obstruction, and the use of manual maneuvers to assist defecation. Chronicity: 12 weeks in the previous year, which do not need to be consecutive. 3 subtypes:[14] colonic inertia (delayed motility), outlet obstruction, and functional constipation.

Variable	Definition
Inflammatory Bowel Diseases	Chronic, nonspecific inflammation of the gastrointestinal tract including Crohn disease and ulcerative colitis
Irritable Bowel Syndrome	A disorder with chronic or recurrent colonic symptoms without a clear-cut etiology characterized by chronic or recurrent abdominal pain, bloating, mucus in feces, and an erratic disturbance of defecation
Fecal impaction	Formation of a firm impassable mass of stool in the rectum or distal colon
Cardiovascular diseases	Pathological conditions involving the cardiovascular system including the heart; blood vessels; or pericardium: arrhythmia; congestive heart failure; coronary disease; myocardial infarction; hypertension
Smoking	Inhaling and exhaling the smoke of tobacco or something similar to tobacco
Smoking related respiratory tract diseases	Lung neoplasm Chronic obstructive pulmonary disease—a disease of chronic diffuse irreversible airflow obstruction Pneumonia—Inflammation of the lungs Asthma—A form of bronchial disorder associated with airway obstruction, marked by recurrent attacks of paroxysmal dyspnea, with wheezing due to spasmodic contraction of the bronchi.
Gastrointestinal procedures	Proctocolectomy, Restorative—A surgical procedure involving the excision of the colon and rectum and the formation of an illeoanal reservoir
Major abdominal/pelvic surgery	Anterior resection; abdominal aortic aneurism surgery
Gynecologic procedures	Surgery performed on the female genitalia. Colposcopy—The examination, therapy or surgery of the cervix and vagina by means of a specially designed endoscope introduced vaginally Culdoscopy—Endoscopic examination, therapy, or surgery of the female pelvic viscera by means of an endoscope introduced into the pelvic cavity through the posterior vaginal fornix. Hysteroscopy—Endoscopic examination, therapy, or surgery of the interior of the uterus Gynecological surgery for pelvic organ prolapse repair, pelvic organ prolapse
Urologic surgical procedures	Surgery performed on the urinary tract or its parts in the male or female Cystectomy—Used for excision of the urinary bladder Cystoscopy—Endoscopic examination, therapy, or surgery of the urinary bladder Ureteroscopy—Endoscopic examination, therapy, or surgery of the ureter. Urinary diversion—Temporary or permanent diversion of the flow of urine through the ureter away from the urinary bladder in the presence of a bladder disease or after cystectomy Prostatectomy—Complete or partial surgical removal of the prostate. Three primary approaches are commonly employed: suprapubic—removal through an incision above the pubis and through the urinary bladder; retropubic—as for suprapubic but without entering the urinary bladder; and transurethral Ultrasound, high-intensity focused, transrectal—Tissue ablation of the prostate performed by ultrasound from a transducer placed in the rectum
Stroke	A sudden, nonconvulsive loss of neurologic function due to an ischemic or hemorrhagic intracranial vascular event classified by anatomic location in the brain, vascular distribution, etiology, age of the affected individual, and hemorrhagic vs. nonhemorrhagic nature
Spinal cord diseases	Pathologic conditions which feature spinal cord damage or dysfunction, including disorders involving the meninges and perimeningeal spaces surrounding the spinal cord. Traumatic injuries, vascular diseases, infections, and inflammatory/autoimmune processes may affect the spinal cord.
Hip fractures	Fractures of the femur head; the femur neck; the trochanters; or the inter- or subtrochanteric region

Variable	Definition
Degenerative joint diseases	Diseases of the bones and cartilage viewed collectively.
Osteoarthritis	A progressive, degenerative joint disease, the most common form of arthritis, especially in older persons
Parkinson's disease	A progressive, degenerative neurologic disease characterized by a tremor that is maximal at rest, retropulsion, rigidity, stooped posture, slowness of voluntary movements, and a mask like facial expression.
Multiple sclerosis	An autoimmune disorder mainly affecting young adults and characterized by destruction of myelin in the central nervous system. Pathologic findings include multiple sharply demarcated areas of demyelination throughout the white matter of the central nervous system. Clinical manifestations include visual loss, extra-ocular movement disorders, paresthesias, loss of sensation, weakness, dysarthria, spasticity, ataxia, and bladder dysfunction
Rectal diseases and surgeries	Hemorroidectomy -surgical removal of hemorrhoids; bowel resection; anal and recto-vaginal fistula; rectal prolapse; acute sphincter trauma and sphincter repair
Obstetrical and other injuries to the pelvic floor	Parity—the number of offspring a female has borne Delivery, Obstetric—delivery of the fetus and placenta under the care of an obstetrician or a health worker including vaginal, forceps delivery; vacuum extraction; episiotomy; and cesarean. Fetal characteristics: increased fetal weight and head circumference
Family History	History of incontinence in parents and first degree siblings
History of childhood nocturnal enuresis	History of childhood involuntary discharge of urine during sleep at night after expected age of completed development of urinary control
Demographics:	
Education	Educational attainment or level of education of individuals
Socioeconomic factors	Social and economic factors that characterize the individual or group within the social structure
Marital status	Person's status with respect to marriage, divorce, widowhood, singleness.
Physical activity	The physical activity as a behavioral phenomenon characterized by frequency and intensity of motor activity per unit of time (day, week).
Sexual abuse	Violation of established legal or moral codes in respect to sexual behavior. A condition in which there is a derivation of pleasure from inflicting pain, discomfort, or humiliation on another person or persons.
Torture	The intentional infliction of physical or mental suffering upon an individual.
Sodomy	Anal sexual intercourse
Alcohol use	Behaviors associated with the ingesting of alcoholic beverages, including social drinking
Nutritional deficits, malnutrition, fiber-free tube-feeding formulas	An imbalanced nutritional status resulting from insufficient intake of nutrients to meet normal physiological requirement. Nutritional support given via the alimentary canal or any route connected to the gastrointestinal system (i.e., the enteral route). This includes oral feeding, sip feeding, and tube feeding using nasogastric, gastrostomy, and jejunostomy tubes
Mobility status	Bedbound, wheelchair bound, assistive device; physical restraints
Sleep disturbances	Conditions characterized by disturbances of usual sleep patterns or behaviors: dyssomnias (i.e., disorders characterized by insomnia or hypersomnia), parasomnias (abnormal sleep behaviors), and sleep disorders secondary to medical or psychiatric disorders

Conceptual definition of clinical interventions to reduce the risk of fecal and urinary incontinence—epidemiologic investigations designed to test a hypothesized cause-effect relation between intervention and incidence (progression) of fecal and urinary incontinence in the study population

Primary prevention—specific practices for the prevention of incontinence in susceptible individuals or populations; aims to remove the causes of the disease

Secondary prevention[1,6]— intervention for existing symptoms of incontinence to prevent disease progression

Table 4. Operational definitions of clinical interventions for the primary and secondary prevention of incontinence

Variable	Definition
Health education	Education that increases the awareness and favorably influences the attitudes and knowledge relating to the early detection and prevention of fecal and urinary incontinence
Behavioral therapy	The application of behavioral changes to detect and manage incontinence including: education about urinary and fecal tract structure and function; development of individualized diaries of daily dietary, physical activities, urinary and fecal habits; pelvic floor muscle exercises; voiding schedules: prompted, timed, habit retraining, patterned urge response toileting
Biofeedback	Process by which a person uses biofeedback information to gain voluntary control over pelvic floor muscle function, urination and defecation processes
Pelvic floor muscle training for urinary incontinence	A systematic program of pelvic floor muscle exercises (Kegel exercises) designed to improve the strength and coordination of the pelvic floor muscles in order to improve urinary sphincter function and to control urgency
Pelvic floor muscle training for fecal incontinence	Training technique to become aware of the presence of fecal material in the rectum and relearning skills necessary for coordinating contractions of external anal sphincter and improving the force of muscle contraction.
Vaginal cones	Insertion of vaginal cone (weighted device) into the vagina and contraction of the pelvic floor muscles in an effort to hold the device in place.
Electrical stimulation	Application of electric current in treatment without the generation of perceptible heat. Using low-voltage electric current to stimulate the correct group of muscles delivered using an anal or vaginal probe
Sacral neuromodulation	Placement of a "bladder pacemaker" for continuous stimulation to the sacral nerve that controls the urinary sphincter Placement of a "pacemaker" for continuous stimulation of the sacral nerves to control fecal incontinence Percutaneous tibial neuromodulation—Placement of a fine needle into the skin above the ankles for intermittent stimulation of the post tibial nerve
Urethral "plugs" and patches	Insertion of plastic shapes into the urethra to stop the flow of urine or placed externally at the urinary meatus to prevent urine leakage; Used for female stress urinary incontinence
Pessaries	A plastic or silicone device which is inserted into the vagina to provide support to the uterus, vagina, bladder, or rectum when there is pelvic organ prolapse. Special pessaries with knobs are available for use in treatment of urinary incontinence.
Sanitary shield	Sanitary products for a single use in incontinent patients

Variable	Definition
Penile compression devices	A special clamp that is placed around the penis to prevent urinary leakage.
Intermittent catheterization	Drainage or aspiration of the bladder or a urinary reservoir with subsequent removal of the catheter. Intermittent self-catheterization is performed by the patient himself/herself Intermittent catheterization is performed by an attendant (e.g., doctor, nurse or relative) Clean intermittent catheterization: use of a clean technique. This implies ordinary washing techniques and use of disposable or cleansed reusable catheters. Aseptic intermittent catheterization: use of a sterile technique. This implies genital disinfection and the use of sterile catheters and instruments/gloves.
Indwelling catheterization	Indwelling catheter remains in the bladder, urinary reservoir, or urinary conduit for a period of time longer than one emptying. Clamps and compression rings in males are placed over the penis to squeeze the urethra shut
Bladder reflex triggering	Various maneuvers performed by the patient or the therapist in order to elicit reflex detrusor contraction by exteroceptive stimuli including suprapubic tapping, thigh scratching, and anal/rectal manipulation.
Weight loss	Intentional decrease in existing body weight as a results of reduced calorie intake and/or increased physical activity
Smoking cessation	Discontinuation of the habit of smoking, the inhaling and exhaling of tobacco smoke
Diet therapy	Adjusting the quantity and quality of food intake to improve health status of an individual (alcohol, fluid, and caffeine intake)
Magnetic stimulation	Stimulation with a brief magnetic field on the pelvic floor muscles and sacral roots without insertion of an annals or vaginal probe
Elective Caesarian delivery	Extraction of the fetus by means of abdominal hysterotomy
Direct neuromodulation of the sacral spinal cord	Placement of quadripolar electrode into S3 foramen for stimulation of S3 nerve in order to normalize vesico urethral function
Urethropexy	Surgical suspension of the urethra from the posterior surface of the pubic symphysis in order to correct urinary stress incontinence
Laparoscopic and open Burch retropubic urethropexies	Extra/transperitoneal laparoscopic/retropubic urethropexies using non absorbable sutures or prolene meshes fixed with tackers or staplers
Abdominal sacrocolpopexy	Support of the vaginal vault by affixing it to the periosteum of the sacrum following a hysterectomy Traditional Burch urethropexy included the basic principles of the Tanagho modification: (1) minimal dissection within 2cm of the urethrovesical junction and urethra, (2) placement of sutures through full thickness of shiny white paravaginal fascia, (3) use of two sutures on each side, one opposite to the urethrovesical junction and another at the level of the midurethra, (4) removal of adipose tissue lateral to the sutures to stimulate fibrosis, and (5) facilitating typing of sutures to the Cooper ligament with intravaginal fingers elevating the anterior vaginal wall. Modified Burch colposuspension includes the suspension of anterior vaginal wall at the level of the bladder neck with permanent sutures connected to the iliopectineal ligament
Urethral bulking procedures: Transurethral or periurethral injection techniques for females and transurethral or antegrade injection for males	Artificially inflating the submucosal tissues of the bladder neck Urethral bulking agents approved by the FDA include collagen (Contigen), autologous fat, and carbon bead technology (Durasphere). Autologous fat from the lower abdomen injected around the urethra. Glutaraldehyde, cross-linked collagen-extracted and purified bovine collagen. Durasphere - pyrolytic carbon-coated beads suspended in a water-based gel. Synthetic calcium

Variable	Definition
	hydroxylapatite, cross-linked hyaluronic acid (HA), and ethylene vinyl alcohol copolymer suspended in dimethyl sulfoxide are under investigation.
Anterior colporrhaphy (anterior repair)	An operation of placating and suturing the anterior wall of the vagina to provide support to the anterior wall of the vagina and the bladder.
Posterior colporrhaphy (posterior repair)	An operation of placating and suturing of the posterior wall of the vagina to provide support to the rectum.
Artificial bowel sphincter	A surgical procedure that inserts an inflatable artificial sphincter in cases of bowel (fecal) incontinence caused by a sphincter dysfunction or injury. Devices implanted under the skin to mimic the natural function of the anal sphincter include an inflatable cuff, placed in the anus, a balloon reservoir, placed in the pubic area, and a pump, placed in the pubic area, connecting the cuff and balloon
Overlapping sphincteroplasty	A surgical technique designed to restore integrity and function to anal sphincter: Incision and removal of episiotomy scar tissue from the sphincter muscles; mobilization of external anal sphincter muscle; the stitching of muscle to itself
Dynamic graciloplasty	Transposition of the gracilis muscle to the anus with the implantation of stimulating electrodes
Hormone replacement therapy	Therapeutic use of hormones to alleviate the effects of hormone deficiency in menopausal females
Topical estrogen therapy	Topical vaginal administration of estrogenes

Table 5. Clinical interventions by type of incontinence

Urinary Incontinence	Fecal Incontinence
Prolapse surgery	Prolapse surgery
Estrogens: Topical; oral	Dietary fiber supplements, diet high in fiber foods, or fiber supplemented tube feeding formula
Scheduled voiding regimens, e.g., timed voiding, prompted voiding, patterned urge response toileting, habit training, bladder training	Yogurt, other lactobacillus preparations, or and other probiotics, fructooligosaccharides
Pelvic floor muscle training	Diet modifications: avoiding caffeine, sorbitol containing artificial sweeteners
Vaginal cones	Overlapping sphincteroplasty
Biofeedback	Dynamic graciloplasty
Electrical stimulation	Biofeedback
Urethral "plugs," patches, and urethral pessaries	Electrical stimulation
Penile compression devices	Antimotility or antidiarrheal medications
Bladder reflex triggering	Artificial bowel sphincter
Detrol (tolterodine tartrate)	Anal plug
Ditropan, oxytrol (oxybutynin chloride)	Overlapping sphincteroplasty
Sanctura (trospium chloride)	Pelvic floor muscle or Kegel exercises
Enablex (darifenacin)	Urgency suppression, relaxation
Vesicare (solifenacin succinate)	Bowel training techniques: toileting, prompting, scheduled toileting upon awakening or after meals, digital stimulation, abdominal massage
Magnetic stimulation	Rectal evacuation or irrigation using small enema, suppository or laxative
Direct neuromodulation of the sacral spinal nerves	Direct neuromodulation of the sacral spinal nerves
Percutaneous nerve stimulation	
Urethropexy	
Laparoscopic and open Burch retropubic urethropexies	
Abdominal sacrocolpopexy	
Anterior colporrhaphy (anterior repair)	
Posterior colporrhaphy (posterior repair)	
Artificial sling	
Botulinum toxin injections for detrusor-sphincter dyssyndergia or detrusor hyperreflexia)	
Bulking injections	

Commonly used medications that may affect urinary and fecal continence

Type of Medication	Examples	Potential Effects on Continence
Sedatives/hypnotics	Long-acting benzodiazepines (e.g., diazepam, flurazepam)	Sedation, delirium, immobility
Alcohol		Polyuria, frequency, urgency, sedation, delirium, immobility
Anticholinergics	Dicyclomine, disopyramide, sedating antihistamines	Urinary retention, overflow incontinence, delirium, impaction
Antipsychotics	Thioridazine, haloperidol	Anticholinergic actions, sedation, rigidity, immobility
Tricyclic antidepressants Selective serotonin reuptake inhibitors Serotonin norepinephrine reuptake inhibitors	Amitriptyline, desipramine Duloxetine fluoxetine, citalopram, paroxetine, sertraline, fluvoxamine, and venlafaxine	Anticholinergic actions, sedation
Antiparkinsonians	Trihexyphenidyl, benztropine mesylate (not L-dopa/selegiline)	Anticholinergic actions, sedation
Narcotic analgesics	Opiates	Urinary retention, fecal impaction, sedation, delirium
α-Adrenergic antagonists	Prazosin, terazosin, doxazosin	Urethral relaxation may precipitate stress incontinence in women
α-Adrenergic agonists	Nasal decongestants	Urinary retention in men
Calcium channel blockers	All dihydropyridines	Urinary retention; nocturnal diuresis due to fluid retention
Potent diuretics	Furosemide, bumetanide	Polyuria, frequency, urgency
Angiotensin-converting enzyme inhibitors	Furosemide, bumetanide	Drug-induced cough can precipitate stress incontinence in women and in some men with prior prostatectomy
Thiazolidinediones	Rosiglitazone	Nocturnal diuresis due to fluid retention
Cyclooxygenase 2 selective NSAIDs	Rofecoxib, celecoxib	Nocturnal diuresis due to fluid retention
Vincristine		Urinary retention

Algorithm to Define Eligibility of Studies

RESEARCH QUESTION.

1. What are the prevalence and incidence of fecal and urinary incontinence in the community and long-term care settings? By:
   - Race
   - Ethnicity
   - Gender
   - Age

   What is the range of estimates?
   What factors account for the variance?
   - Nature of the sample
   - Definition of incontinence
   - Manner of ascertainment

VERIFICATION/SELECTION OF STUDY ELIGIBILITY

Criteria 1 - Confirm eligibility of target population
Eligible descriptors:
Adults in the community Yes No Combined
Adults in long-term care settings Yes No Combined
If NO – exclude

Criteria 2 - Confirm eligibility of the outcomes
Eligible descriptors:
Prevalence of urinary/fecal incontinence Yes No Combined
Incidence of urinary/fecal incontinence Yes No Combined
If No – exclude

Criteria 3. Confirm eligible level of evidence
Eligible descriptors:
Large population based cross sectional analyses Yes
Large population based cohort studies Yes
Large cross sectional analyses in long-term care settings Yes
Large cohort studies in long-term care settings Yes
Case-series with more than 100 subjects Yes
If NO for all descriptors – exclude

2. What are the independent contributions of risk factors for fecal and urinary incontinence, including:
   - Age
   - Frailty
   - Prostate disorders
   - Pregnancy and postpartum state
   - Menopause
   - Institutionalization
   - Neurological impairment
   - Dementia
   - Psychiatric disorders, specifically depression
   - Diabetes
   - Obesity
   - Chronic GI conditions such as IBS, diarrhea, constipation, and IBD
   - Cardiovascular and pulmonary conditions, specifically smokers
   - Gastrointestinal, gynecologic, and urological procedures
   - Neurological disorders, such as stroke and spinal cord problems

VERIFICATION/SELECTION OF STUDY ELIGIBILITY

Criteria 1 – Confirm eligibility of target population
Eligible descriptors:
Adults in the community
Adults in long-term care settings Yes No Combined
If NO – exclude

Criteria 2 – Confirm eligibility of the outcomes
Eligible descriptors:
Prevalence of urinary/fecal incontinence Yes No Combined
Incidence of urinary/fecal incontinence Yes No Combined
If No – exclude

Criteria 3 – Confirm eligibility of risk factors
Eligible descriptors are listed in the tables with definitions (Table 2)
If NO – exclude

Criteria 4 - Confirm eligible level of evidence
Eligible descriptors:
Large population based cross sectional analyses Yes
Large population based cohort studies Yes
Large cross sectional analyses in long-term care settings Yes
Large cohort studies in long-term care settings Yes
Case-series with more than 100 subjects Yes
Case-control studies with randomly selected controls Yes
If NO for all descriptors – exclude

3. What is the evidence to support specific clinical interventions to reduce the risk of fecal and urinary incontinence?

VERIFICATION/SELECTION OF STUDY ELIGIBILITY

Criteria 1 - Confirm eligibility of target population
Eligible descriptors:
Adults in the community
Adults in long-term care settings Yes No Combined
If NO – exclude

Criteria 2 – Confirm eligibility of the outcomes
Eligible descriptors:
Prevalence of urinary/fecal incontinence Yes No Combined
Incidence of urinary/fecal incontinence Yes No Combined
Progression of urinary/fecal incontinence Yes No Combined
If No – exclude

Criteria 3 – Confirm eligibility of interventions
Eligible descriptors are listed in tables with definitions (Table 4-5)
If NO – exclude

Criteria 4 – Confirm eligible level of evidence
Eligible descriptors:
For the studies that examined urinary incontinence
Randomized controlled clinical trials Yes No
If NO – exclude

For the studies that examined the effects of drug treatment on progression of incontinence:
Length of follow up 12 months or more Yes No
If NO – exclude
For the studies that examined fecal and combined incontinence
Randomized controlled clinical trials Yes No
Multi center not randomized clinical trials Yes No
If NO – exclude

4. What are the strategies to improve the identification of persons at risk and patients who have fecal and urinary incontinence?

VERIFICATION/SELECTION OF STUDY ELIGIBILITY

Criteria 1 – Confirm eligibility of target population
Eligible descriptors:
Adults in the community
Adults in long-term care settings Yes No Combined
If NO – exclude

Criteria 2 - Confirm eligibility of diagnostic strategies.
Eligible descriptors are listed in tables with definitions (Table 1) and in the Conceptual model 2.
If NO – exclude

Criteria 3 – Confirm eligibility of outcomes.
Eligible descriptors:
Diagnosis of urinary and fecal incontinence Yes No Combined
Cost-effectiveness of diagnostic strategies Yes No Combined
If No – exclude

Criteria 4 – Confirm eligibility of the outcomes assessment:
Eligible descriptors:
True positive Yes No
True negative Yes No
False positive Yes No
False negative Yes No
Sensitivity Yes No
Specificity Yes No
Positive predictive likelihood of the test Yes No
Validity of the scale Yes No
Validity of the questionnaire Yes No
Reliability of the scale Yes No
Reliability of the questionnaire Yes No
For the studies that examined urinary incontinence
Inter-observer variability Yes No
If No for all descriptors – exclude

Criteria 5 – Confirm the eligible level of evidence:
Eligible descriptors:

Randomized controlled clinical trials	Yes	No
Multicenter controlled clinical trials	Yes	No
Large (>100 subjects) observational studies	Yes	No
Case-control studies with >10 cases	Yes	No

If No for all descriptors – exclude

International classification of diseases, diagnostic codes of incontinence:[15]
625.6 Stress incontinence, female
787.6 Incontinence of feces
Encopresis NOS
Incontinence of sphincter ani
788.32 Stress incontinence, male
788.31 Urge incontinence
788.38 Overflow incontinence
788.39 Other urinary incontinence
788.34 Incontinence without sensory awareness
788.33 Mixed incontinence (female) (male)
596 Other disorders of bladder
788.30 Urinary incontinence, unspecified
788.63 Urgency of urination
788.3 Urinary incontinence
599.6 Urinary obstruction
Use additional code to identify urinary incontinence (625.6, 788.30-788.39)
598 Urethral stricture Includes: pinhole meatus; stricture of urinary meatus
Use additional code to identify urinary incontinence (625.6, 788.30-788.39)
596.51 Hypertonicity of bladder
Hyperactivity
Overactive bladder
344.61 With neurogenic bladder
Acontractile bladder
Autonomic hyperreflexia of bladder
Cord bladder
Detrusor hyperreflexia
788.43 Nocturia
788.41 Urinary frequency
Frequency of micturition

Definitions of the studies' design characteristics to estimate the level of evidence.
Level of evidence as defined by the U.S. Preventive Services Task Force[16]
Level I: Evidence obtained from at least one properly designed randomized controlled trial.
Level II-1: Evidence obtained from well-designed controlled trials without randomization.
Level II-2: Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group.
Level II-3: Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled trials.

Level III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

Independent intervention variables for the question 3 extracted from the studies:
Type of intervention as a categorical variable: behavioral interventions, drug therapy, device therapy, surgery.
Type of intervention as a categorical variable using author's definitions.
Dose of the drug as a continuous variable.

Dependent incontinence variables for question 3 extracted from the studies:
Type of incontinence as a categorical variable: Urinary, Anal, Combined.
Urinary incontinence as stress, urge, mixed, total.
Anal incontinence as flatus, fecal, combined.
Incontinence outcomes as a categorical variable using author's definitions.
Number of cases with outcomes in the active and the control groups as a continuous variable.
Rates of outcomes (%) in the active and control groups as a continuous variable.
We applied intention-to treat principle and calculated the number of cases in the active and control groups among randomized when the authors reported the rates of outcomes among analyzed.
Outcomes level in the active and control groups as a continuous variable. We extracted means and standard deviations of outcomes from the articles. We calculated standard deviations when the authors reported standard errors:
Standard deviation = Standard Error * Square root of the sample size in the group.
We extracted medians when the authors did not reported means assuming normal distribution of the outcome.
Relative risk of the outcome in the active group compared to the control group.
Regression coefficient with standard error of association between intervention and outcome.

Tested sources of heterogeneity:[17]
Clinical settings as a categorical variable: Community, nursing homes.
Sample size as a continuous variable equals the number of randomized subjects.
Proportion of females in the sample as a continuous variable (%)
Length of followup months as a continuous variable
Loss o followup as a continuous variable (%)
Masking of the treatment status as a categorical variable: open label, single blind, double blind
Adequacy of randomization and allocation concealment as a categorical variable: not reported, adequate, not adequate.
Intention to treat principle as categorical variable: Yes, no, not stated when all randomized subjects were analyzed but the authors did not plan Intention to treat principle in the study design.
We tested the possible sources of heterogeneity as interaction variables which could modify the effect of clinical interventions on incontinence outcomes and conducted sensitivity analysis within each category of effect modifiers.
Analytical framework for pooled analysis of prevalence of incontinence in adults:
Prevalence was calculated as number of subjects with incontinence among total number of patients in the study, standard error and confidence interval for population prevalence were calculated with Wilson estimate as follows:[18]

SEρ=√ [ρ*(1-ρ)]/[n+4]

95% level C confidence interval ρ±1.96*SEρ
Where p – prevalence, n- sample size. We calculated logarithm of prevalence for pooling analysis.

Hypotheses tested in pooled analysis[19]

1. The urinary incontinence outcome is associated with an active treatment as a categorical variable compared to the control interventions. Random effects model was used to incorporate differences between studies.
2. The effect size of an active treatment can be modified by the proportion of males and females in the sample (when applicable).

We grouped pelvic floor muscle training programs into one category in the text and for a pooled analysis providing the details about different regimes of exercise in the tables.
We grouped different definitions of continence and improvement in incontinence to have an overall estimation of the interventions.
Algorithms of meta-analysis[19]
Pooled estimate as a weighted average:

$$\theta_{IV} = \frac{\sum_i w_i \theta_i}{\sum_i w_i}$$

Weights are inverse of variance (standard error):

$$w_i = \frac{1}{SE(\theta_i)^2}$$

Standard error of pooled estimate:

$$SE(\theta_{IV}) = \frac{1}{\sqrt{\sum_i w_i}}$$

Heterogeneity (between-study variability) measured by:

$$Q = \sum_i w_i (\theta_i - \theta_{IV})^2$$

Assumptions for random effects model: true effect sizes *qi* have a normal distribution with mean *q* and variance *t2*; *t2* is the between-study variance
Between study variance:

$$\tau^2 = \frac{Q - (k-1)}{\sum_i w_i - \left(\frac{\sum_i w_i^2}{\sum_i w_i} \right)}$$

Where:
wi are the weights from the fixed effect inverse-variance method

Q is the heterogeneity test statistic from before (either from inverse-variance method or Mantel-Haenszel method)
k is the number of studies, and
t2 is set to zero if *Q*<*k*-1
Random effect pooled estimate is weighted average:

$$\theta_{DL} = \frac{\sum_i w'_i \theta_i}{\sum_i w'_i}$$

Weights used for the pooled estimate are similar to the inverse-variance, but now incorporate a component for between-study variation:

$$w'_i = \frac{1}{SE(\theta_i)^2 + \tau^2}$$

Standard error of pooled estimate

$$SE(\theta_{DL}) = \frac{1}{\sqrt{\sum_i w'_i}}$$

Meta regression with random effects was obtained using aggregate level data.

Additive component of variance tau2 was estimated:

$$y[i] = a + B*x[i] + u[i] + e[i],$$

where u[i] is a normal error (standard deviations that may vary across units), e[i] is a normal error with variance tau2 to be estimated, assumed equal across units.
t-distribution was used calculating p-values and confidence intervals[17,20]
Attributable risk was calculated as the outcome events rate in patients exposed to different clinical interventions[21-23]
Attributable risk of the outcome = rate of events in patients in the control group x (relative risk -1)

Number needed to treat to prevent one event of incontinence was calculated as reciprocal to absolute risk differences in rates of outcomes events in the active and control groups:[22,24]
1/(control group event rate - treatment group event rate).

The number of avoided or excess events (respectively) per 1000 population is the difference between the two event rates multiplied by 1000:

(control group event rate - treatment group event rate)*1000

We calculated diagnostic values of different tests to diagnose incontinence:
Sensitivity=TP/(TP+FN)
Specificity=TN/(FP+TN)
Prevalence=(TP+FN)/(TP+FN+FP+TN)

Predictive value positive=TP/(TP+FP)
Positive predictive likelihood ratio:

$$LR+ = \frac{\text{probability of an individual with the condition having a positive test}}{\text{probability of an individual without the condition having a positive test}}$$

$$LR+ = \frac{\text{sensitivity}}{1\text{-specificity}}$$

Number needed to screen to identify one undiagnosed incontinence case = [(prevalence of undiagnosed incontinence)(sensitivity of the diagnostic method)]$^{-1}$
Number of diagnostic tests to identify one undiagnosed incontinence case = 2 + number needed to screen (1 - prevalence of undiagnosed incontinence)(1 – specificity of the diagnostic test).[25]

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Appendix B. Exact Search Strings

Search Strategy

The following data bases were searched:

- Med Line (PubMed)
- The Cochrane Database of Systematic Reviews
- The Cochrane Central Register of Controlled Trials
- Internet (www.google.com and www.scirus.com/srsapp) with the key words identical MeSH terms
- CINAHL
- Manual search of the references in articles to identify eligible studies published before 1990

The following MeSH terms and key words (in databases other than Medline) and their combinations were used to search the data bases from 1990 through March 2007:

Medical Subject Headings Terms

"Urinary incontinence"
"Fecal incontinence"
"Costs and cost analysis"
"Prevalence"
"Incidence"
"Spinal cord"
"Spinal cord injuries"
"Spinal cord neoplasms"
"Spinal cord ischemia"
"Cerebrovascular accident"
"Brain stem infarctions"
"Infarction, middle cerebral artery"
"Infarction, anterior cerebral artery"
"Urologic surgical procedures, male"
"Digestive system surgical procedures"
"Obstetric surgical procedures"
"Gynecologic surgical procedures"
"Ureteroscopy"
"Hysteroscopy"
"Sigmoidoscopy"
"Proctoscopy"
"Mediastinoscopy"
"Cystoscopy"
"Colonoscopy"
"Smoking"
"Lung diseases"
"Pulmonary disease"
"Pulmonary heart disease"
"Lung diseases, obstructive"
"Pulmonary disease, chronic obstructive"
"Cardiovascular diseases"
"Intestinal diseases"
"Obesity"

“Diabetes mellitus”
“Diabetes mellitus, Type 2”
“Diabetes mellitus, Type 1”
“Depressive disorder”
“Depression”
“Depression, postpartum”
“Long-term depression (physiology)”
“Dementia”
“Institutionalization”
“Menopause”
“Pregnancy complications”
“Prostatic neoplasms”
“Body mass index”
“Multiple sclerosis”
“Fibromyalgia”
“Prostatic hyperplasia”
“Uterine prolapse”
“Rectal prolapse”
“Cystocele”
“Caffeine”
“Parkinson disease”
“Primary prevention”
Tolterodine tartrate
“Health education”
“Behavior therapy”
“Biofeedback”
“Bladder retraining “
“Kegel exercises”
Weight loss”
“Anti-obesity agents”
“Homosexuality, male”
“Predictive value of tests”
“Reproducibility of results”
"Anal Canal/surgery"
"Biocompatible Materials"
"Polyethylenes"
"Electric Stimulation Therapy"

Exact Literature Search Strings

Medical Subject Headings Terms and Key Words	Number of Retrieved References
Urinary incontinence/epidemiology” [MeSH] OR “urinary incontinence/prevention and control” [MeSH]	2,125
“Urinary incontinence/epidemiology” [MeSH] OR “urinary incontinence/prevention and control” [MeSH] Limits: adult: 19-44 years, middle aged: 45-64 years, middle aged + aged: 45+ years, aged: 65+ years, 80 and over: 80+ years, English, humans	1,307

"Urinary incontinence/epidemiology" [MeSH] OR "urinary incontinence/prevention and control" [MeSH] Limits: adult: 19-44 years, middle aged: 45-64 years, middle aged + aged: 45+ years, Aged: 65+ years, 80 and over: 80+ years, English, randomized controlled trial, humans	59
"Fecal incontinence/epidemiology" [MeSH] OR "fecal incontinence/prevention and control" [MeSH]	845
"Fecal incontinence/epidemiology" [MeSH] OR "fecal incontinence/prevention and control" [MeSH] Limits: adult: 19-44 years, middle aged: 45-64 years, middle aged + aged: 45+ years, aged: 65+ years, 80 and over: 80+ years, English, humans	398
"Fecal incontinence/epidemiology" [MeSH] OR "fecal incontinence/prevention and control" [MeSH]) Limits: adult: 19-44 years, middle aged: 45-64 years, middle aged + Aged: 45+ years, aged: 65+ years, 80 and over: 80+ years, English, randomized controlled trial, humans	15
"Costs and cost analysis" [MeSH] AND fecal incontinence Limits: adult, English, humans	30
"Costs and cost analysis" [MeSH] AND urinary incontinence Limits: adult English, humans	162
"Prevalence" [MeSH] AND fecal incontinence Limits: adult, English, humans	124
"Prevalence" [MeSH] AND urinary incontinence Limits: adult, English, humans	437
"Incidence" [MeSH] AND fecal incontinence Limits: adult, English, humans	73
"Incidence" [MeSH] AND urinary incontinence Limits: adult, English, humans	230
"Fecal incontinence/epidemiology" [MeSH] OR "fecal incontinence/prevention and control" [MeSH] AND "costs and cost analysis" [MeSH] Limits: adult, English, humans	10
"Fecal incontinence/epidemiology" [MeSH] OR "fecal incontinence/prevention and control" [MeSH] AND "prevalence" [MeSH] Limits: adult, English, humans	86
"Fecal incontinence/epidemiology" [MeSH] OR "fecal incontinence/prevention and control" [MeSH] AND "incidence" [MeSH] Limits: adult, English, humans	39
"Urinary incontinence/epidemiology" [MeSH] OR "urinary incontinence/prevention and control" [MeSH] AND "costs and cost analysis" [MeSH] Limits: adult, English, humans	49
"Urinary incontinence/epidemiology" [MeSH] OR "urinary incontinence/prevention and control" [MeSH] AND "costs and cost analysis" [MeSH]	71
"Urinary incontinence/epidemiology" [MeSH] OR "urinary incontinence/prevention and control" [MeSH] AND "prevalence" [MeSH] Limits: adult, English, humans	343
"Urinary incontinence/epidemiology" [MeSH] OR "urinary incontinence/prevention and control" [MeSH] AND "prevalence" [MeSH]	460
"Urinary incontinence/epidemiology" [MeSH] OR "urinary incontinence/prevention and control" [MeSH] AND " incidence" [MeSH]	228
"Urinary incontinence/epidemiology" [MeSH] OR "urinary incontinence/prevention and control" [MeSH] AND "incidence" [MeSH] Limits: adult, English, humans	152

"Fecal incontinence/epidemiology" [MeSH] OR "fecal incontinence/prevention and control" [MeSH] AND "costs and cost analysis" [MeSH]	14
"Fecal incontinence/epidemiology" [MeSH] OR "fecal incontinence/prevention and control" [MeSH] AND "prevalence" [MeSH]	124
"Fecal incontinence/epidemiology" [MeSH] OR "fecal incontinence/prevention and control" [MeSH] AND "incidence" [MeSH]	58
Fecal incontinence AND ("spinal cord" [MeSH] OR "spinal cord injuries" [MeSH] OR "spinal cord neoplasms" [MeSH] OR "spinal cord ischemia" [MeSH]) Limits: adult, English, humans	88
Urinary incontinence AND ("spinal cord" [MeSH] OR "spinal cord injuries" [MeSH] OR "spinal cord neoplasms" [MeSH] OR "spinal cord ischemia" [MeSH]) Limits: adult, English, humans	195
Fecal incontinence AND ("cerebrovascular accident" [MeSH] OR "brain stem infarctions" [MeSH] OR "infarction, middle cerebral artery" [MeSH] OR "infarction, anterior cerebral artery" [MeSH]) Limits: adult, English, humans	10
Urinary incontinence AND ("cerebrovascular accident" [MeSH] OR "brain stem infarctions" [MeSH] OR "infarction, middle cerebral artery" [MeSH] OR "infarction, anterior cerebral artery" [MeSH]) Limits: adult, English, humans	77
Fecal incontinence AND ("urologic surgical procedures, male" [MeSH] OR "urologic surgical procedures" [MeSH] OR "digestive system surgical procedures" [MeSH] OR "obstetric surgical procedures" [MeSH] OR "gynecologic surgical procedures" [MeSH] OR "ureteroscopy" [MeSH] OR "hysteroscopy" [MeSH] OR "sigmoidoscopy" [MeSH] OR "proctoscopy" [MeSH] OR "mediastinoscopy" [MeSH] OR "cystoscopy" [MeSH] OR "colonoscopy" [MeSH]) Limits: adult, English, humans	566
Urinary incontinence AND ("urologic surgical procedures, male" [MeSH] OR "urologic surgical procedures" [MeSH] OR "digestive system surgical procedures" [MeSH] OR "obstetric surgical procedures" [MeSH] OR "gynecologic surgical procedures" [MeSH] OR "ureteroscopy" [MeSH] OR "hysteroscopy" [MeSH] OR "sigmoidoscopy" [MeSH] OR "proctoscopy" [MeSH] OR "mediastinoscopy" [MeSH] OR "cystoscopy" [MeSH] OR "colonoscopy" [MeSH]) Limits: adult, English, humans	1862
"Smoking" [MeSH] AND fecal incontinence Limits: adult, English, humans	1
"Smoking" [MeSH] AND urinary incontinence Limits: adult, English, humans	25
("Lung diseases" [MeSH] OR "pulmonary disease (specialty)" [MeSH] OR "pulmonary heart disease" [MeSH] OR "lung diseases, obstructive" [MeSH] OR "pulmonary disease, chronic obstructive" [MeSH]) AND fecal incontinence Limits: adult, English, humans	6
("Lung diseases" [MeSH] OR "pulmonary disease (specialty)" [MeSH] OR "pulmonary heart disease" [MeSH] OR "lung diseases, obstructive" [MeSH] OR "pulmonary disease, chronic obstructive" [MeSH]) AND urinary incontinence Limits: adult, English, humans	46
"Cardiovascular diseases" [MeSH] AND fecal incontinence Limits: adult, English, humans	135
"Cardiovascular diseases" [MeSH] AND urinary incontinence Limits: adult, English, humans	349

“Intestinal diseases” [MeSH] AND fecal incontinence Limits: adult, English, humans	2,531
“Intestinal diseases” [MeSH] AND urinary incontinence Limits: adult, English, humans	693
“Obesity” [MeSH] AND fecal incontinence Limits: adult, English, humans	9
“Obesity” [MeSH] AND urinary incontinence Limits: adult, English, humans	61
(“Diabetes mellitus” [MeSH] OR “diabetes mellitus, type 2” [MeSH] OR “diabetes mellitus, type 1” [MeSH]) AND fecal incontinence Limits: adult, English, humans	37
(“Diabetes mellitus” [MeSH] OR “diabetes mellitus, type 2” [MeSH] OR “diabetes mellitus, type 1” [MeSH]) AND urinary incontinence Limits: adult, English, humans	69
(“Depressive disorder” [MeSH] OR “depression” [MeSH] OR “depression, postpartum” [MeSH] OR “long-term depression (physiology)” [MeSH]) AND fecal incontinence Limits: adult, English, humans	26
(“Depressive disorder” [MeSH] OR “depression” [MeSH] OR “depression, postpartum” [MeSH] OR “long-term depression (physiology)” [MeSH]) AND urinary incontinence Limits: adult, English, humans	108
“Dementia” [MeSH] AND fecal incontinence Limits: adult, English, humans	26
“Dementia” [MeSH] AND urinary incontinence Limits: adult, English, humans	175
“Institutionalization” [MeSH] AND fecal incontinence Limits: adult, English, humans	11
“Institutionalization” [MeSH] AND urinary incontinence Limits: adult, English, humans	34
“Menopause” [MeSH] AND fecal incontinence Limits: adult, English, humans	16
“Menopause” [MeSH] AND urinary incontinence Limits: adult, English, humans	213
“Pregnancy complications” [MeSH] AND fecal incontinence Limits: adult, English, humans	133
“Pregnancy complications” [MeSH] AND urinary incontinence Limits: adult, English, humans	155
“Prostatic neoplasms” [MeSH] AND fecal incontinence Limits: adult, English, humans	39
“Prostatic neoplasms” [MeSH] AND urinary incontinence Limits: adult, English, humans	346
Urinary incontinence AND “prostatic neoplasms” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	311
Fecal incontinence AND “prostatic neoplasms” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	37
Fecal incontinence AND “pregnancy complications” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	119

Urinary incontinence AND “pregnancy complications” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	138
Urinary incontinence AND “menopause” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	177
Fecal incontinence AND “menopause” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	15
Fecal incontinence AND “institutionalization” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	10
Urinary incontinence AND “institutionalization” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, Humans	30
Urinary incontinence AND “dementia” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	145
Fecal incontinence AND “dementia” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	24
Fecal incontinence AND (“depressive disorder” [MeSH] OR “depression” [MeSH] OR “depression, postpartum” [MeSH] OR “long-term depression (physiology)” [MeSH]) NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	26
Urinary incontinence AND (“depressive disorder” [MeSH] OR “depression” [MeSH] OR “depression, postpartum” [MeSH] OR “long-term depression (physiology)” [MeSH]) NOT review NOT letter NOT editorial Limits: all Adult: 19+ years, English, humans	85
Urinary incontinence AND (“diabetes mellitus” [MeSH] OR “diabetes mellitus, type 2” [MeSH] OR “diabetes mellitus, type 1” [MeSH]) NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	63
Fecal incontinence AND (“diabetes mellitus” [MeSH] OR “diabetes mellitus, type 2” [MeSH] OR “diabetes mellitus, type 1” [MeSH]) NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	34
Fecal incontinence AND “obesity” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	7
Urinary incontinence AND “obesity” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	50
Urinary incontinence AND “intestinal diseases” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	603
Fecal incontinence AND “intestinal diseases” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	2,229
Fecal incontinence AND “cardiovascular Diseases” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	118
Urinary incontinence AND “cardiovascular diseases” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	286
Urinary incontinence AND (“lung diseases” [MeSH] OR “pulmonary disease (specialty)” [MeSH] OR “pulmonary heart disease” [MeSH] OR “lung diseases, obstructive” [MeSH] OR “pulmonary disease, chronic obstructive” [MeSH]) NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	34

Fecal incontinence AND (“lung diseases” [MeSH] OR “pulmonary disease (specialty)” [MeSH] OR “pulmonary heart disease” [MeSH] OR “lung diseases, obstructive” [MeSH] OR “pulmonary disease, chronic obstructive” [MeSH]) NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	5
Fecal incontinence AND “smoking” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	0
Urinary incontinence AND “smoking” [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	23
Urinary incontinence AND (“urologic surgical procedures, male” [MeSH] OR “urologic surgical procedures” [MeSH] OR “digestive system surgical procedures” [MeSH] OR “obstetric surgical procedures” [MeSH] OR “gynecologic surgical procedures” [MeSH] OR “ureteroscopy” [MeSH] OR “hysteroscopy” [MeSH] OR “sigmoidoscopy” [MeSH] OR “proctoscopy” [MeSH] OR “mediastinoscopy” [MeSH] OR “cystoscopy” [MeSH] OR “colonoscopy” [MeSH]) NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	1669
Fecal incontinence AND (“urologic surgical procedures, male” [MeSH] OR “urologic surgical procedures” [MeSH] OR “digestive system surgical procedures” [MeSH] OR “obstetric surgical procedures” [MeSH] OR “gynecologic surgical procedures” [MeSH] OR “ureteroscopy” [MeSH] OR “hysteroscopy” [MeSH] OR “sigmoidoscopy” [MeSH] OR “proctoscopy” [MeSH] OR “mediastinoscopy” [MeSH] OR “cystoscopy” [MeSH] OR “colonoscopy” [MeSH]) NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	524
Fecal incontinence AND (“cerebrovascular accident” [MeSH] OR “brain stem infarctions” [MeSH] OR “infarction, middle cerebral artery” [MeSH] OR “infarction, anterior cerebral artery” [MeSH]) NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	6
Urinary incontinence AND (“cerebrovascular accident” [MeSH] OR “brain stem infarctions” [MeSH] OR “infarction, middle cerebral artery” [MeSH] OR “infarction, anterior cerebral artery” [MeSH]) NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	64
Urinary incontinence AND (“spinal cord” [MeSH] OR “spinal cord injuries” [MeSH] OR “spinal cord neoplasms” [MeSH] OR “spinal cord ischemia” [MeSH]) NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	167
Fecal incontinence AND (“spinal cord” [MeSH] OR “spinal cord injuries” [MeSH] OR “spinal cord neoplasms” [MeSH] OR “spinal cord ischemia” [MeSH]) NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	78
“Costs and cost analysis” [MeSH] AND (“fecal incontinence/diagnosis” [MeSH] OR “fecal Incontinence/epidemiology” [MeSH] OR “fecal incontinence/ etiology” [MeSH] OR “fecal incontinence/prevention and control” [MeSH]) NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	16
“Costs and cost analysis” [MeSH] AND (“urinary incontinence/diagnosis” [MeSH] OR “urinary incontinence/epidemiology” [MeSH] OR “urinary incontinence/ etiology” [MeSH] OR “urinary incontinence/prevention and control” [MeSH]) NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	57
“Costs and cost analysis” [MeSH] Limits: all adult: 19+ years, English, humans	25,982

“Incidence” [MeSH] AND urinary incontinence NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	180
“Incidence” [MeSH] AND fecal incontinence NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	65
“Prevalence” [MeSH] AND urinary incontinence NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	358
“Prevalence” [MeSH] AND fecal incontinence NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	104
“Costs and cost analysis” [MeSH] AND urinary incontinence NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	128
“Costs and cost analysis” [MeSH] AND fecal incontinence NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	26
(“Fecal incontinence/diagnosis” [MeSH] OR “fecal incontinence/epidemiology” [MeSH] OR “fecal incontinence/etiology” [MeSH] OR “fecal incontinence/ prevention and control” [MeSH]) NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	1,436
(“Fecal incontinence/diagnosis” [MeSH] OR “fecal incontinence/epidemiology” [MeSH] OR “fecal incontinence/etiology” [MeSH] OR “fecal incontinence/ prevention and control” [MeSH]) Limits: all adult: 19+ years, English, humans	1,635
(“Urinary incontinence/diagnosis” [MeSH] OR “urinary incontinence/epidemiology” [MeSH] OR “urinary incontinence/etiology” [MeSH] OR “urinary incontinence/ prevention and control” [MeSH]) NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	3,815
(“Urinary incontinence/diagnosis” [MeSH] OR “urinary incontinence/epidemiology” [MeSH] OR “urinary incontinence/etiology” [MeSH] OR “urinary Incontinence/ prevention and control” [MeSH]) Limits: all adult: 19+ years, English, humans	4,470
(“Urinary incontinence/diagnosis” [MeSH] OR “urinary incontinence/epidemiology” [MeSH] OR “urinary incontinence/etiology” [MeSH] OR “urinary incontinence/ prevention and control” [MeSH]) Limits: English, humans	6,966
(“Urinary incontinence/diagnosis” [MeSH] OR “urinary incontinence/epidemiology” [MeSH] OR “urinary incontinence/etiology” [MeSH] OR “urinary incontinence/ prevention and control” [MeSH])	9,492
(“Urinary incontinence” [MeSH] OR “urinary incontinence, urge” [MeSH] OR “urinary incontinence, stress” [MeSH]) AND "primary prevention" [MeSH] NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	6
(“Urinary incontinence” [MeSH] OR “urinary incontinence, urge” [MeSH] OR “urinary incontinence, stress” [MeSH]) AND “primary prevention” [MeSH] Limits: all adult: 19+ years, English, humans	12
(“Urinary incontinence” [MeSH] OR “urinary incontinence, urge” [MeSH] OR “urinary incontinence, stress” [MeSH]) AND “primary prevention” [MeSH]	29
“Primary prevention” [MeSH] AND fecal incontinence Limits: all adult: 19+ years, English, randomized controlled trial, humans	1
“Primary prevention” [MeSH] AND urinary incontinence Limits: all adult: 19+ years, English, randomized controlled trial, humans	1
“Primary prevention” [MeSH]	83,315

“Fecal incontinence” [MeSH] AND “primary prevention” [MeSH] Limits: all adult: 19+ years, English, randomized controlled trial, humans	1
“Fecal incontinence” [MeSH] Limits: all adult: 19+ years, English, randomized controlled trial, humans	99
(“Urinary incontinence” [MeSH] OR “urinary incontinence, urge” [MeSH] OR “urinary incontinence, stress” [MeSH]) AND “primary prevention” [MeSH] Limits: all adult: 19+ years, English, randomized controlled trial, humans	1
(“Urinary incontinence” [MeSH] OR “urinary incontinence, urge” [MeSH] OR “urinary incontinence, stress” [MeSH])	18,254
Tolterodine tartrate	307
“Fecal incontinence” [MeSH] Limits: all adult: 19+ years, English, clinical trial, randomized controlled trial, “clinical trial, phase I”, “clinical trial, phase II”, “clinical trial, phase III”, “clinical trial, phase IV”, controlled clinical trial, multicenter study, humans	268
“Urinary incontinence” [MeSH] Limits: all adult: 19+ years, English, clinical trial, randomized controlled trial, “clinical trial, phase I”, “clinical trial, phase II”, “clinical trial, phase III”, “clinical trial, phase IV”, controlled clinical trial, multicenter study, humans	1,077
“Urinary incontinence” [MeSH] Limits: all adult: 19+ years, English, humans	8,007
“Health education” [MeSH] AND “urinary incontinence” NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	133
“Health education” [MeSH] Limits: all adult: 19+ years, English, humans	23,976
“Behavior therapy” [MeSH] AND “urinary incontinence” NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	194
“Behavior therapy” [MeSH] Limits: all adult: 19+ years, English, humans	13,495
“Biofeedback” AND “urinary incontinence” NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	126
“Bladder retraining” AND “urinary incontinence” NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	26
“Kegel exercises” AND “urinary incontinence” NOT review NOT letter NOT editorial Limits: all adult: 19+ years, English, humans	13
Incontinence AND (“weight loss” [MeSH] OR “anti-obesity agents” [MeSH]) Limits: all adult: 19+ years, English, randomized controlled trial, humans	5
Incontinence AND “weight loss” Limits: all adult: 19+ years, English, randomized controlled trial, humans	3
“Fecal incontinence/diagnosis” [MeSH] Limits: all adult: 19+ years, English, clinical trial, randomized controlled trial, humans	43
“Fecal incontinence/diagnosis” [MeSH]	817
“Urinary incontinence/diagnosis” [MeSH] Limits: all adult: 19+ years, English, clinical trial, randomized controlled trial, humans	143
“Fecal incontinence” [MeSH] AND “homosexuality, male” [MeSH]	1
“Fecal incontinence” [MeSH]	5,420
“Homosexuality, male” [MeSH]	4,303
“Urinary incontinence” [MeSH] AND “predictive value of tests” [MeSH] NOT review NOT letter NOT comment Limits: all adult: 19+ years, English, humans	122

"Urinary incontinence" [MeSH] AND "predictive value of tests" [MeSH] Limits: all adult: 19+ years, English, humans	136
"Urinary incontinence" [MeSH] Limits: all adult: 19+ years, English, humans	8,216
"Fecal incontinence" [MeSH] AND "predictive value of tests" [MeSH] NOT review NOT letter NOT comment Limits: all adult: 19+ years, English, humans	34
"Fecal incontinence" [MeSH] AND "predictive value of tests" [MeSH]	48
"Predictive value of tests" [MeSH]	72,697
"Urinary incontinence/diagnosis" [MeSH] Limits: all adult: 19+ years, English, validation studies, humans	18
"Fecal incontinence/diagnosis" [MeSH] Limits: all adult: 19+ years, English, validation studies, humans	0
"Fecal incontinence/diagnosis" [MeSH] Limits: all adult: 19+ years, English, humans	348
"Reproducibility of results" [MeSH] AND "urinary incontinence" [MeSH] NOT review NOT letter NOT comment Limits: all adult: 19+ years, English, humans	148
"Reproducibility of results" [MeSH] AND "fecal incontinence" [MeSH] NOT review NOT letter NOT comment Limits: all adult: 19+ years, English, humans	45
"Reproducibility of results" [MeSH] AND "fecal incontinence" [MeSH] Limits: all adult: 19+ years, English, humans	47
"Reproducibility of results" [MeSH] Limits: all adult: 19+ years, English, humans	45,118
Hormone AND incontinence Limits: all adult: 19+ years, English, randomized controlled trial, female, humans	39
"Parkinson disease" [MeSH] AND "fecal incontinence" [MeSH] NOT review NOT comment NOT case-reports NOT letter Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	4
"Parkinson disease" [MeSH] AND "urinary incontinence" [MeSH] NOT review NOT comment NOT case-reports NOT letter Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	12
"Parkinson disease" [MeSH] Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	9,932
"Caffeine" [MeSH] AND "fecal incontinence" [MeSH] NOT review NOT comment NOT case-reports NOT letter Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	0
"Caffeine" [MeSH] AND "urinary incontinence" [MeSH] NOT review NOT comment NOT case-reports NOT letter Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, Humans	5
"Caffeine" [MeSH] Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	1,832

(“Uterine prolapse” [MeSH] OR “rectal prolapse” [MeSH] OR “cystocele” [MeSH]) AND “fecal incontinence” [MeSH] NOT review NOT comment NOT case-reports NOT letter Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	105
(“Uterine prolapse” [MeSH] OR “rectal prolapse” [MeSH] OR “cystocele” [MeSH]) AND “urinary incontinence” [MeSH] NOT review NOT comment NOT case-reports NOT letter Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	265
(“Uterine prolapse” [MeSH] OR “rectal prolapse” [MeSH] OR “vystocele” [MeSH]) Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	1,341
“Prostatic hyperplasia” [MeSH] AND “fecal incontinence” [MeSH] NOT review NOT comment NOT case-reports NOT letter Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	0
“Prostatic hyperplasia” [MeSH] AND “urinary incontinence” [MeSH] NOT review NOT comment NOT case-reports NOT letter Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	47
“Prostatic hyperplasia” [MeSH] Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	3,980
“Fibromyalgia” [MeSH] AND “fecal incontinence” [MeSH] NOT review NOT comment NOT case-reports NOT letter Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	0
“Fibromyalgia” [MeSH] AND “urinary incontinence” [MeSH] NOT review NOT comment NOT case-reports NOT letter Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	1
“Fibromyalgia” [MeSH] Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	1,416
“Fecal incontinence” [MeSH] AND “multiple sclerosis” [MeSH] NOT review NOT comment NOT case-reports NOT letter Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	12
“Multiple sclerosis” [MeSH] AND “urinary incontinence” [MeSH] NOT review NOT comment NOT case-reports NOT letter Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	23
“Multiple sclerosis” [MeSH] Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	7,758
“Fecal incontinence” [MeSH] AND “body mass index” [MeSH] NOT review NOT comment NOT case-reports NOT letter Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	5

“Urinary incontinence” [MeSH] AND “body mass index” [MeSH] NOT review NOT comment NOT case-reports NOT letter Limits: all adult: 19+ years, English, publication date from 1990/01/01 to 2007/07/31, humans	74
“Body mass index” [MeSH]	32,517
"Anal Canal/surgery"[MeSH] AND fecal continence Limits: Entrez Date from 1990/01/01 to 2007/08/31, English, Clinical Trial, Randomized Controlled Trial, Humans	34
gracilis transposition AND fecal continence Limits: English, Clinical Trial, Randomized Controlled Trial, Multicenter Study, Humans	2
Fecal incontinence AND ("Biocompatible Materials"[MeSH] OR "Biocompatible Materials"[Pharmacological Action] OR "Polyethylenes"[MeSH]) Limits: All Adult: 19+ years, English, Clinical Trial, Randomized Controlled Trial, Multicenter Study, Humans	2
Sacral nerve stimulation AND fecal Limits: All Adult: 19+ years, English, Clinical Trial, Randomized Controlled Trial, Multicenter Study, Humans	18
"Electric Stimulation Therapy"[MeSH] AND fecal Limits: All Adult: 19+ years, English, Clinical Trial, Randomized Controlled Trial, Multicenter Study, Humans	27
"Colostomy"[MeSH] AND fecal incontinence Limits: All Adult: 19+ years, English, Clinical Trial, Randomized Controlled Trial, Multicenter Study, Humans	9
"Colorectal Neoplasms"[Mesh] AND "fecal continence" Limits: published in the last 10 years, Humans, Randomized Controlled Trial, English, All Adult: 19+ years	2
"Colorectal Neoplasms"[Mesh] AND "fecal incontinence" Limits: published in the last 10 years, Humans, Randomized Controlled Trial, English, All Adult: 19+ years	12
"Colorectal Neoplasms"[Mesh] Limits: published in the last 10 years, Humans, Randomized Controlled Trial, English, All Adult: 19+ years	959
"Colorectal Neoplasms" [Mesh]	95,866
"Fecal Incontinence"[Mesh] AND "Proctocolectomy, Restorative"[Mesh] Limits: published in the last 10 years, Humans, Randomized Controlled Trial, Controlled Clinical Trial, Multicenter Study, English, All Adult: 19+ years	9
"Fecal Incontinence"[Mesh] Limits: Humans, Clinical Trial, Randomized Controlled Trial, Controlled Clinical Trial, Multicenter Study, All Adult: 19+ years	305
"Proctocolectomy, Restorative"[Mesh] Limits: Humans, Clinical Trial, Randomized Controlled Trial, Controlled Clinical Trial, Multicenter Study, All Adult: 19+ years	123
Coloanal anastomoses AND fecal incontinence Limits: Humans, Clinical Trial, Randomized Controlled Trial, Controlled Clinical Trial, Multicenter Study, All Adult: 19+ years	2
Coloanal anastomoses AND fecal incontinence	18
Coloanal anastomoses	85

Manual search of Cochrane review on treatment options for fecal incontinence

Source: Cochrane Incontinence Group reviews.

Topic. Nonsurgical therapy for anal fissure (Review)
Reference: Nelson R. Nonsurgical therapy for anal fissure
Cochrane Database Syst Rev. 2006 Oct 18;(4):CD003431. Review
PMID: 17054170

Analysis 02.02. Comparison 02 GTN or IDN versus sphincterotomy, Outcome 02 Minor Incontinence
Review: Non surgical therapy for anal fissure
Comparison: 02 GTN or IDN versus sphincterotomy
Outcome: 02 Minor Incontinence

	GTN		LIS	
	n	N	n	N
Evans 2001	0	34	2	31
Libertiny 2002	0	35	1	35
Mishra 2005	0	20	3	20
x Oettle 1997	0	12	0	12
Parellada 2004	0	27	4	27
Richard 2000	7	34	3	33

Analysis 08.02. Comparison 08 Botox versus sphincterotomy, Outcome 02 Minor Incontinence
Review: Nonsurgical therapy for anal fissure
Comparison: 08 Botox versus sphincterotomy
Outcome: 02 Minor Incontinence

Analysis 08.02. Comparison 08 Botox versus sphincterotomy, Outcome 02 Minor Incontinence

	Botox low dose		Botox high dose	
	n	N	n	N
Arroyo 2005	0	40	2	40
Mentes 2001	0	61	8	50

Topic. Biofeedback and/or sphincter exercises for the treatment of faecal incontinence in adults.

Reference: Norton C, Cody JD, Hosker G. Biofeedback and/or sphincter exercises for the treatment of faecal incontinence in adults. Cochrane Database Syst Rev. 2006 Jul 19;3:CD002111. Review. PMID: 16855987

Analysis 03.01. Comparison 03 BIOFEEDBACK ALONE versus NO TREATMENT, Outcome 01 Number of people failing to achieve full continence (worse, unchanged or improved)
Review: Biofeedback and/or sphincter exercises for the treatment of faecal incontinence in adults
Comparison: 03 BIOFEEDBACK ALONE versus NO TREATMENT
Outcome: 01 Number of people failing to achieve full continence (worse, unchanged or improved)

	Exercises or BFB		No exercises or BFB	
	n	N	n	N
Miner 1990	9	13	12	12

Analysis 03.02. Comparison 03 BIOFEEDBACK ALONE versus NO TREATMENT, Outcome 02 Number of people with no improvement in incontinence status (worse or unchanged)
Review: Biofeedback and/or sphincter exercises for the treatment of faecal incontinence in adults
Comparison: 03 BIOFEEDBACK ALONE versus NO TREATMENT
Outcome: 02 Number of people with no improvement in incontinence status (worse or unchanged)

	Exercises or BFB		No exercises or BFB	
	n	N	n	N
Miner 1990	2	13	7	12

Analysis 03.04. Comparison 03 BIOFEEDBACK ALONE versus NO TREATMENT, Outcome 04 Number of incontinence episodes per week
Review: Biofeedback and/or sphincter exercises for the treatment of faecal incontinence in adults
Comparison: 03 BIOFEEDBACK ALONE versus NO TREATMENT
Outcome: 04 Number of incontinence episodes per week

	Exercises or BFB			No exercises or BFB		
	N	Mean	STD	N	Mean	STD
Miner 1990	13	0.9	0.08	12	2.3	0.17

Analysis 06.01. Comparison 06 ANAL SPHINCTER EXERCISES/PELVIC FLOOR MUSCLE TRAINING AND BIOFEEDBACK versus ANY OTHER TREATMENT, Outcome 01 Number of people failing to achieve full continence (worse, unchanged or improved)
Review: Biofeedback and/or sphincter exercises for the treatment of faecal incontinence in adults
Comparison: 06 ANAL SPHINCTER EXERCISES/PELVIC FLOOR MUSCLE TRAINING AND BIOFEEDBACK versus ANY OTHER TREATMENT
Outcome: 01 Number of people failing to achieve full continence (worse, unchanged or improved)

	Exercises or BFB		No exercises or BFB	
	n	N	n	N
Fynes 1999	12	19	5	20

Analysis 06.02. Comparison 06 ANAL SPHINCTER EXERCISES/PELVIC FLOOR MUSCLE TRAINING AND BIOFEEDBACK versus ANY OTHER TREATMENT, Outcome 02 Number of people with no improvement in incontinence status (worse or unchanged)
Review: Biofeedback and/or sphincter exercises for the treatment of faecal incontinence in adults
Comparison: 06 ANAL SPHINCTER EXERCISES/PELVIC FLOOR MUSCLE TRAINING AND BIOFEEDBACK versus ANY OTHER TREATMENT
Outcome: 02 Number of people with no improvement in incontinence status (worse or unchanged)

	Exercises or BFB		No exercises or BFB	
	n	N	n	N
Fynes 1999	8	19	0	20

Topic: Drug treatment for faecal incontinence in adults.
Reference: Cheetham M, Brazzelli M, Norton C, Glazener CM Drug treatment for faecal incontinence in adults.
Cochrane Database Syst Rev. 2003;(3):CD002116.
No summary tables.
1 reference was excluded from our analysis as non RCT: Kusunoki M, Shoji Y, Ikeuchi H, Yamagata K, Yamamura T, Utsunomiya J. Usefulness of valproate sodium for treatment of incontinence after ileoanal anastomosis. Surgery. 1990 Mar;107(3):311-5.

Topic: Electrical stimulation for faecal incontinence in adults.
Reference: Hosker G, Norton C, Brazzelli M. Electrical stimulation for faecal incontinence in adults. Cochrane Database Syst Rev. 2000;(2):CD001310.
References to studies included in this review:
Fynes 1999 – *included in our analysis*
Fynes MM,Marshall K, Cassidy M, Behan M,Walsh D, O'Connell PR, O'Herlihy C. A prospective, randomized study comparing the effect of augmented biofeedback with sensory biofeedback alone on fecal incontinence after obstetric trauma. *Diseases of the Colon and Rectum* 1999;42(6):753-8; discussion 758-61. [MedLine: 99304944]

Topic: Management of faecal incontinence and constipation in adults with central neurological diseases.
Reference: Coggrave M, Wiesel PH, Norton C. Management of faecal incontinence and constipation in adults with central neurological diseases. Cochrane Database Syst Rev. 2006 Apr 19;(2):CD002115. Review.
PMID: 16625555

No studies reported fecal incontinence as an outcomes.

Analysis 01.34. Comparison 01 CISAPRIDE versus PLACEBO, Outcome 34 Number of bowel motions or successes bowel care routine per week
Review: Management of faecal incontinence and constipation in adults with central neurological diseases
Comparison: 01 CISAPRIDE versus PLACEBO
Outcome: 34 Number of bowel motions or successes bowel care routine per week

	Mean difference (95% CI)
Badiali 1991	-0.5 (-2.26; 1.26)
de Both 1992	-0.1 (-1; 0.8)
Total (95% CI)	-0.18 (-0.99; 0.62)

Analysis 01.35. Comparison 01 CISAPRIDE versus PLACEBO, Outcome 35 Ease of evacuation or straining effort (score)
Review: Management of faecal incontinence and constipation in adults with central neurological diseases
Comparison: 01 CISAPRIDE versus PLACEBO
Outcome: 35 Ease of evacuation or straining effort (score)

	Mean difference (95% CI)
Badiali 1991	0.6 (-0.18; 1.38)
de Both 1992	-0.1 (-0.51; 0.31)
Total (95% CI)	0.05 (-0.31; 0.42)

Analysis 01.36. Comparison 01 CISAPRIDE versus PLACEBO, Outcome 36 Oro-anal transit time (hours)
Review: Management of faecal incontinence and constipation in adults with central neurological diseases
Comparison: 01 CISAPRIDE versus PLACEBO
Outcome: 36 Oro-anal transit time (hours)

	Mean difference (95% CI)
Badiali 1991	10 (-19.01; 39.01)
de Both 1992	19.2 (-38.23; 76.63)
Total (95% CI)	11.87 (-14.02; 37.76)

Authors' conclusions: ”There is still remarkably little research on this common and, to patients, very significant condition. It is not possible to draw any recommendation for bowel care in people with neurological diseases from the trials included in this review. Bowel management for these people must remain empirical until well-designed controlled trials with adequate numbers and clinically relevant outcome measures become available”.

Topic: Operative procedures for fissure in ano.
Reference: Nelson R. Operative procedures for fissure in ano.
Cochrane Database Syst Rev. 2005 Apr 18;(2):CD002199. Review.
PMID: 15846630
The review included the studies with minor incontinence to flatus only.
Analysis 01.01. Comparison 01 Anal Stretch and partial internal sphincterotomy, Outcome 01 Persistence of the anal fissure
Review: Operative procedures for fissure in ano
Comparison: 01 Anal Stretch and partial internal sphincterotomy
Outcome: 01 Persistence of the anal fissure

	Anal Stretch		Sphincterotomy		Peto Odds Ratio (95% CI)
	n	N	n	N	
Fischer 1976	3	34	1	32	2.68 (0.36; 19.96)
Jensen 1984	8	28	1	30	6.63 (1.62; 27.17)
Marby 1979	3	41	10	45	0.32 (0.1; 1.03)
Olsen 1987	3	10	1	10	3.28 (0.39; 27.75)
Saad 1992	3	37	2	20	0.79 (0.12; 5.33)
Weaver 1987	3	59	2	39	0.99 (0.16; 6.17)
Total (95% CI)	209		176		(.66; 2.48)

Analysis 01.02. Comparison 01 Anal Stretch and partial internal sphincterotomy, Outcome 02 Minor incontinence to flatus
Review: Operative procedures for fissure in ano
Comparison: 01 Anal Stretch and partial internal sphincterotomy
Outcome: 02 Minor incontinence to flatus

	Anal Stretch		Sphincterotomy		Peto Odds Ratio (95% CI)
	n	N	n	N	
Fischer 1976	6	34	0	32	8.19 (1.55; 43.35)
Jensen 1984	8	28	0	30	10.61 (2.41; 46.62)
Marby 1979	0	41	0	45	Not estimable
Olsen 1987	2	10	1	10	1 (0.12; 8.46)
Saad 1992	8	37	1	20	3.41 (0.78; 14.98)
Weaver 1987	0	59	2	39	0.08 (0; 4.44)
Total (95% CI)	209		176		4.22 (1.89; 9.41)

Analysis 02.02. Comparison 02 Open versus closed partial lateral internal sphincterotomy, Outcome 02 Minor incontinence to flatus
Review: Operative procedures for fissure in ano
Comparison: 02 Open versus closed partial lateral internal sphincterotomy
Outcome: 02 Minor incontinence to flatus

	Open LIS		Closed LIS		Peto Odds Ratio (95% CI)
	n	N	n	N	
Arroyo 2004	2	40	1	40	1.98 (0.2; 19.62)
Boulos 1984	2	14	3	14	0.63 (0.09; 4.18)
Kortbeek 1992	4	54	5	58	0.85 (0.22; 3.3)
Wiley 2002	2	40	3	36	0.59 (0.1; 3.56)
Total (95% CI)	148		148		0.83 (0.35; 1.97)

Topic: Surgery for complete rectal prolapse in adults.
Reference: Bachoo P, Brazzelli M, Grant A. Surgery for complete rectal prolapse in adults. Cochrane Database Syst Rev. 2000;(2):CD001758. Review.
PMID: 10796817
McKee 1992 added to the review
Galili 1997 added to the review
Novell 1994 added to the review

Topic: Plugs for containing faecal incontinence.
Reference: Deutekom M, Dobben A. Plugs for containing faecal incontinence. Cochrane Database Syst Rev. 2005 Jul 20;(3):CD005086.
PMID: 16034966

Analysis 01.04. Comparison 01 Anal plugs versus no plugs, Outcome 04 Condition specific measures of faecal incontinence improved
Review: Plugs for containing faecal incontinence
Comparison: 01 Anal plugs versus no plugs
Outcome: 04 Condition specific measures of faecal incontinence improved
Based on *unpublished data:*
Bond 2005 *unpublished data only´*
Bond C. The anal plug: an evaluation of a novel management option for faecal incontinence. Final report to Chief Scientist Office, Scottish
Executive Health Department, Edinburgh 2005.

Analysis 01.07. Comparison 01 Anal plugs versus no plugs, Outcome 07 Achievement of pseudo-continence
Achievement of pseudo-continence
Study Anal plug period Control period

Analysis 02.01. Comparison 02 One type of anal plug versus another type, Outcome 01 Plug effectiveness: number of people with no soiling
Plug effectiveness: number of people with no soiling
Study PU plug PVA plug

Van Winckel 2005 *unpublished data only´*
Van Winckel M. Clinical evaluation of a new anal medical device to achieve faecal continence in spina bi_da and anal atresia patients.
personal communication 2005.
VanWinckel M, Van Biervliet S,Van Laecke E,Hoebeke P. Is an anal plug useful in the treatment of fecal incontinence in children with spina bi_da or anal atresia?. *Journal of Urology* 2006;176(1):342{4. [MedLine: 22027].

Topic: Methods of repair for obstetric anal sphincter injury
Reference: Fernando R, Sultan AH, Kettle C, Thakar R, Radley S. Methods of repair for obstetric anal sphincter injury.
Cochrane Database Syst Rev. 2006 Jul 19;3:CD002866.
No additional published references identified.

Topic: Sacral nerve stimulation for faecal incontinence in adults(protocol only).

Topic: Surgery for faecal incontinence in adults.
Reference: Brown S, Nelson R. Surgery for faecal incontinence in adults.
Cochrane Database Syst Rev. 2007 Apr 18;2:CD001757.
PMID: 17443511
All references included in our review.

Appendix C: List of Excluded Studies

1. Urinary incontinence among hospitalized persons aged 65 years and older--United States, 1984-1987. MMWR Morb Mortal Wkly Rep 1991 Jul 5; 40(26):433-6. *Not eligible target population*
2. Rectal prolapse. Lancet 1991 Sep 7; 338(8767):605-6. *Review*
3. Urinary incontinence in adults. Agency for Health Care Policy and Research. Clin Pract Guidel Quick Ref Guide Clin 1992; (2):QR1-27. *Guideline*
4. High quality long-term care for elderly people. A summary of a report of the Royal College of Physicians and the British Geriatrics Society. J R Coll Physicians Lond 1992 Apr; 26(2):130-3. *Review*
5. Effects of terodiline on urinary incontinence among older non-institutionalized women. Terodiline in the Elderly American Multicenter Study Group. J Am Geriatr Soc 1993 Sep; 41(9):915-22. *Not eligible exposure*
6. Professional development. Promoting continence: knowledge for practice (continuing education credit). Nurs Times 1994 Nov 2-8; 90(44):suppl 1-4. *Review*
7. Goals in continence training. Prof Nurse 1994 Sep; 9(12):783. *Review*
8. Incontinence. Causes, management and provision of services. A Working Party of the Royal College of Physicians. J R Coll Physicians Lond 1995 Jul-Aug; 29(4):272-4. *Review*
9. The chief scientist reports .... 'Incontinence research--the way ahead'. Health Bull (Edinb) 1995 May; 53(3):174-9. *Congresses publication*
10. Managing acute and chronic urinary incontinence. AHCPR Urinary Incontinence in Adults Guideline Update Panel. Am Fam Physician 1996 Oct; 54(5):1661-72. *Review*
11. Managing acute and chronic urinary incontinence. U.S. Department of Health and human services. J Am Acad Nurse Pract 1996 Aug; 8(8):390-403. *Guideline*
12. RU3: making a difference for women. AWHONN's continence research reveals preliminary findings. AWHONN Lifelines 1998 Aug; 2(4):55-6. *News*
13. Clinical practice guidelines: Neurogenic bowel management in adults with spinal cord injury. Spinal Cord Medicine Consortium. J Spinal Cord Med 1998 Jul; 21(3):248-93. *Guideline*
14. Continence care. Elder Care 1998 Feb-Mar; 10(1):35. *Comment*
15. Case records of the Massachusetts General Hospital. Weekly clinicopathological exercises. Case 11-1999. A 60-year-old woman with epidural and paraspinal masses. N Engl J Med 1999 Apr 15; 340(15):1188-96. *Case-reports*
16. Goserelin and locally advanced prostate cancer: new indication. Pros and cons. Prescrire Int 2000 Jun; 9(47):75-6. *Comment*
17. Biofeedback in the treatment of urinary incontinence in adults. Tecnologica MAP Suppl 2000 Apr:3-5. *Not eligible target population*
18. Solutions for declining bladder control. Johns Hopkins Med Lett Health After 50 2001 Jul; 13(5):6-7. *Comment*
19. Patient information. Understanding urinary incontinence. Adv Nurse Pract 2001 Mar; 9(3):64. *Patient Education Handout*
20. Market research on urinary incontinence offers insightful findings. Urol Nurs 2001 Dec; 21(6):413. *News*
21. I've been having problems controlling my bowels and have had some "accidents" lately. Is this common? Can it be helped? Mayo Clin Health Lett 2001 Mar; 19(3):8. *Comment*
22. Page for patients. Menopause. Prev Med 2001 Mar; 32(3):207-8. *Patient Education Handout*
23. Simpler solutions for incontinence. Health News 2002 Sep; 8(9):9. *News*
24. Behavior therapy and urge incontinence. Mayo Clin Health Lett 2003 May; 21(5):4. *News*
25. New treatment for fecal incontinence. Health News 2004 Jul; 10(7):11. *News*
26. Summaries for patients. Factors associated with acute kidney infections in healthy women. Ann Intern Med 2005 Jan 4; 142(1):I34. *Patient Education Handout*
27. Many effective treatments for urinary incontinence. There's no need to suffer in silence; there are many treatments and therapies for this disorder. Health News 2006 Aug; 12(8):7-8. *News*

28. Summaries for patients. A simple test to diagnose urinary incontinence in women. Ann Intern Med 2006 May 16; 144(10):I30. *Patient Education Handout*
29. Promoting urinary continence in older people. Nurs Older People 2006 Apr; 18(3):35-6. *Comment*
30. Elderly care. Controlling interest. Health Serv J 2006 Nov 23; 116(6033):26-7. *Comment*
31. When nature calls too often. Johns Hopkins Med Lett Health After 50 2006 Nov; 18(9):4-5. *Comment*
32. Aanestad O, Flink R. Interference pattern in perineal muscles. A quantitative electromyographic study in patients with faecal incontinence. Eur J Surg 1994 Feb; 160(2):111-8. *Case-series*
33. Aanestad O, Flink R. Urinary stress incontinence. A urodynamic and quantitative electromyographic study of the perineal muscles. Acta Obstet Gynecol Scand 1999 Mar; 78(3):245-53. *Not eligible outcomes*
34. Aanestad O, Flink R, Haggman M, et al. Interference pattern in the urethral sphincter: a quantitative electromyographic study in patients before and after radical retropubic prostatectomy. Scand J Urol Nephrol 1998 Dec; 32(6):378-82. *Not eligible outcomes*
35. Aaron R, Muliyil J, Abraham S. Medico-social dimensions of menopause: a cross-sectional study from rural south India. Natl Med J India 2002 Jan-Feb; 15(1):14-7. *Not eligible level of evidence*
36. Abayomi J, Kirwan J, Hackett A, et al. A study to investigate women's experiences of radiation enteritis following radiotherapy for cervical cancer. J Hum Nutr Diet 2005 Oct; 18(5):353-63. *Case-series*
37. Abbas F, Siddiqui K, Biyabani SR, et al. Early surgical results with intent to treat by radical retropubic prostatectomy for clinically localized prostate cancer. J Pak Med Assoc 2002 May; 52(5):200-5. *Case-series*
38. Abbas SM, Bissett IP, Neill ME, et al. Long-term results of the anterior Delorme's operation in the management of symptomatic rectocele. Dis Colon Rectum 2005 Feb; 48(2):317-22. *Case-series*
39. Abbas SM, Bissett IP, Neill ME, et al. Long-term outcome of postanal repair in the treatment of faecal incontinence. ANZ J Surg 2005 Sep; 75(9):783-6. *Case-series*
40. Abbasakoor F, Nelson M, Beynon J, et al. Anal endosonography in patients with anorectal symptoms after haemorrhoidectomy. Br J Surg 1998 Nov; 85(11):1522-4. *Not eligible target population*
41. Abdelghany S, Hughes J, Lammers J, et al. Biofeedback and electrical stimulation therapy for treating urinary incontinence and voiding dysfunction: one center's experience. Urol Nurs 2001 Dec; 21(6):401-5, 10. *No associative hypothesis tested*
42. Abdel-Hady el S, Constantine G. Outcome of the use of tension-free vaginal tape in women with mixed urinary incontinence, previous failed surgery, or low valsalva pressure. J Obstet Gynaecol Res 2005 Feb; 31(1):38-42. *Case-series*
43. Abercrombie JF, Rogers J, Swash M. Faecal incontinence in myotonic dystrophy. J Neurol Neurosurg Psychiatry 1998 Jan; 64(1):128-30. *Case-reports*
44. Abes M, Sarihan H, Madenci E. Evaluation of bone mineral density with dual x-ray absorptiometry for osteoporosis in children with bladder augmentation. J Pediatr Surg 2003 Feb; 38(2):230-2. *Not eligible target population*
45. Abicht-Swensen LM, Debner LK. The Minimum Data Set 2.0: a functional assessment to predict mortality in nursing home residents. Am J Hosp Palliat Care 1999 May-Jun; 16(3):527-32. *Not eligible target population*
46. Aboseif S, Tamaddon K, Chalfin S, et al. Sacral neuromodulation as an effective treatment for refractory pelvic floor dysfunction. Urology 2002 Jul; 60(1):52-6. *Not eligible target population*
47. Aboseif SR, Borirakchanyavat S, Lue TF, et al. Continence mechanism of the ileal neobladder in women: a urodynamics study. World J Urol 1998; 16(6):400-4. *Case-series*
48. Aboseif SR, Konety B, Schmidt RA, et al. Preoperative urodynamic evaluation: does it predict the degree of urinary continence after radical retropubic prostatectomy? Urol Int 1994; 53(2):68-73. *Not eligible outcomes*
49. Aboseif SR, O'Connell HE, Usui A, et al. Collagen injection for intrinsic sphincteric deficiency in men. J Urol 1996 Jan; 155(1):10-3. *Case-series*
50. Abouassaly R, Lane BR, Lakin MM, et al. Ejaculatory urine incontinence after radical prostatectomy. Urology 2006 Dec; 68(6):1248-52. *Case-series*

51. Abouassaly R, Steinberg JR, Lemieux M, et al. Complications of tension-free vaginal tape surgery: a multi-institutional review. BJU Int 2004 Jul; 94(1):110-3. *Case-series*
52. Abou-Zeid AA. Preliminary experience in management of fecal incontinence caused by internal anal sphincter injury. Dis Colon Rectum 2000 Feb; 43(2):198-202; discussion -4. *Case-series*
53. Abramov Y, Gandhi S, Goldberg RP, et al. Site-specific rectocele repair compared with standard posterior colporrhaphy. Obstet Gynecol 2005 Feb; 105(2):314-8. *Not eligible outcomes*
54. Abramov Y, Goldberg RP, McGuire M, et al. Eosinophilic cystitis after bladder instillation with dimethyl sulfoxide. Urology 2004 Jun; 63(6):1182-3. *Case-reports*
55. Abrams P, Blaivas JG, Fowler CJ, et al. The role of neuromodulation in the management of urinary urge incontinence. BJU Int 2003 Mar; 91(4):355-9. *Secondary data analysis*
56. Abrams P, Cardozo L, Chapple C, et al. Comparison of the efficacy, safety, and tolerability of propiverine and oxybutynin for the treatment of overactive bladder syndrome. Int J Urol 2006 Jun; 13(6):692-8. *Not eligible target population*
57. Abrams P, Donovan JL, de la Rosette JJ, et al. International Continence Society "Benign Prostatic Hyperplasia" Study: background, aims, and methodology. Neurourol Urodyn 1997; 16(2):79-91. *Not eligible outcomes*
58. Abrams P, Kaplan S, De Koning Gans HJ, et al. Safety and tolerability of tolterodine for the treatment of overactive bladder in men with bladder outlet obstruction. J Urol 2006 Mar; 175(3 Pt 1):999-1004; discussion *Not eligible exposure*
59. Abu J, Wong MY, Foo KT, et al. A case report on vesico-uterine fistula: a very rare complication of the lower caesarean section. Singapore Med J 2000 Nov; 41(11):554-6. *Case-reports*
60. Achtergael W, Michielsen D, Gorus FK, et al. Indoxyl sulphate and the purple urine bag syndrome: a case report. Acta Clin Belg 2006 Jan-Feb; 61(1):38-41. *Case Reports*
61. Adams C, Lorish C, Cushing C, et al. Anatomical urinary stress incontinence in women with rheumatoid arthritis: its frequency and coping strategies. Arthritis Care Res 1994 Jun; 7(2):97-103. *Not eligible level of evidence*
62. Adams D, Samuel D, Goulon-Goeau C, et al. The course and prognostic factors of familial amyloid polyneuropathy after liver transplantation. Brain 2000 Jul; 123 (Pt 7):1495-504. *Not eligible outcomes*
63. Adams JB, 2nd, Micali S, Moore RG, et al. Complications of extraperitoneal balloon dilation. J Endourol 1996 Aug; 10(4):375-8. *Case Reports*
64. Adang EM, Engel GL, Rutten FF, et al. Cost-effectiveness of dynamic graciloplasty in patients with fecal incontinence. Dis Colon Rectum 1998 Jun; 41(6):725-33; discussion 33-4. *Not eligible target population*
65. Addington-Hall J, Lay M, Altmann D, et al. Symptom control, communication with health professionals, and hospital care of stroke patients in the last year of life as reported by surviving family, friends, and officials. Stroke 1995 Dec; 26(12):2242-8. *Not eligible outcomes*
66. Addison R, Dodd L, Abili J, et al. Stroke, catheters and constipation: action plans. Nurs Times 2001 Jul 26-Aug 1; 97(30):54-5. *Case Reports*
67. Adekanmi OA, Freeman RM, Reed H, et al. Improving the diagnosis of genuine stress incontinence in symptomatic women with negative cough stress test: the Distal Urethral Electrical Conductance test (DUEC) revisited. Int Urogynecol J Pelvic Floor Dysfunct 2003 Feb; 14(1):9-12; discussion *Not eligible outcomes*
68. Adkins VK, Mathews RM. Prompted voiding to reduce incontinence in community-dwelling older adults. J Appl Behav Anal 1997 Spring; 30(1):153-6. *Case-series*
69. Adler US, Kirshblum SC. A new assistive device for intermittent self-catheterization in men with tetraplegia. J Spinal Cord Med 2003 Summer; 26(2):155-8. *Case-series*
70. Agachan F, Pfeifer J, Joo JS, et al. Results of perineal procedures for the treatment of rectal prolapse. Am Surg 1997 Jan; 63(1):9-12. *Case-series*
71. Agachan F, Pfeifer J, Wexner SD. Defecography and proctography. Results of 744 patients. Dis Colon Rectum 1996 Aug; 39(8):899-905. *Not eligible outcomes*
72. Agachan F, Reissman P, Pfeifer J, et al. Comparison of three perineal procedures for the treatment of rectal prolapse. South Med J 1997 Sep; 90(9):925-32. *Case-series*

73. Agarwal A, Dhiraaj S, Singhal V, et al. Comparison of efficacy of oxybutynin and tolterodine for prevention of catheter related bladder discomfort: a prospective, randomized, placebo-controlled, double-blind study. Br J Anaesth 2006 Mar; 96(3):377-80. *Not eligible outcomes*
74. Aghaji AE, Odoemene C. Ureteric injuries in Enugu, Nigeria. East Afr Med J 1999 Apr; 76(4):184-8. *Case-series*
75. Agnew G, Byrne P. The evaluation and treatment of female urinary incontinence--a comparison of clinical practice in the Republic of Ireland with the recommendations of the International Continence Society. Ir Med J 2004 Sep; 97(8):238-40. *Not eligible outcomes*
76. Agostini A, De Lapparent T, Bretelle F, et al. Abscess of the thigh and psoas muscle after transobturator suburethral sling procedure. Acta Obstet Gynecol Scand 2006; 85(5):628-9. *Case report*
77. Aharon-Peretz J, Kliot D, Finkelstein R, et al. Cryptococcal meningitis mimicking vascular dementia. Neurology 2004 Jun 8; 62(11):2135. *Case Reports*
78. Ahlering TE, Skarecky D, Lee D, et al. Successful transfer of open surgical skills to a laparoscopic environment using a robotic interface: initial experience with laparoscopic radical prostatectomy. J Urol 2003 Nov; 170(5):1738-41. *Case-series*
79. Ahlering TE, Weinberg AC, Razor B. Modified Indiana pouch. J Urol 1991 Jun; 145(6):1156-8. *Case-series*
80. Ahn SC, Brown AW. Cobalamin deficiency and subacute combined degeneration after nitrous oxide anesthesia: a case report. Arch Phys Med Rehabil 2005 Jan; 86(1):150-3. *Case-reports*
81. Ahn SM, Han SW, Choi SH. The results of antegrade continence enema using a retubularized sigmoidostomy. Pediatr Surg Int 2004 Jul; 20(7):488-91. *Not eligible target population*
82. Aitchison M, Fisher BM, Carter K, et al. Impaired anal sensation and early diabetic faecal incontinence. Diabet Med 1991 Dec; 8(10):960-3. *Not eligible exposure*
83. Aitola P, Hiltunen KM, Matikainen M. Functional results of anterior levatorplasty and external sphincter plication for faecal incontinence. Ann Chir Gynaecol 2000; 89(1):29-32. *Case-series*
84. Aitola PT, Hiltunen KM, Matikainen MJ. Functional results of operative treatment of rectal prolapse over an 11-year period: emphasis on transabdominal approach. Dis Colon Rectum 1999 May; 42(5):655-60. *Case-series*
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Appendix D: Technical Expert Panel Members and Affiliation

TEP Member	Affiliation
Linda Brubaker, M.D.	Clinical and Translational Research Loyola University Medical Center
Tomas L. Griebling, M.D.	Department of Urology The University of Kansas
Robert Madoff, M.D.	Colon and Rectal Surgery University of Minnesota Medical School
Richard Nelson, M.D.	Department of General Surgery Northern General Hospital, Sheffield, UK
Joseph Ouslander, M.D.	Division of Geriatric Medicine and Gerontology Wesley Woods Center of Emory University
Neil Resnick, M.D.	Department of Medicine University of Pittsburgh Medical Center
Carolyn Sampselle, Ph.D, R.N.C.	School of Nursing University of Michigan
David Thom, M.D., Ph.D.	Family and Community Medicine San Francisco General Hospital
Joanne Townsend, R.N., B.A. (Hons) Post Grad Cert HSR	Urogynaecology Nurse Specialist University Hospitals of Leicester, Leicester, UK

Appendix E. Data Abstraction Forms

Prevalence and incidence of urinary incontinence in the community and long-term care settings

Abstraction Form

(Complete for each study**)**

Number of the study in the database (PubMed ID, Cochrane accession number, ISBN)_____
First author_____
Year of publication_____
Purpose/aim of study _____

Design of the study (check one)
☐ prospective cohort
☐ retrospective cohort
☐ cross-sectional
☐ descriptive study
☐ case-control
☐ case-series
☐ randomized controlled clinical trial
☐ not randomized clinical interventions
☐ ecologic

Adjustment for confounding factors: _____

Population variables (independent variables)
Data source for population variables (define) _____
Survey_____
Administrative data base_____
Population based_____
Clinic based_____
Other_____

Settings
Community (general population)_____
Long term care settings_____
Nursing home_____
Long term care hospital_____

Location
Residence _____
Country _____
Region (State, Province, Census region)_____
Urban_____
Rural_____

Time
Year of the publication_____
Year to collect the data (Range)_____

Subjects
Race
African Continental Ancestry Group, %_____
Asian Continental Ancestry Group, %_____
European Continental Ancestry Group, %_____

Ethnicity
Caucasians, %_____
African Americans, %_____
Arabs, %_____
Asian Americans, %_____
Hispanic Americans, %_____

Gender_____
Males, %_____
Females, %_____

Age: _____
Mean age, years_____ Standard deviation_____
Age intervals:_____

Health status
Sample size:_____
Inclusion criteria:_____
Exclusion criteria:_____

Incontinence variables
Methods to assess incontinence:
Self report_____
Medical diagnosis_____
Medical procedure_____

Data source to measure incontinence: _____
Time of followup from the diagnosed incontinence in months_____

Urinary Incontinence (Incidence, Prevalence)
Define _____
Symptoms_____
Signs_____
Acuity_____
Severity_____
Length_____
Bothersomeness_____

Type of Incontinence (Incidence. Prevalence)
Define_____
Symptoms_____
Signs_____
Acuity_____
Severity_____
Frequency_____
Length_____
Bothersomeness_____

Subject Age, Gender, Race, Ethnicity	Prevalence (%) of Incontinence	Prevalence (%) of Incontinence	Prevalence (%) of Incontinence
Race	Definition overall and by type	Severity of urinary incontinence	Bothersomeness
African Continental Ancestry Group			
Asian Continental Ancestry Group			
European Continental Ancestry Group			
Ethnicity			
Caucasians			
African Americans			
Arabs			
Asian Americans			
Hispanic Americans			
Gender			
Males			
Females			
Age groups			

Level of evidence of the individual study (check one)

Observational studies
☐ I-2A Well-designed cohort (prospective) study with concurrent controls
☐ I-2B Well-designed cohort (prospective) study with historical controls
☐ II-2C Well-designed cohort (retrospective) study with concurrent controls
☐ II-3 Well-designed case-controlled (retrospective) study
☐ III Large differences from comparisons between times and/or places
☐ IY Opinion of respected authorities based on clinical experience

Prevalence and incidence of fecal and combined incontinence in the community and long-term care settings

Abstraction Form

(Complete for each study**)**

Number of the study in the database (PubMed ID, Cochrane accession number, ISBN)_____
First author_____
Year of publication_____
Purpose/aim of study _____

Design of the study (check one)
☐ prospective cohort
☐ retrospective cohort
☐ cross-sectional
☐ descriptive study
☐ case-control
☐ case-series
☐ randomized controlled clinical trial
☐ not randomized clinical interventions
☐ ecologic

Adjustment for confounding factors: _____

Population variables (independent variables)
Data source for population variables (define) _____
Survey_____
Administrative data base_____
Population based_____
Clinic based_____
Other_____

Settings
Community (general population)_____
Long term care settings_____
Nursing home_____
Long term care hospital_____

Location
Residence _____
Country _____
Region (State, Province, Census region)_____
Urban_____
Rural_____

Time
Year of the publication_____
Year to collect the data (Range)_____

Subjects
Race
African Continental Ancestry Group, %_____
Asian Continental Ancestry Group, %_____
European Continental Ancestry Group, %_____

Ethnicity
Caucasians, %_____

African Americans, %_____
Arabs, %_____
Asian Americans, %_____
Hispanic Americans, %_____

Gender_____
Males, %_____
Females, %_____

Age: _____
Mean age, years_____ Standard deviation_____
Age intervals:_____

Health status
Sample size:_____
Inclusion criteria:_____
Exclusion criteria:_____

Incontinence variables
Methods to assess incontinence:
Self report_____
Medical diagnosis_____
Medical procedure_____

Data source to measure incontinence: _____
Time of followup from the diagnosed incontinence in months_____

Fecal Incontinence (Incidence, Prevalence)
Define _____
Symptoms_____
Signs_____
Acuity_____
Severity_____
Length_____
Bothersomeness_____

Combined Incontinence (Incidence. Prevalence)
Define_____
Symptoms_____
Signs_____
Acuity_____
Severity_____
Frequency_____
Length_____
Bothersomeness_____

Subject Age, Gender, Race, Ethnicity	Prevalence (%) of Incontinence	Prevalence (%) of Incontinence	Prevalence (%) of Incontinence
Race	Definition overall	Severity of fecal incontinence	Bothersomeness
African Continental Ancestry Group			
Asian Continental Ancestry Group			
European Continental Ancestry Group			
Ethnicity			
Caucasians			
African Americans			
Arabs			
Asian Americans			
Hispanic Americans			
Gender			
Males			
Females			
Age groups			

Level of evidence of the individual study (check one)

Observational studies
☐ I-2A Well-designed cohort (prospective) study with concurrent controls
☐ I-2B Well-designed cohort (prospective) study with historical controls
☐ II-2C Well-designed cohort (retrospective) study with concurrent controls
☐ II-3 Well-designed case-controlled (retrospective) study
☐ III Large differences from comparisons between times and/or places
☐ IY Opinion of respected authorities based on clinical experience

Independent contributions of risk factors for fecal and combined Incontinence

Abstraction Form

(Complete for each study)

Number of the study in the database (PubMed ID, Cochrane accession number, ISBN)_____
First author_____
Year of the publication_____
Purpose/aim of study_____

Design of the study (check one)
☐ prospective cohort
☐ retrospective cohort
☐ cross-sectional
☐ descriptive study
☐ case-control
☐ case-series
☐ randomized controlled clinical trial
☐ not randomized clinical interventions
☐ ecologic

Adjustment for confounding factors: _____

Population variables
Data source for population variables (define) _____
Survey_____
Administrative data base_____
Population based_____
Clinic based_____
Other_____

Settings
Community (general population)_____
Long term care settings_____
Nursing home_____
Long term care hospital_____

Location
Residence: _____
Country _____
Region (State, Province, Census region)_____

Subjects
Race
African Continental Ancestry Group, %_____
Asian Continental Ancestry Group, %_____
European Continental Ancestry Group, %_____

Ethnicity
Caucasians, %_____
African Americans, %_____
Arabs, %_____
Asian Americans, %_____
Hispanic Americans, %_____

Gender
Males, %_____
Females, %_____

Age
Mean age, years_____ Standard deviation_____
Age intervals:_____

Health status _____
Sample size_____
Inclusion criteria:_____
Exclusion criteria:_____

Risk factors (independent variables)
Data source for variables (define) _____

Frailty
Unintentional weight loss (10 pounds or more in a year) _____
General feeling of exhaustion _____
Weakness (as measured by grip strength)_____
Slow walking speed_____
Low levels of physical activity_____

Prostate disorders
Define _____
Prostatic enlargement, benign _____
Urethral stricture_____
Bladder neck contracture_____
Prostate cancer_____
Prostatectomy, radical_____
Prostatectomy, laparoscopic_____
TURP_____

Sexual abuse, torture, sodomy _____

Anal sexual intercourse_____

Pregnancy and Postpartum period
Define_____
Semester or pregnancy_____
Complications of Pregnancy_____
Labor, Obstetric_____

Menopause
Define_____
Years of amenorrhea_____
Hysterectomy_____

Dementia
Define _____
Levels of decline_____
Functional status_____
ADL_____
CPS_____

Depression
Define_____
Depressive Disorder_____
Depression, Postpartum_____
Depressive Disorder, Major_____

Psychiatric disorders
Define_____
Functional status_____
ADL_____
CPS_____

Diabetes
Diabetes Mellitus, Type 2_____
Compensation (HbA1c)_____
Diabetes Mellitus, Type 1_____
Compensation (HbA1c)_____

Obesity
Define_____
class I (BMI 30-34.9)_____
class II (BMI 35-39.9)_____
class III (BMI 40 and above)_____

Abdominal Obesity
Define_____
Waist Circumference >102 cm(men) >88cm (women)_____
Waist-Hip Ratio >0.9 (men) >0.8(women)_____

Diet
Define_____
Caffeine intake_____
Alcohol intake_____
Liquid Intake_____
Calories intake_____
Saturated fat intake_____
Salt Intake_____
Dietary fiber intake_____
Nutritional deficits_____
Malnutrition_____
Fiber-free tube-feeding formulas_____

Irritable Bowel Syndrome
Length of the diseases_____
Severity of the disease_____

Diarrhea
Define_____
Length of the diseases_____
Severity of the disease_____

Constipation
Define_____
Length of the diseases_____
Severity of the disease_____

Inflammatory Bowel Diseases
Length of the diseases_____
Severity of the disease_____
Radiation to pelvis or radiation enteritis_____

Fecal impaction
Define_____
Length of the diseases_____
Severity of the disease_____

Cardiovascular Diseases
Define _____
Length of the diseases_____
Arrhythmia_____
Congestive heart failure_____
Coronary Disease_____
Myocardial infarction_____
Hypertension_____

Smoking
Define_____
Length of smoking_____
Dose of nicotine per day_____
Secondary smoking_____
Years after cessation_____

Smoking related Respiratory Tract Diseases
Define_____
Length of the diseases_____
Lung neoplasm_____
Chronic obstructive pulmonary disease_____
Pneumonia_____
Asthma_____
Dyspnea_____

Gastrointestinal Procedures
Define_____
Endoscopy, Gastrointestinal_____
Proctocolectomy, Restorative_____

Gynecologic Procedures
Define_____
Colposcopy_____
Culdoscopy_____
Hysteroscopy_____
Gynecological surgery for pelvic organ prolapse repair_____

Urologic Surgical Procedures
Define_____
Cystectomy_____
Cystoscopy_____
Ureteroscopy_____
Urinary Diversion_____
Prostatectomy: Suprapubic_____
Retropubic_____
Transurethral_____
Ultrasound, High-Intensity Focused, Transrectal_____

Stroke
Define_____
Type (ischemic)_____
Type (Hemorrhagic)_____
Plegia, hemi_____ para _____ tetra_____ quadri_____

Spinal Cord Diseases
Define_____
Length of the diseases_____
Severity (functional status) _____
Traumatic injuries_____
Vascular diseases_____
Infections_____
Inflammatory/autoimmune processes_____

Multiple Sclerosis
Define _____
Length of the diseases_____
Severity (functional status) _____

Parkinson's Disease
Length of the diseases_____
Severity (functional status) _____

Hip Fractures
Length of the diseases_____
Severity (functional status) _____

Degenerative Joint Diseases, Osteoarthritis
Define_____
Length of the diseases_____
Severity (functional status) _____

Rectal Diseases and Surgeries
Hemorroidectomy _____
Bowel resection_____
Anal and recto-vaginal fistula_____
Rectal prolapse_____
Acute sphincter trauma, Sphincterotomy, and sphincter repair_____
Fistulotomy_____

Obstetrical and Other Injuries to the Pelvic Floor
Define _____
Parity_____
Forcept delivery_____
Vacuum extraction_____
Episiotomy_____
Increased Fetal weight_____

Functional impairments (e.g., ADL impairments)_____

Mobility status (bedbound, wheelchair bound, assistive device)_____

Drugs_____
Alpha Blocker_____
Alzheimer's agent _____
Antipsychotic _____
Antidepressants _____
Antiparkinson agents _____
Diuretics _____
Sedative/hypnotics _____
Skeletal muscle relaxants _____
Antineoplastic and antiviral medications _____
Laxatives _____
Stool softeners _____
Nursing home institutionalization_____
Physical restraints_____

Other Risk Factors
Define_____

Incontinence (dependent variable)

Incontinence Variables
Methods to assess of incontinence:
Self report_____

Medical diagnosis_____
Medical procedure_____

Data source to measure incontinence: _____
Time of followup from the diagnosed incontinence in months_____

Fecal Incontinence (Incidence, Prevalence)
Define _____
Symptoms_____
Signs_____
Acuity_____
Severity_____
Length_____
Bothersomeness_____

Combined Incontinence (Incidence, Prevalence)
Define _____
Symptoms_____
Signs_____
Acuity_____
Severity_____
Frequency_____
Length_____
Bothersomeness_____

Risk Factor	Outcome	Reporting Number of Cases for Each Level of Risk Factor	Percentage with Incontinence for Each Level of Risk Factor	Relative Risk, 95% CI
Levels of risk factor	Fecal Incontinence			
Levels of risk factor	Combined Incontinence			

Level of evidence of the individual study (check one)

Interventions:
☐ I Well-designed randomized controlled trial
☐ II-1A Well-designed controlled trial with pseudo-randomization
☐ I-1B Well-designed controlled trial without randomization

Observational studies
☐ I-2A Well-designed cohort (prospective) study with concurrent controls
☐ I-2B Well-designed cohort (prospective) study with historical controls
☐ II-2C Well-designed cohort (retrospective) study with concurrent controls
☐ II-3 Well-designed case-controlled (retrospective) study
☐ III Large differences from comparisons between times and/or places
☐ IY Opinion of respected authorities based in clinical experience

Evidence to support specific clinical interventions to reduce risk of fecal and urinary incontinence

Abstraction Form

(Complete for each study)

Number of the study in the database (PubMed ID, Cochrane accession number, ISBN)_____
First author_____
Year of the publication _____
Purpose/aim of study _____

Design of the study (check one)
☐ prospective cohort
☐ retrospective cohort
☐ randomized controlled clinical trial
☐ not randomized clinical interventions

Length of intervention_____
Length of follow up_____

Population variables (target population)
Data source for population variables (define) _____
Survey_____
Administrative data base_____
Other_____

Settings
Community (general population)_____
Hospital (clinic)_____
Long term care settings_____
Nursing home_____

Subjects
Race
African Continental Ancestry Group, %_____
Asian Continental Ancestry Group, %_____
European Continental Ancestry Group, %_____

Ethnicity
African Americans, %_____
Arabs, %_____
Asian Americans, %_____
Hispanic Americans, %_____

Gender
Males, %_____
Females, %_____

Age_____

Health status

Primary Health Condition, Diagnosis:

Sample size:
Inclusion criteria _____
Exclusion criteria _____
Loss of follow up _____

Incontinence (dependent variable)

1. Provide the definition of urinary and fecal incontinence used in the article.
2. Provide the data source to measure incontinence.
3. Mark how the outcome was reported.

/*Complete with values reported in article with page number in articles where data was extracted for quality control*/
/*Add as many lines for categories as necessary*/
/*Median is calculated when ranges only reported assuming normal distribution*/
/*Increment is analyzed when regression coefficients only reported*/
/*Provide means and standard deviation (95%CI) when reported*/

Methods to assess urinary incontinence:
Self report_____
Medical diagnosis_____
Medical procedure_____

Methods to assess fecal incontinence:
Self report_____
Medical diagnosis_____
Medical procedure_____

Urinary Incontinence, Incidence
Define _____
Symptoms_____
Signs_____
Acuity_____
Severity_____
Length_____
Bothersomeness_____

Urinary Incontinence, Progression
Define _____
Symptoms_____
Signs_____
Acuity_____
Severity_____
Frequency_____

Urinary Continence
Define _____
Dependent Continence_____
Independent Continence_____

Fecal Incontinence, Incidence
Define _____
Symptoms_____
Signs_____
Acuity_____
Severity_____
Frequency_____
Length_____
Bothersomeness_____

Fecal Incontinence, Progression
Define _____
Symptoms_____
Signs_____
Acuity_____
Severity_____
Length_____
Frequency_____
Bothersomeness_____

Fecal Continence
Define _____
Dependent Continence_____
Independent Continence_____

Clinical Interventions (independent variables)
Provide the definition of each variable used in the article.

Health Education
Define _____

Behavioral Therapy
Define_____
Education about urinary and fecal tract structure and function
Development of individualized diaries of daily dietary, physical activities, urinary and fecal habits
Development of individualized voiding schedules
Voiding schedules: prompted, timed, habit retraining
Patterned urge response toileting
Dose of intervention:
Length of therapy_____
Intensity of therapy, section number _____

Biofeedback
Define_____
Dose of intervention:
Length of therapy_____
Intensity of therapy _____
Monitoring device_____

Pelvic Floor Muscle Training
Define_____
Dose of intervention:
Length of training_____
Intensity of training _____

Vaginal Cones
Define _____

Electrical Stimulation
Define_____
Dose of intervention:
Length of therapy_____
Intensity of therapy _____

Urethral "Plugs" and Urethral Pessaries
Define_____

Intermittent Catheterization
Define_____
Intermittent self-catheterization is performed by the patient himself/herself
Intermittent catheterization is performed by an attendant (e.g., doctor, nurse, or relative)
Clean intermittent catheterization: use of a clean technique
Aseptic intermittent catheterization: use of a sterile technique

Indwelling Catheterization
Define _____
Dose of intervention:
Length of therapy_____
Intensity/frequency of therapy _____

Detrol (tolterodine tartrate)
Define_____
Dose of intervention:
Length of therapy_____
Dose _____

Ditropan
Define _____
Dose of intervention:
Length of therapy_____
Dose _____

Sanctura (trospium chloride)
Define_____
Dose of intervention:
Length of therapy_____
Dose _____

Enablex (darifenacin)
Define_____
Dose of intervention:
Length of therapy_____
Dose _____

Vesicare (solifenacin succinate)
Define_____
Dose of intervention:
Length of therapy_____
Dose _____

Weight Loss
Define _____
Dose of intervention:
Length of therapy_____
Intensity of therapy _____

Smoking Cessation
Define _____

Diet Therapy
Define_____
Dose of intervention:
Length of therapy_____
Intensity (dose) of therapy _____

Magnetic Stimulation
Define_____
Dose of intervention:
Length of therapy_____
Intensity (dose) of therapy _____

Elective Caesarian Delivery
Define _____

Direct Neuron Modulation of the Sacral Spinal Cord
Define _____
Dose of intervention:
Length of therapy_____
Intensity (dose) of therapy _____

Urethropexy
Define_____

Laparoscopic and Open Burch Retropubic Urethropexies
Define _____

Abdominal Sacrocolpopexy
Define _____

Urethral Bulking Procedures
Define_____
Dose of intervention:
Length of therapy_____
Intensity (dose) of therapy _____

Anterior Colporrhaphy (anterior repair)
Define_____

Posterior Colporrhaphy (posterior repair)
Define_____

Radiofrequency Therapy to the Anal Canal
Define _____
Dose of intervention:
Length of therapy_____
Intensity (dose) of therapy _____

Artificial Bowel Sphincter
Define_____

Overlapping Sphincteroplasty
Define _____

Dynamic Graciloplasty
Define_____

Other Surgical Procedures
Define_____

Botulinum Toxin Injections
Define _____
Dose of intervention:
Length of therapy_____
Intensity (dose) of therapy _____

Hormone Replacement Therapy
Define_____
Dose of intervention:
Length of therapy_____
Intensity (dose) of therapy _____

Topical Estrogen Therapy
Define_____
Dose of intervention:
Length of therapy_____
Intensity (dose) of therapy _____

Intervention	Control	Outcomes Definition	Outcome Level in Active Group	Outcome Level in Control Group	Rate in Active Group	Rate in Control Group	Relative Risk, 95% CI
		Urinary Incontinence					
		Fecal Incontinence					
		Combined Incontinence					

Quality of the studies:

Intention to treat:
☐ Yes ☐ No ☐ not stated but all subjected included in analysis

Masking of treatment status:
Double blind _____
Single blind _____
Open label _____

Randomization regime_____
Adequate: computer-generated random numbers or random numbers tables
Inadequate: alternation, case record numbers, birth dates, or days of the week

Adequacy of randomization_____
Baseline data not reported_____
Baseline data confirmed the adequacy of randomization_____

Allocation concealment _____
Not reported_____
Adequate_____
Not adequate_____
Adequate approaches to concealment of allocation:
Centralized or pharmacy-controlled randomization
Serially-numbered identical containers
On-site computer based system with a randomization sequence that is not readable until allocation
Inferior approaches to concealment of allocation:
Use of alternation
Case record numbers
Birth dates or days of the week
Open random numbers lists
Serially numbered envelopes (even sealed opaque envelopes can be subject to manipulation)

Justification for sample size_____

Level of evidence of the individual study (check one)

Interventions:
☐ I Well-designed randomized controlled trial
☐ II-1A Well-designed controlled trial with pseudo-randomization
☐ I-1B Well-designed controlled trial without randomization

Observational studies
☐ I-2A Well-designed cohort (prospective) study with concurrent controls
☐ I-2B Well-designed cohort (prospective) study with historical controls
☐ II-2C Well-designed cohort (retrospective) study with concurrent controls
☐ II-3 Well-designed case-controlled (retrospective) study
☐ III Large differences from comparisons between times and/or places
☐ IY Opinion of respected authorities based in clinical experience

Strategies to improve the identification of persons at risk and patients who have fecal and urinary incontinence

Abstraction Form

(Complete for each study)

Number of the study in the database (PubMed ID, Cochrane accession number, ISBN)_____
First author_____
Year of the publication_____
Purpose/aim of study_____

Design of the study (check one)
☐ prospective cohort
☐ retrospective cohort
☐ cross-sectional
☐ descriptive study
☐ case-control
☐ case-series
☐ randomized controlled clinical trial
☐ not randomized clinical interventions
☐ ecologic

Population variables (target population)

Data source for population variables (define) _____
Survey_____
Administrative data base_____
Other_____

Settings:
Community (general population)_____
Hospital (clinic)_____
Long term care settings _____
Nursing home_____

Location:
Country _____
Urban _____
Rural _____

Subjects:
Race
Define _____
African Continental Ancestry Group, %_____
Asian Continental Ancestry Group, %_____
European Continental Ancestry Group, %_____

Ethnicity
Define _____
African Americans, %_____
Arabs, %_____
Asian Americans, %_____
Hispanic Americans, %_____

Gender
Males, %_____
Females, %_____

Age:
Mean age, years_____ Standard deviation_____
Age intervals:_____

Health status
Primary Health Condition, Diagnosis _____
Sample size:
Sampling strategy:
Random _____
Self-selected _____
Inclusion criteria:_____

Incontinence (dependent variable)
Definition of incontinence _____
Urinary_____
Fecal_____
Combined_____

"Gold standard" to detect urinary incontinence used in the article_____

Multichannel urodynamics cut points of continence
- Maximal urethral pressure (MUP)_____
- Functional urethral length (FUL)_____
- Maximal cystometric capacity (MCC)_____
- Abdominal leak point pressure (ALPP)_____

Index diagnostic tests for urinary incontinence:
Define_____
Cut points of continence_____

Clinical history
Nature _____
Duration _____
Symptoms and their severity _____
Symptom bothersomeness or impact _____
Functional and mental status _____
Medical, surgical and gynecological history _____
Exacerbating factors: diet, fluid, and medications _____
Physical examination, general
Pelvic, Abdominal _____
Rectal _____
Neurological _____
Body mass index _____
Pelvic floor muscle assessment _____
Diagnostic tests for urinary incontinence:
Provocation stress test_____
Frequency volume chart_____
Post-void residual volume (PVR)_____
Distal Urethral Electrical Conductance test_____
Pad tests_____
Paper towel test_____
Ultrasound_____
Q-Tip test_____

Screening programs (clinic based, MDS based)
Define_____
Clinician education programs with and without individual consultation

Scales_____
Define_____

For the each test provide comparison with “gold standard”:
True positives_____
False positives_____
False negatives_____
True negatives
Sensitivity, % _____
Specificity, % _____

Reliability:
Cronbach alpha _____
Kappa statistics _____
Correlation coefficients _____

Inter-observer variability_____

Absolute values of the tests in patients with urinary incontinence and in controls:_____

“Gold standard” to detect Fecal Incontinence used in the article_____

Index diagnostic tests for fecal incontinence:
Define_____

Cut points of continence_____

Clinical history
Nature ,type, frequency, symptoms consistency, amount of leakage_____
Duration _____
Symptoms: Urgency, flatus and their severity_____
Functional and mental status_____
Medical, surgical and gynecological history_____
Exacerbating factors: diet, fluid, and medications_____
Alleviating factors_____
Physical examination, general
Pelvic, Abdominal_____
Rectal_____
Neurological _____
Body mass index_____
Pelvic floor muscle assessment_____

Anal manometry _____
Endoanal ultrasound _____
Cinedefography _____
Pudendal nerve terminal motor _____
Single-fiber electromyography_____

Screening programs (clinic based, MDS based) _____
Clinician education programs with and without individual consultation _____
Stool diary_____
Scales_____

For the each test provide comparison with “gold standard”:
True positives_____
False positives_____
False negatives_____
True negatives _____
Sensitivity, % _____
Specificity, % _____

Reliability:
Cronbach alpha _____
Kappa statistics _____
Correlation coefficients _____

"Gold standard" to detect combined Incontinence used in the article_____

Index diagnostic tests for combined incontinence:
Define_____

Cut points of continence_____

For the each test provide comparison with "gold standard":
True positives_____
False positives_____
False negatives_____
True negatives
Sensitivity, % _____
Specificity, % _____

Level of evidence of the individual study (check one)

Interventions:
☐ I Well-designed randomized controlled trial
☐ II-1A Well-designed controlled trial with pseudo-randomization
☐ I-1B Well-designed controlled trial without randomization

Observational studies
☐ I-2A Well-designed cohort (prospective) study with concurrent controls
☐ I-2B Well-designed cohort (prospective) study with historical controls
☐ II-2C Well-designed cohort (retrospective) study with concurrent controls
☐ II-3 Well-designed case-controlled (retrospective) study
☐ III Large differences from comparisons between times and/or places
☐ IY Opinion of respected authorities based in clinical experience

Appendix F. Evidence Tables

Contents

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community

F1-a. Incidence of urinary incontinence in adults

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
Townsend, 2007[1] Prospective cohort Adjusted by: Age, BMI, Weight, Race Parity, Smoking, Oral contraceptive use, Menopausal status, Hormone use, Hysterectomy, Diabetes, Physical activity, Diuretic use Level of evidence: II-2A	Female nurses selected using data from the Nurses Health Study II which is updated biennially. Response rate: Approximately 88% Data source: Self-reported mailed questionnaires. Incontinence was defined as, "Leaked or lost control of urine in the last 12 months."	Age: 37-54 (Mean: 46.1) Gender: Female Race: Not reported Ethnicity: Not reported Residency: USA	Incident incontinence: (2 years) 13.60%
Altman, 2006[2] Prospective, observational cohort study with 10-year followup Adjusted for maternal age and parity Level of evidence: 11-2A	304 primiparous women who had a vaginal delivery over a 10-week period in 1995 and completed a bladder function questionnaire Excluded: Elective or acute cesarean delivery; inadequate knowledge of Swedish language; dual pregnancy <u>UI Measurement</u>: Survey using self-administered questionnaire • Do you experience sudden desires to void urine that are difficult to hold back? • Do you experience involuntary loss of urine at physical activities? UI Severity Definition • Mild SUI defined as <1/week Moderate-severe SUI defined as UI >1/week or daily	Swedish women with mean age at index delivery 29.9 ± 4.1 years	Adjusted for age and parity, odds ratios for SUI compared with index delivery: • 6 months: RR 2.2, 95% CI: 0.9-5.8 • 9 months: RR 1.8, 95% CI: 1.6-5.4 • 5 years: RR 4.1, 95% CI: 3.1-9.2 • 10 years: RR 3.9, 95% CI: 1.1-8.2 Adjusted by maternal age and parity, the RR of moderate-severe SUI after first delivery was 5.8, 95% CI 1.2-33.7 Mean incidence rates 10-year period before and after index delivery, respectively: # of cases per 1,000 person years • Mild SUI: 5 vs. 30 • Moderate-severe SUI: 2 vs. 10
Edwards, 2006[3] Prospective cohort study Level of analysis: II-2A	361/460 patients (78.5% response rate) consecutively admitted with ischemic stroke hospitalized between 1999-2000 Inclusion criteria: community residence, absence of serious	Adults ages 22-90 years with a mean age 65,5 (SD 15.2), USA (Missouri) Age: • Continent: 64.6 (SD 15.2) (n=301)	• UI group was older (P <.001) • UI more common in women than men (P <.003) • Individuals continent at 6 month followup were functioning significantly better than incontinent stroke survivors; more independent in basic self-care, functional communication, and cognition as measured by FIM (P

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
	cognitive or language deficits, no pre-stroke UI, and met ICD-9 criteria for ischemic stroke Telephone interview 6 months post-stroke UI Measurement: Classified as incontinent if FIM bladder management item ≤5 (e.g., experience loss of bladder control at least 1x/month)	• Incontinent: 70.1 (SD (14.8) (n=59) Gender: • 160 (47%) male; 137 (46%) continent and 23 (40%) incontinent • 201 (53%) female; 165 (54%) continent and 35 (60%) incontinent Race: • 181 (50%) white • 79 (50%) African-American	<.0001) • Individuals continent at 6 months had greater independent in ADLs measured by the FAM (P <.0001) SF-12 scores • Continent vs. Incontinent o Physical health: 45.6 (SD 6.7) vs. 42.0 (SD 5.4) (P = .18) o Mental health: 43.9 (SD 7.8) vs. (37.1 (SD 6.9) (P = .0001)
Engh, 2006[4] Case-control Not adjusted Level of evidence: II-2A	835/1,022 women (81.7% response rate) ages 40-52 years who underwent uterine surgery with ovaries preserved between 1997-2002 Excluded: preoperative urinary symptoms; 6 or more vaginal deliveries, followup time <2 years, uterine size >9 weeks or uterine weight >120g, previous UI surgery and/or concomitant prolapse surgery Types of surgery, n • Total hysterectomy (abdominal/laproscopic) n=198/116 • Subtotal hysterectomy (abdominal/laproscopic) n=163/86 • Total hysterectomy (vaginal/laproscopic assisted vaginal) n=265/7 Control group: women undergoing endometrial destruction (ablation, balloon treatment) n=187 Questionnaire	Women with mean age 44.9 years, Sweden	De novo UI by type of surgery at least 2 years postop: • Total abdominal/laproscopic hysterectomy o 236 (75.2%) no symptoms o 43 (13.7%) SUI o 10 (3.2%) UUI • Subtotal abdominal/laproscopic hysterectomy o 186 (74.7%) no symptoms o 36 (14.5%) SUI o 12 (4.8%) UUI • Total vaginal/laproscopically assisted o 210 (77.2%) no symptoms o 39 (14.3%) SUI o 11 (4.0%) UUI • Endometrial destruction (control) o 138 (73.8%) no symptoms o 26 (13.9%) SUI o 7 (3.7%) UUI • No significant differences noted between groups

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
Glazener, 2006[5] Cross-sectional Adjusted Level of evidence:	3,405/4,537 (75.1% response rate) of women responding they had singleton births delivered over 1 year between 1994-1995 (3489/4555 responded to survey) Excluded: Twin pregnancies Conducted in 3 countries Mailed survey UI Measurement: A positive response to one or more of the following questions: • At present, do you ever lose any urine when you don't mean to? • In the last month, how often has this happened on average? • Do you wear a pad for this?	Women mean age 26.7 years (SD 5.3), Scotland, New Zealand, and England	UI onset during index pregnancy: 3% (n=101) UI onset after 3 months index pregnancy: 15% (n=503)
McGrother, 2006[6] Prospective cohort study with 1-year followup Adjusted for age and ADL; separate models adjusted for general and specific morbidities and parity Level of evidence: 11-2A	12,570/19,241 (65.3% response rate) community-dwelling women drawn from 108 general practices (71% of all practices) Mailed questionnaire at baseline and 1 year UI Measurement: SUI: leakage upon laughing, coughing, or exercise ≥monthly Included OAB but could not differentiate those with OAB with urge incontinence from those with OAB without urge incontinence	Women aged ≥40 years (range 40-98), UK Median age: 58 and 56 years	Incident rate at 1-year: 3.6% SUI
van Brummen, 2006[7] Prospective cohort study No adjustment for confounding factors Level of evidence: II-2A Note: van Brummen, 2006[8] had similar sample but recruited from fewer	Consecutive recruitment of nulliparous pregnant women with single, low-risk pregnancy between 12 and 18 weeks gestation recruited from 10 midwifery practices from January 2002 to July 2003 Exclusion criteria: previous urogynaecological surgery, urogynaecological malformations,	Women with a mean age of 30.4 (SF 0.19); Netherlands	Bothersome SUI:: • 53 (15.4%) at 36 weeks • 36 (10.5%) at 1 year after childbirth Moderately or greatly bothersome UUI: • 58 (16.9%) at 36 weeks • 51 (14.8%) at 1 year after childbirth

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
midwifery practices over same time period	diabetes mellitus, or neurological disorders; good knowledge of Dutch language; pregnancy within 1 year after index pregnancy 344/954 of those invited and not pregnant with 1 year postpartum (37.1% response rate) 344/904 of those eligible (38.1% response rate) Self-report questionnaire at 12, 24, and 36 weeks gestation, and 3 and 12 months after delivery UI Measurement: Using questions from the UDI, • SUI was defined as: Do you experience urine leakage related to physical activity, coughing, or sneezing? • UUI: Do you experience urine leakage related to the feeling of urgency? Defined symptom bother using item levels and total scores from UDI Baseline continence status unknown		
Wehrberger, 2006[9] Prospective cohort study with mean duration of follow-up of 6.5 years Adjusted for confounding factors Level of evidence: II-2A	441/925 women (47.7% response rate) who completed a free examination in 1998 or 1999 Mailed questionnaire UI Measurement: BFLUTS: Have you leaked any urine at all during past 4 weeks?	Women ages 20-84 years; Austrian	Study described as incidence but unclear how they calculated numbers (see prevalence table) Cumulative incidence of any UI over 6.5 years: • 3.9% annually • 25.6% By age and frequency, cumulative incidence over 6.5 years (n, n with UI, cumulative incidence, annual incidence??, frequency ≥1 time/week, cumulative, annual): • 20-39 years: 8/54 (14.8%, 2.3%), frequency = 2 (3.7%, 0.6%) • 40-49 years: 18/70, 25.7%, 4.0%; frequency = 10 (14.2%, 2.2%) • 50-59 years: 22/92, 23.6%, 3.6%, frequency = 10, 10.8%, 1.7%)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
			• 60-69 years, 11/46, 23.9%, 3.7%; frequency = 7, 15.2%, 2.3% • 70+ years: 18/38, 47.3%, 7.3%, frequency = 13, 24.2%, 5.3% • Total = 77/300, 25.6%, 3.9%; frequency = 42, 13.9%, 2.1% Frequency of UI: • ≤1 time/week: 44% • 2-3 times/week: 28% • 1 time/day: 15% • More often: 13% UI severity: • Enough to make underwear/pads damp: 72% • Enough to make underwear/pads wet: 20% • Enough to wet outer clothes: 5% • Urine runs down legs onto floor: 3% Impact of UI: • 14% not at all • 40% a little • 29% moderate • 17% significant UI type: • 34% SUI • 13% UUI • 53% MUI
Andersson,2004[10] Population based study II-3	3/2000, Life and Health questionnaire sent to 70,000 residents randomly selected. In Orebro, pop of 274,000, one of the five counties that participated in above study, a special section on UI was given to a sample of 15,360 residents Questionnaire mailed to home comprising 12 questions on UI as a supplement to a large public health survey on health and general living Sample of 15,360 residents aged 18-79yrs of Orebro, Sweden;	7680 females 7680 males age categories 18-34 53.9% 35-49 60.3 50-64 69.6 65-79 72.2 Swedish population	Only prevalence rates given – see other table

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
	Response rate was 64.5% Used defs from ICS Stats on wts and calibration and found results were the same		
Bogner, 2004[11] Population based longitudinal survey II-2B	Used ECA (Epi Catchment Area) program sample to select from 3,481 community dwelling adults who were initially living in East Baltimore in 1981. 1,920 were contacted (73% of original cohort). Study sample included 822 persons ≥50 years, who completed info on UI. After exclusions for missing data, the final sample was 747. Age ≥65 over sampled GHQ used and self report on UI. UI = "Have you ever had any difficulty in controlling your water, losing your urine or having trouble getting to the bathroom on time?" If any uncontrolled urine loss was reported within the 12mos before the interview, persons were classified as having UI.	Mean age: 67.2 64% were women 72.3% White – mean age 68.2+/- 11 27.7% AA – mean age 64.5 +/-10 White AA diabetes 14.3 16.9 heart trouble 27.4 26.6 arthritis 51.1 56.5 stroke 8.2 7.3 cancer 14.4 6.3 MME 27.6+-2.6 25.6+-3.6 ADL impaired 1.9% 3.9% (AA and Whites ≥50years at followup interview 1993-1996)	
Corcos, 2004[12] Prospective cohort No control mentioned	Population ≥35 years, stratified by census of metro area and by gender. 7,487 persons were sample base. 53.7% response rate. 3249 interviews were final sample. Investigators developed standardized questionnaire to ascertain OAB and SUI and impact on QoL. Computer assisted telephone interviews conducted in 2 steps: an initial questionnaire to evaluate presence of OAB followed by detailed questionnaire to complete assessment.	48.2% men; mean age=52 51.8% women; mean age=50.9 82.4% younger than 65 and 17.6% older Montreal, Toronto, Vancouver and Edmonton, Canada	
Dallosso,2004[13] Prospective longitudinal study	Part of the Leicestershire MRC Incontinence Study. This study focused on women living in the community in UK	Baseline data compared to those who provided FFQ data –	Incidence rate over 1 yr of f/u was 8.3% Highest in perimenopausal group (40-49) and in the very elderly (80+)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
II=2B	age ≥40. Of a random sample of 20,244 women drawn, 12,565 returned the questionnaire (65% response rate). FFQ sent to 10,852 of above sample, 1st Postal questionnaire mailed Oct 1998 and completed by 7,046 women(response rate 65%). 2nd postal questionnaire mailed Oct 1999 and completed by 6,424 women (91% response rate). Excluded women living in residential or nursing homes and those of South Asian origin who make up 5.3% of Leicestershire pop > 40years. Used ICS definitions	Median age 57 vs. 61 Rating of health poorer in baseline after adjusting for age (OR: 1.66; 95% CI 1.51-1.82) More long term health problems in baseline (OR 1.14; 95% CI, 1.05-1.25) No difference in reporting SUI (OR: 1.02; CI 95%, .92-1.13)	Incidence at 1 year followup Total N / SUI cases % 40-49 1,242 9.3 50-59 1,272 7.2 60-69 1,108 7.6 70-79 756 8.3 80+ 214 12.6
Dallosso, 2003[14] Longitudinal, Prospective cohort II – 2B	7,046 women at baseline with follow up collected from 6,426 1 year later, age ≥40 living at home, part of the Leicestershire MRC Incontinence Study on prevalence and incidence including men and women begun 10/98 with followup in 10/99 Postal survey with usual definitions of SI. OAB defined by ICS and for this study as one or both of the sxs urge leakage and urgency. Subgroups of OAB and SI Excluded nursing home or residential pts and SI at baseline was excluded from analysis of onset of S.(19,239 eligible women; 65.3% returned N= 12,565, 6,426 in this study)	Age 40-49 - 26% 50-59 27.4% 60-69 23.3% 70-79 17.1% >80 6.2% BMI Acceptable 48.4% Underwt 7% Overwt 31.4% Obese 13.3% Smoking Never 54.3 Exsmoker 30.3 Current 15.2 United Kingdom	Prevalence of OAB increased with age but no marked change with SI 1 yr f/u there were 492 new cases of OAB and 421 cases of SI giving incidence rates of 9.2% and 8.3% respectively *Being overwt or obese were both sig associated with an increased risk of SUI (OR: 1.42; 95% CI, 1.09-1.84 and OR 1.91; 95% CI, 1.38-2.63) respectivelly*
Deliveliotis, 2004[15] Prospective cohort II-2A	283 of 441 pts enrolled; 105/142pts tx with RRP for prostate cancer, 98/151pts tx with TURP for BPH, 80/148 healthy men as control completed surveys Used AUA Sx Index, UCLA Prostate	Greek men Mean ages 67.4 range 55-75 group 1 70.3 range 58-74 group 2 72.4 range 62-82 control	RRP / TURP Pretx post p pretx post p Urinary function 85.1 80.2 .121 71.2 87.3 .005 Urinary Bother 85.1 70.6 .021 65.1 80.2 .003

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
	Cancer Index; Rand 36-Item Health Survey and BMSFI translated into Greek Patient outcomes 2 years post tx compared to pretx status at 2 weeks prior to tx Investigators felt poor returns due to length of questionnaires and the number of them	HRQOL post tx RRP TURP Control Physical functioning 81.5 78.1 82.3	AUA SI 11.1 8.6 .812 24.2 8.2 .001 UI every day 2% 9% .002 12% 2.78% .002 RRP had trend towards worse urinary function 2yrs after surgery but diff not significant. Urinary bother deteriorated. UI in control group was 5.78%
Grodstein, 2004[16] Prospective cohort II-2A Confounded for stroke and physical limitations and results were the same in both analysis	Nurse Health Study from 1996-2000 females, Cohort of 39,436 women 50-75 years Questionnaire mailed in 1996 to 39,436 post menopausal women who had no leaking of urine and were followed for 4 years Incident cases of occasion UI defined as leaking 1-3 times/month; frequent ≥1/week Excluded premenopausal women or users of estrogen creams, or reported leaking in 1996	Mean age; 61 for current HRT use; 64 for never used. BMI for never used HRT was 27, current use BMI = 47, past BMI = 47. Smokers @45% all. HRT use: Never Current Past Cauc 98 97 98 AfrA 1 1 1 Hisp 0 1 0 Asian 1 1 1 Hysterectomy 16 47 40	5,060 incident cases of occasional UI and 2,495 incident cases of frequent UI Average incidence rate of 3.2% per year and 1.6% per year respectively
Hagglund, 2004[17] 4 year followup cohort study II-2A	145 incontinent and 193 continent women 22-50 years in 2000 follow up, who participated in 1995 study on prevalence. Response rate 73% 248/338 Among the 248 responders as followup, 118 reported UI and 130 reported being continent. Changes in type of UI measured using DIS “do you have problem with involuntary loss of urine?”	Sweden	At 4 year followup in 2000 118 women were found to be incontinent. Of these, 95/118 had remained incontinent. 130 women were continent. Of these women, 112/130 had remained continent. Incidence rate from 1996-2000 was 17% (23/135) with a mean annual incidence rate of 4% Persistence of UI – this group consisted of 95 women. 28% reported UI daily, 34% reported UI weekly, 16% reported monthly and 22% reported seldom.

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
Haltbakk, 2004[18] Prospective cohort no control mentioned historical control	480 Norwegian men at St. Olavs Hospital, Trondheim Norway. Tentative dx of BPH made on 612 patients and from this pool, sample analyzed was 480 (78%). ICS LUTS questionnaire (ICS-BPH) between 1997-2000. IPSS, SPI and SISI used also. UI defined as any involuntary leakage of urine.	Mean age of patients was 67 years, SD 10.6 years; median 69 years range 39-91 years 15% mild sxs 54% moderate sxs 31% severe sxs mean age in incontinent group was 68 years	
Holroyd-Leduc, 2004[19] Population based Prospective cohort Confounders – sex, age, sex, race, smoking, alcohol, BMI, sensory impairment, comorbid disease, depression, cognitive function and baseline dependency. II-2A	6,506 of 7,447 subjects ≥70 in the Asset and Health Dynamics Among the Oldest Old study who had complete info on continence status at baseline. 3 groups- 5,872 nursing home, 5,521 ADL decline and 5,509 IADL decline as outcomes Subjects interviewed in 1993 and 1995 Blacks, Hispanics and Florida residents were over sampled Overall response rate was 80% UI measured "next question might not be easy to talk about, but it is very impt for research on health and aging, during the last 12 mos, have you lost any amount of urine beyond your control?"	Mean age =/- SD = 77 (range 69-103) 63% female 86% white Median number of baseline comorbid medical conditions was 2 10% received help ≥1 ADLs; 23% were receiving help in ≥1 IADLS at baseline Patients with UI had more comorbidities (p=.001), higher rate of visual impairment (35% vs. 22.4% p <.001) and hearing impairment (39.7% vs. 30.5% p<.001) More functionally impaired at baseline Community dwelling in US	
Hunskaar, 2004[20] Cross national study, Prospective No control group	Postal survey mailed to 29,500 households in 4 countries – France, Germany, UK and Spain age >/= 18yrs 58.1% response rate. Women with UI included in analysis = 5,976 (35% of study pop) Definitions used by ICS; sxs in last 30 days and in last 7 days	Mean age France – 44.8 Germany – 59 UK – 45 Spain – 64 All – 58	

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
Jackson, 2004[21] Cross sectional analysis, longitudinal study II-2A	1,584 white and black women 70-79 years at 2 clinical sites in Pittsburg and Memphis. 1,558 answered the questions Limited enrollment to those who reported no difficulty walking quarter mile, climbing 10 steps or performing ADLs Questionnaires – in the past 12 mos, have you leaked even a small amt of urine? How often have you leaked?	Smoking Alcohol Depression Diabetes BMI Parity Hysterectomy Oral estrogen use COPD Stroke Arthritis Age Race	
Jackson, 2004[22] population based Prospective cohort; also randomly selected from HMO diabetes registry II-2A	1,017 post menopausal US women a 55-75 years enrolled in HMO and followed for 2 years (1998-2002) inclusion criteria were no natural menstrual cycle in past 12 months (oral estrogen or vaginal estrogen users were excluded), resided in Washington state. Exclusion factors were residential nursing care, restriction to wheel chair, dementia or severe psych disorder, indwelling catheter or intermittent urinary catheter, end stage renal disease requiring dialysis, active malignancy other than skin cancer and chronic antibiotic use. Acute cystitis in past 90 days exclusionary. Postvoid residual bladder volume measured using portable ultrasound device. 12 month f/u done by 87% and 24mo f/u by 81%. Primary study outcome was sx cystitis	Risk factor (%) Crude HR (95% CI) Complete sample 1,017 Age (years) 55-59-32% 1.0 60-69- 42% 1.3 (0.8–2.2) 70-75- 26% 1.6 (0.9–2.9) Ethnicity White- 87% 1.0 Other-12 % 0.6 (0.3–1.2) General health score from SF-36 76-100(51%) 1.0 51-75(37%) 2.0 (1.2-3.3) 0-50 (12%) 2.6 (1.3-4.8) Smoking history Never (55%) 1.0 Former (39%) 0.9 (0.5-1.4) Current (6%) 0.1 (0.02-0.8) Diabetes at baseline No (79%) 1.0 Yes (21%) 1.9 (1.1-3.1) Diabetes treatment type Not diabetic (79%) 1.0 Diet/pill (17%) 1.2 (0.7-2.0) Insulin (4%) 4.7 (2.2-10.3) Accidental leakage of urine	Incidence of UTI was .07 per person per year. Independent predictors of infection included insulin treated diabetes (hazard ratio [HR]=3.4;95%confidence interval [CI]: 1.7 to 7.0) and a lifetime history of urinary tract infection(HR for six or more infections = 6.9; 95% CI: 3.5 to 13.6). Borderline associations included a history of vaginal estrogen cream use in the last month (HR = 1.8; 95% CI: 1.0 to 3.4), a history of kidney stones (HR=1.9; 95% CI: 1.0 to 3.7), and asymptomatic bacteriuria at baseline (HR= 1.8; 95% CI: 0.9 to 3.5).

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
		in last year No (34%) 1.0 Yes (66%) 1.6 (0.9-2.7) Type of urinary incontinence in last month None 1.0 Stress only 0.9 (0.5–1.8) Urge only 1.7 (0.8–3.6) Mixed 1.4 (0.9-2.4) Postvoid residual bladder volume, ml <50ml (79%) 1.0 50-100ml (10%) 1.1 (0.5–2.2) >100ml (10%) 1.6 (0.8–3.2) History of hysterectomy No (69%) 1.0 Yes (31%) 1.2 (0.8-2.0) History of kidney stones No (90%) 11.0 Yes (5%) 2.4 (1.2-4.9) History of bladder or urinary surgery No (90%) 1.0 Yes (10%) 1.6 (0.9-3.0) Parity (N of full-term pregnancies) 0-(14%) 1.0 1-3-(63%) 1.3 (0.7-2.5) >4-(23%) 2.2 (1.1-4.3)	
Johnson, 2004[23] Long term cohort, Prospective study of RRP vs. Radiotherapy II-2B	Men from the Prostate Cancer Outcomes Study dx with primary prostate cancer between Oct 1994-Oct 1995 Residents of LA, King County Washington, states of CT, NM, U,T 60-89 years in King County and younger >90 in others.	1,433 men RRP 642 men received radiotherapy RRP group – wt % by race NHW AA Hisp Arthritis: 33.3 38.6 35.8 Diabetes:	Wt % for men with RRP NHW AA Hispanic Level of urinary control baseline Total control 87.9 86.6 80.5 Occ leakage 8.8 9.5 11.2 Freq leakage 2.1 2 6.5 P = .77 .29 6 months

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
	Self questionnaire at 6, 12, 24 and 60 mos after diagnosis and medical record review at 12 and 60 mos. 11,137 men identified in registries; 5,672 randomly selected, letters sent to 4,736(83.5%) of selected cases. Total of 3,533 men(62.3%) completed 6 and 12mo were included in f/u cohort. 1433 men had RRP completed 6mos 1178 did 24 mos (82.2%) 1109 did 60mos (77.4%) For Radiotherapy – urinary problems not reported Questionnaire also translated into Spanish and interview conducted in Spanish when necessary.	11.1 29.5 17.2 COPD: 7.5 6.6 5.4 HF: 4.9 2.1 4.4 CVA: 2.6 2.5 3.3 HTN: 37.3 54 37.5 MI: 7.9 4 4.2 Age at dx <60 27.5 38.6 23.4 60-64 26.8 26.1 30 65-75 41.9 32.9 45.5 ≥75 3.8 2.4 1	total control 22.7 27.6 28.9 occ leakage 52.1 44.2 40.8 freq 22.6 23.4 26.7 p = .57 .83 12 months total control 33.1 38.5 37 occ leakage 50.2 51.4 46.9 freq 15.6 9 14.9 p= .24 .26 24 months total control 38.2 41.9 35.2 occ leakage 50.2 45.1 53 freq 9.8 11.1 11.3 p = .86 .38 60 months total control 30.8 49.3 32.8 occ leakage 53.7 39.7 47.4 freq 14.3 10.4 18.7 p = .01 .36 *definitions of occasional and frequent were not given
Lagergren, 2004[24] National, longitudinal, multi-purpose study in Sweden (SNAC). Study consisted of two parts – population part and the care/service part. II-2A	65-79years old = 12%, >80years = 6% Of a total pop of 17,044, 8,627 ≥65 years were targeted and 7,518 sampled from 2001-March 2004. 16-25% of SNAC received public care F/u every 6 years starting at age 66 Combo of interviews and questionnaires	Men 3,052 Women 4,465 Total 7,518 Avg age 85 compared to national avg age 83 Skane, Karlskrona, Kungshomen and Nordanstig, Sweden	

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
Liebling, 2004[25] Prospective study	393 UK women with term singleton, cephalic pregnancies who required op delivery at full dilatation between 2/1999-2/2000 from a cohort of 10,106 deliveries Postal questionnaires at 6wks and 1yr study conducted at St. Michael's Hospital, Bristol, UK Only instrumental vaginal deliveries performed in surgery as the definition of difficult vaginal operative delivery.	Instrumental C-section OR(95% CI) (184) (209) Primi 78% 79% 1.09(.67-1.77) Age>35 14% 9% Nonwhite 7% 5% BMI>30 7% 15% .44(.22-.86) 25% attempted with forceps 51% ventouse 24% ventouse and forceps 59% rotational del attempted	Incidence of urinary sxs (at least occasional episodes of UI) after delivery was reported by 43% and 22% in each group, respectively, at 6 weeks and 52% and 32% at 1 year. 6 weeks: Instr. delivery / c-section; 1 year: inst. delivery / c-section UI 16.2% 2.7% 17% 5.4% OR 7.8 (2.58-23.55) OR 3.12 (1.27-7.64) Difficulty holding on to urine 9.6% 2.7% 12.9% 6.6% OR 3.59 (1.22-10.54) OR 1.90 (.81-4.45)
McGrother, 2004[26] Cross sectional and longitudinal II – 2B	162,533 prevalence study and 39,602 incidence study subjects ≥40 years Response rate 60 and 63% respectively and 79% at follow up Excluded people living in institutional settings Response rate at 1 year: 79.8% women (n=12,036) 77.6% men (n=7,823) UI Measurement: Daytime or evening urine leakage Almost dry: minimal Damp: moderate Wet: severe Profound: soaked	15% age ≥ 65 yrs 85.5% white 44.9% employed 91.8% good health Mean age 57 54% women U.K.	Annual incidence rates: 6.3% in men and women combined In women: 8.8% overall: 8.4% 40-49 years; 7.9% 50-59 years; 8.5% 60-69 years: 9.4% 70-70 years; 14.7% ≥80 years In men: 3.8% overall; 2.2% 40-49 years; 2.5% 50-59 years; 4.0% 60-69 years; 7.1% 70-79 years; 10.9% ≥80 years Period prevalence was: moderate or greater incontinence, 16.1%; storage disorder, 28.5%; storage sxs with impact on QoL, 30.4%, healthcare need, 37.1% and requirement 20.4%. Remission rates substantially greater in men than women. Over a year, 20.4% of people aged ≥40 yrs, have requirement in terms of seeking or desiring help or wanting more help for storage sxs. In men: 3.8% overall; 2.2% 40-49 years; 2.5% 50-59 years; 4.0% 60-609 years; 7.1% 70-79 years; 10.9% ≥80 years Weekly wetting prevalence was 2.5 times higher in residential care than in the community. Women: Overall: Men: 5.5% minimal 5.5% minimal

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
			3.9% moderate 4.0% severe 0.8% profound
			Minimal leakage: 13.3% 40-49 years 13.5% 50-59 years 11.1% 60-69 years 8.6% 70-79 years 6.3% ≥80 years
			Moderate leakage: 7.7% 40-49 years 7.9% 50-59 years 7.0% 60-69 years 6.4% 70-79 years 6.8% ≥80 years
			Severe leakage: 9.8% 40-49 years 11.7% 50-59 years 12.0% 60-69 years 13.2% 70-79 years 17.0% ≥80 years
			Profound leakage: 2.0% 40-49 years 2.9% 50-59 years 3.3% 60-69 years 4.2% 70-79 years 9.6% ≥80 years
Neumann, 2004[27] Prospective study II-2A	Study group – 549 women who had hysterectomy during 1/1/98-12/31/2000 born after 1939 Background group – 144 women, born between 1940-1965, who had non-GYN surgery. Exclue nulliparae Questionnaire sent 9- 45 mos postop SI as involuntary leakage during effort, Urge as leakage with a sense of	Caucasian Women: 12% hysterectomy – 33% of these had abdominal, 55% had vaginal Denmark.	Pre urinary sxs in relation to mode of hysterectomy: Supracer 53 Tot 51 Abd 247 Vag Backgd 110 % of N listed Sig SI 17 17 15 18 Sig Urge 13 3 6 7 Bothersome SI 17 12 9 15 Both. urge 13 3 5 6 Supracer 53 Tot 1 Abd 247 Vag Backgd 110

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
	urgency, sig UI was defined as involuntary leakage at least once a week, bothersome UI as sig incontinence and use of devices, decreased social ability or having hygienic problem with incon. Questionnaires returned by 82% in study group, 76% in background group		% of N listed sig SI 36 26 29 28 sig urge 19 11 14 11 Bothersome SI 28 19 23 22 Both. Urge 11 7 13 9
Østbye, 2004[28] Population-based with 5 and 10-year follow-up	8,949 adults aged 65 and over who were participants in the Canadian Study of Health and Aging:	Age at baseline: Women: 65-74: 2,159 (40.6%) 75-842,254 (42.4%) 85+: 909 (11%), Men: 65-74: 1,722 (58.9%) 75-84: 1,455 (40.2%) 85+: 397 (11%) Race/ethnicity: not reported Residence: Canada	Cumulative 5-year incidence: Women: 14.3% ages 65-74 years 20.5% ages 75-84 years 24.3% ages 85+ years Men: 8.6% ages 65-74 years 12.3% ages 75-84 years 23.2% ages 85+ years Remission at 5 and 10 years: 37% and 40% women 29% and 38% men
Ozerdogan, 2004[29] Cross sectional study, Prospective II-2A	625 women living in Turkey ≥20years from 4 different cities of Turkey Questionnaire and I-QOL: Rare – UI less than once a month Reg – UI more than twice per month Serious – continuous use of sanitary protection SI and Urge defined as usual definitions	Age distribution 20-29 – 26.4% 30-39 – 22.6 40-49 – 18.7 50-59 – 13.4 60-69 – 11/7 ≥70 – 7.2 Illiteracy rate 9.4% 1 in 4 resided in rural area 1 in 5 had ≥4 births and most were vaginal deliveries (25%) 50% BMI >25 25% smokers Recurrent UTIs 19% Diabetes 6.6% COPD – 7.5% Neurological disorders 11.2%	

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
Schytt, 2004[30] Prospective, longitudinal cohort II-2A	After childbirth 5,550 women from 593 clinics booked appts during recruitment time. Of 4,500 eligible, 3,191 consented, 3,061completed 1st , 2,762 completed 2nd, and 2,563 completed 3rd questionnaire. 2,450 completed all 3 with 2,390 total after exclusion. Selected data from a National Swedish survey investigating physical and psychological assessment of childbirth (May and Sept 1999 and January 2000 antepartal visits) 3 questionnaires; 1st at baseline, 2nd mailed 6-8 weeks after the birth and 3rd 1 year after birth. Women were asked to recall any sxs of UI during and post-pregnancy. Excluded miscarriages, non-Swedish speaking, and women at non-participating clinics, delivery of twins	Avg gestation answering 1st quest – 16 weeks, 2nd – 10 weeks post, 3rd – 1 year and 2 weeks. Avg age at recruit – 29.5 years Primiparas – 44% Multiparas – 56% 79.2% had vaginal delivery 13.4% had c-section	
de Tayrac, 2004[31] Case control, retrospective study II-3	French women – study pop 717 who had Dargent and Rudigoz technique 449 did not respond 365 (50.9%) returned questionnaires 51 excluded leaving 314 women 117 pts who had a vaginal hysterectomy for menorrhagia from Jan 1991 to Dec 2001 control group of 116 pt who had conservative tx 197 had hyster for pelvic pain and 117 for menorrhagia Self report questionnaire	Vaginal hyst. Control Age 51.4 50.9 Parity 2.1 2.2 Menopause 43.5% 47.4% Smoking 17.9% 17.2% Drink >2 L/d 7.7% 9.5% Hx of uro sxs 0 0	
Hu, 2003[32] Retrospective longitudinal study. Level of evidence:	Subject selection: 12,079 patients who underwent radical prostatectomy were identified in the claims data of a 5% national random sample of beneficiaries from the CMMS.	Men aged >65 years USA	The 3-year incontinence rate decreased from 20% in 1991 to 4% in 1995. On multivariate analysis nonwhite patients were at increased risk for in hospital complications (OR 1.34, 95%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
	Study done to ascertain whether radical prostatectomy outcomes improved after the diffusion of surgical innovations during the last decade.		CI 1.17 to 1.55)
Kolominsky-Rabas, 2003 (7715059) Population-based, longitudinal survey Adjusted by age, continence status, disability, stroke type, dependency and setting prior to stroke, independence	752 adults with first-ever stroke and no UI prior to stroke were prospectively identified from the Erlangen Stroke Project. Of these, 586 had information on UI presence prior to stroke (84%)	55% female 45% male Mean age of those without UI at Day 7: 68.1 and those with UI: 74.7) Race/ethnicity: not identified Residence: Bavaria, Germany	35.3% UI incidence at day 7 28% full incontinence 7% partial incontinence 24% UI at 12 months 12% full incontinence 12% partial incontinence Significant differences between those with UI and without UI at day 7: Age: 74.7 vs. 68.1 (P =.001) Age group: < 65 years: 17% vs. 31%; 65-74 years: 25% vs. 36%; 75-84 years: 40% vs. 26%; >85 years: 17% vs. 7% (P =.001) Female gender: 59% vs. 51%, P=NS Cerebral infarction: 78% vs. 91%; intracerebral hemorrhage: 8% vs. 20%; subarachnoid hemorrhage 2% vs. 0%; undefined type (no CT scan): 0% vs. 1%; P=.001 Disability at day 7: Very severe disabled: 80% vs. 1%; Severe disabled: 8% vs. 9%; Mildly disabled: 8% vs. 16%; moderate disabled: 5% vs. 43%; not disabled: 0% vs. 30%, P =.001 Living situation before stroke: Independent at home: 67% vs. 88%; dependent at home: 21% vs. 9%; institution: 8% vs. 2%, missing: 4% vs. 2%, P=.001 Comorbidity before stroke: Diabetes: 29% vs. 23%, P = NS Hypertension: 62% vs. 63%, P = NS Cardiac risk factors: 56% vs. 45%, P =.03

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
Long, 2003[33] Prospective/Observational II-2	Patients admitted from June 1999 to June 2001 with various indications for hysterectomy were evaluated. 22 patients were postmenopausal and had received hormone replacement therapy. 54 excluded due to: (i) the presence of peculiar pelvic mass (anterior wall or low-lying uterine myoma >5cm diameter) (n = 10); (ii) conversion to laparotomy (n = 3); (iii) intraoperative bladder rupture (n = 4); (iv) diabetes mellitus type 2 (n = 10); (v) combined colposuspension or TVT procedure (n = 12); and (vi) incomplete medical records (n = 15). Data pertaining to 151 women was therefore assessed for this study.	Women Age: Range 35 to 61 years Mean: 45 years; Parity ranged from 0 to 6, with a median of 3. Taiwan	Incidence of UI Post-op SUI Pre-op: 29.1% Post-op: 15.2 UUI Pre-op: 7.3% Post-op: 7.9%
Yip, 2003[34] Observational (Cohort) II-2	Subject selection: 276 nulliparous women were asked to participate; recruited consecutively on day 1 postpartum after a singleton, full term, vaginal delivery. Women with history of UI (including ante-partum stress UI), cesarean delivery, multiple pregnancy, or breech delivery were excluded. Response rate: 148 (53.6%) women answered a telephone interview. Definition: Urinary stress incontinence was defined as ‘‘2 or more episodes of urinary stress incontinence occurring in the past month’’	Women Age range: 23-30yrs Hong Kong	Prevalence UI Women without interval vaginal delivery: 28.6% Women with one interval vaginal delivery: 21.1% 25.7% of women suffered from urinary incontinence 2
Kherulff, 2002[35] Prospective cohort with 2-year follow-up Adjusted by age, race, income, and hysterectomy indication Level of evidence: II-2B	Enrolled women 1,299 undergoing hysterectomy for noncancerous conditions from February 1992 to October 1993 at 28 hospitals. (81% response rate) Excluded: <18 years, cancer as indication for hysterectomy Interviews prior, and at 3, 6, 12, 18, and 24 months post-hysterectomy	Women ages ≥18, with a mean age 43.3 years; Maryland, USA 65% white 32% black 2% other Maryland Women’s Health Study, USA	Prior to hysterectomy: • 29.5% (n=382) had severe UI • 35.9% (n=464) had moderate UI • 34.^% (n=447) had mild or no UI Preoperatively, UI severity global measure (during last month how much of problem was urination?) • 16.4% (n=212) big problem • 18.9& (n=245) medium problem

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
	UI Measurement: Urinary Symptom Scale for Women (USSW) adapted from questions in the Main Women's Health Study; In the past month how often have you dripped or leaked urine? In the past month how often have you had urine drip when you sneezed or coughed?		• 22.0% (n=285) small problem • 42.8% (n=555) no problem
Viktrup, 2002[36] Prospective cohort with 5-year follow-up Adjusted by maternal age, parity, gestational age, length of first stage, length of second stage, birth weight, head circumference, anesthesis, delivery method, perineal lesions, perineal injury Level of evidence: II-2A	Consecutive recruitment of 305 primiparious women attending obstetric department 91.0% response rate of those who were initially contacted at time of delivery, n=278) Standard questionnaire sent within 2-5 days after 1st delivery, telephone 3 months later; same questionnaire mailed 5 years later UI Measurement: Asked if they had urinary incontinence; if incontinence was provoked by physical exerting (SUI) or accompanied by strong desire to void (UUI); if they had daily UI; and if UI was a hygienic or social problem (Using ICS definition)	Women ages 17-41 years (median 26 years); Denmark Race not reported	32% had SUI during pregnancy, 6% had daily SUI, and 1% reported social and hygienic discomfort 19% reported SUI during 1st puerperium, 5% daily SUI, 2% social and hygienic discomfort 6% SUI 3 months after 1st delivery, 1.4% daily SU, and 0.3% had social and hygienic discomfort 5 years after first delivery, 30% (83/278) had SUI, 6% (17/278) had daily SUI, and 8% (23/278) complained of hygienic or social discomfort UUI 5 years after first delivery occurred concomitantly with SUI in 49% of women with SUI during pregnancy and 36% of women with SUI during 3-month puerperal period
Miles 2001 (14687387) Population-based, longitudinal survey Adjusted by depression, self-reported number of medical conditions, BMI, gender, age, lifetime smoking, ADLs, and IADLs II-2A	Random sample of 2,660/3,051 Mexican Americans aged 65 years and over who were participants in the Hispanic Established Population for Epidemiologic Studies of the Elderly (HEPESE); 2,025 persons had data at baseline and at the 2-year followup Home interviews UI measured by asking subjects how often they experienced difficulty holding urine. If answered "some," "most" or "all," categorized as incontinent	Mean age at baseline of continent subjects: 71.9 years, and incontinent subjects: 73.6 years 57% women Mexican-Americans Texas, New Mexico, Colorado, Arizona, and California	14.1% with prevalent UI at baseline and 16.1% at 2-year followup: 11.6% with new UI at 2-year followup Weighted sample of 436,533 persons, 60,565 had prevalent UI at baseline, and 32, 271 became incontinent at 2-year followup Prevalent UI: ADLs: 1.5 [0.9-2.7] IADLs: 1.0 [0.7-1.5] Walking: 1.6 [1.0-2.4] Balance: 1.0 [0.6-1.6] Chair rises: 1.1 [0.7-1.6] Incident UI: ADLs: 1.3 [0.6-2.6]

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
			IADLs: 1.7 [1.1-2.6] Walking: 2.0 [1.2-3.0] Balance: 2.0 [1.2-3.2] Chair rises: 2.0 [1.3-3.1]
Møller 2000[37] Population-based with 1-year followup	2,860 of 4,000 (71.5%) women aged 40-60 years who were originally randomly selected from the Danish Civil Registration System; After 1-year 2,284 (79.9%) completed 1-year follow-up study Mailed questionnaire UI measured by asking subjects about leakage caused by coughing or sneezing, moving, lifting, sleeping, sexual intercourse, urgency, and rest. Stress UI defined as leakage caused by exertion (coughing or sneezing, moving, or lifting) and urge UI as leakage associated with urgency; UI categorized as leakage occurring weekly or more	21.9% age 40 20.7% aged 45 20.4% aged 50 19.1% aged 55 17.6% aged 60 Ethnicity: not reported Residence: one rural (Storstrøm) and one urban county (Copenhagen) in Denmark	Incidence at 1-year: Stress UI: 4.0 [2.3-4.9] Urge UI: 2.7 [2.0-3.4] Remission at 1-year: Stress UI: 41.4% [39.2-43.6] Urge UI: 42.0% [39.8-44.1] Progression from baseline: Never at baseline to: 69.0% never, 28.9% sometimes, 1.4% weekly or more, 0.7% daily or more Sometimes at baseline: 11.8% never, 79.8% sometimes, 7.6% weekly or more, 0.8% daily or more Weekly or more at baseline: 4.5% never, 46.9% sometimes, 39.9% weekly or more, 8.6% daily or more Daily or more: 0.8% never, 20.6% sometimes, 31% weekly or more, 47.6% daily or more
Samuelsson, 2000[38] Prospective cohort Adjusted by: Age Marital status Education Smoking Parity BMI Diabetes Hypertension Asthma Neurological disease Oral contraceptives Hysterectomy Level of evidence: II-2C	All women scheduled for a gynecological health examination by midwives in primary health care district during 1 year were mailed a questionnaire. Exclusions: pregnant or lactating, a cervical smear in the last year, or mental retardation. Response rate: 77% (n=491) Follow-up: 87.8% (n=382) Data source: Self-reported postal questionnaire. (Also for follow up). UI as yes to, “Do you suffer from involuntary loss of urine?” Stress incontinence as, “leakage during effort,” and urge incontinence as, “leakage with sense of urge.” Mixed incontinence was presence of both. Unspecific	Age: 20-59 years old. Gender: Female Race: Not reported Ethnicity: Not reported Residency: Sweden	292 continent women at baseline: 40 became incontinent, 252 remained continent 90 incontinent women at baseline, 25 became continent, 65 remained incontinent Incidence of any degree of UI during follow-up was 40/292 (13.7%) Annual incidence of U (any, once a week or more often)I: 20-29 years: 1.5%, 0.60% 30-39 years: 3.5%, 0.24% 40-49 years: 2.9%, 0.81% 50-59 years: 3.3%, 0.41% 60-69 years: 3.9%, 0.79% Overall: 2.9%, 0.51% Note: if pregnant women were excluded, the annual incidence would have been 2.7%, with mean annual incidence rate of weekly or more UI as 0.36%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
	incontinence as, “leakage, but not during effort or with sense of urge.”		UI frequency of incident cases: Seldom: 70% At least monthly: 12.5% At least weekly: 12.5% Daily: 5.0% Number of women developing UI type by type of UI at baseline: None: 25 stress UI, 5 mixed UI, 4 urge UI, 6 Nonspecific UI Stress UI: 18 None, 24 stress UI, 7 mixed UI, 4 urge UI, 3 nonspecific Mixed UI: 1 none, 5 stress UI, 2 mixed UI, 0 urge UI, 0 nonspecific; Urge UI: 0 None, 2 stress UI, 1 mixed UI, 2 urge UI, 1 Nonspecific Nonspecific: 6 None, 6 stress UI, 0 mixed UI, 2 urge UI, 6 Nonspecific Characteristics of women who became incontinent (n=40) vs. those who remained continent (n=252): Maximum birth weight was heavier (P <.05) and on estrogen treatment (P < .01). Variables tested but not significantly different between the two groups were: age, current smokers, BMI, parity, delivery during follow-up, prior episiotomy, poor pelvic floor muscle strength, instruction in pelvic floor exercises, any disease, number of symptoms reported number of symptoms, hysterectomy, cystocele, vaginal atrophy, fragile vaginal mucous membranes, vaginal pH, and estrogen treatment started during follow-up were not significantly different between women rem Remission rate: 27.8% over 5 years, mean annual remission rate: 5.9% 20-29 years: 10.6^ 30-39 years: 8.5% 40-49 years: 6.4% 50-59 years: 5.7% 60-69 years: 2.7% Remission by frequency of UI at baseline:

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
			Seldom: 6.6% Monthly: 6.6% Weekly: 3.6% Daily: 0 Remission by UI type at baseline: Stress UI: 6.8% Urge UI: 0 Mixed UI: 2.7% Unspecified: 6.4%
Hojberg, 1999[39] Cross-sectional Adjusted by: Age, parity, BMI, smoking, previous abortions, lower abdominal or urological surgery Level of evidence: III	Subjects were selected from all women attending routine antenatal care from January 1993 to April 1996 at the Department of Obstetrics and Gynecology, Aarhus University Hospital. The subjects were asked to fill out a questionnaire at 16 weeks of gestation. Response rate: 91% (n=7,795) Data source: Self-administered questionnaires. Urinary incontinence was defined as, "Involuntary loss of urine within the last year." Stress incontinence was defined as, "Involuntary loss of urine during physical exertion." Urge incontinence was defined as, "involuntary loss of urine associated with a strong desire to void." Mixed incontinence was defined as, "A combination of stress and urge incontinence."	Age: 15-24: 17.3% (n=1,347) 25-29: 41.7% (n=3,253) 30-34: 30.3% (n=2,365) 35+: 10.6% (n=830) Gender: Female Race: Not reported Ethnicity: Not reported Residency: Denmark	Prevalence: Overall: 8,900/100,000 (8.9%) By Type: Stress incontinence: 5,000/100,000 (5%) Urge incontinence: 700/100,000 (0.7%) Mixed incontinence: 2,400/100,000 (2.4%) By Severity: 3,000 / 100,000 (3%) (Reported stress or mixed UI at least once a week)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life
Sgadari, 1997[40]	Subjects were selected using data from a cross-national database. The interRAI data-base of nursing home assessments was used, containing information on the countries of Denmark, France, Iceland, Italy, Japan, Sweden, and the USA. The data within the interRAI are population-based for the USA, Denmark, and Iceland. The data from the remaining countries are "likely to be representative, but not as broadly-based." Response rate: Not reported. Data comes from a pre-existing data set. (n=279,191) Data source: Nursing home MDS/Resident Assessment Instrument (RAI). MDS items measuring UI have "been proved to be valid." A resident was considered incontinent when they had, "any uncontrolled leakage of urine, regardless of amount, that occurred two or more times a week."	Age: Denmark: <75: 15.1% 75-84: 34.8% 85+: 50.1% France: <75: 25.2% 75-84: 30.5% 85+: 44.3% Iceland: <75: 11.2% 75-84: 37.3% 85+: 51.5% Italy: <75: 18.2% 75-84: 42.4% 85+: 39.3% Japan: <75: 18.6% 75-84: 46.3% 85+: 35.2% Sweden: <75: 18.3% 75-84: 38.1% 85+: 43.5% USA: <75: 18.9% 75-84: 33.9% 85+: 47.2% Gender: Male and female Denmark: Male: 23.8% Female: 76.2% France: Male: 30.1% Female: 69.9% Iceland: Male: 32.9% Female: 67.1%	Prevalence of urinary incontinence: By country: Denmark: 52,200 / 100,000 (52.2%) France: 65,200 / 100,000 (65.2%) Iceland: 56,500 / 100,000 (56.5%) Italy: 54,400 / 100,000 (54.4%) Japan: 42,900 / 100,000 (42.9%) Sweden: 61,600 / 100,000 (61.6%) USA: 46,400 / 100,000 (46.4%)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-a. Incidence of urinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Incidence (new cases/year * 100,000 age standardized adult population, males and females) of UI, Overall: by Type, Severity, and Impact on Life		
Herzog, 1990[41]	Subjects were all non-institutionalized persons ≥60 years in a stratified probability sample.	Age: 60 years and older		1 year incidence rate	2 year incidence rate
Prospective cohort	Response rate: 66% (n=1,956)	Gender: Male and female	**Male**	9.0%	10.60%
Adjusted by:	1 year followup: 69%	Males: 41%	Stress	2.2%	2.40%
Age	2 year followup: 72%	Females: 59%	Urge	9.1%	10.60%
Sex	Data source: At home interviews conducted by interviewers trained at the U of Michigan School of Public Health.	Race: Not reported	Mixed	4.9%	4.30%
General health status		Ethnicity: Not reported	Other	5.1	5.90%
Level of evidence: II-2C	Incontinence was defined as, “any uncontrolled urine loss within the 12 months prior to the interview.”	Residency: Washtenaw County, Michigan	**Female**	22.40%	20.20%
			Stress	13.7	17.40%
			Urge	3.6	4.10%
			Mixed	26.8	27.60%
			Other	3.9	3.60%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)

F1-b. Risk factors for urinary incontinence in adults

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
Bluestein, 2007[42] Cross sectional survey II-2A Listed as excluded in endnote	Random sample of 262 patients from 400 mailed surveys from 1,327 potential patients older than 65 years in urban settings Random sample of 1,327 patients with a response rate 70.5% Excluded dementia	Patients divided into two groups – robust health or impaired health. The following are totals for both groups out of 262 patients Mean age: 72.8 163 women; 99 men Depression: 59 Memory loss: 82 Weight loss: 58		48.5% vs. 34.6% 54 reported incontinence in the robust health group (160) 48 reported incontinence in the impaired health group (102)
Boyington, 2007[43] II-3	1999-2002 CMS MDS Southeastern US region Nursing Homes (AL, FL, GA, KY, NC, SC AND TN.) Repeated measures, two time period design Excluded use of a catheter, admission to NH prior to 1999, age <65 or race other than Caucasian or African American. 95,911 African American and Caucasian patients UI measured at 5 levels (0-4)	82.4% Caucasians 76.5% women mean age – 82.71 years Cognitive impairment score of 2.06 +/- 1.84 on admission	Age Gender Education Morbidities: Alzheimer's, diabetes, stroke, HTN, CHF, Dementia Bed mobility Cognitive and functional status	8.9% increase between admission and post admission UI prevalence 65.4% (62,697) vs. 74.3% (71302) Caucasians had a greater increase in UI prevalence post admission (9.4%) compared to African Americans (6.9%); however, prevalence for African Americans was higher at both time points.
Danforth, 2007[44] Prospective, observational study Nurse's Health Study II-2A	Nurses' Health Study of women ages 54-79 from 14 US states Prospective analysis from 2000 to 2002 2,355 cases of incident UI self reported from questions "Have you leaked urine in last 12 months or lost control?" Incident frequent incontinence defined as those reporting at least weekly in 2002 Estimated OR Excluded women missing info on	Mean age 65.9 range 54-79 years Incontinence by race or risk factors not reported	All multivariable logistic regression models included the following covariates: Race BMI Parity Smoking HRT usage	2,355 cases of incident UI increase in level of total physical activity was associated with decrease UI 15-20% lower risk of developing UI compared with the lowest quintile 26% lower risk in the top quintile of walking compared to the lowest quintile (95% CI 0.63-0.88) SUI: 791 cases Urge: 335 cases

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
	incontinence or who reported prevalent incontinence in 2000. Excluded major neurological diseases (stroke) or functional limitations (walking, etc.)			Mixed: 440 cases Higher levels of physical activity associated with decreasing SUI. No relation between activity and other types.
Goldacre, 2007[45] Rate ratios for self harm and depression in a cohort of women admitted for UI, and rate ratios for UI in cohorts of women admitted with self harm or depression compared with a control cohort. II-2C retrospective study with concurrent controls	NHS women admitted for UI; SUI only from 1979 Oxford record-linkage study (ORLS) from 2 health districts from 1968 (no end date) 6 districts from 1974 (no end date) all districts from 1983 (no end date) In addition, psychiatry data were recorded from 1968-1994. SUI pts only from 1979 on but no end date given. Database had records from these dates until; March 31, 1999 Excluded age <20 or >85 and women who had UI recorded at the same NHS contact episode as self harm or depression	Total self harm and depression with subsequent UI Self harm 16,882 women 20-44 years had self harm 4,296 women 45-64 years 1,702 women ≥65 Depression 10,646 women 20-44 years had depression 6,557 women 45-64 years 7,137 women ≥65	Self harm Depression Age Women	Risk of admission for self harm high in women with UI 20-44; and significantly high 20-44 recorded as having SUI. 16,882 women in cohort study of self harm and depression ages 20-44, 4,296 ages 45-64; 1,702 age >65. Self harm was significantly high ages 20-44 before their first admission for UI overall OR, 1.41; 1.23-1.61 and before UI coded anywhere in the record as SUI (1.34; 1.15-1.56) 10,646 women with depression 20-44, 6,557 ages 45-64 and 7,137 65-84. UI significantly high in all three groups RR 1.29 (1.10-1.51), 1.38 (1.15-1.65) and 1.48(1.20-1.81) Significant association at an interval ≤5 years between depression and subsequent UI RR 1.46; 1.33-1.75; ≥5 years depression and UI 1.20;1.05-1.35 and depression and subsequent SUI 1.23; 1.05-1.43
Huang, 2007[46] II-2A	Observational study of 6,361 community dwelling women ages 65 and older participating in the Study of Osteoporotic Fractures from 1986-1988 Restricted to patients who gave	Age: mean age 76.7± 4.7 years	All women recruited Depression:7% BMI: <25 – 42%; 25-30 – 37%; >30 – 21% History of hysterectomy: 39%	By visit 4, 31% of women reported at least weekly incontinence; 5% reported disruptive incontinence No data before this time or for subsequent visits.

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
	data on cognitive, physical function and UI through visit 4 Excluded abnormal cognitive and physical function at baseline Self administered questionnaire "in last 12 months, have you ever leaked urine or lost control?"		CHF: 3% Parity: 0 births – 20%; 1 birth – 12%; 2 births – 23%; >3 – 45% Diabetes: 6% Stroke: 5% Parkinson: <1% Alcohol use: 3%	
Jacobsen, 2007[47] Prospective study of men II-2A	All men with localized prostate cancer scheduled for either open retropubic or laparoscopic prostatectomy at University of Alberta between Oct 1999-July 2002 Exclusion: prior pelvic radiotherapy, subjective complaint of incontinence at baseline or neurological impairment known to affect bladder Post evaluation included 24 hour pad test and voiding diary performed at 3 and 12 months. I-PSS completed at 3-6-9-12 months UI defined as total pad weight gain of more than 8gm during 24 hours. To control affect of activity, subjects recorded activity for baseline pad test and repeated this activity as closely as possible for subsequent pad tests.	RRP compared to LRP at 2 points RRP LRP 1st half LRP 2nd # pts 148 29 28 Age 63.7 62.3 60.9 Mean BMI 28.1 26.87 27.54 % smokers 14.9 10.3 7.1	RRP LRP Surgery	Despite subject claims, 4% of patients in RRP had incontinence and 3.5% in LRP at baseline. Mean gm weight Post op RRP LRP 1st LRP 2nd 3 months 34.9 28 49.6 12 months overall 8.2 9.6 6 12 months UI 34.8 24.5 12.2 % Incontinent 3 months 42 70.4 60 12 months 12.8 20.7 14.3
Smither, 2007[48] Prospective consecutive patients No controls	U.S. men, 203 consecutive patients who underwent radical prostatectomy by a single surgeon. Walsh technique used. Patients instructed in pelvic floor	Age range 40-72 mean 58 Preop PSA range .3-25.4 mean 7.3 Localized cancer	RRP	Mean pad weight (range, SD) 2 weeks: 36.7 (0-241.8; 40.5) 6 weeks: 21.9 (0-226; 39.5) 18 weeks: 5.6 (0-76; 4.2) 30 weeks: 2.6 (0-80.4; 10.6)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
	exercises preop with no other interventions. No data on compliance reported. Dates of study: 3/98-8/03 1 hour pad test used on post op visits Gram weight of urine loss was recorded and subdivided into 4 groups – minimal loss <1g; mild >1, <10; moderate 10-50g and severe >50g. Post op visits at 2 weeks, 6, 18, 30, 42 and 54 weeks. Did not use patient estimates of pad usage at home No mention if incontinence before surgery			42 weeks: 2.8 (0-104.5; 14.1) 54 weeks:1.7 (0-71.1; 8.9) 18 week marker appears to be the time point which the majority of patients achieved urinary control, such that at 30 weeks,.85% of patients fit in the minimal incontinence category, and by 54 weeks, 91% are in that category.
Waetjen, 2007[49] Prospective cohort II-2A	Study of Women's Health Across the Nation (SWAN) 1995-2001 Multidisciplinary cohort study of menopausal transition 7 clinical sites (Boston, Chicago, Detroit, LA, Newark, Pittsburg, Oakland, CA) community based women ages 40-55 years each site recruited one Caucasian group and one minority group – African American, Japanese, Chinese and Hispanic Exclusion: no menstrual period in more than 3 months, hysterectomy and/or bilateral oophorectomy, use of oral contraceptives, estrogens or progestins	3,302 women at baseline, 599 dropped out or did not complete UI questions (18.1%) baseline mean age: 45.8 Caucasian: 47% African Americans: 28.3 Japanese: 8.5 Hispanic: 8.7 Premenopausal: 46.5 Early perimeno: 53.5	Race Ethnicity SES Obstetric history Smoking Medication use Educational level Depression Physical activity BMI	Compared to Caucasians; African American, Chinese, Japanese, and Hispanic women had lower odds of reporting frequent prevalent incontinence; no sign trend in reporting of any or frequent incident incontinence by racial ethnic group. Parity, diabetes, uterine fibroids, depression and poor social support were significantly associated with prevalent but not incident incontinence. Significant interaction between education and both Chinese and Japanese ethnicity. Lower level of education associated with less prevalent incontinence (Chinese – OR = .33 95% CI .17, .69; for Japanese – OR .48, 95% CI .25,

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
	Interview and self administered questionnaire "In the past year, have you ever leaked even a small amount of urine involuntarily?" Defined any incontinence: at least monthly SI: urge to void and can't reach toilet fast enough Combined less than once a month incidents with "no incontinence"			.97. Being either a smoker or past smoker associated with increased odds of incident incontinence in African Americans but not other racial groups. Diabetes was the strongest risk for prevalent incontinence and highest in Caucasians. See supplemental table.
Adelmann, 2004[50] Prospective cohort	Community UI prevalence sample of 910 persons to a 1998-1999 survey enrolled in a Medicaid managed health plan Seven county Minneapolis-St. Paul metro area Age ≥65 Random sample of 910 persons enrolled in Medicaid health plan. Of this the n= 378 that were eligible due to UI. Sample was further limited to persons based on at least one claim for a doctor's visit and medical chart could be located. n=236 Nursing home abstraction sample was randomly drawn from Medicaid persons for a total of 480 persons. Interviews face to face in residence. Response rate 59%, cooperation rate 90%. Abstraction of medical record at clinics also.	Characteristics of community and nursing home N=910 Community NH (%) Women 82.1% 79.2 Men 17.9 20.8 Age 65-74 50% 14 75-84 34.9 34.2 85+ 15.1 51.9 Mean 75.9 84.5 Race White 69.4 93.8 Black 14.5 4.6 Other 16.2 1.7	Race Age Gender	Prevalence of UI in community sample Ever/current Past week UI (%) Total 41.6 23 Women 45 25.5 Men 25.8 11.7 Age 65-74 34.1 17.6 75-84 45. 26.2 85+ 58.1 33.8 Race White 45 25.5 Black 39.8 20.3 Other 30.1 16.1 Subgroup report by race and age Race among women (self report) p<.003 p<.016 White 49 28.7 Black 43 22.4 Other 31.9 16.4 p,.001 p<.001 65-74 37.4 20.4 75-84 47.7 27.6 85+ 62.1 36.3

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
	Definition: ever/current UI measured by a yes response to questions about trouble holding urine or leaking urine			Age among Whites p<.001 p<.001 65-74 35.3 19.5 75-84 49.8 27.7 85+ 59.1 35.7 Age among Blacks p<.037 p<.021 65-74 34.1 14.6 75-84 46.2 28.2 85+ 71.4 57.1 Age among White women p<.001 p<.005 65-74 39.1 22.9 75-84 53.1 30.3 85+ 62.3 37.7 Age among Black women p<.044 p<.050 65-74 36.4 16.7 75-84 50 29.4 85+ 71.4 42.9 Medically detected UI in community and nursing home samples Community Nursing Home Past 18 months Past 12 months Total 22.3% 77.2% Gender p=.278 p=.174 Age in years p.868 p<.001 65-74 61.2% 75-84 75% 85+ 82.7% race also insignificant p Prevalence of medically treated UI community nursing home past 18 months past 12 months any type 64.8% 6.5%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
				SI 38.9% 3% Urge 9.3 0. Other 5.6 2.4 Mixed 11.1 0.3
Andersson, 2004[10] Population based study II-3	Swedish population, both men and women ages 18-79 years (Orebro county) in March 2000 Questionnaire mailed to home comprising 12 questions on UI as a supplement to a large public health survey on health and general living. Mailed to 15,360 randomly selected residents out of 274,000 population in this county. Response rate 64.5% Used definitions from ICS Stats on weights and calibration and found results were the same	7,680 females 7,680 males Age categories 18-35 53.9% 35-50 60.3 50-65 69.6 65-80 72.2 Life and Health questionnaire sent to 70,000 residents randomly selected. In Orebro, pop of 274,000, one of the five counties that participated in above study, a special section on UI was given to a sample of 15,360 residents	Age Gender	Prevalence reported by age and gender for weekly Women (men) Women (men) 18-34 – 3 (1); 35-49 – 10 (2); 50-64 – 13(3) ; 65-79 – 21(8). Total for weekly Women – 11% Men 3% SI total for women 77%, men 13% 18-34 – 59(18); 35-49 – 83(13); 50-64 – 83(11); 65-79 – 71(13) Urge Incontinence for women 46%; men 45% 18-34 – 42(18); 35-49 – 38(37); 50-64 – 48(43); 65-79 – 53(59) Women more affected than men Proportion of people with UI increased markedly with age At least 1/week At any time Women 11% 27% 18-34 3 10 35-49 10 26 50-64 13 37 65-79 21 39 Men 3% 10% 18-34 1 3 35-49 2 6 50-64 3 13 65-79 8 21 SI Urge Women 77 46

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
				Men 13 45 Duration of UI years <1 24% 1-5 51 6-10 14 >10 11
Bogner, 2004[11] Population based longitudinal survey II-2B	ECA (Epi Catchment Area) program was used to sample from Baltimore to include 3,481 persons selected from East Baltimore for this study. Community dwelling adults who were initially living in East Baltimore in 1981. Out of 3,481 persons, 1,920 were contacted (73% of original cohort). Study sample included 822 persons aged ≥50 who completed info on UI. After exclusions for missing data, 747 were the final sample. African Americans and Whites aged ≥50 at followup interview performed 1993-1996 Age ≥65 were over sampled GHQ used and self report on UI UI = "Have you ever had any difficulty in controlling your water, losing your urine or having trouble getting to the bathroom on time?" If any uncontrolled urine loss was reported within the 12 months before the interview, persons were classified as having UI.	Mean age of study sample was 67.2 64% were women 72.3% White; mean age 68.2 ± 11 27.7% AA – mean age 64.5 ± 10 White Black Diabetes 14.3 16.9 Heart trouble 27.4 26.6 Arthritis 51.1 56.5 Stroke 8.2 7.3 Cancer 14.4 6.3 MME 27.6±2.6 25.6±3.6 ADL impaired 1.9% 3.9%	Age Gender Functional status Cognitive status Chronic medical conditions-diabetes, heart trouble, stroke, arthritis or cancer Race	22% Whites reported UI 13% of Blacks reported UI 19.8% reported UI during the year preceding the interview White (540) Black (207) UI 22.4% 13% No information on SI, Urge Incon. Association between UI and Psychological Distress Crude Adjusted OR (95% CI) White 1.28 (.76-2.14) 1.07 (.62-1.84) Black 4.22 (1.72-10.39) 5.6 (1.88-16.67)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
Corcos, 2004[12] Prospective cohort No control mentioned	Canadian population ≥35 Stratified by census of metro area and by gender. 7,487 persons were sample base. 53.7% response rate. 3,249 interviews from Montreal, Toronto, Vancouver, and Edmonton were final sample Investigators developed standardized questionnaire to ascertain OAB and SUI and impact on quality of life. Computer assisted telephone interviews conducted in 2 steps: an initial questionnaire evaluate presence of OAB followed by detailed questionnaire completing the assessment.	48.2% men; mean age 52 51.8% women; mean age 50.9 82.4% younger than 65 and 17.6% older	Gender Age	Wet OAB markedly higher in both men and women over age 75 years No correlation observed between age and prevalence of mixed OAB in women whereas linear relationship was noted in men
Dallosso, 2004[13] Prospective longitudinal study II=2B	Part of the Leicestershire MRC Incontinence Study. This study focused on women living in the community in UK ages ≥40. A random sample of 20,244 women drawn, 12,565 returned the questionnaire (65% response rate). FFQ sent to 10,852 of above sample. 7,46 completed it (response rate 65%) 1st postal questionnaire mailed Oct 1998 and completed by 7,046 women. 2nd postal questionnaire mailed Oct 1999 and completed by 6,424 women (91% response rate). Excluded women living in residential or nursing homes	Baseline data compared to those who provided FFQ data. Median age 57 vs. 61. Rating of health poorer in baseline after adjusting for age (OR: 1.66; 95% CI 1.51-1.82). More long-term health problems in baseline (OR 1.14; 95% CI, 1.05-1.25). No difference in reporting SUI (OR: 1.02; CI 95%, .92-1.13)	BMI Fat intake Vitamin usage Cholesterol and other dietary factors Age	Incidence at 1 year followup Total N / SUI cases % 40-49 1,242 9.3 50-59 1,272 7.2 60-69 1,108 7.6 70-79 756 8.3 80y + 214 12.6 only significant p abstracted – others in article not significant Total fat OR (95% CI) Q2-Q5 1.38(.89-2.13); 1.35(.88-2.08); 1.27(.83-1.94); 2.02 (1.33-3.05) p=.02 Saturated fat 1.08(.69-1.69); 1.46(.96-2.22); 1.08(.7-1.67); 2.02(1.35-3.03) p = .001 Carbs

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
	Excluded those of South Asian origin who make up 5.3% of Leicestershire pop over 40 years. Used ICS definitions			.95(.65-1.38); .68(.46-1.01); .59(.39-.9); .73(.49-1.08) p=.05 Cholesterol 1.09(.70-1.69); 1.24(.81-1.9); 1.34(.88-2.04); 2.09(1.4-3.14) p=.003 after adjusting for BMI, fat unchanged but carbs were no longer sig p=.07 3 vitamins associated with SUI Vit B12 Zinc Retinol was marginal After adjusting for BMI, association with B12 remained + while zinc was no longer sig.
de Tayrac, 2004[31] Case control, retrospective study II-3	French women – study population 717 who had Dargent and Rudigoz technique 449 did not respond 365 (50.9%) returned questionnaires 51 excluded leaving 314 women 117 patients who had a vaginal hysterectomy for menorrhagia from Jan 1991 to Dec 2001 control group of 116 patients who had conservative treatment 197 had hysterectomy for pelvic pain and 117 for menorrhagia self report questionnaire	Vaginal hyst. Control group Age 51.4 50.9 Parity 2.1 2.2 Menopause 43.5% 47.4% Smoking 17.9% 17.2% Drink >2 L/day 7.7% 9.5% History of uro sxs 0 0	Age Parity Menopausal status Smoking Volume of drink Did not report incidence by each of these	Prevalence (as stated in article) Vag hyster % Control % Freq day>8 19.7% 16.4% Noc: day >1 5.1 6.9 Urgency 62.4 54.3 Qmo 36.8 30.2 Qwk 19.7 12.1 Qday 6 12.1 UI 39.3 33.6 Use of pads 15.4 12.9 Urge Inc 20.5 13.8 Qmonth 12 7.8 Qweek 4.3 5.2 Qday 4.3 0.9 SI 36.7 31.9 Qmonth 18.8 16.4 Qweek 12.8 8.6 Qday 4.3 3.5 Age <60 VH Control UI 41.8% 33.7 Urge Incon 21.8 12.5

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
				SI 40 33.7 Age >60 UI 28.6 41.7 Urge Incon 14.3 25 SI 28.6 33.3
Deliveliotis, 2004[15] Prospective cohort II-2A	283 Greek men from 441 patients enrolled. 105/142 patients treated with RRP for prostate cancer 98/151patients treated with TURP for BPH 80/148 healthy men as control completed surveys used AUA Sx Index, UCLA Prostate Cancer Index; Rand 36-Item Health Survey and BMSFI translated into Greek Patient outcomes 2 years post treatment compared to pretreatment status at 2 weeks prior to treatment investigators felt poor returns due to length of questionnaires and the number of them	Mean ages 67.4 range 55-75 group 1 70.3 range 58-74 group 2 72.4 range 62-82 control HRQOL post treatment RRP TURP Control Physical functioning 81.5 78.1 82.3	Types of surgery	RRP; TURP; pretreatment; post treatment Urinary fun 85.1; 80.2; .121; 71.2; 87.3; .005 Urinary bother 85.1; 70.6; .021; 65.1; 80.2; .003 AUA SI 11.1; 8.6; .812; 24.2; 8.2; .001 UI every day 2%; 9%; .002; 12%; 2.78%; .002 RRP had trend towards worse urinary function 2 years after surgery but difference not significant. Urinary bother deteriorated. UI in control group was 5.78%
Foldspang, 2004[51] Age stratified random samples II-2A	6,240 and 6,468 women ages 20-59 years analysis based on 1,232 women in combined samples who reported their 1st and last childbirth within 13-120 months prior to responding to the questionnaire so minimum followup period after childbirth was 12 months Self questionnaire mailed Jan-March 1995 and 1998 67.8% responded	C-section in 12.2% of 1st childbirths Average age: 32.8 years (20-41) 52.1% reported having 2 births or more Mean age at 1st birth = 27.5 years and 29.9 years at 2nd Average duration since 1st childbirth was 5.3 years Denmark	Mode of delivery # of children Characteristic of group analyzed First childbirth(n=1232) With index pregnancy UI; vaginal childbirth vs. cesarean section Without index pregnancy UI; vaginal childbirth vs. cesarean section	Risk of postpartum UI depending on UI during pregnancy Adjusted OR 2.0 (0.8; 4.9) 5.4 (2.3; 12.4)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
			Vaginal childbirth index pregnancy; UI vs. no UI during index pregnancy	8.4 (5.9; 12.1)
			Cesarean section; index pregnancy UI vs. no index pregnancy UI	22.0 (6.8; 70.9)
			Second childbirth(n=642)	1.8 (0.3; 10.5)
			With index pregnancy UI; vaginal childbirth vs. cesarean section	2.7 (0.8; 9.0)
			Without index pregnancy UI; vaginal childbirth vs. cesarean section	20.3 (2.4; 172.4)
			Vaginal childbirth; index pregnancy UI vs. no index pregnancy UI	11.9 (7.3; 19.3)
			Cesarean section; index pregnancy UI vs. no index pregnancy UI	Mutually and age-adjusted relative risks (odds ratio, OR) and attributable risks (AR) for postpartum UI by pregnancy UI, vaginal childbirth and parity
			Childbirth	OR / Attributable risks (%)
			First childbirth (n=1232)	9.2 (6.5; 13.0) / 56.1
			index pregnancy UI	3.6 (2.1; 6.3) / 69.5
			Vaginal childbirth	
			Second childbirth (n=642)	12.3 (7.6; 19.9) / 67.6
			Index pregnancy UI	2.2 (0.9; 5.7) / 53.0
			Vaginal childbirth	
Fritel, 2004[52] Retrospective cohort II-2C	Women from hospital database of 1st birth women who had not delivered fetus >22 weeks 307/669 primiparous women who delivered in 1996 in vertex	Table I. Analysis of the differences among responders, women not reached and non-responders concerning potential risk factors for stress urinary incontinence (SUI) Risk factor Responders Not	Age at 1st delivery BMI Birth weight Duration of labor Duration of second stage Mode of delivery	Table III. Risk factors for SUI 4 years after the first delivery SUI Risk factor: yes (n=89) no (n=218) p Age at delivery >30 years: 53.9

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
	position between 37-41 weeks (274 had moved and 88 did not respond) 45.9% response rate. Excluding the women who did not receive the questionnaire (274), response rate was 77.7% Mailed questionnaire sent 4 weeks after delivery and asked about SUI before, during, and after pregnancy – "Do you have loss of urine during physical exertion, cough or sneeze?" UI categorized slight, mode or severe using Sandvik Index	reached Non-responders p Age at delivery 29.3 [4.4]; 28.2 [4.4]; 28.9 [4.7] 0.01 BMI (kg/m2): 21.3 [2.9]; 21.1 [2.9]; 21.3 [3.2] 0.62 Birth weight (g): 3240 [384]; 3253 [400]; 3241 [430] 0.92 Labor (hours) 6.2 [2.3]; 6.5 [2.5]; 6.6 [2.3] 0.21 Active 2nd stage (minutes): 11.1 [7.5];10.6 [7.9]; 10.9 [7.9] 0.69 C- section: 10.1 (31);17.5 (48);17.0 (15) 0.03 Forceps: 36.2 (111);31.3 (86); 44.3 (39) 0.08 Third-degree tear: 1.3 (4); 1.1 (3);1.1 (1) 0.97 France	3rd degree tear at first delivery Second delivery since 1996 Urinary leakage before 1st pregnancy Urinary leakage during 1st pregnancy	(48); 36.7 (80); 0.005 BMI >27 kg/m2: 2.2 (2); 4.6 (10); 0.34 Birth weight ≥4000g 2.2 (2); 1.4 (3); 0.58 Labor ≥8 hours: 41.6 (37); 21.1 (46); 0.0002 Active 2nd stage ≥20 minutes: 16.9 (15); 19.3 (42); 0.62 C section: 6.7 (6); 11.5 (25); 0.21 Forceps: 38.2 (34); 35.3 (77); 0.63 3rd degree tear: 2.2 (2); 0.9 (2); 0.35 Leak before pregnancy: 16.1; 0.9 <0.0001 Leak during pregnancy: 40.2; 15.3 <0.0001 2nd delivery: 69.6 (53); 61.0 (133); 0.81 Table IV. Risk factors for stress urinary incontinence 4 years after the first delivery Risk factor Odds ratio 95% CI p Leakage before the 1st pregnancy 18.7 3.6–96.4 0.0005 Leakage during the 1st pregnancy 2.5 1.3–4.8 0.005 Age at the 1st delivery: >30 years: 2.4 1.4–4.2 0.002 Labor ≥8 hours 3.1 1.7–5.7 0.0002 Cesarean at the 1st delivery: 0.3 0.1–0.9 0.04 Adjusted odds ratios estimated by logistic regression analysis According to multiple logistic regression analysis, the independent risk factors were urine leakage before the first

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
				pregnancy [odds ratio (OR) 18.7; 95% confidence interval (CI) 3.6–96.4], urine leakage during the first pregnancy (OR 2.5; 95% CI 1.3–4.8), duration of first labor ≥8 hours (OR 3.1; 95% CI 1.7–5.7), mother's age >30 years at the first delivery (OR 2.4; 95% CI 1.4–4.2) and cesarean section at the first delivery (OR 0.3; 95% CI 0.1–0.9). Table III. Risk factors for SUI 4 years after the first delivery SUI Risk factor: Yes (n=89); No (n=218) p Age at delivery >30 years: 53.9 (48); 36.7 (80) 0.005 BMI >27 kg/m2: 2.2 (2); 4.6 (10) 0.34 Birth weight ≥4000g: 2.2 (2); 1.4 (3) 0.58 Labor ≥8 hours: 41.6 (37); 21.1 (46) 0.0002 Active 2nd stage ≥20 minutes: 16.9 (15); 19.3 (42) 0.62 C section: 6.7 (6); 11.5 (25) 0.21 Forceps: 38.2 (34); 35.3 (77) 0.63 3rd degree tear: 2.2 (2); 0.9 (2) 0.35 Leak before pregnancy: 16.1; 0.9 <0.0001 Leak during pregnancy: 40.2; 15.3 <0.0001 2nd delivery: 69.6 (53); 61.0 (133) 0.81 Table IV. Risk factors for stress urinary incontinence 4 years after

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
				the first delivery Risk factor Odds ratio 95% CI p Leakage before 1st pregnancy: 18.7 3.6–96.4 0.0005 Leakage during 1st pregnancy: 2.5 1.3–4.8 0.005 Age at 1st delivery >30 years: 2.4 1.4–4.2 0.002 Labor ≥8 hours 3.1 1.7–5.7 0.0002 Cesarean at 1st delivery: 0.3 0.1–0.9 0.04 Adjusted odds ratios estimated by logistic regression analysis
Grodstein, 2004[16] Prospective cohort II-2A Confounded for stroke and physical limitations and results were the same in both analysis	Nurse Health Study from 1996-2000 females Questionnaire mailed in 1996 to 39,436 women post menopausal women who had no leaking of urine and were followed for 4 years Incident cases of occasion UI were defined as leaking 1-3 times per month; frequent were at least once per week Excluded premenopausal women or users of estrogen creams, or reported leaking in 1996	Cohort of 39,436 women ages 50-75 Mean age 61 for current HRT use; 64 for never used BMI for never used HRT was 27 Current use BMI was 47 and past use for BMI was 47 Hormone Use Post Menopause Never Current Past Caucasian 98 97 98 African American 1 1 1 Hispanic 0 1 0 Asian 1 1 1 Smokers @ 45% all Hysterectomy 6 47 40	Age BMI Smokers Recurrent UTI Diabetes COPD Neurological disorders Parity HRT	5,060 incident cases of occasional UI 2,495 incident cases of frequent UI Average incidence rate of 3.2% per year and 1.6% per year respectively 50-55 years yearly incontinence was 3% in those who never took HRT 56-60 – 3.5 61-65 – 3.8 66-70 – 4.3 71-75 years – 5.3%
Groutz, 2004[53] Prospective cohort elective C-section without trial of labor vs. vaginal	363 consecutive primiparae followed for 1 year SUI before pregnancy excluded Non-singleton deliveries, instrumental-assisted vaginal	Vaginal; Obstructed; Elective C-sec Delivery; labor; c-sec Age: 28±4; 32.5±5.3; 31.7±5.2 Weight:	Age Maternal age Weight Height Mode of delivery	SUI significant in heavier women – 67±10kg vs. 59±9 kg p=.001 and increase in prevalence during pregnancy 67% vs. 27% p=.003.

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
delivery vs. C-section due to obstructed labor II-2A (if controls are considered types of deliveries)	deliveries excluded 145 spontaneous vaginal delivery 100 C-section following obstructed labor with mean cervical dilation of 8.7 ± 1.6cm 118 elective C section Interviewed one year PP SUI – involuntary leakage with cough, sneeze, etc Regular UI as defined by involuntary excretion or leakage of urine in inappropriate places or times twice or more a month, regardless of quantity loss	60±9; 62.5±11.6; 63±13 Height: 164+/-6/6; 162±5.6; 164±6.7 Gestation age: 39.7; 40.2 ; 38.8 Birth weight: 3,251; 3,450; 3,260 Israeli women delivered at Tel Aviv Sourasky Medical Center		Duration of 1st, 2nd, and active second stages of labor were stat longer (p<.05) in women who had PP SUI compared to those without P SUI (376 vs. 287min, 121 vs.. 103 min; 61 vs. 43min) Older maternal age (36 years vs. 32 years), heavier maternal weight (71kg vs. 63kg) and prevalence of SUI during pregnancy was noted among incontinent vs. continent women
Hagglund, 2004[17] 4 year followup cohort study II-2A	145 incontinent and 193 continent women in year 2000, who had participated in 1995 prevalence study. Response rate 73% (248/338) Of 248 responders at followup, 118 reported UI and 130 reported being continent. Changes in type of UI measured using DIS "do you have problem with involuntary loss of urine?"	Swedish women	Age; 22-50 years	Women continent at baseline incidence 22-30 13% 31-40 16 41-50 18 Women incontinent at baseline 22-30 33 31-40 18 41-50 13
Haltbakk, 2004[18] Prospective cohort no control mentioned ? historical control	480 Norwegian men at St. Olavs Hospital, Trondheim Norway. Tentative diagnosis of BPH made on 612 patients and from this pool, sample analyzed was 480 (78%). ICS LUTS questionnaire (ICS-BPH) between 1997-2000. IPSS, SPI and SISI used also. UI defined as any involuntary leakage of urine.	Mean age of patients was 67 years, SD 10.6 years; median 69 years range 39-91 years 15% mild symptoms 54% moderate symptoms 31% severe symptoms Mean age in incontinent group was 68 years	Age	3/4 of men experienced sleeping problems during previous months and 31% had experienced sleeping problems issues related to altered lifestyle were recognized by 7-90% of men and 47% reported they would be mostly dissatisfied if their current urinary symptoms persisted for rest of life. Incontinent group – 64% had sx ≤5 years

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
				22% for 5-10 years 6% for ≥10 years remaining 8% did not indicate
Holroyd-Leduc, 2004[19] Population based Prospective cohort Confounders – sex, age, socio-economic status, race, smoking, alcohol, BMI, sensory impairment, comorbid disease, depression, cognitive function and baseline dependency. II-2A	6,506 of 7,447 subjects ages ≥70 in the Asset and Health Dynamics Among the Oldest Old study who had complete info on continence status were baseline –outcomes 3 groups- 5,872 nursing home, 5,521 ADL decline and 5,509 IADL decline as outcomes Subjects interviewed in 1993 and 1995 Blacks, Hispanics, and Florida residents were over sampled Overall response rate was 80% UI measured "next question might not be easy to talk about, but it is very important for research on health & aging, during the last 12 months, have you lost any amount of urine beyond your control?"	Mean age ≤SD = 77 (range 69-103) 63% female 86% White Median number of baseline comorbid medical conditions was 2 10% received help with 1 or more ADLs and 23% were receiving help in 1 or more IADLS at baseline Patients with UI had more comorbidities (p=.001), higher rate of visual impairment (35% vs. 22.4% p <.001) and hearing impairment (39.7% vs. 30.5% p<.001) Community dwelling in U.S.	Age Sex SES Race Smoking/alcohol BMI Sensory impairment Comorbidity Cognitive scores Depression ADL IADL	UI and outcomes adjusted OR (95%CI) Death: 10.9% .90 (.67-1.21) Nursing home: 4.4% 1.33 (.86-2.04) ADL decline: 13.6% 1.24(.92-1.68) IADL decline: 21.2% 1.31(1.05-1.63) More functionally impaired at baseline
Hunskaar, 2004[20] Cross national study, Prospective No control group	Postal survey mailed to 29,500 households in 4 countries. 58.1% response rate 5,976 women with UI included in analysis (35%) Definitions used by ICS; symptoms in last 30 days and in last 7 days	Age ≥18 years France – 44.8 Germany – 59 UK – 45 Spain – 64 All – 58	Age Ethnic background	No new cases reported Only prevalence reported by country
Jackson, 2004[22] Population based Prospective cohort; also randomly selected	1,017 post menopausal U.S. women ages 55-75 enrolled in HMO and followed for 2 years (1998-2002) inclusion criteria were no natural menstrual cycle	Frequency of Exposures at Enrollment and University Risk of Symptomatic Urinary Tract Infection Characteristic (%) Hazard ratio Washington State, USA	Smoking Alcohol Depression Diabetes BMI	Incidence of UTI was .07 per person per year. Independent predictors of infection included insulin treated diabetes (hazard ratio

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
from HMO diabetes registry II-2A	in past 12 months. Exclusion: oral estrogen or vaginal estrogen, residential nursing care, restriction to wheel chair, dementia or severe psych disorder, indwelling catheter or intermittent urinary catheter, end stage renal disease requiring dialysis, active malignancy other than skin cancer, chronic antibiotic use, acute cystitis in past 90 days. Post void residual bladder volume measured using portable ultrasound device 12 month followup done by 87% and 24 month followup by 81% Primary study outcome was sx cystitis		Parity Hysterectomy Oral estrogen use COPD Stroke Arthritis Age Race Urinary tract infection Vaginal estrogen use Race and arthritis were associated with SI and Urge. Current oral estrogen use and arthritis were associated with 1.5 to 2 fold higher odds of SI and Urge See table 4	[HR]_3.4;95%confidence interval [CI]: 1.7 to 7.0) and a lifetime history of urinary tract infection(HR for six or more infections = 6.9; 95% CI: 3.5 to 13.6). Borderline associations included a history of vaginal estrogen cream use in the last month (HR = 1.8; 95% CI: 1.0 to 3.4), a history of kidney stones (HR_1.9; 95% CI: 1.0 to 3.7), and asymptomatic bacteriuria at baseline (HR = 1.8; 95% CI: 0.9 to 3.5). 27% white reported weekly UI vs. 14% black (95% Confidence Interval) Complete sample† 1017 (100) Age (years) 55-59 32 1.0 60-69 42 1.3 (0.8–2.2) 70-75 26 1.6 (0.9–2.9) Ethnicity White 87 1.0 Other 12 0.6 (0.3–1.2) General health score from SF-36‡ 76-100 (51) 1.0 51-75 (37) 2.0 (1.2–3.3) 0-50 (12) 2.6 (1.3–4.8) Smoking history Never (55) 1.0 Former (39) 0.9 (0.5–1.4) Current (6) 0.1 (0.02-0.8) Diabetes at baseline No (79) 1.0 Yes (21) 1.9 (1.1–3.1) Diabetes treatment type

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
				Not diabetic (79) 1.0 Diet or pill (17) 1.2 (0.7–2.0) Insulin (4) 4.7 (2.2-10.3) Accidental leakage of urine in last year No (34) 1.0 Yes (66) 1.6 (0.9–2.7) Type of urinary incontinence in last month None (41) 1.0 Stress only 174 (17) 19 0.9 (0.5-1.8) Urge¶ only 106 (10) 20 1.7 (0.8-3.6) Stress and urge 324 (32) 52 1.4 (0.9–2.4) Postvoid residual bladder volume <50ml residual (79) 1.0 50-100ml residual (10) 1.1 (0.5–2.2) >100ml residual (10) 1.6 (0.8–3.2) History of hysterectomy No (69) 1.0 Yes (31) 1.2 (0.8–2.0) History of kidney stones No (90) 11.0 Yes (5) 2.4 (1.2–4.9) History of bladder or urinary surgery No (90) 1.0 Yes (10) 1.6 (0.9-3.0) Parity (number of full-term pregnancies) 0 (14) 1.0 1-3 (63) 1.3 (0.7-2.5)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
				≥4 (23) 2.2 (1.1-4.3)
Johnson, 2004[23] Long-term cohort, Prospective study of RRP vs. radiotherapy II-2B	Men from the Prostate Cancer Outcomes Study diagnosis with primary prostate cancer between Oct 1994-Oct 1995 Residents of LA, King County Washington, states of Connecticut, NM, UT. Between ages of 60-89 years in King County and younger than 90 in others. Self questionnaire at 6, 12, 24 and 60 months after diagnosis and medical record review at 12 and 60 months. 11,137 men identified in registries; 5,672 randomly selected, letters sent to 4,736 (83.5%) of selected cases. Total of 3,533 men (62.3%) completed 6 and 12 months were included in f/u cohort. 1,433 men had RRP completed 6 months 1,178 did 24 months (82.2%) 1,109 did 60 months (77.4%) For radiotherapy – urinary problems not reported Questionnaire also translated into Spanish and interview conducted in Spanish when necessary.	1,433 men RRP 642 men received radiotherapy RRP group – wt % by race NHW AA Hispanic Arthritis 33.3 38.6 35.8 Diabetes 11.1 29.5 17.2 COPD 7.5 6.6 5.4 HF 4.9 2.1 4.4 CVA 2.6 2.5 3.3 HTN 37.3 54 37.5 MI 7.9 4 4.2 Age at dx <60 27.5 38.6 23.4 60-64 26.8 26.1 30 65-75 41.9 32.9 45.5 >/=75 3.8 2.4 1	Prostate cancer RRD Radiation therapy	Wt % for men with RRP NHW AA Hispanic Level of urinary control baseline Total control 87.9 86.6 80.5 Occ leakage 8.8 9.5 11.2 Freq leakage 2.1 2 6.5 P = .77 .29 6 months total control 22.7 27.6 28.9 occ leakage 52.1 44.2 40.8 freq 22.6 23.4 26.7 p = 57 .83 12 months total control 33.1 38.5 37 occ leakage 50.2 51.4 46.9 freq 15.6 9 14.9 p= .24 .26 24 months total control 38.2 41.9 35.2 occ leakage 50.2 45.1 53 freq 9.8 11.1 11.3 p = .86 38 60 months total control 30.8 49.3 32.8 occ leakage 53.7 39.7 47.4 freq 14.3 10.4 18.7 p = .01 .36

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
Lagergren, 2004[24] National, longitudinal, multi-purpose study in Sweden (SNAC). Study consisted of two parts – population part and the care/service part. II-2A	Swedish men and women ≥65 years starting in 3/2001-3/2004. 12% in SNAC is 65-79 years old, 6% >80 years Total pop of SNAC 17,044; baseline 8,627 targeted persons/ 7,518 sampled 16-25% of SNAC received public care Followup every 6 years starting at 66 years Combo of interviews and questionnaires	Functionally disabled – 37% Average PADL – 6.9 Severe cognitive impairment (Berger 2-6)- 27% Severe mobility restrictions – 51% Men 3,052 Women 4,465 Total 7,518 Skane, Karlskrona, Kungshomen and Nordanstig, Sweden Average age 85 compared to average age in Sweden 83	Men 3,052 Women 4,465 Total 7,518 Avg age 85 compared to avg age in Sweden 83 Residency	Prevalence Severe UI – Ordinary homes – 15% Special accommodations - 44% Total 31%
Liebling, 2004[25] Prospective study	393 UK women with term singleton, cephalic pregnancies who required op delivery at full dilatation between 2/1999-2/2000 from a cohort of 10,106 deliveries Postal questionnaires at 6 weeks and 1 year study conducted at St. Michael's Hospital, Bristol, UK Only instrumental vaginal deliveries performed in surgery as the definition of difficult vaginal operative delivery.	Instrumental; C-section; OR (95% CI) (184) (209) Primi: 78%; 79%;1.09(.67-1.77) Age >35: 14%; 9% Nonwhite: 7%; 5% BMI >30: 7%; 15%; .44; (.22-.86) 25% attempted with forceps 51% were ventouse 24% both ventouse and forceps rotational delivery attempted in 59%	Mode of delivery Age Parity	Women in instrumental delivery group were more likely to have UI more occasionally at 6 weeks adjusted OR 7.8 (95% CI, 2.6-23.6) and at 1 year OR 3.1 (95% CI, 1.3-7.6) Multiparity was a significant risk factor for 'more than occasional' UI at 1 year with an adjusted OR of 2.39 (95% CI, .99-5.73) At 6 weeks: Instrum c-section UI 16.2% 2.7% OR 7.8(2.58-23.55) At 1 year: 17% 5.4% OR 3.12(1.27-7.64) Difficulty holding on to urine 12.9% 6.6% At 6 weeks: OR 3.59 (1.22-10.54) At 1 year: OR 1.90 (.81-4.45)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
McGrother, 2004[26] Cross sectional and longitudinal II – 2B	United Kingdom women AND men 162,533 prevalence study and 39,602 incidence study people age ≥40 years Response rate 60 and 63% respectively and 79% at followup Excluded people living in institutional settings	15% age ≥65 years 85.5% White 44.9% employed 91.8% good health Mean age: 57 54% women	Gender	Female to male ratio for storage disorder was 1.5 and was highest with incontinence at 2.6; urgency, 1.6; frequency, 1.4; and nocturia 1.0.
Neumann, 2004[27] Prospective study II-2A	Study group – 549 Denmark women who had hysterectomy from 1/1/98-12/31/2000 born after 1939 Background group – 144 women who had non-GYN surgery born between 1940-1965 who had lap chole in Denmark. Nulliparae were excluded. Questionnaire sent 9- 45 months postop SI was involuntary leakage during effort, urge as leakage with a sense of urgency, significant UI was defined as involuntary leakage at least once a week, bothersome UI as significant incontinence and use of devices, decreased social ability or having hygienic problem with incontinence. Questionnaires returned by 82% in study group, 76% in background group	All women were Caucasian In study group 12% hysterectomy – 33% of these had abdominal, 55% vaginal	BMI	BMI associated with de novo significant urge Incontinence and de novo urgency (r=.18 and r = .15 p<.01) – BMI accounted for 1-2% of the variance in these variables BMI associated with SI before and after hysterectomy (r=.20 and r=.21 p<.01)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
Ozerdogan, 2004[29] Cross sectional study, Prospective II-2A	625 women living in Turkey ages 20 and over 4 different cities of Turkey. Questionnaire and I-QOL; Rare – UI less than once a month Reg – UI more than twice per month Serious – continuous use of sanitary protection. SI and urge defined as usual definitions	Age distribution 20-29 – 26.4% 30-39 – 22.6 40-49 – 18.7 50-59 – 13.4 60-69 – 11/7 ≥70 – 7.2 illiteracy rate 9.4% 1 out of 4 resided in rural area 1 in 5 gave birth at least 4 or more times and most were vaginal deliveries (25%)	Age BMI Smokers Diabetes	UI was associated with advancing age (p <001) UI rate increased from 9.69% in 20-29 to 40% in >70 years. Hysterectomy was a risk factor for MI and Urge (p<.001) BMI (OR 12.75, 95% 6.68-24.6) Diabetes (OR 3.55, 95%, 1.44-8.73 Neuro (OR 3.8, 95%, 1.69-8.58 RUTIs (OR 4.73, 95%, 2.52-8.88) 50% BMI >25, 25% smokers, recurrent UTIs 19%, Diabetes 6.6%, COPD 7.5% Neuro disorders 11.2%
Schytt, 2004[30] Prospective, longitudinal cohort II-2A	Swedish women after childbirth at 593 clinics in Sweden. 5,550 women booked appointments during recruitment time, 4,500 eligible, 3,191 consented, and 3,061 completed 1st questionnaire, 2,762 completed 2nd, and 2,563 completed 3rd. Total 2,450 completed all three. Study sample was 2,390 women after exclusion factors also. Selected data from a National Swedish survey investigating physical and psychological assessment of childbirth May and Sept 1999 and January 2000 antepartal visits Three questionnaires 1st at baseline, 2nd mailed 6-8 weeks after the birth and 3rd 1 year after birth. Women were	Average gestation answering 1st quest – 16 weeks, 2nd – 10 weeks post, 3rd – 1 year and 2 weeks. Average age at recruit – 29.5 years Primiparas – 44% Multiparas – 56% 79.2% had vaginal delivery 13.4% had C-section	Age Parity Education Mode of delivery Smoking	Strongest predictor for SI at 1 year in primiparas as well as multi, was UI during pregnancy and PP. Other predictors were obesity and constipation during pregnancy and after birth. Within the vaginal delivery group, the most important predictors were UI during the third trimester (RR 2.4; CI 95% 2-2.8) and 4-8 weeks PP (RR 2.9, I 95% 2.5-3.3), multiparity (RR 1.3, CI 95% 1.1-1.5), obesity, (RR 1.5 95% 1.1-1.9) and constipation during the third trimester (RR 1.4 (5% CI 1.2-1.6)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
	asked to recall any symptoms of UI during the pregnancy and post. Excluded miscarriages, non-Swedish speaking, and women from nonparticipating clinics, delivery of twins			
Stenzelius, 2004[54] Cross-sectional Adjusted by: Age, Gender, Quality of life, Occupation, Economy, Living condition, Need of help, Satisfaction with children contact, and problems with Communication, Mobility, Elimination, Digestion, Breathing and circulation Psychosocial problems Other type of pain Level of evidence: III	Subjects were selected and mailed a questionnaire from a randomized, age-stratified sample of persons ≥75 years living in a southern part of Sweden. Response rate: 52.8% (n=4,277) Data source: Self-reported postal questionnaire Incontinence as a yes to the question, "Have you had problems controlling urine in the last 3 months?"	Age: 75 and above Mean: 83.7 (SD: 5.69) Gender: Male and Female Male: 38.4% Female: 61.6% Race: Not reported Ethnicity: Not reported Residency: Community dwelling and special accommodations residents in Southern Sweden.	**Risk Factor** OR 95% CI Sex (0=women, 1=men) 0.68 0.58; 0.81 Difficult talking 1.25 1.04; 1.54 Memory problems 1.7 1.42; 2.03 Difficulty walking 1.63 1.37; 1.95 Mobility limitation 1.23 1.02; 1.48 Oedema in legs 1.32 1.11; 1.58 Other urinary symptoms 1.37 1.10; 1.71 Diarhoea 0.66 0.50; 0.88 Dizziness 1.26 1.07; 1.50 Protracted coughing 1.33 1.04; 1.69 Fatigue 1.21 1.02; 1.44	
Vandoninck, 2004[55] Age stratified Prospective cohort for men in the original study. Mentions sampling weights upon the	Dutch women from Urepik (Uro Epi in Europe and Korea)study in the community In 1999, a national postal questionnaire survey 1,460 spouses of 1,771 men. 1,071 returned- 73% response rate	Mean age 57 (29-79) 34% minimal UI 12% severe Mean parity 2.6 13.5% women were childless During the past month: % How often have you leaked urine? 0 Never 54.5	Age Parity	No relationship between mean parity or age and presence of UI; only in oldest category (figure graph in article).

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
ratio of # of women in each age group in the sample to # of women in the age group in population. ?Prospective cohort, no controls	UI assessed by total score on short UI specific questionnaire – 3 groups – no symptoms score 0-2; minimal 3-6 and severe 7-14. In addition self reported UI calculated conforming to ICS standard definitions. "Do you ever have involuntary urine loss?" QOL also used	1 Not more than once a week 19.6 2 More than one but less than three times a week 10.0 3 More than three times a week 6.0 4 Nearly always 8.6 If you experienced urine loss, how much did you leak? 0 I never leak 50.2 1 Some drops 32.2 2 A small stream 11.4 3 Protection material or clothes soaking wet 4.9 4 Leaking through pads or clothes 0.3 How often do you use protection material 0 Never 68.1 1 Occasionally 21.4 2 Nearly always 3.9 3 Always 5.8 Did you lose urine on coughing or sneezing? 0 Never 31.1 1 Occasionally 45.0 2 Nearly always 13.5 3 Always 9.3		
Arya, 2001[56] Prospective Observational II-2	Subject selection: 315 consecutive primiparous women delivering by forceps (n = 90), vacuum (n = 75), or spontaneously (n = 150). Follow-up for urinary incontinence was done at 2 weeks, 3 months, and 1 year after delivery. The labor room logs were screened every morning by a research nurse to identify patients who met the	Women ≥18years USA		

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
	eligibility criteria for the study. Inclusion criteria: primiparity, vaginal route for delivery, age, gestational age ≥37 weeks, and accessibility by telephone. Exclusion criteria: history of urinary incontinence before or during pregnancy, delivery by cesarean section, known diabetes or neurologic disease, and non- English speaking. Definition: Urinary incontinence was defined as the presence of urine loss of any amount that had occurred on at least 2 occasions.			
Sherburn, 2001[57] Cross-sectional and Longitudinal phases III	Subject selection: **2** parts: (1) a cross-sectional phase involving a population-based sample of 1,897 Australian-born women who participated in the baseline interview; (2) a 7-year follow-up phase, assessing a 373 women (premenopausal at 1 year follow-up) from the cross-sectional study. Eligibility for longitudinal study: menstruation in previous 3 months, an intact uterus, at least one ovary, and not currently taking oral contraceptives or HRT. Response rate: of original cohort, 779 met these criteria and 438 (56%) agreed to be interviewed in the first year of the longitudinal study.	Women 45-55 years. Australia	Multivariate analysis found that urinary incontinence patients were significantly more likely than those without incontinence to have higher body mass index (odds ratio [OR] 1.50, 95% confidence interval [CI] 1.15, 1.95), have had gynecologic surgery (OR 2.17, 95% CI 1.42, 3.32), report urinary tract infections (OR 4.75, 95% CI 2.28, 9.90), diarrhea or constipation (OR 1.95, 95% CI 1.27, 3.00), and have had three or more children (OR 1.47, 95% CI 1.06, 2.05).	During the 7-year follow-up phase, overall incidence was 35%. Women who experienced a hysterectomy during the follow-up period had a higher incidence.

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
Van Kessel, 2001[58] Retrospective Observational II-2 Adjustment for factors including mode of delivery, age in years, and duration of enrollment	Subject selection: The study was conducted at a managed care organization with over 500,000 enrollees. All women who had given birth between 1982 and 1986 and who were continuously enrolled until 1998 were identified with the patient computerized data file. From this cohort, a random sample of women with SUI was selected. 43,288 mother-baby pairs were identified within the computerized database. A random, case-controlled sample of 85 cases and 88 controls was identified	Women 22.6-52.9 years USA	After adjustment factors, the risk for SUI associated with duration of second stage of labor was 1.10 (95% CI 0.90-1.28; *P* = .5) There was no significant difference in mode of delivery between cases and controls with one exception; 10.7% of the cases underwent forceps delivery compared with only 1.1% of controls (odds ratio, 10.4; 95% confidence interval, 1.17-93.4; *P* = .04)	
Larrieu, 2004[59] Cross-sectional III	Data from the Three-City (3C) study; a collaborative research program from a cohort of 9,294 community-dwellers ≥65 years. Subjects living at home were randomly sampled from electoral rolls. Included 8,966 subjects after excluding 328 subjects with missing BMI.	Men and Women ≥65 years 3566 men (39.8%); Mean age: 74.2 y (SD=5.6, not different according to sex) France	BMI	The univariate analysis showed quite frequent incontinence (20.4%) with prevalence significantly higher in the severely obese (39% *vs.* ~ 20% in other categories of BMI, P<0.0001).
Viktrup, 1992[60] Observational II-2	305 primiparas interviewed repeatedly about stress incontinence before and during pregnancy and after delivery over 6 month period. Definition: ICS	Women 17-41years Denmark	Pregnancy	SUI Before pregnancy: 4% During pregnancy: 32% After pregnancy: 7%
Van Kuijk, 2001[61] Observational (cohort) II-2	Subject selection: All patients with first-time, unilateral hemispheric stroke admitted from August 1994 to August 1997 for a post-acute inpatient rehabilitation	Men and Women Age: Men: Mean, 62+-11.5; Range, 32-83yrs Women:		Incidence rates: Overall: 29/1000 Women: 17/1000 Men: 39/1000

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
	program. Exclusion criteria: non-ischemic stroke, history of previous stroke, evidence of brainstem lesions or bilateral signs on examination, diabetes mellitus, use of anticholinergic medication, history of urinary incontinence, previous urologic surgery, indwelling or intermittent catheterization not regarded as incontinent because of stroke. Definition: Urinary incontinence as any form of involuntary urinary loss. Only urinary incontinence ≤6 months post stroke, considered to be from stroke.	Mean, 62+ - 12.7 years; Range, 30 - 83 years Netherlands		The incidence rate of urinary incontinence was 29/1,000 persons per month (95% confidence interval [CI], 18-48/1,000 persons monthly).
Schmidbauer, 2001[62] Cross-sectional III	Subject selection: Analysis of ~2,500 participants in a health screening project in the area of Vienna, using Bristol LUTS incontinence questionnaire and (a) medical history; (b) a physical investigation; (c) socio-demographic parameters (smoking, eating and drinking habits), and (d) urine and blood study including 14 parameters. The parameters collected during this health investigation were correlated to the presence of urinary incontinence to identify potential risk factors for urinary incontinence. Definition: UI was defined as any involuntary loss of urine within the past four weeks.	Age: Men (49.7+-13.6 years), Women (48.6+-13 years) Austria	Parity showed a strong correlation to UI. 26.3% reported episodes of urinary incontinence in the past 4 weeks. Other factors, age (r = 0.22), BMI (r = 0.20), urgency (r = 0.16), feeling of incomplete bladder emptying (r = 0.21), previous uro-gynecological surgery and fasting blood glucose correlated significantly to UI., 5% of men were incontinent, age (r = 0.12), urgency (r = 0.16), nocturia (r = 0.16), feeling of incomplete emptying (r = 0.16), reduced uroflow (r = 0.18) and previous	In women with no childbirth 16.5% reported on UI, this percentage increased to 29.9% (one child), 29.6% (two children), 33.3% (three children), and 57.7% (four or more children).

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
			prostatectomy (r = 0.11) correlated to the presence of UI. Smoking habits and education level revealed no association in either sex.	
Hu, 2004[63] Observational II-2	**Subject selection:** women at Group Health Cooperative of Puget Sound (GHC), a staff-model health maintenance organization with approximately 450,000 members in western Washington State. Study subjects with a recent diagnosis of acute UTI. Women were then randomly selected from GHC enrollment files to serve as control subjects, matched to cases by date of birth (within 2 years).	Women aged 55-75 years USA	Acute UTI	Case subjects more likely than controls to report episodes of incontinence >x/month (age-adjusted OR, 1.74; 95% CI, 1.44-2.10) and incontinence with typical quantities greater than a few drops (age-adjusted OR, 1.71; 95% CI, 1.38-2.11). Infrequent incontinence and incontinence of only a few drops were not associated with increased odds of UTI.
Bradley, 2005[64] Cross-sectional Adjusted by: Age, BMI, Parity, Smoking, Alcohol use, Coffee, Exercise, Education, Prior surgery, Angina, Hypothyroidism, Hypertension, Asthma, Pelvic floor symptoms Level of evidence: III	Women with intact uterus enrolled in the Women's Health Initiative Hormone Therapy trial. Response rate: 88% (n=297) Data source: Self-reported written validated questionnaire Incontinence as, "Urinary leaking at least once in the last 3 months."	Age: Mean: 68.2 (SD: 5.6) Gender: Female Race: Not reported Ethnicity: Not reported Residency: Midwest, USA	Risk factor Age Body mass index	UI / OR Difficulty emptying bladder / 3.3 (0.9, 12.2) Feeling of incomplete bladder emptying / 3.4 (1.3, 9.2) Weak urinary stream / 6.4 (2.0, 20.0) Intermittent urinary stream / 4.0 (1.6, 10.4) Vaginal or perineal splinting to defecate / 2.2 (1.0, 4.8) Feeling of incomplete bowel movements / 2.7 (1.2, 5.9) Urgency / 1.8 (0.8, 4.0) Urge urinary / 2.2

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life	
				leaking	(1.0, 4.8)
				Intermittent urinary stream	0.8 (0.3, 1.9)
			Exercise (>weekly)	Urinary urgency	0.6 (0.4, 1.0)
				Fecal urgency	0.3 (0.2, 0.8)
			Coffee drinking	Difficulty emptying bladder	8.6 (1.4, 55.0)
				Weak urinary stream	5.3 (1.5, 19.0)
			Smoking	Pelvic heaviness	5.4 (1.0, 30.0)
				Fecal urgency	2.9 (0.7, 11.7)
O'Donnell, 2005[65] Observational II-2	Subject selection: In 2001, a 13 item questionnaire was mailed to a representative sample of 29,500 community-dwelling women to determine the prevalence, type and treatment behavior of women with UI. Within 2 months of the initial survey a more detailed self-completion questionnaire was mailed to a randomly selected sub-sample of 2,953 women identified as having UI from the initial survey. Follow-up included questions on general health status, quality of life and help-seeking behavior, characteristics of UI, and women's attitudes to health care in general and UI specifically. Response rate: 58% in the initial and 535 in the second. Definition: UI was defined as any	Women ≥18 years with UI France, Germany, Spain and the UK.	UI and women's attitudes were found to be associated with help-seeking after adjusting for age, UI duration and frequency, and 'bother' of UI; factors traditionally associated with help-seeking. After adjustment for these factors, willingness to take long-term medication and having spoken to others about UI were found to be strong predictors of help-seeking in all four countries.	Initial survey: SUI France: 30% Germany: 40% Spain: 39% UK: 41% Total: 37% UUI France: 27% Germany: 16% Spain: 20% UK: 16% Total: 20% MUI France: 34% Germany: 37% Spain: 26% UK: 34% Total: 33% Followup survey: SUI France: 37% Germany: 46%	

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
	leakage or involuntary loss of urine, conforming to the standards recommended by the ICS. For the purpose of this study this definition was restricted to an incidence during the last 30 days.			Spain: 44% UK: 44% Total: 43% UUI France: 9% Germany: 9% Spain: 14% UK: 10% Total: 10% MUI France: 50% Germany: 42% Spain: 34% UK: 42% Total: 42%
Samuelsson,2000 [66] Cross-sectional Adjusted by:, Age Parity, Weight Smoking Type of delivery Co-morbidity Hormonal use Surgical history Pelvic floor muscle strength Genital prolapse Level of evidence: III	Subjects were selected from women aged 20-59 who were invited in for their gynecological health examination. The exam is conducted every third year for women in Sweden. Response rate: 76% (n=487) Data source: Self-reported postal questionnaire Incontinence was defined as a positive response to, “Do you suffer from involuntary loss of urine?”	Age: 20-59 Gender: Female Race: Not reported Ethnicity: Not reported Residency: Urban area in Mid-Sweden	Age years 20–29 years 30–39 years 40–49 years 50–59 years Parity 0 deliveries 1 delivery 2 deliveries >3 deliveries Smoking habits Never smoked Former smoker Current smoker Weight 45–58 kg 59–70 kg 71–105 kg ERT use No Yes	Crude Odds ratios 1 4.18 2.04; 8.57 7.21 3.47; 15.00 9.52 4.82; 18.82 1 3.92 2.14; 7.20 5.24 3.01; 9.10 8.59 4.53; 16.27 1 1.28 0.78; 2.09 1.78 1.12; 2.86 1 0.54; 1.41 0.87 0.65; 1.96 1.13 2.67; 8.93 1 4.89

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life	
			Type of delivery	Prevalence, %	
			Vaginal		
			Section	42.2	
			Episiotomy	30.8	
			No episiotomy		
			Episiotomy	45.2	
			Maximum birth weight (g)	35.7	
			<3199		
			3200 – 3924	35.5	
			>3925	44.7	
			Type of genital prolapse	43.8	
			Loss of urethrovesical crease	53.2	
			Rectocele	55.3	
			Cystocele	58.1	
			Uterine prolapse	72	
			Degree of prolapse		
			None	18.7	
			Not to introitus	47.9	
			To introitus	62.5	
			# of prolapse components		
			None	18.7	
			One	31	
			Two	59.6	
			Three	66.7	
			Four	100	
			Age (years)	Adjusted odds ratios	
			20-29	1	
			30-39	2.31	1.18; 4.51
			40-49	2.2	1.07; 4.52
			50-59	3.47	1.25; 4.90
			Parity		
			0 deliveries	1	
			1 delivery	1.38	0.68; 2.81
			2 deliveries	1.84	0.94; 3.59
			3 deliveries or more	2.71	1.27; 5.77
			Smoking habits		
			Never smoked	1	reference

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life	
			Former smoker	1.42	0.81; 2.57
			Current smoker	1.86	1.08; 3.22
			Pelvic floor muscle strength (scores)		
			4	1	reference
			3	1.51	0.87; 2.62
			2	2.56	1.33; 4.93
			1	3.44	0.51; 23.09
			Presence of cystocele and/or absence of urethrovesical crease		
			No	1	»
			Yes	2.49	1.48; 4.18
			ERT use		
			No	1	
			Yes	2.91	1.44; 5.89

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
Adelmann, 2004[50] Prospective cohort	Community UI prevalence sample of 910 persons to a 1998-1999 survey enrolled in a Medicaid managed health plan Seven county Minneapolis-St. Paul metro area Age ≥65 Random sample of 910 persons enrolled in Medicaid health plan. Of this the n= 378 that were eligible due to UI. Sample was further limited to persons based on at least one claim for a doctor's visit and medical chart could be located. n=236 Nursing home abstraction sample was randomly drawn from Medicaid persons for a total of 480 persons. Interviews face to face in residence. Response rate 59%, cooperation rate 90%. Abstraction of medical record at clinics also. Definition: ever/current UI measured by a yes response to questions about trouble holding urine or leaking urine	Characteristics of community and nursing home N=910 Community NH (%) Women 82.1% 79.2 Men 17.9 20.8 Age 65-74 50% 14 75-84 34.9 34.2 85+ 15.1 51.9 Mean 75.9 84.5 Race White 69.4 93.8 Black 14.5 4.6 Other 16.2 1.7	Race Age Gender	Prevalence of UI in community sample Ever/current Past week UI (%) Total 41.6 23 Women 45 25.5 Men 25.8 11.7 Age 65-74 34.1 17.6 75-84 45. 26.2 85+ 58.1 33.8 Race White 45 25.5 Black 39.8 20.3 Other 30.1 16.1 Subgroup report by race and age Race among women (self report) p<.003 p<.016 White 49 28.7 Black 43 22.4 Other 31.9 16.4 p,.001 p<.001 65-74 37.4 20.4 75-84 47.7 27.6 85+ 62.1 36.3 Age among Whites p<.001 p<.001 65-74 35.3 19.5 75-84 49.8 27.7 85+ 59.1 35.7 Age among Blacks p<.037 p<.021 65-74 34.1 14.6 75-84 46.2 28.2 85+ 71.4 57.1 Age among White women p<.001 p<.005 65-74 39.1 22.9

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
				75-84 53.1 30.3 85+ 62.3 37.7 Age among Black women p<.044 p<.050 65-74 36.4 16.7 75-84 50 29.4 85+ 71.4 42.9 Medically detected UI in community and nursing home samples Community Nursing Home Past 18 months Past 12 months Total 22.3% 77.2% Gender p=.278 p=.174 Age in years p.868 p<.001 65-74 61.2% 75-84 75% 85+ 82.7% race also insignificant p Prevalence of medically treated UI Community Nursing Home past 18 months Past 12 months any type 64.8% 6.5% SI 38.9% 3% Urge 9.3 0. Other 5.6 2.4 Mixed 11.1 0.3
Andersson, 2004[10] Population based study II-3	Swedish population, both men and women ages 18-79 years (Orebro county) in March 2000 Questionnaire mailed to home comprising 12 questions on UI as a supplement to a large public health survey on health and general living. Mailed to 15,360 randomly selected residents out of 274,000 populations in this county. Response rate 64.5%	7,680 females 7,680 males	Age Gender	Prevalence reported by age and gender for weekly Women (men) Women (men) 18-35 – 3 (1); 35-49 – 10 (2); 50-64 – 13 (3); 65-79 – 21(8). Total for weekly Women – 11% Men 3% SI total for women 77%, men 13% 18-34 – 59(18); 35-49 – 83(13); 50-64 – 83(11); 65-79 – 71(13) Urge Incontinence for women 46%;

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
				men 45% 18-34 – 42(18); 35-49 – 38(37); 50-64 – 48(43); 65-79 – 53(59)
	Swedish population 3/2000, Life and Health questionnaire sent to 70,000 residents randomly selected. In Orebro, pop of 274,000, one of the five counties that participated in above study, a special section on UI was given to a sample of 15,360 residents Postal questionnaire with 12 questions on UI Sample of 15,360 residents ages 18-79 years of Orebro, Sweden; Response rate was 64.5% Used definitions from ICS Stats on weights and calibration and found results were the same	7,680 females 7,680 males Age categories 18-36 53.9% 35-51 60.3 50-66 69.6 65-81 72.2	Gender Age	Women more affected than men Proportion of people with UI increased markedly with age At least 1/week / At any time Women 11% 27% 18-34 3 10 35-49 10 26 50-64 13 37 65-79 21 39 Men 3% 10% 18-34 1 3 35-49 2 6 50-64 3 13 65-79 8 21 SI / Urge Women 77 46 Men 13 45 Duration of UI years <1 24% 1-6 51 6-11 14 >10 11
Bogner, 2004[11] Population based longitudinal survey II-2B	ECA (Epi Catchment Area) program was used to sample from Baltimore to include 3,481 persons selected from East Baltimore for this study. Community dwelling adults who were initially living in East Baltimore in 1981. Out of 3,481 persons, 1,920 were contacted (73% of original cohort). Study sample included 822 persons aged ≥50 who completed info on UI. After exclusions for missing data, 747 were the final sample.	Mean age of study sample was 67.2 64% were women 72.3% White; mean age 68.2 ± 11 27.7% AA – mean age 64.5 ± 10 White / Black Diabetes 14.3 16.9 Heart trouble 27.4 26.6 Arthritis 51.1 56.5 Stroke 8.2 7.3 Cancer 14.4 6.3	Age Gender Functional status Cognitive status Chronic medical conditions-diabetes, heart trouble, stroke, arthritis or cancer Race	22% Whites reported UI 13% of Blacks reported UI 19.8% reported UI during the year preceding the interview White (540) / Black (207) UI 22.4% 13% No information on SI, Urge Incon. Association between UI and Psychological Distress Crude / Adjusted OR (95% CI)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
	African Americans and Whites aged ≥50 at followup interview performed 1993-1996 Age ≥65 were over sampled GHQ used and self report on UI UI = "Have you ever had any difficulty in controlling your water, losing your urine or having trouble getting to the bathroom on time?" If any uncontrolled urine loss was reported within the 12 months before the interview, persons were classified as having UI.	MME 27.6±2.6 25.6±3.6 ADL impaired 1.9% 3.9%		White 1.28 (.76-2.14) 1.07 (.62-1.84) Black 4.22 (1.72-10.39) 5.6 (1.88-16.67)
Corcos, 2004[12] Prospective cohort No control mentioned	Canadian population ≥35 Stratified by census of metro area and by gender. 7,487 persons were sample base. 53.7% response rate. 3,249 interviews from Montreal, Toronto, Vancouver, and Edmonton were final sample Investigators developed standardized questionnaire to ascertain OAB and SUI and impact on quality of life. Computer assisted telephone interviews conducted in 2 steps: an initial questionnaire evaluate presence of OAB followed by detailed questionnaire completing the assessment.	48.2% men; mean age 52 51.8% women; mean age 50.9 82.4% younger than 65 and 17.6% older	Gender Age	Wet OAB markedly higher in both men and women over age 75 years No correlation observed between age and prevalence of mixed OAB in women whereas linear relationship was noted in men
Dallosso, 2004[13] Prospective longitudinal study II=2B	Part of the Leicestershire MRC Incontinence Study. This study focused on women living in the community in UK ages ≥40. A random sample of 20,244 women drawn, 12,565 returned the questionnaire (65% response rate). FFQ sent to 10,852 of above sample. 7,460 completed it (response rate 65%) 1st postal questionnaire mailed Oct	Baseline data compared to those who provided FFQ data. Median age 57 vs. 61. Rating of health poorer in baseline after adjusting for age (OR: 1.66; 95% CI 1.51-1.82). More long-term health problems in baseline (OR 1.14; 95% CI, 1.05-1.25). No difference in reporting SUI (OR: 1.02; CI 95%, .92-1.13)	BMI Fat intake Vitamin usage Cholesterol and other dietary factors Age	Incidence at 1 year followup Total N SUI cases % 40-49 1242 9.3 50-59 1272 7.2 60-69 1108 7.6 70-79 756 8.3 80y + 214 12.6 only significant p abstracted – others in article not significant Total fat OR (95% CI) Q2-Q5

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
	1998 and completed by 7,046 women. 2nd postal questionnaire mailed Oct 1999 and completed by 6,424 women (91% response rate). Excluded women living in residential or nursing homes Excluded those of South Asian origin who make up 5.3% of Leicestershire pop over 40 years. Used ICS definitions			1.38 (.89-2.13); 1.35 (.88-2.08); 1.27 (.83-1.94); 2.02 (1.33-3.05) p=.02 Sat fat 1.08 (.69-1.69); 1.46(.96-2.22); 1.08 (.7-1.67); 2.02 (1.35-3.03) p = .001 Carbs .95 (.65-1.38); .68 (.46-1.01); .59 (.39-.9); .73 (.49-1.08) p=.05 Cholesterol 1.09 (.70-1.69); 1.24 (.81-1.9); 1.34 (.88-2.04); 2.09 (1.4-3.14) p=.003 after adjusting for BMI, fat unchanged but carbs were no longer sig p=.07 3 vitamins associated with SUI Vit B12 Zinc Retinol was marginal After adjusting for BMI, association with B12 remained + while zinc was no longer sig.
de Tayrac, 2004[31] Case control, retrospective study II-3	French women – study population 717 who had Dargent and Rudigoz technique 449 did not respond 365 (50.9%) returned questionnaires 51 excluded leaving 314 women 117 patients who had a vaginal hysterectomy for menorrhagia from Jan 1991 to Dec 2001 control group of 116 patients who had conservative treatment 197 had hysterectomy for pelvic pain and 117 for menorrhagia self report questionnaire	Vaginal hyst. / Control group Age 51.4 / 50.9 Parity 2.1 / 2.2 Menopause 43.5% / 47.4% Smoking 17.9% / 17.2% Drink >2 L/day 7.7% / 9.5% History of uro sxs 0 / 0	Age Parity Menopausal status Smoking Volume of drink Did not report incidence by each of these	Prevalence (as stated in article) Vag hyster % / Control % Freq day>8: 19.7% / 16.4% Noc: day >1: 5.1 / 6.9 Urgency: 62.4 / 54.3 Qmo: 36.8 / 30.2 Qwk: 19.7 / 12.1 Qday: 6 / 12.1 UI: 39.3 / 33.6 Use of pads: 15.4 / 12.9 Urge Inc: 20.5 / 13.8 Qmonth: 12 / 7.8 Qweek: 4.3 / 5.2 Qday: 4.3 / 0.9 SI: 36.7 / 31.9 Qmonth: 18.8 / 16.4 Qweek: 12.8 / 8.6

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
				Qday 4.3 3.5 Age <60 VH Control UI 41.8% 33.7 Urge Incon 21.8 12.5 SI 40 33.7 Age >60 UI 28.6 41.7 Urge Incon 14.3 25 SI 28.6 33.3
Deliveliotis, 2004[15] Prospective cohort II-2A	283 Greek men from 441 patients enrolled. 105/142 patients treated with RRP for prostate cancer 98/151patients treated with TURP for BPH 80/148 healthy men as control completed surveys used AUA Sx Index, UCLA Prostate Cancer Index; Rand 36-Item Health Survey and BMSFI translated into Greek Patient outcomes 2 years post treatment compared to pretreatment status at 2 weeks prior to treatment investigators felt poor returns due to length of questionnaires and the number of them	Mean ages 67.4 range 55-75 group 1 70.3 range 58-74 group 2 72.4 range 62-82 control HRQOL post treatment RRP TURP Control Physical functioning 81.5 78.1 82.3	Types of surgery	RRP; TURP; pretreatment; post treatment Urinary fun 85.1; 80.2; .121; 71.2; 87.3; .005 Urinary bother 85.1; 70.6; .021; 65.1; 80.2; .003 AUA SI 11.1; 8.6; .812; 24.2; 8.2; .001 UI every day 2%; 9%; .002; 12%; 2.78%; .002 RRP had trend towards worse urinary function 2 years after surgery but difference not significant. Urinary bother deteriorated. UI in control group was 5.78%
Fritel, 2004[52] Retrospective cohort II-2C	French women from hospital database of 1st birth women who had not previously delivered fetus >22 weeks 307/669 primiparous women who delivered in 1996 in vertex position between 37-41 weeks (274 had moved and 88 did not respond) 45.9% response rate. Excluding the women who did not receive the questionnaire (274), response rate was 77.7% Mailed questionnaire sent 4 weeks after	Table I. Analysis of the differences among responders, women not reached and non-responders concerning potential risk factors for stress urinary incontinence (SUI) Risk factor Responders Not reached Non-responders p Age at delivery 29.3 [4.4]; 28.2 [4.4]; 28.9 [4.7] 0.01	Age at 1st delivery BMI Birth weight Duration of labor Duration of second stage Mode of delivery 3rd degree tear at first delivery Second delivery since 1996 Urinary leakage before	Table III. Risk factors for SUI 4 years after the first delivery SUI Risk factor: Yes (n=89) No (n=218) p Age at delivery >30 years: 53.9 (48); 36.7 (80); 0.005 BMI >27 kg/m2: 2.2 (2); 4.6 (10); 0.34 Birth weight ≥4000g 2.2 (2); 1.4 (3); 0.58 Labor ≥8 hours: 41.6 (37); 21.1 (46); 0.0002 Active 2nd stage ≥20 minutes: 16.9

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
	delivery and asked about SUI before, during, and after pregnancy – "Do you have loss of urine during physical exertion, cough or sneeze?" UI categorized slight, mode or severe using Sandvik Index	BMI (kg/m2): 21.3 [2.9]; 21.1 [2.9]; 21.3 [3.2] 0.62 Birth weight (g): 3240 [384]; 3253 [400]; 3241 [430] 0.92 Labor (hours) 6.2 [2.3]; 6.5 [2.5]; 6.6 [2.3] 0.21 Active 2nd stage (minutes): 11.1 [7.5];10.6 [7.9]; 10.9 [7.9] 0.69 C- section: 10.1 (31);17.5 (48);17.0 (15) 0.03 Forceps: 36.2 (111);31.3 (86); 44.3 (39) 0.08 Third-degree tear: 1.3 (4); 1.1 (3);1.1 (1) 0.97	1st pregnancy Urinary leakage during 1st pregnancy	(15); 19.3 (42); 0.62 C section: 6.7 (6); 11.5 (25); 0.21 Forceps: 38.2 (34); 35.3 (77); 0.63 3rd degree tear: 2.2 (2); 0.9 (2); 0.35 Leak before pregnancy: 16.1; 0.9 <0.0001 Leak during pregnancy: 40.2; 15.3 <0.0001 2nd delivery: 69.6 (53); 61.0 (133); 0.81 Table IV. Risk factors for stress urinary incontinence 4 years after the first delivery Risk factor Odds ratio 95% CI p Leakage before the 1st pregnancy 18.7 3.6–96.4 0.0005 Leakage during the 1st pregnancy 2.5 1.3–4.8 0.005 Age at the 1st delivery: >30 years: 2.4 1.4–4.2 0.002 Labor ≥8 hours 3.1 1.7–5.7 0.0002 Cesarean at the 1st delivery: 0.3 0.1–0.9 0.04 Adjusted odds ratios estimated by logistic regression analysis According to multiple logistic regression analysis, the independent risk factors were urine leakage before the first pregnancy [odds ratio (OR) 18.7; 95% confidence interval (CI) 3.6–96.4], urine leakage during the first pregnancy (OR 2.5; 95% CI 1.3–4.8), duration of first labor ≥8 hours (OR 3.1; 95% CI 1.7–5.7), mother's age >30 years at the first delivery (OR 2.4; 95% CI 1.4–4.2) and cesarean section at the first delivery

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
				(OR 0.3; 95% CI 0.1–0.9). Table III. Risk factors for SUI 4 years after the first delivery SUI Risk factor: Yes (n=89); No (n=218) p Age at delivery >30 years: 53.9 (48); 36.7 (80) 0.005 BMI >27 kg/m2: 2.2 (2); 4.6 (10) 0.34 Birth weight ≥4000g: 2.2 (2); 1.4 (3) 0.58 Labor ≥8 hours: 41.6 (37); 21.1 (46) 0.0002 Active 2nd stage ≥20 minutes: 16.9 (15); 19.3 (42) 0.62 C section: 6.7 (6); 11.5 (25) 0.21 Forceps: 38.2 (34); 35.3 (77) 0.63 3rd degree tear: 2.2 (2); 0.9 (2) 0.35 Leak before pregnancy: 16.1; 0.9 <0.0001 Leak during pregnancy: 40.2; 15.3 <0.0001 2nd delivery: 69.6 (53); 61.0 (133) 0.81 Table IV. Risk factors for stress urinary incontinence 4 years after the first delivery Risk factor Odds ratio 95% CI p Leakage before 1st pregnancy: 18.7 3.6–96.4 0.0005 Leakage during 1st pregnancy: 2.5 1.3–4.8 0.005 Age at 1st delivery >30 years: 2.4 1.4–4.2 0.002 Labor ≥8 hours 3.1 1.7–5.7 0.0002 Cesarean at 1st delivery: 0.3 0.1–0.9 0.04 Adjusted odds ratios estimated by logistic regression analysis

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
Grodstein, 2004[16] Prospective cohort II-2A Confounded for stroke and physical limitations and results were the same in both analysis	Nurse Health Study from 1996-2000 females Questionnaire mailed in 1996 to 39,436 women post menopausal women who had no leaking of urine and were followed for 4 years Incident cases of occasion UI were defined as leaking 1-3 times per month; frequent were at least once per week Excluded premenopausal women or users of estrogen creams, or reported leaking in 1996	Cohort of 39,436 women ages 50-75 Mean age 61 for current HRT use; 64 for never used BMI for never used HRT was 27 Current use BMI was 47 and past use for BMI was 47 Hormone Use Post Menopause Never Current Past Caucasian 98 97 98 African American 1 1 1 Hispanic 0 1 0 Asian 1 1 1 Smokers @ 45% all Hysterectomy 6 47 40	Age BMI Smokers Recurrent UTI Diabetes COPD Neurological disorders Parity HRT	5,060 incident cases of occasional UI 2,495 incident cases of frequent UI Average incidence rate of 3.2% per year and 1.6% per year respectively 50-55 years yearly incontinence was 3% in those who never took HRT 56-60 – 3.5 61-65 – 3.8 66-70 – 4.3 71-75 years – 5.3%
Groutz, 2004[53] Prospective cohort elective C-section without trial of labor vs. vaginal delivery vs. C-section due to obstructed labor II-2A (if controls are considered types of deliveries)	363 consecutive primiparae followed for 1 year SUI before pregnancy excluded Non-singleton deliveries, instrumental-assisted vaginal deliveries excluded 145 spontaneous vaginal delivery 100 C-section following obstructed labor with mean cervical dilation of 8.7 ± 1.6cm 118 elective C section Interviewed one year PP SUI – involuntary leakage with cough, sneeze, etc Regular UI as defined by involuntary excretion or leakage of urine in inappropriate places or times twice or more a month, regardless of quantity loss	Vaginal; Obstructed; Elective C-sec Delivery; labo; c-sec Age: 28±4; 32.5±5.3; 31.7±5.2 Weight: 60±9; 62.5±11.6; 63±13 Height: 164+/-6/6; 162±5.6; 164±6.7 Gestation age: 39.7; 40.2 ; 38.8 Birth weight: 3,251; 3,450; 3,260 Israeli women delivered at Tel Aviv Sourasky Medical Center	Age Maternal age Weight Height Mode of delivery	SUI significant in heavier women – 67±10kg vs. 59±9 kg p=.001 and increase in prevalence during pregnancy 67% vs. 27% p=.003. Duration of 1st, 2nd, and active second stages of labor were stat longer (p<.05) in women who had PP SUI compared to those without P SUI (376 vs. 287min, 121 vs.. 103 min; 61 vs. 43min) Older maternal age (36 years vs. 32 years), heavier maternal weight (71kg vs. 63kg) and prevalence of SUI during pregnancy was noted among incontinent vs. continent women

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
Hagglund, 2004[17] 4 year followup cohort study II-2A	Swedish women all 145 incontinent and 193 continent women ages 22-50 in year 2000. Same group of women had participated in earlier study 1995 on prevalence. Response rate 73% 248/338 Among the 248 responders as followup, 118 reported UI and 130 reported being continent. Changes in type of UI measured using DIS "Do you have problem with involuntary loss of urine?"		Age	Women continent at baseline incidence 22-31 13% 31-41 16 41-50 18 Women incontinent at baseline 22-31 33 31-41 18 41-51 13
Haltbakk, 2004[18] Prospective cohort no control mentioned ? historical control	480 Norwegian men at St. Olavs Hospital, Trondheim Norway. Tentative diagnosis of BPH made on 612 patients and from this pool, sample analyzed was 480 (78%). ICS LUTS questionnaire (ICS-BPH) between 1997-2000. IPSS, SPI and SISI used also. UI defined as any involuntary leakage of urine.	Mean age of patients was 67 years, SD 10.6 years; median 69 years range 39-91 years 15% mild symptoms 54% moderate symptoms 31% severe symptoms Mean age in incontinent group was 68 years	Age	3/4 of men experienced sleeping problems during previous months and 31% had experienced sleeping problems Issues related to altered lifestyle were recognized by 7-90% of men and 47% reported they would be mostly dissatisfied if their current urinary symptoms persisted for rest of life. Incontinent group – 64% had sx ≤5 years 22% for 5-10 years 6% for >/=10 years remaining 8% did not indicate
Holroyd-Leduc, 2004[19] Population based Prospective cohort Confounders – sex, age, socio-economic status, race, smoking, alcohol, BMI, sensory	Community dwelling in U.S. 6,506 of 7,447 subjects ages ≥70 in the Asset and Health Dynamics Among the Oldest Old study who had complete info on continence status were baseline – outcomes 3 groups- 5,872 nursing home, 5,521 ADL decline and 5,509 IADL decline as outcomes Subjects interviewed in 1993 and 1995 Blacks, Hispanics, and Florida residents	Mean age ≤SD = 77 (range 69-103) 63% female 86% White Median number of baseline comorbid medical conditions was 2 10% received help with 1 or more ADLs and 23% were receiving help in 1 or more	Age Sex SES Race Smoking/alcohol BMI Sensory impairment Comorbidity Cognitive scores Depression ADL	UI and outcomes adjusted OR (95%CI) Death: 10.9% .90 (.67-1.21) Nursing home: 4.4% 1.33 (.86-2.04) ADL decline: 13.6% 1.24 (.92-1.68) IADL decline: 21.2% 1.31 (1.05-1.63) More functionally impaired at baseline

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
impairment, comorbid disease, depression, cognitive function and baseline dependency. II-2A	were over sampled Overall response rate was 80% UI measured "next question might not be easy to talk about, but it is very important for research on health & aging, during the last 12 months, have you lost any amount of urine beyond your control?"	IADLS at baseline Patients with UI had more comorbidities (p=.001), higher rate of visual impairment (35% vs. 22.4% p <.001) and hearing impairment (39.7% vs. 30.5% p<.001)	IADL	
Hunskaar, 2004[20] Cross national study, Prospective No control group	Postal survey mailed to 29,500 households in 4 countries – France, Germany, UK and Spain age ≥18 years 58.1% response rate women with UI included in analysis was 5976 (35% of study population) Definitions used by ICS; symptoms in last 30 days and in last 7 days	Mean age France – 44.8 Germany – 59 UK – 45 Spain – 64 All – 58	Age Ethnic background	No new cases reported Only prevalence reported by country
Jackson, 2004[22] Population based Prospective cohort; also randomly selected from HMO diabetes registry II-2A	1,017 post menopausal U.S. women ages 55-75 enrolled in HMO and followed for 2 years (1998-2002) inclusion criteria were no natural menstrual cycle in past 12 months. Exclusion: oral estrogen or vaginal estrogen, residential nursing care, restriction to wheel chair, dementia or severe psych disorder, indwelling catheter or intermittent urinary catheter, end stage renal disease requiring dialysis, active malignancy other than skin cancer, chronic antibiotic use, acute cystitis in past 90 days. Post void residual bladder volume measured using portable ultrasound device 12 month followup done by 87% and 24 month followup by 81% Primary study outcome was sx cystitis	Frequency of Exposures at Enrollment and Univariate Risk of Symptomatic Urinary Tract Infection Characteristic (%) Hazard ratio Washington State, USA	Smoking Alcohol Depression Diabetes BMI Parity Hysterectomy Oral estrogen use COPD Stroke Arthritis Age Race Urinary tract infection Vaginal estrogen use Race and arthritis were associated with SI and Urge. Current oral estrogen use and arthritis were associated with 1.5 to 2 fold higher odds of SI and Urge	Incidence of UTI was .07 per person per year. Independent predictors of infection included insulin treated diabetes (hazard ratio [HR]=3.4;95%confidence interval [CI]: 1.7 to 7.0) and a lifetime history of urinary tract infection(HR for six or more infections = 6.9; 95% CI: 3.5 to 13.6). Borderline associations included a history of vaginal estrogen cream use in the last month (HR = 1.8; 95% CI: 1.0 to 3.4), a history of kidney stones (HR=1.9; 95% CI: 1.0 to 3.7), and asymptomatic bacteriuria at baseline (HR = 1.8; 95% CI: 0.9 to 3.5). 27% white reported weekly UI vs. 14% black (95% Confidence Interval) Complete sample† 1017 (100) Age (years)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
			See table 4	55-59 32 1.0 60-69 42 1.3 (0.8–2.2) 70-75 26 1.6 (0.9–2.9) Ethnicity White 87 1.0 Other 12 0.6 (0.3–1.2) General health score from SF-36‡ 76-100 (51) 1.0 51-75 (37) 2.0 (1.2–3.3) 0-50 (12) 2.6 (1.3–4.8) Smoking history Never (55) 1.0 Former (39) 0.9 (0.5–1.4) Current (6) 0.1 (0.02-0.8) Diabetes at baseline No (79) 1.0 Yes (21) 1.9 (1.1–3.1) Diabetes treatment type Not diabetic (79) 1.0 Diet or pill (17) 1.2 (0.7–2.0) Insulin (4) 4.7 (2.2-10.3) Accidental leakage of urine in last yr No (34) 1.0 Yes (66) 1.6 (0.9–2.7) Type of urinary incontinence in last month None (41) 1.0 Stress only 174 (17) 19 0.9 (0.5-1.8) Urge¶ only 106 (10) 20 1.7 (0.8-3.6) Stress and urge 324 (32) 52 1.4 (0.9–2.4) Postvoid residual bladder volume <50ml residual (79) 1.0 50-100ml residual (10) 1.1 (0.5–2.2)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
				>100ml residual (10) 1.6 (0.8–3.2) History of hysterectomy No (69) 1.0 Yes (31) 1.2 (0.8–2.0) History of kidney stones No (90) 11.0 Yes (5) 2.4 (1.2–4.9) History of bladder or urinary surgery No (90) 1.0 Yes (10) 1.6 (0.9-3.0) Parity (number of full-term pregnancies) 0 (14) 1.0 1-3 (63) 1.3 (0.7-2.5) ≥4 (23) 2.2 (1.1-4.3)
Johnson, 2004[23] Long-term cohort, Prospective study of RRP vs. radiotherapy II-2B	Men from the Prostate Cancer Outcomes Study diagnosis with primary prostate cancer between Oct 1994-Oct 1995 Residents of LA, King County Washington, states of Connecticut, NM, UT. Between ages of 60-89 years in King County and younger than 90 in others. Self questionnaire at 6, 12, 24 and 60 months after diagnosis and medical record review at 12 and 60 months. 11,137 men identified in registries; 5,672 randomly selected, letters sent to 4,736 (83.5%) of selected cases. Total of 3,533 men (62.3%) completed 6 and 12 months were included in f/u cohort. 1,433 men had RRP completed 6 months 1,178 did 24 months (82.2%) 1,109 did 60 months (77.4%) For radiotherapy – urinary problems not	1,433 men RRP 642 men received radiotherapy RRP group – wt % by race NHW AA Hispanic Arthritis 33.3 38.6 35.8 Diabetes 11.1 29.5 17.2 COPD 7.5 6.6 5.4 HF 4.9 2.1 4.4 CVA 2.6 2.5 3.3 HTN 37.3 54 37.5 MI 7.9 4 4.2 Age at dx <60 27.5 38.6 23.4 60-64 26.8 26.1 30 65-75 41.9 32.9 45.5 >/=75 3.8 2.4 1	Prostate cancer RRD Radiation therapy	Wt % for men with RRP NHW AA Hispanic Level of urinary control baseline Total control 87.9 86.6 80.5 Occ leakage 8.8 9.5 11.2 Freq leakage 2.1 2 6.5 P = .77 .29 6 months total control 22.7 27.6 28.9 occ leakage 52.1 44.2 40.8 freq 22.6 23.4 26.7 p = 57 .83 12 months total control 33.1 38.5 37 occ leakage 50.2 51.4 46.9 freq 15.6 9 14.9 p= .24 .26 24 months total control 38.2 41.9 35.2 occ leakage 50.2 45.1 53 freq 9.8 11.1 11.3 p = .86 38 60 months

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
	reported Questionnaire also translated into Spanish and interview conducted in Spanish when necessary.			total control 30.8 49.3 32.8 occ leakage 53.7 39.7 47.4 freq 14.3 10.4 18.7 p = .01 .36
Lagergren, 2004[24] National, longitudinal, multi-purpose study in Sweden (SNAC). Study consisted of two parts – population part and the care/service part. II-2A	Swedish men and women from Skane, Karlskrona, Kungshomen and Nordanstig ages ≥65 starting in 2001-March 2004, 12% in SNAC is 65-79 years old, 6% >80 years Total pop of SNAC 17,044; baseline 8,627 targeted persons/ 7,518 sampled 16-25% of SNAC received public care Followup every 6 years starting at 66 years Combo of interviews and questionnaires	Functionally disabled – 37% Average PADL – 6.9 Severe cognitive impairment (Berger 2-6)- 27% Severe mobility restrictions – 51% Men 3,052 Women 4,465 Total 7,518 Average age 85 compared to average age in Sweden 83	Men 3052 Women 4465 Total 7518 Avg age 85 compared to avg age in Sweden 83 Residency	Prevalence Severe UI – Ordinary homes – 15% Special accommodations - 44% Total 31%
McGrother, 2004[26] Cross sectional and longitudinal II – 2B	United Kingdom women AND men 162,533 prevalence study and 39,602 incidence study people age ≥40 years Response rate 60 and 63% respectively and 79% at followup Excluded people living in institutional settings	15% age ≥65 years 85.5% White 44.9% employed 91.8% good health Mean age: 57 54% women	Gender	Female to male ratio for storage disorder was 1.5 and was highest with incontinence at 2.6; urgency, 1.6; frequency, 1.4; and nocturia 1.0.
Neumann, 2004[27] Prospective study II-2A	Study group – 549 Denmark women who had hysterectomy from 1/1/98-12/31/2000 born after 1939 Background group – 144 women who had non-GYN surgery born between 1940-1965 who had lap chole in Denmark. Nulliparae were excluded. Questionnaire sent 9- 45 months postop SI was involuntary leakage during effort, urge as leakage with a sense of urgency, significant UI was defined as involuntary leakage at least once a week, bothersome UI as significant incontinence and use of devices,	All women were Caucasian In study group 12% hysterectomy – 33% of these had abdominal, 55% vaginal	BMI	BMI associated with de novo significant urge Incontinence and de novo urgency (r=.18 and r = .15 p<.01) – BMI accounted for 1-2% of the variance in these variables BMI associated with SI before and after hysterectomy (r=.20 and r=.21 p<.01)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
	decreased social ability or having hygienic problem with incontinence. Questionnaires returned by 82% in study group, 76% in background group			
Ozerdogan, 2004 [29] Cross sectional study, Prospective II-2A	625 women living in Turkey ages 20 and over 4 different cities of Turkey. Questionnaire and I-QOL; Rare – UI less than once a month Reg – UI more than twice per month Serious – continuous use of sanitary protection. SI and urge defined as usual definitions	Age distribution 20-29 – 26.4% 30-39 – 22.6 40-49 – 18.7 50-59 – 13.4 60-69 – 11/7 ≥70 – 7.2 illiteracy rate 9.4% 1 out of 4 resided in rural area 1 in 5 gave birth at least 4 or more times and most were vaginal deliveries (25%)	Age BMI Smokers Diabetes	UI was associated with advancing age (p <001) UI rate increased from 9.69% in 20-29 to 40% in >70 years. Hysterectomy was a risk factor for MI and Urge (p<.001) BMI (OR 12.75, 95% 6.68-24.6) Diabetes (OR 3.55, 95%, 1.44-8.73 Neuro (OR 3.8, 95%, 1.69-8.58 RUTIs (OR 4.73, 95%, 2.52-8.88) 50% BMI >25, 25% smokers, recurrent UTIs 19%, Diabetes 6.6%, COPD 7.5% Neuro disorders 11.2%
Schytt, 2004[30] Prospective, longitudinal cohort II-2A	Swedish women after childbirth at 593 clinics in Sweden. 5,550 women booked appointments during recruitment time, 4,500 eligible, 3,191 consented, and 3,061 completed 1st questionnaire, 2,762 completed 2nd, and 2,563 completed 3rd. Total 2,450 completed all three. Study sample was 2,390 women after exclusion factors also. Selected data from a National Swedish survey investigating physical and psychological assessment of childbirth May and Sept 1999 and January 2000 antepartal visits Three questionnaires 1st at baseline, 2nd mailed 6-8 weeks after the birth and 3rd 1 year after birth. Women were asked to recall any symptoms of UI during the pregnancy and post. Excluded miscarriages, non-Swedish speaking, and women from nonparticipating clinics, delivery of twins	Average gestation answering 1st quest – 16 weeks, 2nd – 10 weeks post, 3rd – 1 year and 2 weeks. Average age at recruitment – 29.5 years Primiparas – 44% Multiparas – 56% 79.2% had vaginal delivery 13.4% had C-section	Age Parity Education Mode of delivery Smoking	Strongest predictor for SI at 1 year in primiparas as well as multi, was UI during pregnancy and PP. Other predictors were obesity and constipation during pregnancy and after birth. Within the vaginal delivery group, the most important predictors were UI during the third trimester (RR 2.4; CI 95% 2-2.8) and 4-8 weeks PP (RR 2.9, I 95% 2.5-3.3), multiparity (RR 1.3, CI 95% 1.1-1.5), obesity, (RR 1.5 95% 1.1-1.9) and constipation during the third trimester (RR 1.4 (5% CI 1.2-1.6)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
Stenzelius, 2004[54] Cross-sectional Adjusted by: Age, Gender, Quality of life, Occupation, Economy, Living condition, Need of help, Satisfaction with children contact, and problems with Communication, Mobility, Elimination, Digestion, Breathing and circulation Psychosocial problems Other type of pain Level of evidence: III	Subjects were selected and mailed a questionnaire from a randomized, age-stratified sample of persons ≥75 years living in a southern part of Sweden. Response rate: 52.8% (n=4,277) Data source: Self-reported postal questionnaire Incontinence as a yes to the question, "Have you had problems controlling urine in the last 3 months?"	Age: 75 and above Mean: 83.7 (SD: 5.69) Gender: Male and Female Male: 38.4% Female: 61.6% Race: Not reported Ethnicity: Not reported Residency: Community dwelling and special accommodations residents in Southern Sweden.	**Risk Factor** Sex (0=women, 1=man) Difficult talking Memory problems Difficulty walking Mobility limitation Oedema in legs Other urinary symptoms Diarrhea Dizziness Protracted coughing Fatigue	OR / 95% CI 0.68 0.58-0.81 1.25 1.04-1.54 1.7 1.42-2.03 1.63 1.37-1.95 1.23 1.02-1.48 1.32 1.11-1.58 1.37 1.10-1.71 0.66 0.50-0.88 1.26 1.07-1.50 1.33 1.04-1.69 1.21 1.02-1.44
Vandoninck, 2004[55] Age stratified Prospective cohort for men in the original study. Mentions sampling weights upon the ratio of # of women in each age group in the sample to # of women in the age group in population. Prospective cohort, no controls	Dutch women from Urepik (Uro Epi in Europe and Korea)study in the community In 1999, a national postal questionnaire survey 1,460 spouses of 1,771 men. 1,071 returned- 73% response rate UI assessed by total score on short UI specific questionnaire – 3 groups – no symptoms score 0-2; minimal 3-6 and severe 7-14. In addition self reported UI calculated conforming to ICS standard definitions. "Do you ever have involuntary urine loss?" QOL also used	Mean age 57 (29-79) 34% minimal UI 12% severe Mean parity 2.6 13.5% women were childless During the past month: % How often have you leaked urine? 0 Never 54.5 1 Not more than once/wk 19.6 2 More than one but less than three times a week 10.0 3 More than 3 times/week 6.0 4 Nearly always 8.6 If you experienced urine loss, how much did you leak? 0 I never leak 50.2	Age Parity	No relationship between mean parity or age and presence of UI; only in oldest category (figure graph in article).

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
		1 Some drops 32.2 2 A small stream 11.4 3 Protection material or clothes soaking wet 4.9 4 Leaking through pads or clothes 0.3 How often do you use protection material 0 Never 68.1 1 Occasionally 21.4 2 Nearly always 3.9 3 Always 5.8 Did you lose urine on coughing or sneezing? 0 Never 31.1 1 Occasionally 45.0 2 Nearly always 13.5 3 Always 9.3		
Arya, 2001[56] Prospective Observational II-2	Subject selection: 315 consecutive primiparous women delivering by forceps (n = 90), vacuum (n = 75), or spontaneously (n = 150). Follow-up for UI was done at 2 weeks, 3 months, and 1 year after delivery. The labor room logs were screened every morning by a research nurse to identify patients who met the eligibility criteria for the study. Inclusion criteria: primiparity, vaginal route for delivery, age, gestational age ≥37 weeks, and accessibility by telephone. Exclusion criteria: history of urinary incontinence before or during pregnancy, delivery by cesarean section, known diabetes or neurologic disease, and non- English speaking. Definition: Urinary incontinence was defined as the presence of urine loss of any amount that had occurred on at least 2 occasions.	Women ≥18 years USA		

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
Sherburn, 2001[57] Cross-sectional and Longitudinal phases III	Subject selection: 2 parts: (1) a cross-sectional phase involving a population-based sample of 1,897 Australian-born women who participated in the baseline interview; (2) a 7-year follow-up phase, assessing a 373 women (premenopausal at 1 year follow-up) from the cross-sectional study. Eligibility for longitudinal study: menstruation in previous 3 months, an intact uterus, at least one ovary, and not currently taking oral contraceptives or HRT. Response rate: of original cohort, 779 met these criteria and 438 (56%) agreed to be interviewed in the first year of the longitudinal study.	Women 45–55 years. Australia	Multivariate analysis found that urinary incontinence patients were significantly more likely than those without incontinence to have higher body mass index (odds ratio [OR] 1.50, 95% confidence interval [CI] 1.15, 1.95), have had gynecologic surgery (OR 2.17, 95% CI 1.42, 3.32), report urinary tract infections (OR 4.75, 95% CI 2.28, 9.90), diarrhea or constipation (OR 1.95, 95% CI 1.27, 3.00), and have had three or more children (OR 1.47, 95% CI 1.06, 2.05).	During the 7-year followup phase, overall incidence was 35%. Women who experienced a hysterectomy during the followup period had a higher incidence.
Van Kessel, 2001[58] Retrospective Observational II-2 Adjustment for factors including mode of delivery, age in years, and duration of enrollment	Subject selection: The study was conducted at a managed care organization with over 500,000 enrollees. All women who had given birth between 1982 and 1986 and who were continuously enrolled until 1998 were identified with the patient computerized data file. From this cohort, a random sample of women with SUI was selected. 43,288 mother-baby pairs were identified within the computerized database. A random, case-controlled sample of 85 cases and 88 controls was identified	Women 22.6-52.9 years USA	After adjustment factors, the risk for SUI associated with duration of second stage of labor was 1.10 (95% CI 0.90-1.28; p = .5) There was no significant difference in mode of delivery between cases and controls with one exception; 10.7% of the cases underwent forceps delivery compared with only 1.1% of controls (odds ratio, 10.4; 95% CI, 1.17-93.4; p = .04)	

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
Larrieu, 2004[59] Cross-sectional III	Data from the Three-City (3C) study; a collaborative research program from a cohort of 9,294 community-dwellers ≥65 years. Subjects living at home were randomly sampled from electoral rolls. Included 8,966 subjects after excluding 328 subjects with missing BMI.	Men and Women ≥65 years 3566 men (39.8%); Mean age: 74.2 y (SD=5.6, not different according to sex) France	BMI	The univariate analysis showed quite frequent incontinence (20.4%) with prevalence significantly higher in the severely obese (39% *vs.* ~ 20% in other categories of BMI, P<0.0001).
Viktrup, 1992[60] Observational II-2	305 primiparas interviewed repeatedly about stress incontinence before and during pregnancy and after delivery over 6 month period. Definition: ICS	Women 17-41years Denmark	Pregnancy	SUI Before pregnancy: 4% During pregnancy: 32% After pregnancy: 7%
Van Kuijk, 2001[61] Observational (cohort) II-2	Subject selection: All patients with first-time, unilateral hemispheric stroke admitted from August 1994 to August 1997 for a post-acute inpatient rehabilitation program. Exclusion criteria: non-ischemic stroke, history of previous stroke, evidence of brainstem lesions or bilateral signs on examination, diabetes mellitus, use of anticholinergic medication, history of urinary incontinence, previous urologic surgery, indwelling or intermittent catheterization not regarded as incontinent because of stroke. Definition: Urinary incontinence as any form of involuntary urinary loss. Only urinary incontinence ≤6 months post stroke, considered to be from stroke.	Men and Women Age: Men: Mean, 62+-11.5; Range, 32-83 years Women: Mean, 62+-12.7 years; Range, 30-83 years Netherlands		Incidence rates: Overall: 29/1000 Women: 17/1000 Men: 39/1000 The incidence rate of urinary incontinence was 29/1,000 persons per month (95% confidence interval [CI], 18-48/1,000 persons monthly).
Schmidbauer, 2001[62] Cross-sectional III	Subject selection: Analysis of ~2,500 participants in a health screening project in the area of Vienna, using Bristol LUTS incontinence questionnaire and (a) medical history; (b) a physical investigation; (c) socio-demographic parameters (smoking, eating and drinking habits), and (d) urine and blood study including 14 parameters. The	Age: Men (49.7+-13.6yrs), Women(48.6+-13yrs) Austria	Parity showed a strong correlation to UI. 26.3% reported episodes of urinary incontinence in the past 4 weeks. Other factors, age (r = 0.22), BMI (r = 0.20), urgency	In women with no childbirth 16.5% reported on UI, this percentage increased to 29.9% (one child), 29.6% (two children), 33.3% (three children), and 57.7% (four or more children).

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
	parameters collected during this health investigation were correlated to the presence of urinary incontinence to identify potential risk factors for urinary incontinence. Definition: UI was defined as any involuntary loss of urine within the past four weeks.		(r = 0.16), feeling of incomplete bladder emptying (r = 0.21), previous uro-gynecological surgery and fasting blood glucose correlated significantly to UI., 5% of men were incontinent, age (r = 0.12), urgency (r = 0.16), nocturia (r = 0.16), feeling of incomplete emptying (r = 0.16), reduced uroflow (r = 0.18) and previous prostatectomy (r = 0.11) correlated to the presence of UI. Smoking habits and education level revealed no association in either sex.	
Hu, 2004[63] Observational II-2	Subject selection: women at Group Health Cooperative of Puget Sound (GHC), a staff-model health maintenance organization with approximately 450,000 members in western Washington State. Study subjects with a recent diagnosis of acute UTI. Women were then randomly selected from GHC enrollment files to serve as control subjects, matched to cases by date of birth (within 2 years).	Women aged 55-75 years USA	Acute UTI	Case subjects more likely than controls to report episodes of incontinence >x/month (age-adjusted OR, 1.74; 95% CI, 1.44-2.10) and incontinence with typical quantities greater than a few drops (age-adjusted OR, 1.71; 95% CI, 1.38-2.11). Infrequent incontinence and incontinence of only a few drops were not associated with increased odds of UTI.
O'Donnell, 2005[65] Observational II-2	Subject selection: In 2001, a 13 item questionnaire was mailed to a representative sample of 29,500 community-dwelling women to	Women ≥18 years with UI France, Germany, Spain and the UK.	UI and women's attitudes were found to be associated with help-seeking after	Initial survey: SUI France: 30% Germany: 40%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life
	determine the prevalence, type and treatment behavior of women with UI. Within 2 months of the initial survey a more detailed self-completion questionnaire was mailed to a randomly selected sub-sample of 2,953 women identified as having UI from the initial survey. Follow-up included questions on general health status, quality of life and help-seeking behavior, characteristics of UI, and women's attitudes to health care in general and UI specifically. Response rate: 58% in the initial and 535 in the second. Definition: UI was defined as any leakage or involuntary loss of urine, conforming to the standards recommended by the ICS. For the purpose of this study this definition was restricted to an incidence during the last 30 days.		adjusting for age, UI duration and frequency, and 'bother' of UI; factors traditionally associated with help-seeking. After adjustment for these factors, willingness to take long-term medication and having spoken to others about UI were found to be strong predictors of help-seeking in all four countries.	Spain: 39% UK: 41% Total: 37% UUI France: 27% Germany: 16% Spain: 20% UK: 16% Total: 20% MUI France: 34% Germany: 37% Spain: 26% UK: 34% Total: 33% Followup survey: SUI France: 37% Germany: 46% Spain: 44% UK: 44% Total: 43% UUI France: 9% Germany: 9% Spain: 14% UK: 10% Total: 10% MUI France: 50% Germany: 42% Spain: 34% UK: 42% Total: 42%
Samuelsson, [66] Cross-sectional Adjusted by:, Age Parity, Weight	Subjects were selected from women aged 20-59 who were invited in for their gynecological health examination. The exam is conducted every third year for	Age: 20-59 Gender: Female Race: Not reported	Age years 20-29 years 30-39 years 40-49 years	Crude Odds ratios 1 4.18 2.04–8.57 7.21 3.47–15.00

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life	
Smoking Type of delivery Co-morbidity Hormonal use Surgical history Pelvic floor muscle strength Genital prolapse Level of evidence: III	women in Sweden. Response rate: 76% (n=487) Data source: Self-reported postal questionnaire Incontinence was defined as a positive response to, “Do you suffer from involuntary loss of urine?”	Ethnicity: Not reported Residency: Urban area in Mid-Sweden	50-59 years	9.52	4.82–18.82
			Parity		
			0 deliveries	1	
			1 delivery	3.92	2.14–7.20
			2 deliveries	5.24	3.01–9.10
			>3 deliveries	8.59	4.53–16.27
			Smoking habits		
			Never smoked	1	
			Former smoker	1.28	0.78–2.09
			Current smoker	1.78	1.12–2.86
			Weight		
			45-58 kg	1	0.54–1.41
			59-70 kg	0.87	0.65–1.96
			71-105 kg	1.13	2.67–8.93
			ERT use		
			No	1	
			Yes	4.89	
				Prevalence, %	
			Type of delivery		
			Vaginal	42.2	
			Section	30.8	
			Episiotomy		
			No episiotomy	45.2	
			Episiotomy	35.7	
			Maximum birth weight (g)		
			<3199	35.5	
			3200 – 3924	44.7	
			>3925	43.8	
			Type of genital prolapse		
			Loss of urethrovesical crease	53.2	
			Rectocele	55.3	
			Cystocele	58.1	
			Uterine prolapse	72	
			Degree of prolapse		
			None	18.7	
			Not to introitus	47.9	

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-b. Risk factors for unrinary incontinence in adults (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Levels of Risk Factors	Incidence of Urinary Incontinence, Overall: by Type, Severity, and Impact on Life	
			To introitus	62.5	
			Number of prolapse components		
			None	18.7	
			One	31	
			Two	59.6	
			Three	66.7	
			Four	100	
			Age (years)	Adjusted odds ratios	
			20-29	1	
			30-39	2.31	1.18; 4.51
			40-49	2.2	1.07; 4.52
			50-59	3.47	1.25; 4.90
			Parity		
			0 deliveries	1	
			1 delivery	1.38	0.68; 2.81
			2 deliveries	1.84	0.94; 3.59
			3 deliveries or more	2.71	1.27; 5.77
			Smoking habits		
			Never smoked	1	»
			Former smoker	1.42	0.81; 2.57
			Current smoker	1.86	1.08; 3.22
			PFMS		
			4	1	»
			3	1.51	0.87; 2.62
			2	2.56	1.33; 4.93
			1	3.44	0.51; 23.09
			Presence of cystocele and/or absence of urethrovesical crease		
			No	1	»
			Yes	2.49	1.48; 4.18
			ERT use		
			No	1	
			Yes	2.91	1.44; 5.89

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)

Multiple logistic regression of 'long term' UI and delivery mode history[67]

Variable	Incontinence Total	N	%	Odds ratio	(95% CI)	P
Delivery mode history						
All other histories	2,707	1263	(46.7)	1.0	Reference	
Only caesarean section(s)	435	141	(32.4)	0.50	0.40-0.63	0.001
Any forceps	1,029	480	(46.6)	0.96	0.83-1.11	0.567
Maternal age at first birth						
<25	1,432	568	(39.7)	1.0	Reference	0.001
25-29	1,697	766	(45.1)	1.34	1.15-1.55	0.001
30-34	835	427	(51.1)	1.88	1.57-2.25	0.001
>35	207	123	(59.4)	2.98	2.18-4.07	0.001
Number of births						
One	528	202	(38.3)	1.0	Reference	0.001
Two	2,202	993	(45.1)	1.30	1.07-1.59	0.001
Three	1,025	490	(47.8)	1.61	1.29-2.02	0.001
Four or more	416	199	(47.8)	1.73	1.31-2.27	0.001
Number of women	5 4171					
Number symptomatic	5 1884					
Symptoms are yes at 6 years						

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)

Supplemental Evidence Table: Association between risk factors and incidence of UI in adults in the community and long-term care settings
Odds of UI according to potential risk factors , 2006[68]

Variable	Occasional Incontinence*	OR (95% CI)	Frequent Incontinence*	OR (95% CI)	Severe Incontinence*	OR (95% CI)
Age (years)						
<40	2,270	Reference	3,174	Reference	1,293	Reference
40-44	4,664	1.20 (1.13,1.28)	6,475	1.16 (1.10,1.22)	3,125	1.34 (1.24,1.44)
45-49	4,949	1.29 (1.21,1.37)	7,685	1.32 (1.26,1.40)	4,146	1.69 (1.57,1.81)
50-54	2,623	1.38 (1.28,1.48)	4,105	1.35 (1.27,1.44)	2,354	1.81 (1.66,1.97)
P for trend		<.0001		!.0001		!.0001
Race/ethnicity						
White	13,512	Reference	20,011	Reference	10,186	Reference
Black	159	0.58 (0.48,0.69)	254	0.56 (0.48,0.65)	128	0.49 (0.40,0.60)
Hispanic	207	1.09 (0.92,1.28)	286	1.01 (0.87,1.17)	159	1.10 (0.91,1.33)
Asian	184	0.78 (0.67,0.92)	224	0.71 (0.61,0.83)	87	0.57 (0.46,0.72)
BMI (kg/m2)						
<22	2,881	0.80 (0.76,0.85)	3,623	0.78 (0.74,0.82)	1,476	0.70 (0.66,0.76)
22-24	3,574	Reference	4,703	Reference	2,150	Reference
25-29	3,905	1.26 (1.20,1.33)	5,651	1.37 (1.31,1.44)	2,931	1.52 (1.43,1.62)
>30	3,547	1.80 (1.70,1.91)	6,544	2.43 (2.31,2.55)	3,888	3.10 (2.91,3.30)
P for trend		<.0001		<.0001		<.0001
Type 2 diabetes mellitus	987	1.08 (1.00,1.17)	1,678	1.18 (1.10,1.26)	990	1.30 (1.20,1.41)
Hysterectomy	2,295	1.23 (1.13,1.33)	4,147	1.43 (1.33,1.54)	2,373	1.59 (1.45,1.73)
Parity						
None	2,142	Reference	3,538	Reference	1,587	Reference
1 birth	2,038	1.43 (1.33,1.53)	3,005	1.26 (1.19,1.34)	1,560	1.48 (1.36,1.60)
2 births	6,038	1.58 (1.49,1.67)	8,783	1.41 (1.35,1.48)	4,566	1.67 (1.57,1.79)
>3 births	4,288	1.59 (1.50,1.69)	6,113	1.41 (1.34,1.49)	3,205	1.69 (1.58,1.82)
Oral contraceptive use						
Never	1,735	Reference	2,465	Reference	1,252	Reference
Former	10,954	1.18 (1.12,1.26)	16,302	1.21 (1.15,1.28)	8,556	1.20 (1.12,1.29)
Current	1,780	1.04 (0.96,1.12)	2,591	1.13 (1.05,1.21)	1,071	0.97 (0.89,1.07)
Cigarette smoking						
Never	9,629	Reference	13,399	Reference	6,707	Reference
Former	3,743	1.00 (0.96,1.05)	5,915	1.12 (1.08,1.16)	3,012	1.11 (1.05,1.17)
Current	1,115	0.91 (0.85,0.98)	2,097	1.20 (1.13,1.28)	1,188	1.34 (1.25,1.45)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)

F1-c. Prevalence of UI in adults in the community

Author, Design, Adjustment for Confounding Factors, Level of Evidence	Subject Selection, Response Rate, Data Source, Methods to Measure Incontinence (survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
Huang, 2006[69] Population-based, cross-sectional survey Adjusted by age, race, ethnicity, income, occupation, education, health status, fecal incontinence, number of medications, UI severity, UI type, timing of incontinence, age of onset of UI, sexual activity II-2b	603 of 2,109 women aged 40-69 years previously sampled as part of the RRISK study who enrollees in Kaiser Permanete Medical Care Program with weekly UI UI measured using self-report questionnaires: During the past 12 months, on average, how often have you leaked urine, even a small amount? Additional questions asked: number of incontinent episodes that occurred in past 7 days "with an activity like coughing, lifting, sneezing, or exercise" (stress UI) or with "a physical sense of urgency" (urge UI) UI severity was determined using Sandvick Severity Scale (frequency and amount of urine lost per episode)	Mean age: 57 (SD 9) years 50% nonwhite	50% had clinically severe UI according to the Sandvik Severity Scale Predictors of high impact UI (≥ 75th percentile on Incontinence Impact Questionnaire) with weekly UI: High school/some college vs. college: 1.9 , 1.1-3.1) Good health status: 3.2, 1.9-5.4 Fair health status: 4.6, 2.5-8.4 Poor health status: 14.2, 4.8-41.2 Fecal incontinence ≥ 1/mo: 2.2, 1.2-4.2 Daytime and nighttime UI vs. daytime only: 2.5, 1.3-4.9 Some leakage during sex: 1.9, 1.1-3.3 Not sexually active: 1.9, 1.1-3.3
Huang, 2006[70] Population-based, cross-sectional mailed survey II-2a	1,349 women ages 40-69 years from 2,109 women previously sampled as part of the RRISK study who were enrollees in Kaiser Permanente Medical Care Program UI measured using self-report questionnaires: During the past 12 months, on average, how often have you leaked urine, even a small amount? Additional questions asked: number of incontinent episodes that occurred in past 7 days "with an activity like coughing, lifting, sneezing, or exercise" (stress UI) or with "a physical sense of urgency" (urge UI)	345 Asian-American women (mean age 53) 1003 White women (mean age 58) Residence: Northern California, USA	Asian: 10.6% weekly, 7.8% daily White: 17.8% weekly, 13.0% daily Type: Asian: 7.8% stress UI, 7.3% urge UI White: 15.5% stress UI, 9.5% urge UI

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author, Design, Adjustment for Confounding Factors, Level of Evidence	Subject Selection, Response Rate, Data Source, Methods to Measure Incontinence (survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
Fitzgerald 2006[71] Population-based, cross-sectional survey Adjusted by age, race, parity, BMI, and other potential confounding variables II-2A	Random selection from age and race strata of 2,109 women aged 40-69 years who were part of the RRISK study as enrollees in Kaiser Permanente Medical Care; 65% response rate UI measured using self-report questionnaires: During the past 12 months, on average, how often have you leaked urine, even a small amount? Additional questions asked: number of incontinent episodes that occurred in past 7 days "with an activity like coughing, lifting, sneezing, or exercise" (stress UI) or with "a physical sense of urgency" (urge UI)	598 (28%) aged 40-49 796 (38%) aged 50-59 713 (34%) aged 60+ 1003 (48%) white 383 (18%) Black 350 (17%) Hispanic 345 (16%) Asian 29 (1%) Other Northern California, USA	29% weekly UI 13% weekly SUI 206 (10%) weekly UUI 113 (5%) weekly MUI/other Childhood daytime urinary frequency: SUI: 0.97 [.59-1.41] UUI: 0.76 [0.41-1.41] Nocturia: SUI: 1.26 [.66-2.41] UUI: 0.69 [0.19-1.44] Daytime UI: SUI: 1.60 [.72-5.59] UUI: 2.56 [1.11-5.9] Nocturnal enuresis: SUI: 0.57 [.25-1.34] UUI: 2.68 [1.32-5.46] UTIs (1 more than year): SUI: 2.00 [1.00-3.90] UUI: 2.03[0.93-4.46]
Hatem, 2005[72] Population-based, cross-sectional survey No adjustments	Random selection of 2,492 primiparous women who had given birth within a 6 month period in Quebec; 1,305 women responded (55%) with 1,291 usable responses (52% of women sent a questionnaire) Mailed questionnaire at 6-months postpartum UI measured: FPSUND tool which assessed six symptoms and their severity: frequency, use of protection, stress-related complaints, and urge-related complaints, number of daily micturitions. Considered to have UI if had a score of 2 or more	Mean age 27.2 (SD 4.8) years Race/ethnicity: not reported Residence: Quebec, Canada	29.6% UI (could include presence of fecal incontinence) 19.2% UI alone 43% stress UI 38% unspecified UI 6% urge UI 8% mixed UI with UUI predominant 5% mixed UI with stress UI predominant
Lewis, 2005[73] Population-based, cross-sectional survey	10,678 women aged 50-90 years who were participants in the Health and Retirement Study	Women aged 50-90 years 73.8% Non-Hispanic white 14.9% African-American	21.7% UI 57% mild UI 43% severe UI

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author, Design, Adjustment for Confounding Factors, Level of Evidence	Subject Selection, Response Rate, Data Source, Methods to Measure Incontinence (survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
Adjusted by race, parity, BMI, Diabetes (non-insulin dependent and insulin-dependent), hypertension, heart disease, stroke, lung disease, cancer, arthritis, ADLs	Telephone or face-to-face interviews UI measured: During the last 12 months, have you lost any amount of urine beyond your control? Incontinence defined as mild if urine loss was reported on 15 days or fewer, and sever if reported greater than 15 days a month	7.7% Hispanic 3.6% Other Residence: USA	
Rait, 2005 [74] Cross-sectional survey Adjustments by age, gender, residence, marital status, health, needs, hearing, vision, medications, and falls	15,051 out of 20,934 eligible subjects (71.9%) obtained from patients aged 75 years and over from 106 general practices recruited to participate in the MRC Trial of the Assessment and Management of Older People in the Community Study Data obtained by interview; definition and measurement of UI not reported	61.5% female 38.5% male 47% 75-79 years 31.4% 80-84 years 16.0% 85-89 years 5.6% 90+ years Ethnicity: not reported Residence: England, Scotland, and Wales	Associated with cognitive impairment (MMSE < 24): UI: 1.3 [1.0-1.1]
Téllez-Zeneno, 2005[75] Population-based, cross-sectional survey Adjusted by comorbidities	49,026 participants from the National Population Health Survey (NHPS) and 130,0882 from the Community Health Survey (CHS) ages 12 years and over which represented 98% of the Canadian population (85% response rate in both surveys) Data obtained by interview; definition and measurement of UI not reported	50% female 50% male Race/ethnicity: not reported Residence: All Canadian provinces	Weighted point prevalence of UI: NHPS: 4.7 [3.4-6.2] CHS: 3.9 [2.7-5.3] Normal vs. epileptic population: Women: 14 vs. 48, prevalence ratio: 3.4 [2.5-4.5] Men: 29 vs. 94, prevalence ratio: 3.2 [2.6-3.9] UI: AOR 2.2 [1.7-2.9]
Ertunc, 2004[76] Case-control design	154 women who underwent SUI surgery (cases) and 100 women without SUI recruited from clinics 70/108 mothers and 252/305 sisters (cases) 72/100 mothers and 207/272 sisters (control) Self-administered questionnaire using BLUTS:	Mean age of mothers of incontinent women: 68 (SD 9.8) and 69 (SD 8.4) of continent women Mean age of sisters: 50 (SD 11) of incontinent women and 47 (SD 8.5) of continent women Turkey	SUI prevalence in mothers: 71.4% cases 40.3% controls SUI prevalence in sisters: 24.6% cases 11.6% controls Age when symptoms began lower in "incontinent families" 35 (SD 8) years vs. 41 (SD 7) years, P , .001

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author, Design, Adjustment for Confounding Factors, Level of Evidence	Subject Selection, Response Rate, Data Source, Methods to Measure Incontinence (survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
	SUI measurement: leakage with coughing, sneezing, or exertion after sports activities, walking, standing up from sitting position, or even sitting up in bed, leaking while erect or at least movement while lying down		
Hannestad 2004[77] Population-based, cross-sectional Adjusted for age, BMI, number of children, and women at risk	Secondary analysis of data from the EPINCONT study: 6,021 mothers/8,771 recruited/13,501 available), 69% response rate 2104 older sisters from 2,426 sisters/2866 arecruited/4,456 available), 73% response rate Self-administered questionnaire UI measurement: not provided	Median age of mothers: 60 and daughters 33 Median age of older sisters: 33 and younger sisters 34 Norway	Daughters increased risk: UI: 13 [1.2-1.0, absolute risk: 23.3 SUI: 1.5 [1.3-1.8], absolute risk: 14.6% UUI: 1.8-3.9], absolute risk: 2.6% MUI: 1.6 [1.2-20], absolute risk: 8.3% Younger sisters of siblings with UI, SUI, or MUI: UI: 16 [1.3-1.09, absolute risk: 29.6 SUI: 1.8 [1.3-2.3], absolute risk: 18.3% UUI: N too small to calculate MUI: 1.7 [1.1-2.8], absolute risk: 10.8%
McGrother, 2004[26] Cross sectional and longitudinal mailed survey No adjustments II-A	Random sample of 92,491 from 154,377 people registered with 108 general practices in mixed urban and rural settings (cross-sectional survey), and 23,182 from 36,799 people for 1-year follow-up (longitudinal survey); response rate: 60.2% for prevalent sample and 63% for incident sample UI measured as: do you ever leak urine when you don't mean to (day or night)? Stress UI: Does any urine leak when you laugh, cough, or exercise? Urge UI: Do you have such a strong desire to pass urine that you leak before reaching the toilet? UI frequency on 5-point scale: continuously, several times a day,	Adults aged 40 and over residing in Leicestershire Health Authority, UK Cross-sectional sample: 50,002 women 42,939 men 15% aged 65 and over 85.5% white Longitudinal sample: 9,598 women 7,923 men	Female to male ratio: 2.6 UI 1-year period prevalence: Women: Overall: 3.5% profound, 11.8% severe, 7.3% moderate, 11.6% minimal Men: Overall: 2.2% profound, 8.2% severe, 5.7% moderate, 8.8% minimal UI incidence at 1-year: Women: 8.4% ages 40-49, 7.9% ages 50-59, 8.5% ages 60-69 years, 9.4% 70-79 years, 14.7% ages 80 and over; 8.8% overall Men: 2.2% ages 40-49, 2.5% ages 50-59, 4.0% ages 60-69 years, 7.1% ages 70-79 years, 10.9% ages 80 and over; 6.3% overall Remission rates: Women: 26.9% ages 40-49, 25.5%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author, Design, Adjustment for Confounding Factors, Level of Evidence	Subject Selection, Response Rate, Data Source, Methods to Measure Incontinence (survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
	week, month, or never; UI volume on 4 point scale: any leakage, damp, wet, soaked. UI severity index calculated by multiplying frequency and volume scores, and categorized as minimal, moderate, severe, and profound		ages 50-59, 23.3% ages 60-69 years, 26.1% ages 70-79 years, 22% ages 80 and over; 25.2% overall Men: 46.0 ages 40-49, 29.9% ages 50-59, 46.5% ages 60-69, 33.3% ages 80 and over, 28.8% overall
Østbye, 2004[28] Population-based with 5 and 10-year follow-up	8,949 adults aged 65 and over who were participants in the Canadian Study of Health and Aging UI measured: Do you ever lose control of your bladder? (By that I mean, do you ever pass water when you don't intend to?)	Age at baseline: Women: 2,159 (40.6%) aged 65-74 2,254 (42.4%) aged 75-84 909 (11%), ages 85+ Men: 1,722 (58.9%) aged 65-74 1,455 (40.2%) aged 75-84 397 (11%) age 85+ Race/ethnicity: not reported Residence: Canada	UI prevalence: 19% women 14.2% ages 65-68 years 15.9% ages 70-74 years 19.7% ages 75-79 years 25.0% ages 80-84 years 24.6% ages 85-89 years 29% ages 90+ years 9% men 6.3% ages 65-69 years 7.2% ages 70-74 years 9% ages 75-79 years 11.2% ages 80-84 years 16.6% ages 85-89 years 16.9% ages 90+ years Remission at 5-years: 29% women 38% men
Rohr 2004[78] Population-based, cross-sectional	1168 twin pairs (548 monozygotic pairs and 620 dizygotic pairs) selected from Danish Twin Registry with data collected from 4 surveys associated with the Longitudinal Survey of Aging Danish Twins (70-94 years) and Longitudinal Study of Middle-Aged Studies (46-68 years) Home interview UI measured: During past month, have you involuntary been wetting yourself in connection with physical exertion, e.g., cough, life, sneeze, and	46-68 years and 70-94 years, Denmark	UI prevalence: 27% Monozygotic twins: 46-68 years: 17% SUI, 32% urge UI, 15% MUI 70-94 years: 41%% SUI, 45% urge UI, 34% MUI Dizygotic twins: 46-68 years: 17% SUI, 32% urge UI, 15% MUI 70-94 years: 41%% SUI, 45% urge UI, 34% MUI Tetrachoric correlations:

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author, Design, Adjustment for Confounding Factors, Level of Evidence	Subject Selection, Response Rate, Data Source, Methods to Measure Incontinence (survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
	laughing? (Stress UI) During the past month, have you experienced such a strong urge to pass water that it was impossible to get to the toilet in time? (Urge UI) If reported > 1 leakage during past month, classified according to UI type		Monozygotic twins: 46-68 years: SUI: .05 [-0.19-.29] urge UI: 0.51 [0.26-.71]; MUI: .28 [-0.09-.59] 70-94 years: SUI: .40 [.17-.60]; urge UI: .50 [.27-.68]; mixed UI: .53[.23-.75] Dizygotic twins: 46-68 years: SUI: .41 [.19-.60] urge UI: -0.22 [-0.59-.18]; MUI: 17 [-0.33-.60] 70-94 years: SUI: .18 [-0.01-.37]; urge UI: .28 [.02-.42]; mixed UI: .33[.06-.55 Heritability: For UUI and MUI, model including additive genetic factors and non-shared environment was best fitting model in both age groups: UUI: 46-68 years: 42% (17-64%) 70-94 years: 49% (29-65%) SUI: best-fitting model was based solely on familial and individual-specific environment: 39% (19-57%)
Nygaard, 2003([79]) Population-based, cross-sectional survey Adjusted by age, depression, race, BMI, parity, education, smoking, psychiatric medication use, comorbidity index, ADL, functional status	5,701 women aged 50-69 years who participated in the third interview of the Health and Retirement Study Telephone interview UI measured: In the last 12 months, have you lost any amount of urine beyond your control? Mild-moderate UI was incontinence on 15 or fewer days in the last month; severe incontinence was 15 days or more of UI in last month	Age: Continent women: 59 (SD 4) years Mild UI: 58.5 (SD 4.1) years Severe UI: 59.6 (SD 4.2) years Race: Continent: 70.4% white, 18.5% Black, 9.2% Hispanic, 1.9% other Mild UI: 81.7% White, 11.2% Black, 6.2% Hispanic, 0.9% Other Severe UI: 81.7% White, 11.3% Black, 5.0% Hispanic, 2.1% Other Residence: USA	15.9% UI 4.4% severe UI 10.5% mild-moderate UI Risk of severe UI: By Composite International Diagnostic Interview (CIDI): Depression: 1.82, 1.26-2.63 Black: 0.30, 0.19-0.46 Hispanic: 0.29, 0.15-0.53 Other: 0.77, 0.29-2.03 BMI: 1.44, 1.26-1.64 Parity: 1.27, 1.01-1.61 Education: NS

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author, Design, Adjustment for Confounding Factors, Level of Evidence	Subject Selection, Response Rate, Data Source, Methods to Measure Incontinence (survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
			Smoking: 1.48, 1.08-2.03 Psychiatric medication: 1.49, 1.01-2.19 Comorbidity index: 1.47, 1.16-1.87 Functional status: 1.90, 1.49, 2.41 Age and ADLs interactions By Center for Epidemiological Studies-Depression Scale (CES-D) Depression: 1.33, 0.91-1.94 Black: .030, 0.19-0.46 Hispanic: 0.28, 0.15-0.53 Other: 0.82, 0.32-2.11 BMI: 1.44, 1.26-1.64 Parity: NS Education: NS Smoking: 1.51, 1.10-2.06 Psychiatric medication: 1.59, 1.08-2.34 Comorbidity index: 1.50, 1.18-1.90 Functional status: 1.92, 1.51-2.45 Age and ADLs interactions Risk of mild UI: By Composite International Diagnostic Interview (CIDI): Depression: 1.41, 1.06-1.87 Black: 0.42, 0.31-0.56 Hispanic: 0.50, 0.34-0.74 Other: 0.36, 0.14-0.90 BMI: 0.97, 0.95-0.99 Parity: NS Education: 1.30, 1.04-1.63 Smoking: NS Psychiatric medication: 1.55, 1.16-2.07 Comorbidity index: 1.20, 1.02-1.41 ADL: 1.44, 1.10-1.88 Functional status: 1.55, 1.35-1.78 By Center for Epidemiological

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author, Design, Adjustment for Confounding Factors, Level of Evidence	Subject Selection, Response Rate, Data Source, Methods to Measure Incontinence (survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
			Studies-Depression Scale (CES-D) Depression: 1.12, 0.83-1.51 Black: 0.42, 0.31-0.56 Hispanic: 0.50, 0.34-0.74 Other: 0.37, 0.15-0.92 BMI: 0.97, 0.95-0.99 Parity: NS Education: 1.31, 1.04-1.64 Smoking: NS Psychiatric medication: 1..64, 1.23-2.18 Comorbidity index: 1.50, 1.18-1.90 ADL: 1.46, 1.11-1.90 Functional status: 1.56, 1.36-1.79
Aaron, 2002[80] Case-control study	200 married premenopausal and postmenopausal women aged 40-49 years in seven villages identified through the Christian Medical College and Hospital, Vellore (CHAD) census records Interview UI definition: not reported	Mean age: postmenopausal women: 46.6 (SD 2.2) and premenopausal: 45.4 (SD 2.3)	Stress UI: 20% premenopausal women 22% postmenopausal
Fitzgerald, 2002[81] Cross-sectional survey design II-2b	Convenience sample of 269 from 500 women (54% response rate) employed by a manufacturing and distribution center UI measured: Have you ever lost urine when you were not able to get to the toilet in time? Have you ever lost urine when you are asleep? Have you ever lost urine when you laugh, cough, or sneezed?	Women with mean age of 40 (SD 9.9) years, range 16-69 years, 85.3% age 50 years or younger 87.3% White 4.1% Black 8.6% Asian/Native American/Other Northeastern, USA	Monthly UI prevalence: 29% Of those with UI: 88% White 11% Asian/Native American/Other < 1% Black 26% stress UI 1% urge UI 73% mixed UI
Langa, 2002[82] Population-based, cross-sectional survey	7,443 adults aged 70 years and over who were participants in the Asset and Health Dynamics among the Oldest Old (AHEAD) cohort of the Health and Retirement Study Interviews	Mean age of continent adults: 77.2 (SD 0.2), and incontinent without pad use: 78.1 (SD 0.5), and incontinent with pad use: 79.3 (SD 0.6) 30.3% men 69.7% women	13% men 24% women 9.9% UI with pad use 9.5% UI –no pad use

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author, Design, Adjustment for Confounding Factors, Level of Evidence	Subject Selection, Response Rate, Data Source, Methods to Measure Incontinence (survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
	UI measured: During the last 12 months, have you lost any amount of urine beyond your control. Use of absorbent products indicating UI severity	89% White 9.3% Black 1.7% Other	
Nuotio 2002[83] Population-based, prospective cohort Adjusted for chronic diseases and ADL disability	1,052 persons (524 men and 528 women) randomly selected from the Tampere Longitudinal Study on Aging In 10-years: 175 men and 260 women were re-interviewed in their home or in institutions UI Measured: Do you ever have trouble getting to the lavatory in time? If, yes do you have urinary leakage, either day or night—never, rarely, frequently? Urge UI: urgency and urinary leakage regardless of the frequency of urine loss	Adults aged 60-89 years, Finland	Men at 10-years (N=524): UUI at baseline: 5% (n=28) 89% (n=25) deceased 7% (n=2) no urgency 4% (n=1) UUI Urgency, no incontinence at baseline: 7% (n=30) 83% deceased 8% no urgency 6% urgency, no incontinence 3% urge UI No urgency at baseline: 88% 57% deceased 3% urgency, no incontinence 3% UUI 7% not known Women at 10-years (N=528): UUI at baseline: 6% 68% deceased 6% no urgency 26% UUI Urgency, no incontinence at baseline: 7% 83% deceased 8% no urgency 6% urgency, no incontinence 3% urge UI No urgency at baseline: 88% 57% deceased 3% urgency, no incontinence 3% UUI 7% not known

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author, Design, Adjustment for Confounding Factors, Level of Evidence	Subject Selection, Response Rate, Data Source, Methods to Measure Incontinence (survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
MacLennan 2000([84]) Population-based, cross-sectional survey	Random selection of 4,400 households; 3,010 men and women (73.3% response rate) aged 15-97 years who were part of the South Australian Health Omnibus Survey In-home interviews UI measured: stress UI (loss of urine with coughing, laughing, or sneezing) or urge UI (suddenly felt urge to go to the toilet but accidentally wetting themselves before reaching toilet)	48.7% (n=1,464) men, mean age: 42.9 years 51.3%(n=1,546) women Race and ethnicity not reported; 75.3% born in Australia/Oceania, and 24.7% born overseas Residence: South Australia	Men: 1.5% stress UI 1.9% urge UI 1.0% mixed UI 4.4% UI Highest in those aged 75+ (17.6%) Women: 20.8% stress UI 2.9% urge UI 11.6% mixed UI 35.3% UI Highest in aged 70-74 (51.9%) UI type (OR for female vs. male) Stress UI: 17.2 [10.9-27.5] Mixed UI: 12.6 [7.3-22.4] Urge UI: 1.5 [0.9-2.6] Overall UI: 11.7 [8.9-15.4] Associated factors in women: Age: 35-54 years: 2.1 [1.5-3.0] 55+ years: 3.1 [2.1-4.5] Method of delivery: C-section only: 2.5 [1.5-4.2] Vaginal only: 3.4 [2.4-4.9] At least on forceps: 4.3 [2.8-6.6] Both vaginal and C-section: 4.7 [2.3-9.3] BMI: Normal weight: 1.4 [0.9-2.2] Overweight: 2.0 [1.3-3.2] Obese: 2.6 [1.6-4.3] Coughing most/every day: 1.6 [1.1-2.3] Osteoporosis 1.8 [1.0-3.2] Arthritis: 1.8 [1.3-2.5]

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author, Design, Adjustment for Confounding Factors, Level of Evidence	Subject Selection, Response Rate, Data Source, Methods to Measure Incontinence (survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
Hägglund 1999[85] Population-based, cross-sectional survey	All women (N=3,493) aged 18-70 years in the population register of Surahammar, Sweden; 3,076 responded (88% response rates) Mailed questionnaire UI measured: For the present dime do you have a problem with involuntary loss of urine (for example when you laugh, jump, cough, or sneeze)?	653 aged 18-30 years 626 aged 31-40 years 736 aged 41-50 years 578 aged 51-60 years 478 aged 61-70 years Race/ethnicity: not reported Residence: Sweden	26% overall prevalence 12% ages 18-30 years 20% ages 31-40 years 32% ages 41-50 years 36% ages 51-60 years 28% ages 61-70 years
Palmer 1999[86] Cross-sectional survey	Random sample of 2,000 of 4,000 women aged 18 years and over employed full-time at large urban academic center; 1,134 returned questionnaires (57% response rate), with 1,113 usable questionnaires Mailed questionnaire UI measurement: Have you ever lost urine when you were not able to get to the toilet in time? Have you ever lost urine when you are asleep? Have you ever lost urine when you laugh, cough or sneeze? Have you ever lost urine without meaning to at any time not mentioned above. UI defined as monthly leakage	Mean age: 40.3 (SD 10.6) years 72% Caucasian 21% African-American 7% Asian, Hispanic, or American Indian Residence: Baltimore, MD, USA	21% monthly UI Incontinent vs. continent women: ≤ 50 years: 69.3% vs. 85.1% > 50 years: 30.7% vs. 14.9% African-American: 13% vs. 17.2% White: 83% vs. 74.2% Asian/American Indian/Other: 3.9% vs. 8.6%
Roe, 1999[87] Population-based, cross-sectional survey Adjusted by age, sex	6,037 of 11,523 adults with usable questionnaires (52.4% response rate) aged 18 years and over randomly sampled from family physician patient registers in two health authorities in England Mailed questionnaire UI measured by asking respondents "if they had ever had bladder problems," e.g., accidentally leaking urine, having wet pants, needing to go	2,681 men with mean age of 53.5 3,356 women with mean age of 49.5 years Race: 5,581 (90.9%) White 33 (0.6%) Black Caribbean 3 (<.01%) Black African 167 (2.8%) Indian 29 (0.5%) Pakistani 3 (< .01%) Bangladeshi 11 (1.8%) Chinese 22 (3.6%) Other Asian	9% regular UI Incontinent vs continent: Females vs males: 11.3% vs 5.3%, P < .0001 Age : 55.7 vs. 46.2, P <.0001) No associations between UI and consumption of tea, soft drinks or alcohol; associations not shown Higher BMI: 26.2 vs. 24.6, P < .0001 No significant association for obesity and UI for men; for women: 27% vs.

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author, Design, Adjustment for Confounding Factors, Level of Evidence	Subject Selection, Response Rate, Data Source, Methods to Measure Incontinence (survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall; by Type, Severity, and Impact on Life
	to the toilet frequently, and not making it on time, and using aids or appliances to manage urinary incontinence. UI defined as 1 or more of these symptoms at least twice a month	38 (6.2%) Other Residence: England	13%, P < .0001) No association found between light cigarette consumption (5 per day), moderate (5-14/day) or heavy (15 or more per day) and continence status Mobility problems: 36% vs. 16%, P < .0001 Foot problems: 12% vs. 2% Less activity than people of own age: 31% vs. 12%, P < .0001 Sleep problems: 21% vs. 9%, P < .0001) Parity: Not significant when age controlled for Fetal weight > 9 pounds: 22% vs. 14%, P < .01
Mushkat 1996[88] Case-control design III	780 first degree female relatives of 259 women with stress UI from gynecological outpatient clinic with 474 first degree relatives of 165 matched controls Clinic interview of cases and controls about female relatives UI measured: SUI symptoms (sneezing, coughing, laughing, walking, bending, or exercising) at least twice a week	Mean age: cases 53 (SD 10.1), controls 50 (10.7) years Ethnicity: not reported Residence: Israel	UI prevalence: 20.3% in first degree relatives in study group, and 7.8% in control group (p < .05) Mothers (P < .005) 34.9% cases 12.7% controls Sisters: (P < .005) 19.9% cases 6.8% controls Daughters: (P = NS) 6.7% cases 2.9% controls

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
Diokno, 2007[89] Cross-sectional Adjusted by: Age Household size Income Region size Level of evidence: III	Subjects from a randomly selected pool of 250,000 households that volunteered to participate in National Family Opinion surveys, balanced to match census 2000 distributions on multiple factors. Response rate: 66.5% (n=29,903) Data source: Self-reported, mailed questionnaire. UI as, "Involuntary leakage or loss of urine during the last 30 days."	Age: 18 and above Mean: 50.03 (SD: 15.23) Gender: Male Race: Not reported Ethnicity: Not reported Residency: United States	Prevalence: 12.7% By type (of incontinent subjects): Urge: 44.6%, Stress: 24.5%, Mixed: 18.8, Other: 12.1% Age — % 18-34 — 7.25 35-44 — 7.17 45-54 — 10.98 55-64 — 15.58 65-74 — 23.82 75 + — 30.19 Age group — Stress UI — Urge UI — Mixed UI 18–35 — 38.1 — 30 — 14.76 35–45 — 35.74 — 35.38 — 12.64 45–55 — 30.77 — 38.91 — 16.52 55–65 — 19.28 — 46.75 — 20.96 65–75 — 16.67 — 53.81 — 22.62 76+ — 13.22 — 56.27 — 22.37 Total — 24.48 — 44.63 — 18.8 Characteristic — Level — % among incontinent UI Symptoms in the past 7 days (n = 1923) — Yes — 65% Duration of symptoms (n = 1628) — >1 year — 36% 1-2 year — 20% >2 year — 44% Consulted physician for UI symptoms (n = 1787) — Yes — 47%
Kinchen, 2007[90] Cross-sectional Adjusted by: Age Race Years with Kaiser Permanente Medication history Surgical history	Subjects randomly selected from all Kaiser Permanente of Northern California members seeking care within a 12 week period in 2002. Response rate: 49.7% (n=3,344) Data source: Mailed self-reported survey. Non-responders followed up with a phone call with survey over the phone or by mail.	Age: 21-75 years Gender: Female <30: 6.9% 30-<40: 13.6% 40-<50: 20.5% 50-<60: 24.6% 60-<70: 10.5% 70-75: 2.5% Race: White: 57.3%, Black: 9.5%, Asian: 7.0%, Hispanic: 7.0%, American Indian:	Overall: 44% Age group — Prevalence % <50 — 34.3 50-64 — 50.4 65+ — 51.8 By type - Stress — 42.5 Urge — 12.7 Mixed — 43.4

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
Level of evidence: III	UI as, "Having leaked urine in the last 7 days". Stress and urge symptoms were also determined.	0.8%, Other/unknown: 18.5% Ethnicity: Not reported	By severity- Reported as "bothersome": 61.8%
Altman, 2006[2] Prospective, cohort study with 10-year followup Adjusted by maternal age and parity Level II-2A	304/309 (98% response rate) primparous women who had a vaginal delivery over a 10-week period in 1995 Excluded: Elective or acute cesarean delivery; inadequate knowledge of Swedish language; dual pregnancy 229/309 (74.1% from original sample) available and met eligibility criteria at 10 years Excluded: UI surgery, C-sections after index delivery UI Measurement by survey with self-administered questionnaire • Do you experience sudden desires to void urine that are difficult to hold back? • Do you experience involuntary loss of urine at physical activities? • Do you experience bladder emptying difficulties? UI Severity Definition • Mild SUI defined as less than once/week • Moderate-severe SUI defined as UI more than once per week or daily	Swedish women with mean age at index delivery 29.9±4.1 years	Prevalence rates: • Mild UI at index delivery: 5%,16/309, 95% CI 3-8, and at 10-year followup: 31%, 72/229, 95% CI: 25-37 • Moderate-severe UI at index delivery: 2%, 5/309, 95% CI 1-4, and at 10-years followup: 18%, 27/229, 95% CI: 11-23 Mild SUI at the following time points: • 5% (n=16/304) at baseline • 14% (n=41/287) at 5 months • 47% (n=17/278) at 9 months • 25% (n=57/230) at 5 years • 31% (n=71/229) at 10 years • P <.001 5 months, 9 months, 5 yrs, 10 yrs Moderate-severe SUI: • 2% (n=5/304, 95% CI 1-4) at baseline • 43% (n=15/287) at 5 months • 7% (n=19/278) at 9 months • 11%(n=24/230) at 5 years • 12% (n=27/229) at 10 years • P <.001 at 5 months, 9 months, 5 years, 10 years
Altman, 2006[91] Case-control study Mean duration of followup: 13.8 years (range 3-23) Median followup: 14.3 years Adjusted for confounding factors	48/52 female patients (92%) with history of abdominal rectal prolapse surgery (65.8% of the 73 patients who had the surgery and were alive at the time of the study) 165/200 (82.5%) randomly selected age matched controls UI Measurement: mailed survey with questions on UI (no definition, time	Swedish women with mean age of cases at followup: 69 (range 32-90), and mean age of rectopexy was 56.2 (range 26-75) Median parity: 2.0 (range 0-4) Mean age of controls: 67.7 (range 30-91) Mean parity: 2.1 (range 0-5)	31% (n=15/48) cases vs. 24% (43/165) controls SUI: 17% (8/48) cases vs. 16% (26/165) controls UUI: 15% (7/48) cases vs. 10% (17/165) controls No difference in SUI prevalence between groups Adjusted OR, 95% CI = 1.0, 0.4-2.4; p =0.9 • Control: 16% (n=26/48) Cases: 17% (n=8/165) No difference in UUI prevalence between groups Adjusted OR, 95% CI = 1.5, 0.6-3.8; p=0.4 • Control: 10% (n=17/48)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
Level of evidence: II-3	frame, or specific question(s) provided)		• Cases: 15% (n=7)
Anger, 2006[92] Cross-sectional No adjustment for confounding factors Level of evidence: II-2C Same as 17070268?	Data extrapolated from 9,965 respondents in the National Health and Nutrition Examination Survey (1999-2000) to women ages 60 and over Multistage probability cluster design using census information Survey UI Measurement: In the past 12 months, have you had difficulty controlling your bladder, including leaking small amounts of urine when you cough or sneeze (exclusive of pregnancy or recovery from childbirth)?	Women ages 60 and over; age and ethnicity/race not specified; USA	UI prevalence was 38% (8,929,543 of 23,477,726 US population estimates) • 41% non-Hispanic white women • 20% non-Hispanic black women • 36% Mexican-American women By severity: • 36% reported daily UI (13.7% in NHANES) • 27% (10.3%) reported weekly incontinence • 23% had a few incontinent episodes/month • 12% had at least yearly incontinence • This corresponded to a prevalence rate of at least weekly UI: 24% of all women surveyed Regardless of age, race/ethnicity or education, the majority of women responding yes to difficulty controlling bladder had at least weekly UI. The exception was the lowest income group (PIR 0) in which 100% of women reported a few leakages a month Overall prevalence rates by age ranged from 33% to 41% with highest in 75-79 year olds (44%) Prevalence of daily UI increased with age, ranging from: • 12.2% age 60-64 • 20.9% age ≥85 • Other numbers unable to read from graph • 32% of women with <high school education vs. 45% of women with high school education vs. 38% of women with some college Women below poverty level (PIR 0 or <1) less likely to report UI (29% and 35%, respectively) vs. women above the poverty level (40% for those with PIR from 1.0 to 1.84 and 37% with PIR >1.84)
Anger, 2006[93] Cross-sectional No adjustments	Female nursing home residents at admission 1,125,163 in 1995	Female; age and race/gender for overall group not specified; USA	Prevalence with admitting or current diagnosis of incontinence in medical records and identified by the National Nursing Home Survey as having UI was 73.8% to 85.4%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
Level of evidence: II-3	1,156,134 in 1997 1,170,065 in 1999 National Nurse Home Survey compared to data from medical records; Data collected in 1995, 1997, and 1999 UI measurement: Admission or current diagnosis of UI in medical records; National Nursing Home Survey questions that asked NH staff about the: presence of indwelling Foley catheter or ostomy, need for assistance from equipment or personnel in using toilet, and difficulty in controlling urination		All with admitting or current UI diagnosis from medical record: (count, %, rate per 100,000 residents, 95% CI): • 1995: 13,915 (1.2%), 1,237 (949-1,524) • 1997: 20,679 (1.8%), 1,789 (1,435-2,143) • 1999: 15,979 (1.4%), 1,366 (1,050-1,681) From medical record from 1995-1999, UI prevalence was: UI rate was1366 per 100,000 female residents (1.4%) Age: with admitting or current UI diagnosis from medical record (count, %, rate per 100,000, 95% CI): • ≤74 years o 1995: 2,443 (17.6%), 1,435 (605-2,265) o 1997: 2,408 (11.7%), 1,334 (610-2,058) o 1999: 2,827 (17.5%), 1,389 (588-2,190) • 75-84 years o 1995: 4,159 (29.9%), 1,131 (662-1,601) o 1997: 9,029 (43.7%), 2,428 (1,679-3,176) o 1999: 5,668 (35.0%), 1,540 (972-2,107) • ≥ 85 years o 1995: 7,313 (52.6%) 1,245 (848-1,644) o 1997: 9,242 (44.7%), 1,531 (1,085-1,978) o 1999: 7,685 (47.5%), 1,254 (823-1,683) Race: with admitting or current UI diagnosis by medical record (count, rate per 100,000, 95% CI): White: • 1995: 13,397, 1,340 (1,022-1,558) • 1997: 17,962, 1,779 (1,402-2,155) • 1999: 15,075, 15,075 (1,148-1,869) Other: • 1995: 518, 421 (0.0-905) • 1997: 2,717, 1,969 (858–3,080) • 1999: 904, 554 (58–1,051) • African Americans: 11% of incontinent vs. 10% of continent • Hispanics: 2.8% of incontinent residents vs. 3.3% of continent residents

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
			• Counts (%) and rates(95% CI) for those with admitting or current diagnosis of UI identified by the NNHS with difficulty controlling urine per 100,000 residents (95% CI): • 1995: 10,695/13,915 (76.9%), 76,858 (66,543-87,176) • 1997: 15,255/20,679 (73.8%), 73,772 (64,947-82,597) • 1999: 13,648/15,979 (85.4%), 85,412 (77,364-93,460) Counts (%), and rates (95% CI) for those with admitting or current diagnosis of UI identified by NHHS with indwelling foley or ostomy : • 1995: 1,435/13,914 (10.3%), 10,316 (2,864-17,768) • 1997: 2,423/20,679 (6.9%), 11,718 (5,311-18,125) • 1999: 1,517/15,979 (9.5%), 9,495 (2,892-16,099) Counts (%), and rates for indwelling foley or ostomy of residents regardless of continence status per 100,000 (95% CI) • 1995: 101,827 (9.1%), 9,050 (8,281-9,819) • 1997: 90,855 (7.9%), 7,859(7,151-8,566) • 1999: 96,151 (8.2%), 8,218 (7,484-8,951) Counts (% for those answering question but those where question skipped for allowed reason or left blank) and rates per 100,000 (95% CI) of residents with UI identified by NHHS as requiring assistance for using toilet: • 1995: 9,847 (70.8%), 70,766 (59,831-81,702) • 1997: 14,237 (83.6%), 68,846 (59,267-78,424) • 1999: 8,898 (73.3%), 55,684 (43,783-67,586) Counts (% for those answering question but not those where question skipped for allowed reason or left blank) and rates per 100,000 (95% CI) of residents regardless of continence status identified by NHHS as requiring assistance using toilet:

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
			• 1995: 659,035 (69.7%), 70,766 (59,831-81,702) • 1997: 652,615 (70.7%), 68,846 (59,267-78,424) • 1999: 670,006 (71.0%), 55,684 (43,783-67,586) Also provides rates for not requiring assistance but did not include those Counts (% of those answering but not those where question skipped for allowed reason or left blank) and rates per 100,000 (95% CI) of those with UI requiring assistance from equipment when using toilet: • 1995: 3,214 (33.2%), 23,095 (12,895-33,295) • 1997: 4,464 (33.0)), 21,587 (13,465-29,709) • 1999: 2,821 (32.4%), 36,771 (25,354-48,188) Counts (% of those answering; does not include those who skipped question for allowed reason or left questions blank) and rates per 100,000 (95% CI) of residents regardless of UI status requiring assistance from equipment when using toilet: • 1995: 182,813 (28.4%), 23,095 (12,895-33,295) • 1997: 180,518 (29.4%), 21,587, (13,465-29,709) • 1999: 178,305 (27.6%), 36,771 (25,354-48,188) UI prevalence with an admitting or current diagnosis of UI in medical records: 73.8%-85.4% identified in NNHS as having difficulty controlling urination Regardless of record-based continence status: 56.3% to 58.6% had difficulty controlling urine Counts (% of those answering; does not include those who skipped question for allowed reason or left questions blank) and rates per 100,000 (95% CI) of residents with UI requiring assistance from a person when using toilet:

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
			• 1995: 9,619 (97.7%), 69,132 (58,007-80,256) • 1997: 14,000 (100%), 67,698 (58,032=77,365) • 1999: 8,675 (97.5%) 54,292 (42,379-66,205) Counts (% of those answering; does not include those who skipped question for allowed reason or left questions blank) and rates per 100,000 (95% CI) of residents regardless of continence status requiring assistance from a person when using toilet: • 1995: 652,088 (99.1%), 57,955 (56,636,59,274) • 1997: 640,137 (98.87%) 55,369 (54,048-56,689) • 1999: 661,92799.0%), 58,608 (57,288-59,927)
Anger, 2006[94] Cross-sectional No adjustment for confounding factors Level of evidence: II-2C	Data extrapolated from 9,965 respondents ≥60 years in the National Health and Nutrition Survey (1999-2000), comparing men to women. Multistage probability cluster design using census information and cross-sectional data Survey UI measurement: In the past 12 months, have you had difficulty controlling your bladder, including leaking small amounts of urine when you cough or sneeze?	Men and women aged 60 years and over; ethnicity/race not specified; USA	Prevalence rate of 17% (3,131,814 of 18,231,934 extrapolated from US estimates) By race: • 21% Non-Hispanic black men • 16% Non-Hispanic white men • 14% Mexican-Americans By education: • 20% <high school education • 15% high school education • 16% some college By income level: • 55% <poverty level (PIR of 0) • Higher income groups had less By UI severity: • 42% (7% of all men) reported daily UI • 24% (4% of all men) reported weekly UI By age and severity: • 50% aged 75-79 had daily UI (highest among age groups reporting daily UI) • 37% aged 60-64 had weekly UI (Highest among age groups reporting weekly UI) • Among all age groups, with daily or weekly UI ranged from 62% aged 86 and over to 71% in

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
			the 60-64 age group In comparison to NHANES data between men and women older than 60 years: • Prevalence in men is <1/2 that in women (17% vs. 38%) • UI prevalence in men increased with age and peaked in 85 and over (31%), whereas, women prevalence peaked in 75-79 year (44%) • Prevalence of UI among black men nearly same as black women (21% vs. 20%) • Black men had highest prevalence of UI vs. Black women who had the lowest prevalence of UI • Differences noted by socioeconomic status between genders o Men with less than high school degree had highest prevalence whereas women with less than high school degree had lowest prevalence • Stratification by poverty yielded similar gender disparity with prevalence highest among poor in men but lowest in poor women
Brown, 2006[95] Cross-sectional Adjusted for BMI Level of Evidence: II-2C	1,461/2,531 (57.7%) nonpregnant female participants aged ≥20 years in the NHANES study (2001-2002) with diabetes or impaired fasting glucose Excluded: incomplete UI information, did not complete physical examination, without diabetes diagnosis and had not fasted 8 hours before laboratory testing • 246 (16.8%) had diabetes (self-report of FBS ≥ 126 mg/dl) • 146 (11.2%) had impaired fasting glucose (FBS 100-125 mg/dl) Stratified, multistage probability cluster design Survey UI measurement using self-administered questionnaire: During	Female, USA Mean age (P <.001) • 60.2 ± 1.5 diabetic women • 58.0 ± 1.1 prediabetic women • 44.0 ± 0.8 normal glucose women Race: (P= .24) • Non-Hispanic white o 104 (42.3%) Diabetic o 90 (54.9%) Prediabetic o 565 (53.8%) Normal glucose • Non-Hispanic black o 59 (24.0%) Diabetic o 90 (54.9%) Prediabetic o 188 (17.9%) Normal glucose • Mexican-American o 65 (26.4%) Diabetic o 32 (19.5%) Prediabetic o 225 (21.1%) Normal glucose	Prevalence of UI: • Similar between those with diabetes (35.4%) and impaired fasting glucose (33.4%) • Higher than those with normal fasting glucose (16.8%; P <.001) • Based on these numbers, researchers estimate ~ 12.7 million women have UI, with 1.9 million prediabetic women (95% CI: 1.3-2.5) and 2.5 million women with diabetes [2.1-2.9] Type of UI • ≥ weekly UUI more common in diabetic (26.4%) and prediabetic (24.6%) women vs. normal women (7.7%, (P <.001) • ≥ weekly SUI more common in diabetic (30.2%) and prediabetic (31.2%) women vs. normal women (14.4%, P <.001) • Bothersome UI is greater among diabetic (31.3%) and prediabetic (24.7%) women than

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
	the past 12 months, have you leaked or lost control of even a small amount of urine with an activity like coughing, lifting, or exercise (stress incontinence) and "with an urge or pressure to urinate and could not get to the toilet fast enough? " (urge incontinence) Primary outcome: weekly or more frequent UI Bothersome UI and impact of UI: asked to rate degree of worry created by urine leakage and affect of urine leakage on day-to-day activities (categorized by not at all, only a little, versus somewhat, very much, or greatly		normal women (18.2%, P <.01) • Impact on daily activities Is greater among diabetic (12.6%) and prediabetic (14.0%) vs. normal women (4.9%, P <.001)
Danforth, 2006[68] Cross-sectional Adjusted for BMI, Type II Diabetes, hysterectomy, parity, oral contraceptive use, cigarette smoking Level of evidence: II-A	83,355 women who provided information on UI and parity out of 101,294 women who were sampled (82.3% response rate) Nurses Health Study II Mailed survey UI Measurement: During the last 12 months, how often have you leaked or lost control of your urine? (never, <1 time/month, 1x/month, 2-3 x/month, 1 time/week, almost every day) If you lose urine, how much usually leaks? (a few drops, enough to wet underwear, enough to wet outer clothing, enough to wet floor) Created two cases: 1) occasional urine loss (leaking 1-3 times/month 2) frequent urine loss (leaking at least weekly) Severe UI=enough to wet underwear	Women, mean age 44.8 years, USA	Leaked urine in past 12 months: (%) (n's available) • 57% never or <1 time/month • 17% 1-3 times/month • 26% 1 time/week By race (%) • Never or <1 time/month o 56% White o 64% Black o 55% Hispanic o 14% Asian o 17% other or missing • 1-3 times per month o 18% White o 15% Black o 19% Hispanic o 14% Asian o 17% other/missing • 1time/week o 26% White o 22% Black o 26% Hispanic

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
			o 18% Asian o 25% Other/missing Quantity of urine leaked: • 41% a few drops • 53% enough to wet underwear • 6% enough to wet outer clothing/floor Quantity of urine leaked by race/ethnicity: • A few drops o 41% White o 35% Black o 36% Hispanic o 49% Asian o 40% Other/missing • Enough to wet underwear o 53% White o 62% Black o 58% Hispanic o 4% Asian o 6% Other/Missing • Enough to wet outer clothing/floor o 6% White o 4% Black o 6% Hispanic o 4% Asian o 6% Other/missing After adjustment for confounding factors (see table on supplemental evidence table for risk factors): • Significant trend of increasing prevalence with increasing age Women ages 50-54 years had 1.81 times the odds of severe UI compared to women <40 (95% CU 1.66-1.97). After adjustment, Black (OR 0.49, 95% CI: .40-.60) and Asian-American women (OR: .57, CI: .46-.72) were at reduced odds of severe incontinence compared to white women; Hispanic and White women did not differ in UI prevalence

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
Glazener, 2006[5] Cross-sectional Adjusted Level of evidence:	3,405/4,537 (75.1% response rate) of women responding they had singleton births delivered over 1-year between 1994-1995 (3489/4555 responded to survey) Excluded: Twin pregnancies Mailed survey UI Measurement: A positive response to one or more of the following questions: • At present, do you ever lose any urine when you don't mean to? • In the last month, how often has this happened on average? • Do you wear a pad for this?	Women mean age 26.7 years (SD 5.3), Scotland, New Zealand, and England Race/ethnicity not reported	UI prevalence: 29% UI frequency at 3 months: • 50% (n=485) <1 time/week • 41% (n=401) <daily and >once per week • 9% (n=88) >daily leakage UI pad usage at 3 months • 68% (n=664) none • 23% (n=221) sometimes • 10% (n=98) daily Effect on quality of life at 3 months: • 51% (n=462) hygiene • 47% (n=342) home, work, social life • 17% (N=140) sex life UI Type at 3 months: • 48% (n=459) SUI • 23% (n=221) UUI • 15% (n=285) MUI Co-existing FI at 3 months: • 15% (n=136) After adjustments were made, the change of UI was increased with maternal age
Irwin, 2006[96] Population-based, cross-sectional Not adjusted Level of evidence: II-2A	19,165/58,139 adults aged ≥ 18 years (33% response rate) who were participants in the EPIC Study Interview UI Measurement: How often do you experience urinary leakage?	Women and men residing in Canada, Germany, Italy, Sweden, and UK 95.6% white Percent of women and men not reported	UI • 13.1% women • 5.4% men UI type by age and gender: See supplemental table
MacArthur, 2006[67] Prospective cohort study with 6 year followup Followup from Glazener, 2006 report Adjusted for maternal age, delivery mode, and parity Level of evidence: II-2A	4,214/7,872 women who had a childbirth during 1993-1994 and had responded to a 3 month questionnaire (54% response rate) Conducted in 3 countries Mailed survey 3 months and 6 years after index birth UI Measurement: A positive response to one or more of the following	Women mean age 26.7 years (SD 5.3), Scotland, New Zealand, and England Race/ethnicity not reported	Prevalence of persistent UI at both 3 months and 6 years was 24% Severity of persistent UI at 6 years: • 12% (120/1010) daily UI • 21% (208) a few times a week • 23% (231) sometimes used a pad • 11% (111) used a pad all day and/or all night UI impact of persistent UI at 6 years: • 47% (477) hygiene

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
	questions: • At present, do you ever lose any urine when you don't mean to? • In the last month, how often has this happened on average? Do you wear a pad for this?		• 16% (166) home life • 35% (356) social life • 21% (162/783 who worked) work life • 13% (120/915 with partner) on sex life Median VAS assessing overall extent of problem = 25.0 with 22% (226) scoring 50 or more (higher scores=worse)
Lewinshtein, 2006[97] Cross-sectional Stratified by age and comorbidity (e.g., circulation problems and diabetes and tested using Chi-square tests Level of evidence:	366 men aged 33-80 years participating in a prostate cancer screening Excluded: diagnosis of prostate cancer Self-administered questionnaire UI Measurement: Over the past 4 weeks, how often have you leaked urine? Overall, how big a problem has your urinary function been for you during the last 4 weeks?	Men with a median age of 54.8 years; Quebec, Canada 226 (76.4%) Caucasian 14 (4.7% African-American 56 (18.9%) Other	Defines UI as SUI except question is worded for presence of leaked urine only UI prevalence by age and severity n, (%): • <50 years o Daily: 0 o 1 time/week: 4 (3.5%) o < 1 time/week: 3 (2.7%) o Never: 106 (93.8%) • 50.1-60 years o Daily: 4 (3.4%) o 1 time/week: 1 (0.9%) o <1 time/week: 8 (6.8%) o Never: 104 (88.9%) • >60 years o Daily: 5 (7.0%) o 1 time/week: 1 (1.4%) o < 1 time/week: 4 (5.6%) o Never: 61 (85.9%) • Total o Daily: 9 (3.0%) o 1 time/week: 6 (2.0%) o <1 time/week:15 (5.0%) o Never: 271 (90.0%) Urinary bother by age, n (%) • <50 years o Big problem: 0 o Moderate problem 1 (0.9%) o Minor problem: 8 (7.2%) o Very minor problem: 11 (9.9%) o No problem: 91 (82%) • 50.1-60 years o Big problem: 3 (2.5%)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
			o Moderate problem 5 (4.2%) o Minor problem: 5 (4.2%) o Very minor problem: 16 (13.6%) o No problem: 89 (75.4%) • > 60 years o Big problem: 1 (1.4%) o Moderate problem: 3 (4.1%) o Minor problem: 3 (4.1%) o Very minor problem: 16 (21.6%) o No problem: 51 (68.9%) • Total o Big problem: 4 (1.3%) o Moderate problem: 9 (3.0%) o Minor problem:16 (5.3%) o Very minor problem: 43 (14.2%) o No problem: 231 (76.2%) Urinary bother, regardless of UI severity, significantly increased with age (P <.001) UI was not associated with age (P <.07)
Mardon, 2006[98] Cross-sectional Adjusted by age, sex, race, Hispanic status Level of evidence: II-2C	Baseline surveys: 145,765 (67% response rate) community-dwelling Medicare beneficiaries ≥65 years Excluded: institutionalized individuals and <65 years Random sample Medicare Health Outcomes Survey (Mailed) 86,708 women 58,470 men Mailed survey UI Measurement: UI in past 6 months UI described as not a problem, a small or big problem	Men and women ≥65 years, USA Race/ethnicity: • 8,343 Hispanics • 133,860 Non-Hispanics • 5,626 American Indians • 3,047 Asians • 10,775 African-Americans • 125,154 Whites • 3,863 Other	UI in past 6 months (P <.001) • 43.6% women • 27.9% men • Overall: 37.3% By age: • 31.9% age 65-69 • 34.0% age 70-74 • 37.9% age 75-79 • 41.1% age 80-84 • 49.3% age 90-94 • 54.3% ≥age 95 By race/ethnicity: • 30.6% Hispanics • 37.9% Non-Hispanics • 38.7% American Indians • 31.6% Asians • 30.3% African-Americans • 38.3% Whites • 31.2% other

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
			Impact (big, small):: • 19.2%, 58.0% women • 13.4%, 57.5% men • 17.3%, 58.8% overall Big impact by age • 13.6% age 65-69 • 14.7% age 70-74 • 18.2% age 75-79 • 19.0% age 80-84 • 22.6% age 85-89 • 27.0% age 90-94 • 37.5% ≥age 95 By race and impact (big • 58.9% Hispanic • 55.4% Non-Hispanic • 58.7% American Indian • 53.6% Asian • 55.1% African-American • 55,3% White • 61.3% Other
McGrother, 2006[6] Prospective cohort study with 1-year followup Adjusted for age and ADL; separate models adjusted for general and specific morbidities and parity Level of evidence: II-2A	12,570/19,241 (65.3% response rate) com40-98munity-dwelling women drawn from 108 general practices (71% of all practices) Mailed questionnaire at baseline and 1 year UI Measurement: SUI: leakage upon laughing, coughing, or exercise ≥monthly OAB included but could not differentiate those with OAB with urge incontinence from those with OAB without urge incontinence	Women aged ≥40 years (range 40-98), UK Median age: 58 years	At baseline: • Pure SUI: 837/12,570 (6.7%)
Thom, 2006[99] Cohort study (cross-sectional) Adjusted by age,	2,108 out of 10,230 women initially invited who were enrolled in the Kaiser Permanente Medical Care Program of Northern California since age 18 and have at least half of births	Women ages 40-69 years, Mean age 56 (SD 8.6) years; USA Race/ethnicity status: • 47.6% (1003) white	UI prevalence in past 12 months by frequency and adjusted for age (OR, 95% CI): • Any incontinence (P =.0068) o White: 73.3, 71.4-75.2 o Hispanic: 74.8, 73.0-76.7

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
response bias, parity, maternal age at first birth, menopausal status, hysterectomy, current oral estrogen use, BMI, Comorbidity (e.g., 1 or more UTIS in last year, Diabetes), current smoker, alcohol 1 drink/wk or more Level of evidence: II-2A	with Kaiser system 2,108/3,240 enrolled (65.1% response rate) Population-based sample with age and race stratified sampling Self-report questionnaires and in-person interviews; medical record data abstraction UI measurement: • At least 1 self-reported UI episode in past 12 month • SUI: Number of UI episodes over last 7 days that occurred with an activity like coughing, lifting, sneezing, or exercise • UUI: Number of UI episodes accompanied by a physical sense of urgency • Severity based on Sandvik Severity score	• 16.6% (350) Hispanic • 18.2% (382) Black • 16.4% (345) Asian-American • 1.3% (28) Did not select category	o Black: 64.8, 62.8-66.9 o Asian: 68.8-66.9-70.8 • Monthly or more (P <.0001) o White: 45.0, 42.9-47.1 o Hispanic: 51.0, 48.9-53.1 o Black: 36.8, 34.7-38.9 o Asian: 33.7, 31.7-35.8 • Weekly or more (P<.0001) o White: 29.6, 27.7-31.6 o Hispanic: 35.9, 33.9-38.0 o Black: 25.2, 23.2-27.0 o Asian:19.0, 17.3-20.7 • Daily (P =.0077) o White: 12.1, 10.7-13.5 o Hispanic: 17.2, 15.5-18.8 o Black: 11.8, 10.4-13.2 o Asian: 8.5, 7.3-9.7 Incontinence severity adjusted by age (OR, 95% CI) • Moderate severity (daily UI of a few drops or weekly UI which wets underwear or crotch of pants) o White: 21.2, 19.4-23.0 o Hispanic: 24.0, 22.1-25.8 o Black: 17.9, 16.2-19.5 o Asian: 13.8, 12.3-15.2 • Severe/very severe (weekly or daily UI which wets pants or floor) (P= .50) o White: 8.3, 7.1-9.5 o Hispanic: 11/7, 10.3-13.1 o Black: 7.3, 6.2-8.4 o Asian: 5.2, 4.3-6.2 UI prevalence in last week by UI type adjusted for age (any UI, SUI, UUI: • White: 27.2%, 15,1%, 8,8% • Hispanic: 33.1%, 17.8%, 10% • Black: 23%, 7.5%, 13.6% • Asian: 18.5%, 7.9%, 7.4% UI prevalence at least weekly by type, adjusted

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
			for age, %, 95% CI • SUI only (P <.0001) o White: 7.2%, 6.1-8.3 o Hispanic: 9.0%, 7.7-10.2 o Black: 2.3%, 1.7-3.0 o Asian: 3.4%, 2.6-4.2 • Mixed, predominantly SUI (P=.035) o White: 7.9%, 6.7-9.1 o Hispanic: 8.8%, 7.6-10.0 o Black: 5.2%, 4.3-6.2 o Asian: 4.5%, 3.6-5.4 • UUI only (P=.027) o White: 4.8%, 3.9-5.7 o Hispanic: 5.8%, 4.8-6.8 o Black: 7.6%, 6.5-8.8 o Asian: 3.0%, 2.3-3.8 • Mixed, predominantly urge (P=NS) o White: 4.0%, 3.1-4.8 o Hispanic: 4.2%, 3.3-5.0 o Black: 6.0%, 5.0-7.1 o Asian: 4.4%, 3.5-5.2 • Mixed, equal SUI and UUI (P= NS) o White: 3.3%, 2.5-4.1 o Hispanic: 5.3%, 4.3-6.3 o Black: 1.9%, 1.3-2.5 o Asian: 3.2%, 2.5-4.0 Readjusted rates of weekly UI considering response bias of no enrolled women: • White: From 29.6% to 26.0% • Hispanic: From 36.0 % to 25.5% • Black: From 25.3% to 17.0% • Asian: From 19.1% to 14.3% Readjusted rates by UI type considering response bias of no enrolled women: (Any UI, at least 1 time/month, once per week, daily UI) • White: 69.2%, 43.3%, 29.2%, 12.4% • Hispanic: 61.2%, 40%, 28.5%, 13.4% • Black: 50.5%, 29%, 19.7%, 9.9% • Asian: 56.1%, 29.2%, 15.9%, 6.3%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
			• Prevalence was significantly lower in black and Asian-American women compared to white and Hispanic women (P <.001) After adjustment for age, parity, hysterectomy, estrogen use, BMI, menopausal status, and diabetes: • SUI risk lower in black (adjusted OR 0.36, 0.23-0.57) and Asian-American (adjusted OR .54, 0.34-0.86) compared to white women • UUI risk similar in black (adjusted OR 1.19, 0.79-1.81) and Asian-American (adjusted OR .86, .52-1.43) compared to white women
Wehrberger, 2006[9] Prospective cohort study with mean duration of follow-up of 6.5 years Adjusted for confounding factors Level of evidence: II-2A	441/925 women (47.7% response rate) who completed a free examination in 1998 or 1999 Mailed questionnaire UI Measurement: BFLUTS: Have you leaked any urine at all during past 4 weeks?	Women aged 20-84 years; Austrian	UI prevalence: • 32% at baseline • 43% at 6.5 years
Jackson, 2006[100] Prospective cohort Adjusted for diabetes Level of evidence: II-2A	Randomly selected 1,107 women from Group Health Cooperative enrollees from 1998 to 2002 which included 799 nondiabetic women and 218 diabetic women (26% of total number of eligible nondiabetic and diabetic women) who were participants in a longitudinal study on urinary tract infection risk Excluded: Natural menstrual cycle in past 12 months; nursing home care, wheel chair bound, dementia, severe psychiatric disorder, indwelling or intermittent catheterization, end-stage renal disease requiring dialysis, active malignancy other than skin cancer, acute cystitis in past 90 days, chronic antibiotic use; enrollment in GHC <1 year	Women ages 55-75 years; USA (Washington state) 87.6% White 4.5% African-American 4.9% Asian or Pacific Islander 3.0% Other (from Boyko, 2005 which first described the sample)	Baseline prevalence of any amount of frequency of UI was 66% and 8% with severe incontinence in past year (see Jackson, 2005[101]

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
	Mailed survey, clinic interview, and computerized laboratory, hospital, and pharmacy records collected at baseline, 12 and 24 months UI measurement: Report of any UI or severe UI at 12 or 24-month followup visits using question: Have you had accidental leakage of your urine during the past year. Approximated the Sandvik index for incontinence severity		
Lukacz, 2006[102] Cross-sectional Adjusted by age, obesity, parity, menopause, caffeine, diabetes, and delivery method Level of evidence: II-2	Age-stratified random selection in 4 age strata 4,458/12,200 (37%) respondents participating in the Kaiser Permanente Continence Associated Risks Epidemiology Study 4,103 available for analysis Mailed survey UI Measurement: See previous publications	Women ages 25-84 years in 4 age strata: 25-39, 40-54, 55-69, and 70-84 years USA 60% non-Hispanic White 20% Hispanic 10% African American 8% Asian-Pacific Islander 1% American Indian 1% Other or unknown	SUI overall prevalence: 15% (511/4043) Prevalence by birth group, %, 95% CI • Nulliparous: SUI: 8% , 6-10; n=64/771 • C-Section: SUI: 11%, 8-15, n=43/387 • Vaginal delivery: SUI: 18%, 16-19, n=505/2,885 • P <.05 for difference between C-section vs. nulliparous and vaginal delivery vs. nulliparous; P <.05 for differences between vaginal and C-section delivery
Tannebaum, 2006[103] Cross-sectional (population-based) No adjustment Level of evidence: II-2A	Population-based sampling of women ages 55 years and over who responded to a 2002 survey on older women's priorities for healthy aging 2,361/5,000 women (47% response rate; 15%-18% response rate from all Canadian households Mailed survey UI Measurement: ICI questions SUI: urine leakage with laughing, coughing, or exercising UUI: urine leakage on way to the bathroom MUI: combination of SUI and MUI Nocturnal UI: urine leakage at night while asleep	Women ages 55 years and over; 10 Canadian provinces Mean age 71±7 years	Overall prevalence: 39% SUI: 32.0% UUI: 22.0% MUI: 35.0% Nocturnal UI: 7.0% UI at least once per day: 45.0% Moderate or large amount of leakage per UI episode: 16.7%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
van Brummen, 2006[7] Prospective cohort study No adjustment for confounding factors Level of evidence: II-2A Note: van Brummen, 2006[8] had similar sample but recruited from fewer midwifery practices over same time period and van Brummen, 2006[7] had similar sample size	Consecutive recruitment of nulliparous pregnant women with single, low-risk pregnancy between 12 and 18 weeks gestation recruited from 10 midwifery practices from January 2002 to July 2003 Exclusion criteria: previous urogynaecological surgery, urogynaecological malformations, diabetes mellitus, or neurological disorders; good knowledge of Dutch language; pregnancy within 1 year after index pregnancy 344 (72.6%) returned all questionnaires Self-report questionnaire at 12, 24, and 36 weeks gestation, and 3 and 12 months after delivery UI Measurement (OAB-wet): Using questions from the UDI, • Wet OAB: Do you experience a strong feeling of urgency to empty your bladder? Do you experience frequent urination? Do you experience urine leakage related to the feeling of urgency? All 3 questions must be answered positively to have OAB-wet Measured impact by IIQ Baseline continence status unknown	Women with a mean age of 30.4 (SF 0.19); Netherlands	Prevalence of OAB-wet symptoms: • 12 (3.5%) at 12 weeks • 50 (14.6%) at 36 weeks • 12 (3.5%) at 3 months • 12 (3.5%) at 1-year
Van Brummen, 2006[8] Prospective cohort study No adjustment for confounding factors Level of evidence: II-2A See van Brummen, 2006[7] (different N and	Consecutive sample 1,366 nulliparous pregnant women with single, low-risk pregnancy between 12 and 18 weeks gestation recruited from 8 midwifery practices from January 2002 to July 2003 Exclusion criteria: previous urogenital surgery, diabetes mellitus, or	Women with a mean age 30.4 years (SD 3.9, range 20-40); Netherlands Race not specified	At 12 weeks gestation: • UUI: 33 (6.4%) • SUI: 96 (18.6%) At 36 weeks gestation: • UUI: 99 (19.2%) • SUI: 217 (42.1%) Symptom bother (denominator—all subjects):

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
number of practices but can be similar study population)	neurological disorders; non-Dutch speaking 515/1244 eligible women (41.4%) Self-report questionnaire at 12, 24, and 36 weeks gestation, and 3 and 12 months after delivery UI Measurement: Using questions from the UDI, • SUI was defined as: Do you experience urine leakage related to physical activity, coughing, or sneezing? • UUI: Do you experience urine leakage related to the feeling of urgency? Defined symptom bother using item levels and total scores from UDI Baseline continence status unknown		• UUI: 2 (0.2%) at 12 weeks; 15 (2.9%) at 36 weeks • SUI: 12 (2.3%) at 12 weeks; 29 (5.6%) at 36 weeks Symptom bother at 36 weeks of those with the symptom: • UUI: 15/99 (15.2%) • SUI: 29/217 (13.4%)
Viktrup, 2006[104] Prospective cohort study with 12-year followup after first pregnancy Not adjusted Level of evidence: II-2A	Consecutive sample of 241/305 primiparous women (79%) Excluded: UUI symptoms Data obtained from birth registration records, hospital records, telephone interviews a few days after first delivery, 3 months; and mailed questionnaire at 5 and 12 years UI measurement (using ICS definitions): Do you have UI provoked by physical exertion? Do you have daily incontinence? Whether UI was a hygienic or social problem?	Women with a mean age during first delivery 26 (range 17-41); Norway Race not specified	Prevalence of SUI: • Before 1st pregnancy: 3.7% any SUI, 0.4% daily SUI, 0.4% social/hygienic problem • 30.7% any SUI during 1st pregnancy, 5% daily SUI, and .8% social or hygienic problem • 18.7% any SUI during 1st puerperium, 5% daily SUI, 2.5% social/hygienic problem • 5.8% any SUI 3 months after 1st delivery, 1.2% daily SUI, 0.4% social/hygienic problem • 29.5% any SUI 5 years after 1st delivery, 6.2% daily SUI, 8.3% social/hygienic problem • 42.3% any SUI 12 years after 1st delivery, 5.4% daily SUI, and 8.7% social/hygienic problem. 12 years after first delivery, SUI prevalence: • 42% (102/241) • 5.4% (13/241) had daily SUI • 8.7% (21/241) complained of hygienic or social discomfort because of SUI SUI prevalence by vaginal delivery: 33.0% (38/115) vaginal delivery in those without

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
			SUI before or during pregnancy 60.8% (31/51) with SUI in 3 months postpartum OR 3.1, CI: 1.6-6.2) SUI prevalence by C-section delivery • 19.4% (6/31) without SUI before or during pregnancy • 40.0% (6/15) with SUI 3 months postpartum • OR 2.8, CI: 0.7-10.9)
Teleman, 2005[105] Cross sectional survey No Adjustment for confounding factors Purpose: To investigate the prevalence of storage and emptying LUTS in women reporting UI or continence; the perceived bother induced by UI, and investigate a possible cut off above which most women perceive their leakage frequency as bothersome	All women born between 12/1/35 and 12/1/45 (n=10,766), invited to screening 12/1/95; data drawn from population register 6,917 screened; 2,213 admitted they were incontinent 1,500 randomly drawn from 2,213 incontinent and 1500 randomly drawn from 4704 not admitting to incontinence Incontinence as self reported urinary leakage which causes a social and/or hygienic problem BFLUTS survey then administered to both groups; response rate 89%-(1,336/1,500) from incontinent group and (1,346/1,500) from continent group	Study says ages 55-64 but taking definition, ages should be 60-70 100% women No figures on race/ethnicity Lund area of Sweden Excluded subjects with incomplete data	o Any type UI in continent group=53.3% o Any type of UI in incontinent group=93.8% o Estimated overall prevalence of 66% o Any type UI defined as urge, stress, nocturnal or leakage without reason o Incontinence by type: Incont / Cont / Calc. / Overall Urge 79.2% 36.2% 57.6% Stress 85.1% 41% 63.0% Noc 13.1% 3% 8.0% No cause 34% 7.4% 20.7% o Amount by Frequency <1/wk / 2-3/wk / Daily / Several x qd Drops 74.2% 87.2% 82.2% 65.3% Dribble 1.9% 6.9% 11.5% 19.4% Soak 0.3% 1.2% 0.6% 11.7% Run down legs 0.2% 0.3% 1.3% 3.1% Problem (calc) 57.8% 86.7% 96.2% 99.0%
Swanson, 2005[106] Cross sectional survey Adjusted for age Purpose: To examine age specific prevalence and correlates of UI and its subtypes among community dwelling women	Survey mailed to 100% (362/362) of small family practice and to random sample of 62.4% (720/1,553) in second practice (list of women generated from roster and/or billing databases) UI and type defined by yes to 1 of 2 questions: 1) during past month have you ever experienced urine loss (wet yourself) when coughing, laughing, or doing some other activity? (stress incont) 2) During the past month have	o Ages 45-81+ o 100% women o No figures on race/ethnicity o Practices in Hamilton Ontario o Excluded subjects with incomplete data	Prevalence / Problem Any UI = 51.3% (311/606) 35.7% (111/311) Stress UI = 17.5% (106/606) 17.9% (19/106) Urge UI = 7.4% (45/606) 20.0% (9/45) Mixed UI = 26.4% (160/606) 51.9% (83/160) CI = 95% No breakdown by severity

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
	you ever had to pee and then wet yourself before getting to the toilet? (urge incont.); if answered yes to both questions, defined as mixed incontinence Negative answer to 3rd question defined continent women: Is wetting yourself a problem that interferes with your day-to-day activities or bothers you in other ways? Response rate: 61.1% by author report (606/992); calculated rate is 56% (606/1082); 90 returned undelivered, 115 not participating, and 271 not returned at all		
Rohr, 2005[107] Cross sectional study using in person interviews No Adjustment for confounding factors Purpose: To describe the prevalence of urge and stress incontinence and find simple clinical characteristics that are useful in general practice for identifying women with a high probability of UI	Study population identified from Central Person Registry participating in 3 studies using same survey, invited via letter (n=6,369); randomly sampled 45-68 year olds from the Longitudinal Study of Danish Twins (n=2075); 70-94 year olds from the Longitudinal Study of Aging Danish Twins (N=2400) and The 1905 Cohort Study of Danes (n=1,320) from 1998. Response rate: 91% (5,795/6,369); original studies' response rate varied between 63-83% Interviews in home by trained interviewers; 3 attempts to contact Incontinence self reported as leaking >1 time during the past month with either physical exertion, strong urgency or both	Age ≥45 100% women No figures on race/ethnicity Danish subjects only Excluded 574 subjects unable to complete the interview without a proxy; incomplete data for any questions	Incontinence by type: All UI Stress Urge All age 32.6% 24.5% 19.6% (calc) (1,857/5,699) (1,401/5,711) (1,118/5,711) By Age: <60 20.1% 15.5% 9.1% (268/1,336) (207/1,336) (122/1,337) 60-80 29.8% 21.8% 16.4% (677/2274) (496/2279) (374/2279) ≥80 43.7% 32.4% 8.0% (912/2089) (679/2096) (622/2095) Asked about frequency, no results given Did not ask about impact
Ruff, 2005[108] Cross sectional survey Purpose: To examine prevalence and risk factors of UI To determine most	Population: Convenience sample of 500 college educated women from prestigious AA women's group of attending a conference Response rate: 47% (233/500) Inclusion criteria: membership in the	Ages 19-82 100% women 100% African Americans Unknown residency-presumed US No exclusion criteria given	Incontinence (n=85): All ages/all types 37.6% (85/233)-calc: 36.5% Stress 76% (63/83) Urge 84% (70/83) Mixed 68% (58/85) By severity (n=83):

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
commonly seen types of incontinence in healthy African American women	organization, attendance at 1 of the conferences sponsored by the organization and willingness to participate in the study Incontinence based on self report answers to Incontinence Screening Questionnaire (Romanzi & Blaivas, 1997) Incontinence defined as leaking urine or losing control of urination when subject did not want to		Stress / Urge Never 24.1% (20/83) 15.7% (13/83) Few x's/yr. 41.0% (34/83) 38.6% (32/83) Few x's/month 13.3% (11/83) 15.7% (13/83) Few x's/wk 10.8% (9/83) 18.1% (15/83) Daily 10.9% (9/83) 12.0% (10/83) By pad usage (n=48): None 39.7% (23/48) calc: 47.9% 1 pad 29.3% (17/48) calc: 35.4% 2 pads 10.3% (6/48) calc: 12.5% 3 pads 3.4% (2/48) calc: 4.2% 4+ pads 17.2% (10/48) calc: 20.8% Four women reported soaked pads at noc Ten women reported soaked pads during day By bother rating (n=78): No bother 15.4% (12/78) 1-2 39.7% (31/78) 3-4 18.3% (14/78) calc: 17.9% 5-6 9.2% (7/78) calc: 9% 7-9 17.9% (10/78) calc: 12.8% 10 (intolerable) 5.3% (4/78) calc: 5.1% Duration also given in article
Lifford, 2005[109] Cross sectional study using survey methodology embedded in prospective cohort design Adjustment for age, duration and complications of DM Purpose: To evaluate the association between type II diabetes and development of urinary incontinence in women	Study population: Nurses Health Study cohort established in 1976 responding to UI items in the biennial questionnaire in 1996 (n=83,569) Sample size after exclusions 81,845 Response rate: unknown 3 attempts to contact, then shortened questionnaire sent Incontinence and diabetes based on self report Incontinence as leaking at least weekly, severe incontinence as weekly leaking of sufficient quantity to wet the underwear	o Aged 50-75 o 100% women o No figures on race/ethnicity o Nurses in US o Excluded 13,909 women who had leakage 1-3 times/month; also women with type I diabetes, gestational diabetes or those who self-reported DM but did not provide diagnostic details excluded from analysis	Prevalence: 17.4% (14286/81,845) Severity: ▪ 10.9% (1555/14,286) leaked enough to wet outer clothing or floor ▪ 21.8% (17,829/81,845) <1x/month, a few drops ▪ 9.4% (7672/81,845) <1x/month, wet underwear or more Did not ask about impact
Fritel, 2005[110] Cross sectional self	Population: GAZEL cohort 45-50 years between 1990-1996 100% sample sent a questionnaire on	o Ages 49-61 o 100% women o Unknown race	(n=2625) Stress UI: 68.4% (1796/2625) Severe SUI: 15% (386/2625)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
reported survey Purpose: To examine prevalence of stress UI To examine potential obstetric risk factors of UI	UI and obstetric symptoms in 2000 (n=3114) Response rate: 84% (2625/3114) Used answers from questionnaire developed for GAZEL study Stress UI defined as urine leak when physically active, coughing or sneezing in the previous four weeks Severely incontinence women leaked often or all the time	o French workers of national power company o No exclusion criteria given	By severity: Stress Never 32% (829/2625) Occasionally 28% (724/2625) Sometimes 26% (686/2625) Often 10% (260/2625) All the time 5% (126/2625) Whether a problem in severe cases (n=386): Not a problem 1% (3/386) Slight problem 21% (81/386) Quite a problem 24% (94/386) Serious problem 53% (206/386)
Oskay, 2005[111] Cross sectional in person survey No Adjustment for confounding factors Purpose: To determine the prevalence of urogenital complaints in post-menopausal women aged 50 and over	From latest national census: Purposive/categorical sampling of 500 women, each representing 1/10,000 women in the 4 age groups on the census (50-54 n=126, 55-59 n=113, 60-64 n=101, 65+ n=160) ,seen at health center for problems other than UI or with a person coming to the clinic Inclusion criteria: Post-menopausal (no period in the last year) SUI as involuntary urinary loss precipitated by coughing, sneezing or physical exertion; Urge incontinence as involuntary urinary loss proceeding the urge to void or uncontrollable voiding with little or no warning; Mixed incontinence as the presence of both stress and urge incontinence Serious incontinence as continuous use of pad Developed their own survey No response rate given-appears 100%	o Ages 50-65+ o 100% women o No figures on race/ethnicity o Lived in Istanbul, Turkey o Excluded subjects with surgically induced menopause or those with presenting complaint of UI	Any type UI =68.8% (344/500) o Stress UI=37.2% (128/344) o Urge Incontinence=32.3% (111/344) o Mixed Incontinence=30.5% (105/344) Frequency (n=500): <1x/mo 18.2 % (91/500) >2x/mo 30.8% (154/500) Serious UI 19.8% (99/500) Weekly incontinence (n=344): <1x/wk 33.2% (114/344) Weekly 17.7% (161/344) calc: 46.8% Once daily 8.4% (20/344) calc: 5.8% >1x/day 22.7% (78/344) Severity (n=344): Drops 41.6% (143/344) Wets underwear 36.9% (127/344) Wets dresses 14.5% (50/344) Urine leaks through legs (runs down legs) 7.0% (24/344)
Melville, 2005[112] Cross sectional survey using mailed questionnaire Adjusted: for age	Population: 6,000 women 30-90 years drawn from claims, and pharmacy data from Group Health Cooperative members (n=550,000), stratified by decade of age with over sampling of women in younger decades	o Ages 30-90 o 100% women o No figures on race/ethnicity, just a non-white category o Women living in Washington state o Excluded subjects that were unable to	Prevalence: All UI/all ages: 42% (1458/3438) SUI: 33% (480/3438) Urge UI: 13% (187/3438) Mixed UI: 50% (732/3438)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
Purpose: To determine the prevalence and severity of UI and the factors associated with this condition in a population based sample of women aged 30-90	UI as by leakage of any amount that occurred at least monthly ▪ SUI: leaking or loosing urine during activities such as coughing, laughing or walking ▪ Urge UI: leaking or losing urine associated with an urge to urinate so strong and sudden that the participant could not reach the toilet fast enough ▪ Mixed: if answered affirmatively to both sets of symptoms Sandvik Severity Index used to characterize degree of incontinence; QOL measured by Incontinence QOL Instrument (I-QOL) and severity by Patient Incontinence Severity Assessment Response rate: 64% (3536/5531); actual analysis on 3,438-calc: 62%	be located, had dis-enrolled, had paralysis, mental or physical incapacity to complete a written questionnaire or a current UTI	Severity (no n given): No UI: 58% Slight UI: 9% Moderate UI: 15% Severe UI: 18% Frequency of UI (no n given): Monthly: 44% Weekly: 30% Daily: 26%
Homma, 2005[113] Cross-sectional Adjusted by: Age, Gender, Parity Functional status General health condition Co morbid diseases Level of evidence: III	Randomly selected using a 2 stage randomization process in proportion to the numbers of households. Response rate: 45% (n=4,570) Data source: Self-reported mailed questionnaires Incontinence as, “Urgency with urge incontinence.”	Age: 40-100 (Mean: 61) Gender: Male and female Race: Not reported Ethnicity: Not reported Residency: Japan	Prevalence: Overall (Urge incontinence): 6.4% Male: 6% Female: 7%
Jorgensen, 2005[114] Cross-sectional Adjusted by: Age, Gender Health status, Medical history Drug use, Alcohol consumption Smoking Level of evidence: III	Selected from all in the municipality of Tromso including those that had suffered stroke and controls. Response rate: 64.5% (213 stroke patients, 242 age-matched controls) Data source: Self-administered questionnaires and clinical evaluation Incontinence as, “Involuntary loss of urine.”	Age: 24 and older Gender: Male and Female Race: Not reported Ethnicity: Not reported Residency: Norway	Prevalence: By Gender: Male: Female: Controls: 12% 32% Stroke survivors: 21% 35% By severity - “More than a little:” Male: Female Controls: 1% 9% Stroke survivors: 6% 18%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
Jumadilova, 2005[115] Design: retrospective, cross sectional secondary data analysis Adjusted: demographics, comorbid conditions, locomotion, incontinence appliances/conditions Purpose: To provide a descriptive overview of the elderly, nursing home patient population with UI	Population: 200,000+ residents of eligible NH nationwide Sample: All residents of any home in the US if admitted to eligible home and rec'd care between 1/2/02 and 12/31/03 (n=87,000) Analyzed: 57,596 records Data Source: MDS, NH progress notes, care plans, medication and tx records, physician orders, accounts payable/receivable and cost accounting Definition of UI: used MDS question H, 1b to classify UI	Subjects: =29,645 Women: 63.8% Race: 89.2% white Resided in US Excluded n= 27951; if rec'ing hospice care, were comatose or had bowel incontinence during the period as indicated on the MDS	UI prevalence prior to exclusions for bowel incontinence : 58% (33, 415/57,596 Of those eligible UI prevalence: 30% (8,995/29,645) No breakdown by type, severity or impact on life
Stothers, 2005[116] Cross-sectional Adjusted by: Age Ethnicity Education Income Region Special needs requirements Level of evidence: III	Subjects were selected from pooled population based surveys and Medicare data. Response rate: Not reported Data source: Population based surveys, such as NHANES, as well as Medicare data. Incontinence was defined as, "Difficulty controlling bladder."	Age: 60+ Gender: Male Race/Ethnicity: Non-Hispanic White, Non-Hispanic Black, Mexican-American, Other, Other Hispanic Ethnicity: Same as above Residency: USA	Prevalence: Overall: 17% By age: 60-64: 11% 65-69: 11% 70-74: 19% 75-79: 27% 80-84: 27% 85+: 31% By race: Non-Hispanic white: 16% Non-Hispanic Black: 21% Mexican-American: 14% Other race: 33% Other Hispanic: 21%
Tegerstedt, 2005[117] Design: cross sectional mailed survey Adjusted: age and parity Purpose: To estimate prevalence of symptomatic pelvic organ prolapse in urban female population	Population: 8,000 residents 30-79 years, representative of source population (random sample) Response rate: 69% (5,500/8,000) Source: validated 5 item questionnaire with weighted scoring giving a total score Definition: Do you suddenly feel the urge to go to the toilet and then accidentally leak urine? Do you leak urine when you cough, sneeze of lift heavy objects?	Subjects: n=5,489 100% women No race/ethnicity figures given Resided in Stockholm, Sweden Excluded: inconsistencies in age information From updated Swedish population register	Overall UI: no figures given o SUI: 63.2% (3444/5489; CI 61.9-64.4%) o Urge UI: 50.5% (2756/5489; CI 49.2-51.8%) o Mixed UI: 3.2% (CI 2.7-3.6%) "Frequent" (often) SUI: 8.8% (CI 8.1-9.6%) "Frequent" (often) Urge UI: 5.8% (5.2-6.5%)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
Adelmann, 2004[50] Prospective cohort	Community UI prevalence sample of a 1998-1999 survey enrolled in a Medicaid managed health plan in 7 county Minneapolis/St. Paul metro area Age 65 above Random sample of 910 persons enrolled in Medicaid health plan. Of this the n= 378 that were eligible due to UI. Sample was further limited to persons based on at least one claim for a doctor's visit and medical chart could be located. n=236 Nursing home abstraction sample was randomly drawn from Medicaid persons for a total of 480 persons. Interviews face to face in residence. Response rate 59%, cooperation rate 90% Abstraction of medical record at clinics also. Definition – ever/current UI measured by a yes response to questions about trouble holding urine or leaking urine	Characteristics of community and nursing home N=910 Community / Nursing Home Women 82.1% / 79.2% Men 17.9 / 20.8 Age in years 65-74 50% / 14% 75-84 34.9 / 34.2 85+ 15.1 / 51.9 mean 75.9 / 84.5 Race White 69.4 / 93.8 Black 14.5 / 4.6 Other 16.2 / 1.7	Prevalence of UI in community sample Ever/current / Past week UI Total 41.6% / 23% Women 45% / 25.5 Men 25.8 / 11.7 Age 65-74 34.1 / 17.6 75-84 45.3 / 26.2 85+ 58.1 / 33.8 White 45 / 25.5 Black 39.8 / 20.3 Other 30.1 / 16.1
Andersson, 2004[10] Population based study, cross sectional Prospective no control mentioned	3/2000, Life and Health questionnaire sent to 70,000 residents randomly selected from 274,000, who participated in above study; a special section on UI was given to a sample of 15,360 residents 18-79 years.	7,680 females 7,680 males Age categories 18-37 53.9% 35-52 60.3 50-67 69.6 65-82 72.2	Prevalence for UI was 19% when defined as 'any leakage' and 7% when defined as 'at least once a week' 17% with UI reported severe problems that interfered with daily life

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
	Response rate was 64.5% Postal questionnaire with 12 questions on UI using definitions from ICS Stats on weights and calibration and found results were the same	Orebro, Sweden	
Bogner, 2004[11] Population based longitudinal survey II-2B	ECA (Epi Catchment Area) program used to sample 3,481 community dwelling adults (African Americans and Whites initially living in area in 1981) selected for this study. 1,920 were contacted (73% of original cohort) including 822 persons ≥50 years who completed info on UI. After exclusions for missing data, 747 were the final sample. Cohort ≥50years at followup interview performed 1993-1996. Those ≥65 years were over-sampled GHQ used and self report on UI UI = "Have you ever had any difficulty in controlling your water, losing your urine or having trouble getting to the bathroom on time?" If any uncontrolled urine loss was reported within the 12 months before the interview, persons were classified as having UI.	Mean age of study sample was 67.2 64% were women 72.3% White; mean age 68.2±11 27.7% AA – mean age 64.5±10 White Black Diabetes 14.3 6.9 Heart trouble 27.4 26.6 Arthritis 51.1 56.5 Stroke 8.2 7.3 Cancer 14.4 6.3 MME 27.6+-2.6 25.6+-3.6 ADL impaired 1.9% 3.9% East Baltimore, MD USA	19.8% reported UI during the year preceding the interview white(540) AA(207) UI 22.4% 13% No information on SI, Urge Incon.
Corcos, 2004[12] Prospective cohort.	Population ≥35 years, stratified by census of metro area and by gender. 7,487 persons in	48.2% men; mean age 52 51.8% women; mean age 50.9	603 persons had wet OAB, dry or mixed 18.5% (14.7% men and 21.3% women) Prevalence of wet OAB;

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
No control mentioned.	the sample base. 53.7% response rate with 3,249 interviews in final sample. Investigators developed standardized questionnaire to ascertain OAB and SUI and impact on quality of life. Computer assisted telephone interviews conducted in 2 steps: an initial questionnaire evaluated presence of OAB followed by detailed questionnaire completing the assessment. Urgency – "In past few months, did you ever feel an urgent need to urinate, to such a point that if you did not immediately go to the bathroom, you risked having an involuntary urine loss or leak?"	82.4% < 65 years. 17.6% > 65 years. Montreal, Toronto, Vancouver and Edmonton, Canada	2.3% (2% men and 2.6% women) Mixed OAB 1.2% (3% men and 2.1% women) Urgency total men women Every day 1.5% 9% 2.1% 3-4 times/week 1.5% 5% 2.4% 1-2 times/week 3.6% 2.7% 4.5% 4 times/4weeks 1.9% 1.3% 2.4% ≤3/month 12.7% 11.6% 13.8% Urgency 9.4% (15.3% men and 23.3% women) SUI; 5.9% (.8% men and 10.6% women)
Dallosso, 2004[13] Prospective longitudinal study. II=2B	Part of the Leicestershire MRC Incontinence Study, focused on women ≥40 years living in the community: From a random sample of 20,244 women drawn, 12,565 returned the questionnaire (65% response). 7,046 completed FFQ sent to 10,852 of above sample (response rate 65%). 1st postal questionnaire mailed Oct 1998 and completed by 7,046 women. 2nd postal questionnaire mailed Oct	Baseline data compared to those who provided FFQ data – Median age 57 vs. 61 Rating of health poorer in baseline after adjusting for age (OR: 1.66; 95% CI 1.51-1.82) More long term health problems in baseline (OR 1.14; 95% CI, 1.05-1.25) No difference in reporting SUI (OR: 1.02; CI 95%, .92-1.13) Leicestershire, UK	Prevalence of SUI at baseline was 17.3% Prevalence at baseline Total N SUI cases % 40-49 1,694 16.7 50-59 1,761 19.8 60-69 1,453 16.2 70-79 995 15.2 80y + 321 18.1

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
	1999 and completed by 6,424 women (91% response rate). Excluded: those in residential/nursing homes and those of South Asian origin (5.3% of pop ≥40 years). Used ICS definitions.		
de Tayrac, 2004[31] Case control, retrospective study II-3 *Authors state it was a case control but they had a control group	717 women who had Dargent and Rudigoz technique. 365 (50.9%) returned questionnaires, 449 did not respond. 51 excluded leaving 314 women. 117 patients who had a vaginal hysterectomy for menorrhagia from Jan 1991 to Dec 2001 and a control group of 116 patients who had conservative treatment. 197 had hysterectomy for pelvic pain and 117 for menorrhagia. Self report questionnaire.	Vaginal hyst. Control Age 51.4 50.9 Parity 2.1 2.2 Menopause 43.5% 47.4% Smoking 17.9% 17.2% Drink>2 L/d 7.7% 9.5% Hx of uro sxs 0 0 France	Prevalence (as stated in article) Vag hyster % control % Freq day>8 19.7% 16.4% Noc: day >1 5.1 6.9 Urgency 62.4 54.3 Qmo 36.8 30.2 Qwk 19.7 12.1 Qday 6 12.1 UI 39.3 33.6 Use of pads 15.4 12.9 Urge Inc 20.5 13.8 Qmo 12 7.8 Qwk 4.3 5.2 Qday 4.3 0.9 SI 36.7 31.9 Qmo 18.8 16.4 Qwk 12.8 8.6 Qday 4.3 3.5 Age <60 VH Control UI 41.8% 33.7 UI 21.8 12.5 SI 40 33.7 Age >60 UI 28.6 41.7 Urge UI 14.3 25 SI 28.6 33.3
Foldspang, 2004[51] Age stratified random samples II-2A	Sample of 6,240 and 6,468 women living in the municipalities of Aarhus and Randers 20-59 years.	C-sec in 12.2% of 1st childbirths. Average age – 32.8yrs (20-41). 52.1% reported having 2 births or more. Mean age at 1st birth = 27.5yrs and	UI during pregnancy with 1st child 15.6% (2nd birth 18.5%) and 12% of deliveries by c-section for 1st child. UI following 1st birth was reported by 26.3% (UI>2wks, 14%; UI >4wks, 9.4%); 2nd birth, 30.5% (UI >2wks, 8.2%, UI

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
	Analysis based on 1,232 women in combined samples who reported their 1st and last childbirth within 13-120 months prior to responding to the questionnaire; minimum f/u period after childbirth was 12months. Self questionnaire mailed Jan-March 1995 and 1998. 67.8% responded	29.9yrs at 2nd.. Average duration since 1st childbirth was 5.3yrs. Denmark	>4wks, 5.9%) Table I. 1st and 2nd birth postpartum urinary incontinence (PPUI) occurrence* by UI during pregnancy, mode of delivery (cesarean section vs. vaginal childbirth) and childbirth number, in 1232 women. Aarhus and Randers, Denmark, 1995 and 1998 Women: PP UI OR Determinant n (%) (%) OR 1st birth (n=1,232) All women 1,232 (100.0) 26.3 Pregnancy UI Yes: 192 (15.6) 66.7 8.6 (6.1–12.1) No: 1,040 (84.4) 18.8 (Reference) Mode of delivery Vag: 1082 (87.8) 28.3 2.9 (1.7–4.8) C- section: 150 (12.2) 12.0 (Reference) 2nd birth: (n=642) All women: 642 (100.0) 30.5 Pregnancy UI Yes: 119 (18.5) 75.6 12.2 (7.6–19.5) No: 523 (81.5) 20.3 (Reference) Mode of delivery Vag: 603 (93.9) 31.3 2.1 (0.9–4.8) C section: 39 (6.1) 17.9 (Reference) *PPUI occurring at all. †p<0.10; ‡p<0.001. Table II. 1st and 2nd (PP UI) occurrence* by mode of delivery; cesarean section (CS) vs. vaginal childbirth (VC)], preceding pregnancy UI (PRUI) and birth number, in 1,232 women. Pregnancy UI Mode Total no. PPUI (%) 1st birth (n=1,232) PRUI VC 169 68.6 PRUI CS 23 52.2 No PRUI VC 913 20.8 No PRUI CS 127 4.7 2nd birth (n=642) PRUI VS 113 76.1

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency		Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life				
				PRUI	CS	6	66.7	
				No PRUI	VS	490	21.0	
				No PRUI	CS	33	9.1	
Fritel, 2004[52] retrospective cohort II-2C	French women from hospital database of 1st birth women who had not previously delivered fetus >22 weeks 307/669 primiparous women who delivered in 1996 in vertex position between 37-41 wks (274 had moved and 88 did not respond) 45.9% response rate. Excluding the women who did not receive the questionnaire (274), response rate was 77.7% Questionnaire sent by mail 4weeks after delivery asking about SUI before, during and after pregnancy – "Do you have loss of urine during physical exertion, cough or sneeze?" UI categorized slight, mode or severe using Sandvik Index.	Age at delivery (years) BMI (kg/m2) Birth weight (g) 3240 Labor (h) Active 2nd stage (min) Cesarean section Forceps Third-degree tear	29.3 (4.4) 21.3 (2.9) 3240 (384) 6.2 (2.3) 11.1 (7.5) 10.1 (31) 36.2 (111) 1.3 (4)	Circumstances of leakage Stress Urge Other circumstances Frequency of leakage Less than once a month One to 3 times per month One to 3 times per week Everyday Unknown Amount of leakage Drops Small amount More Unknown Bothered by incontinence Not at all A little Moderately A lot Unknown Use of pads for incontinence None One to 6 per week One or more per day Unknown				89.9 (89) 64.6 (64) 22.2 (22) 41.4 (41) 29.3 (29) 11.1 (11) 10.1 (10) 8.1 (8) 69.7 (69) 23.2 (23) 3.0 (3) 4.0 (4) 17.2 (17) 54.5 (54) 15.2 (15) 10.1 (10) 3.0 (3) 74.7 (74) 16.2 (16) 4.0 (4) 5.1 (5)
Haltbakk, 2004[18] Prospective cohort no control mentioned ?historical control	480 Norwegian men at St. Olavs Hospital, Trondheim Norway. Tentative dx of BPH made on 612 pts and from this pool, sample analyzed was 480 (78%). ICS LUTS questionnaire (ICS-BPH) between 1997-2000. IPSS, SPI and SISI	Mean age of patients was 67 years, SD 10.6 years; median 69 years range 39-91years mean age in incontinent group was 68 years		37% any leakage 12% slight 18% moderate 3% severe 4% not possible to classify 20% experienced at least some bother 21% drops 13% small splashes 1% substantial amounts				

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
	used also. UI defined as any involuntary leakage of urine.		61% of incontinent group had urge incontinence. 2% had stress incon 9% had mixed 28% were unclassified
Holroyd-Leduc, 2004[19] Population based Prospective cohort Confounders – sex, age, sex, race, smoking, alcohol, BMI, sensory impairment, comorbid disease, depression, cognitive function and baseline dependency. II-2A	Community dwelling in US 6506 of 7447 subjects aged 70 and > in the Asset and Health Dynamics Among the Oldest Old study who had complete info on continence status were baseline – outcomes 3 groups- 5,872 nursing home, 5521 ADL decline and 5,509 IADL decline as outcomes Subjects interviewed in 1993 and 1995 Blacks, Hispanics and Florida residents were over-sampled Overall response rate was 80% UI measured "next question might not be easy to talk about, but it is very important for research on health and aging, during the last 12 months, have you lost any amount of urine beyond your control?"	Mean age =/- SD = 77 (range 69-103) 63% female 86% white Median number of baseline comorbid medical conditions was 2 10% received help with ≥1ADLs and 23% were receiving help in ≥1 IADLS at baseline Pts with UI had more comorbidities (p =.001), higher rate of visual impairment (35% vs. 22.4% p <.001) and hearing impairment (39.7% vs. 30.5% p <.001) more functionally impaired at baseline	Baseline prevalence for UI was 14.8% (18.5% in women and 8.5% in men)
Hunskaar, 2004[20] Cross national study, Prospective No control group	Postal survey mailed to 29,500 households in 4 countries – France, Germany, UK and Spain (age ≥18yrs) 58.1% response rate 5976 women with UI included in analysis (35% of study pop)	Mean age France – 44.8 Germany – 59 UK – 45 Spain – 64 All – 58	In all, 35% of women reported they had UI in past 30 days France – 44% Germany – 41% Spain – 23% UK – 42%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
	Definitions used by ICS; sxs in last 30 days and in last 7 days		
Jackson, 2004[22] population based Prospective cohort; also randomly selected from HMO diabetes registry II-2A	1,017 post menopausal US women a 55-75 years enrolled in HMO and followed for 2 years (1998-2002) inclusion criteria were no natural menstrual cycle in past 12 months (oral estrogen or vaginal estrogen users were excluded), resided in Washington state. Exclusion factors were residential nursing care, restriction to wheel chair, dementia or severe psych disorder, indwelling catheter or intermittent urinary catheter, end stage renal disease requiring dialysis, active malignancy other than skin cancer and chronic antibiotic use. Acute cystitis in past 90 days exclusionary. Postvoid residual bladder volume measured using portable ultrasound device. 12 month f/u done by 87% and 24mo f/u by 81%. Primary study outcome was sx cystitis.	Frequency of Exposures at Enrollment and Univariate Risk of Symptomatic Urinary Tract Infection Characteristic (%) Hazard Ratio (95% Confidence Interval) Complete sample† 1,017 (100) Age (years) 55-59 32 1.0 60-69 42 1.3 (0.8; 2.2) 70-75 26 1.6 (0.9; 2.9) Ethnicity White 87 1.0 Other 12 0.6 (0.3; 1.2) General health score from SF-36 76-100 (51) 1.0 51-75 (37) 2.0 (1.2–3.3) 0-50 (12) 2.6 (1.3–4.8) Smoking history Never (55) 1.0 Former (39) 0.9 (0.5–1.4) Current (6) 0.1 (0.02–0.8) Diabetes at baseline No (79) 1.0 Yes (21) 1.9 (1.1–3.1) Diabetes treatment type Not diabetic (79) 1.0 Diet or pill (17) 1.2 (0.7–2.0) Insulin (4) 4.7 (2.2–10.3) Accidental leakage of urine in last year No (34) 1.0 Yes (66) 1.6 (0.9–2.7) Type of urinary incontinence in last month None (41) 1.0 Stress only 174 (17)	Accidental leakage of urine in last year No (34) 1.0 Yes (66) 1.6 (0.9–2.7) Type of urinary incontinence in last month None (41) 1.0 Stress only 174 (17) 19 0.9 (0.5–1.8) Urge only 106 (10) 20 1.7 (0.8–3.6) Stress and urge 324 (32) 52 1.4 (0.9–2.4) Postvoid residual bladder volume <50ml residual (79) 1.0 50-100ml residual (10) 1.1 (0.5–2.2) >100ml residual (10) 1.6 (0.8–3.2)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
		19 0.9 (0.5–1.8) Urge only 106 (10) 20 1.7 (0.8–3.6) Stress and urge 324 (32) 52 1.4 (0.9–2.4) Postvoid residual bladder volume <50ml residua (79) 1.0 50-100ml residual (10) 1.1 (0.5–2.2) >100ml residual (10) 1.6 (0.8–3.2) History of hysterectomy No (69) 1.0 Yes (31) 1.2 (0.8–2.0) History of kidney stones No (90) 11.0 Yes (5) 2.4 (1.2–4.9) History of bladder or urinary surgery No (90) 1.0 Yes (10 1.6 (0.9–3.0) Parity (no. of full-term pregnancies) 0 (14) 1.0 1-3 (63) 1.3 (0.7–2.5) >4 (23) 2.2 (1.1–4.3)	
Jackson, 2004[21] cross sectional analysis, longitudinal study II-2A	Of 1,584 white and black women 70-79 years at 2 clinical sites in Pittsburg and Memphis recruited, 1,558 answered the questions. Enrollment Limited to those who reported no difficulty walking 1/4mile, climbing 10 steps or performing ADLs Questionnaires – in the past 12 months, have you leaked even a small amount of urine? How often have you	Mean age 73.5 49% were black 20% diabetes 64% arthritis 55% hypertension 27% white reported weekly UI vs. 14% black	9.6% reported daily UI 11.6% weekly UI 24% less than weekly UI (note abstract reports a different weekly number but text reports above number) of those with weekly UI Urge UI was 42% and SI was 40% and incontinence unrelated to stress or urge was 14%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
	leaked?		
Johnson, 2004[23] Long term cohort, Prospective study of RRP vs. Radiotherapy II-2B	Men from the Prostate Cancer Outcomes Study dx with primary prostate cancer between Oct 1994-Oct 1995 Residents of LA, King County, Washington, states of Connecticut, NM, UT, between ages of 60-89yrs in King County and younger than 90 in others. Self questionnaire at 6, 12, 24 and 60 months after diagnosis and medical record review at 12 and 60 mos. 11,137 men identified in registries; 5672 randomly selected, letters sent to 4,736(83.5%) of selected cases. Total of 3,533 men(62.3%) completed 6 and 12mo were included in f/u cohort. 1433 men had RRP completed 6mos 1178 did 24 months (82.2%) 1109 did 60mos (77.4%) For Radiotherapy – urinary problems not reported Questionnaire also translated into Spanish and interview conducted in Spanish when necessary.	1,433 men RRP 642 men received Radiotherapy RRP group – wt % by race NHW AA Hispanic Arthritis 33.3 38.6 35.8 Diabetes 11.1 29.5 17.2 COPD 7.5 6.6 5.4 HF 4.9 2.1 4.4 CVA 2.6 2.5 3.3 HTN 37.3 54 37.5 MI 7.9 4 4.2 Age at dx <60 27.5 38.6 23.4 60-64 26.8 26.1 30 65-75 41.9 32.9 45.5 >/=75 3.8 2.4 1	Wt % for men with RRP NHW AA Hispanic Level of urinary control baseline Total control 87.9 86.6 80.5 Occ leakage 8.8 9.5 11.2 Freq leakage 2.1 2 6.5 P = .77 .29 6months Total control 22.7 27.6 28.9 Occ leakage 52.1 44.2 40.8 Freq 22.6 23.4 26.7 P = .57 .83 12 months Total control 33.1 38.5 37 Occ leakage 50.2 51.4 46.9 Freq 15.6 9 14.9 P= .24 .26 24 months Total control 38.2 41.9 35.2 Occ leakage 50.2 45.1 53 Freq 9.8 11.1 11.3 P = .86 .38 60 months Total control 30.8 49.3 32.8 Occ leakage 53.7 39.7 47.4 Freq 14.3 10.4 18.7 P= .01 .36

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
Lagergren, 2004[24] National, longitudinal, multi-purpose study in Sweden (SNAC). Study consisted of two parts – population part and the care/service part. II-2A	Subjects from Skane, Karlskrona, Kungshomen and Nordanstig from ≥65 years starting in 2001 to 3/2004. Total pop of SNAC 17,044; baseline 8,627 targeted persons 7,518 sampled. 16-25% received public care. F/U every 6 yrs beginning at age 66. Combo of interviews and questionnaires	Men 3,052 Women 4,465 Total 7,518 12% 65-79yrs old, 6% >80yrs Avg age 85 compared to avg age in Sweden 83	Severe UI – Ordinary homes – 15% Special accom - 44% Total 31%
Moorthy, 2004[118] Cross-sectional Adjusted by: Age, Occupation, Income Family history Place of residence Level of evidence: III	Subjects randomly selected from men visiting urology clinics in 11 Asian countries. (n=2,369) Response rate: Not reported Data source: Self-administered questionnaires Incontinence as, "Urgency with urge incontinence."	Age: ≥18 years Gender: Male Race: Not reported Ethnicity: Asian Residency: China, Hong Kong, India, Indonesia, Philippines, Singapore, Korea, Thailand, and Taiwan.	Prevalence (Urge incontinence): Overall: 13%
Ozerdogan, 2004[29] Cross sectional Prospective study. II-2A	625 women ≥20 years, living in 4 different cities in Turkey. 1/4 resided in rural area. 1/5 gave birth at least ≥4 times and most were vaginal deliveries (25%). Illiteracy rate 9.4% Questionnaire and I-QOL Rare – UI <1 time/month. Reg – UI >2 times/month Serious – continuous use of sanitary protection. SI and Urge defined as usual definitions.	Age distribution 20-29 – 26.4% 30-39 years – 22.6% 40-49 years – 18.7% 50-59 years – 13.4% 60-69 years – 11.7% ≥70 years - 7.2% 50% BMI >25.0% Smokers 25.0% Recurrent UTIs 19.0% Diabetes 6.6% COPD 7.5% Neurological disorders 11.2%	Prevalence of UI was 25.8% Rate of rare UI was 9.3%, serious and Regular 16.5% SI in women with UI was 42.9% Urge was 27.3% MI was 29.8% Prevalence of SI was greatest before 50 yrs of age while urge incontinence. MI dominated in women ≥50 yrs. Prevalence increased in diabetes, neurological and recurrent UTI. Smoking, HRT menopause did not have an impact on prevalence.

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
Schytt, 2004[30] Prospective, longitudinal cohort II-2A	After childbirth at 593 clinics 5,550 women booked appts during recruitment time, 4,500 eligible, 3,191 consented. Three questionnaires: 1st at baseline (n=3,061) , 2nd mailed 6-8 weeks after the birth(n=2,762) and 3rd 1 yr after birth(n=2563). Total 2,450 completed all three. Study sample was 2,390 women after exclusions. Women were asked to recall any sxs of UI during and after pregnancy. Selected data from a National Swedish survey investigating physical and psychological assessment of childbirth May and Sept 1999 and January 2000 antepartal visits Excluded miscarriages, non-Swedish speaking, and women from nonparticipating clinics, delivery of twins	Average gestation: 1st quest – 16 weeks, 2nd – 10 weeks post, 3rd – 1 year and 2 weeks. Avg age at recruit – 29.5 years Primiparas – 44% Multiparas – 56% 79.2% had vaginal delivery 13.4% had c-section Sweden	21.7% sxs of SI at one year Prevalence Primi 18.4% Multi 24.3% Vaginal 23.4% C-Section 10.6%
Stenzelius, 2004[54] Cross-sectional Adjusted by: Age, Gender, Quality of life, Occupation, Economy, Living condition, Need of help, Satisfaction with children contact, and problems with Communication, Mobility, Elimination,	Subjects were selected and mailed a questionnaire from a randomized, age-stratified sample of persons ≥75 years living in a southern part of Sweden. Response rate: 52.8% (n=4,277) Data source: Self-reported postal questionnaire Incontinence as a yes to the question, "Have you had problems controlling urine in	Age: 75 and above Mean: 83.7 (SD: 5.69) Gender: Male and Female Male: 38.4% Female: 61.6% Race: Not reported Ethnicity: Not reported Residency: Community dwelling and special accommodations residents in Southern Sweden.	Prevalence by age group and severity: **Male** 75-79 80-84 85-89 90+ A little 26 23.6 27 20.9 Very much 5.2 8.9 16.6 21 Total 31.2 32.5 43.6 41.9 **Female** 75-79 80-84 85-89 90+ A little 23.2 26.8 25.9 32.3 Very much 10.1 13.5 19.1 23.5 Total 33.3 40.3 45 55.8

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life
Digestion, Breathing and circulation Psychosocial problems Other type of pain Level of evidence: III	the last 3 months?"		
Vandoninck, 2004[55] Age stratified Prospective cohort for men in the original study. Mentions sampling wts upon the ratio of # of women in each age group in the sample to # of women in the age group in population.	Dutch women from Urepik (Uro Epi in Europe and Korea)study in the community In 1999, a national postal questionnaire survey of 1,460 spouses of 1,771 men. 1,071 returned - 73 response rate UI assessed by total score on short UI specific questionnaire – 3 groups – no sxs score (0-2); minimal (3-6) and severe (7-14). In addition, self reported UI was calculated conforming to ICS standard definitions. "Do you ever have involuntary urine loss?" QOL also used	During the past month: % How often have you leaked urine? 0) Never 54.5% 1) ≤1/week 19.6% 2) >1 but <3 times/week 10.0% 3) >3 times/week 6.0% 4) Nearly always 8.6% If you experienced urine loss, how much did you leak? 0) I never leak 50.2% 1) Some drops 32.2% 2) A small stream 11.4% 3) Protection material or clothes soaking wet 4.9% 4) Leaking through pads or clothes 0.3% How often do you use protection material 0) Never 68.1% 1) Occasionally 21.4% 2) Nearly always 3.9% 3) Always 5.8% Did you lose urine on coughing or sneezing? 0) Never 31.1% 1) Occasionally) 45.0% 2) Nearly always 13.5% 3) Always 9.3%	Mean age 57 (29-79) 34% minimal UI. 12% severe Self report UI was 40% 38% consulted physician Mean parity 2.6 13.5% women were childless 68% SUI
Teunissen, 2004[119] Cross-sectional Adjusted by: Age	Subjects selected from patients ≥60 in 9 general practices in the Nijmegen Monitering Project, Netherlands.	Age: 60 years and older Gender: Male and Female Male: 46% Female: 64%	Prevalence: Overall=19%, Male:=9%, Female=29% By Age and Gender: Male: Age Prevalence % 95% CI

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of UI, Overall: by Type, Severity, and Impact on Life		
Sex Level of evidence: III	Response rate: 88% (n=4,650) Data source: Self reported, mailed questionnaires. Incontinence was defined as, "Involuntary loss of urine twice or more per month."	Race: Not reported Ethnicity: Not reported Residency: Netherlands	60-64 65-69 70-74 75-79 80+ Total Female: Age 60-64 65-69 70-74 75-79 80+ Total	5 6 8 14 21 9 Prevalence % 22 26 29 36 38 29	3.6-6.8 4.3-8.2 5.6-11.3 10.2-18.9 14.7-28.9 7.4-10.9 95% CI 19.2-25.1 22.6-29.7 25.1-33.3 30.9-41.5 32.4-44.2 27.2-30.9

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
Araki, 2003[120] Cross-sectional Level of evidence: III	Subject selection: Using the I-PSS questionnaire with an additional question on urinary incontinence, LUTS in all outpatients 40 years or older were examined from June 2001 to December 2002. Exclusion criteria: Concurrent urinary tract infection, psychological disease, medication with anti-cholinergic agents, alpha-receptor blockers, anti-androgens, diuretic agents or other drugs that may possibly affect urinary function. Response rate: 550/1201= 46% Data source: Clinic based Definition: The severity of symptoms was defined by the total I-PSS as mild—0 to 7, moderate—8 to 19 and severe—20 to 35. By an additional question urinary incontinence was scored from 0 to 3 as 0—not at all, 1—wet underwear, 2—wet clothes and 3—a large amount.	Men and women aged 40-92 years Japan	Women: UI Prevalence: = 40% Severity: Moderate to Severe UI 40-49 years (24%) 50-59 years (24%) 60-69 years (39%) 70-79 years (45%) 80 yrs or older (50%) Men: UI Prevalence = 24% Severity: Moderate to Severe 40-49 years (30%) 50-59 years (38%) 60-69 years (44%) 70-79 years (52%) 80 years or older (58%)
Boyle, 2003[121] Level of evidence: II-2	Subject selection: A standard questionnaire asking about frequency and amount of urine loss, use of pads and stress incontinence, was used to measure the prevalence of UI among men in four countries. 4979 men responded to the questionnaire. Definition: UI was assessed using the total score from four questions which asked about frequency and quantity of urinary leakage, the use of pads and stress incontinence. The score was 0–14, with high scores indicating the presence of a problem. Groups were defined as 0–2 (none), 3–6 (mild), and 7–14 (severe).	Men Age: 40-79 yrs Boxmeer, The Netherlands; Auxerre, France; Birmingham, UK; and Seoul, Korea).	Prevalence: Mild-Severe UI UK= 14.4% Netherlands=16.2% France=7.3% Korea=4.3% Age related prevalence: 40-49yrs UK=14.4% Netherlands=12.7% France= 5.2% Korea= 1.9% 60-69 years UK=13.7% Netherlands=22.6% France= 9.2% Korea= 8.0%
Burgio, 2003[122] Level of evidence: II-2	Subject selection: Participants: women, ages 14 to 42 years, who had obstetrical deliveries. The women were interviewed on postpartum day 2 or 3 and by telephone 6 weeks, 3 months, 6 months, and 12 months postpartum. Definition: When obtaining the continence history, the interviewer asked, “Have you ever experienced any	Women Age:14 to 42 years (mean, 28.6 years; median, 29.0). Caucasian:82.4%, Black: 16.1% Hispanic/Asian:1.2%	Prevalence : UI Intra-partum =59.6% 6 weeks =11.36% 3 months =9.32% 6 months =10.51% 12 months =13.25%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
	difficulty controlling urination? Have you ever had any accidental loss of urine, even a small amount?" A negative response was followed by rephrasing the question, "Have you ever wet yourself?" Those who acknowledged any incontinence were asked several questions about onset, course, when it occurred, under what circumstances, and the frequency and volume of urine loss.	USA	
Chen Gin-Den, 2003[123] Level of evidence: II-2	Subject selection: 1,581 women sampled (2.92% of registered female residents aged 20 years and older), Response rate: 1,253 (79.1%) women were successfully interviewed by using the Bristol Female Urinary Tract Symptoms Questionnaire and the Questionnaire of Impact index regarding the impact on quality of life. Definition: Urinary incontinence as involuntary urine leakage occurring during physical activities that cause stress or an increase in the intra-abdominal pressure and was considered by the participant to be a hygienic or social problem. Severity of UI was classified as: Grade 1 is defined as mild leakage with moderate stress, no protection is needed. Grade 2 is moderate leakage with moderate stress, and protection is needed with excessive activity. Grade 3 is severe leakage with mild stress, and constant protection is required except at rest. Grade 4 is incontinence at rest, and in need of constant protection. Urge incontinence was defined as involuntary urinary loss preceded by the urge to void or uncontrollable voiding with little or no warning. Overactive bladder was defined as having symptoms of frequency and urgency, or nocturia, with or without urge incontinence. Women who had both stress and urge incontinence were defined as having mixed incontinence.	Age: Mean= 43.2yrs Taiwan	Prevalence Stress UI:18% Urge UI:18.6% Mixed UI:17.1% Women who were elderly, menopausal, had vaginal deliveries, higher BMIs, parities >2, symptoms of uterovaginal prolapse, a history of diabetes or hypertension were significantly predisposed to an overactive bladder. In multivariate models, previous gynecologic surgery (OR, 2.0; 95% CI, 1.1, 3.7), parity >2 (OR, 2.0; 95% CI, 1.1, 3.8), a history of diabetes (OR, 3.3; 95% CI, 1.5, 7.6), and symptoms of uterovaginal prolapse (OR, 32.9; 95% CI, 12.5, 87.1) are the potential risk factors for Stress UI. Overactive bladder is only associated with symptoms of uterovaginal prolapse (OR, 21.3; 95% CI, 7.8, 58.2). Overall, the women suffering from these three types of urinary incontinence reported that they worried about smelling of urine (65.4%), wetting their clothes (68.2%), pad or towel leakage (45.8%), and exposure of pads or towels (43.0%). At least one third of the women believed that urinary incontinence limited their daily activities, including family life (31.8%), social activities (32.7%), outings for pleasure (50.5%), and changed their interests or hobbies (48.6%). Approximately 19% of the women with urinary incontinence reported an impact of this symptom on their sexual life. The reasons for the restriction of social activities were due to worrying about

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
			wetting or leakage (60.8%) and no toilet facilities available (60.8%). The study also found that only 27.1% of the women sought medical attention for their symptoms.
Chen Yi-Ching, 2003[124] Level of evidence: II-2	Subject selection: Women from a stable community located in central Taiwan. 1,584 (2.92%) were randomly sampled, 1,253 (79.1%) were successfully interviewed at home. A total of 1,247 (99.5%) women with complete data were included.	Age Mean(SD): 43.2(+-15.1) Taiwan	Prevalence of Urge UI Overall: 9.1% Pre-menopausal: 6.8 Menopausal: 15.7%
Engstrom, 2003[125] Level of evidence: II-2	A self-administered questionnaire. The questionnaire included items on three specific urinary symptoms: urgency, stress incontinence and post-micturition dribbling, and one question about health care-seeking behavior. A response rate of 86% was obtained in the questionnaire study. Definition: The Stress UI question asked the respondents whether they had experienced involuntary urinary loss in association with for example sneezing, lifting, or coughing.	Men Age: 40-80yrs Sweden	Prevalence of Stress UI: All ages: 2% 40-49yrs: 1% 50-59yrs: 2% 60-69yrs: 4% 70-80yrs: 5%
Espino, 2003[126] Cross-sectional Level of evidence: II-2	Subject selection: A total of 1589 Mexican-American women aged 65 and older who were part of the Hispanic Established Population for the Epidemiologic Study of the Elderly. Definition: Stress incontinence symptoms were identified with the question: ‘‘During an episode of severe coughing, sneezing, vomiting, lifting, laughing, or straining, do you lose any urine?’’ Urge incontinence symptoms were determined by positive responses to the question, ‘‘Do you have a feeling of needing to urinate before you lose your urine?’’	Women 65 and older Mexican-American USA	Prevalence UI: 15% Stress: 10% Urge: 33% Mixed: 42%
Eva, 2003[127] Level of evidence: II-2	Subject selection: 1000 women born in 1937 and 1000 women born in 1957 were randomly selected. The 2000 women received a postal questionnaire concerning their medical and obstetric history, height and weight, exercise and professional activity, and urinary and fecal incontinence defined as flatus,	Women, aged 40 and 60yrs old. Sweden	Prevalence 40-year-olds: Monthly 8%, Weekly 6%, Daily 3% 60-year-olds: Monthly 10%, Weekly 11%, Daily 8%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
	liquid or solid stool. The incontinent women were asked how often leakages occurred. The urinary incontinent women were asked to complete a set of ten questions concerning voiding and leakage. These questions were adapted from the detrusor instability score (DIS) developed by Kauppila. for detecting detrusor instability in incontinent women Response rate: 67 (%1336/2000)		UI weekly or more often: Age Prevalence,% 19-44 9 45-64 19
Goldberg, 2003[128] Level of evidence: II-2	Subject selection: The study population included 769 mothers of multiples. Response rate: 95.3% (733/769) attendees completed the survey.	Age Median: 37 years Range, 22-75 years Ethnicity 94% white, 2.3% black, 1% Hispanic, 0.6% Asian. Parity Mean: 3 Range: 2-12 USA	Prevalence SUI: 45.5% UUI: 27.3% Mixed: 22.9%
Grodstein, 2003[129] Prospective/Observational Level of evidence: II-2	Subject selection: The Nurses' Health Study cohort was identified when 121,701 female, married registered nurses, 30 to 55 years of age who resided in 1 of 11 US states returned a mailed questionnaire in 1976.In 1996, information was requested regarding urinary function from study participants. Included were two questions to evaluate the frequency and extent of urine leakage and difficulty holding urine. Frequency and quantity of urine loss. Women were asked the question: ''During the past 12 months. How often have you leaked urine or lost control of your urine?'' with response categories of ''never,'' ''less than once a month,'' ''once a month,'' ''2 to 3 times a month,'' ''about once a week,'' and ''almost every day.'' Women who responded that they lost urine were then asked, ''When you lose your urine, how much usually leaks?'' with response categories of ''a few drops,'' ''enough to wet your underwear,'' ''enough to wet your outer clothing,'' and ''enough to	Age Mean: 60.4yrs USA	Prevalence (Reported leaking at least once per month) Overall: 17.7% White: 17.9% Black: 9.6% Hispanic: 15.6% Asian: 12.5% 34.1% of the women reported leaking urine at least once per month during the previous 12 months. The prevalence of leaking urine appeared lower in the black, Hispanic, and Asian women compared with white women, although this was most marked for the black women (21.2%). Overall, 17.7% of the women said that they leaked at least once per week; again,

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
	wet the floor.''		
Hunskaar, 2004[20] Prospective/observational II-2	Subject selection: Data collected using postal survey sent to 29,500 community dwelling women ≥18 years in 4 countries. Definition: UI as any leakage or involuntary loss of urine. Stress UI as a leak or loss of urine caused by sneezing, coughing, exercising, lifting or physical activity. Urge UI as either as an urge to urinate but being unable to reach the toilet before leaking or having a strong sudden urge to go to the toilet to urinate with no advance warning. Mixed UI symptoms as at least 1 stress and 1 urge symptom. Response rate: 17,143/29,500 = 58.1%	Women aged ≥18 years in France, Germany, Spain and the UK.	Prevalence: Overall / SUI Spain: 23%, / 39% France: 44%, / 31% Germany: 41% / 41UK:42% UUI / MUI Spain: 21% / 26% France: 27% / 34% Germany: % / 38% UK:% / 34%
Hvidman, 2003[130] Cross-sectional II-2	Subject selection: Cross-sectional survey in a random (age stratified) population sample of 3900 20- to 59-year-old women. The present study includes 376 women who had their last delivery during 1993–96. Definition: Included in the questionnaire was information on UI occurrence, irrespective of type, before and during separate parts of pregnancy, as well as occurrence and duration of PP UI [questions: 'Did you have involuntary loss of urine in the time following the delivery?' – 'If so, how long a time (weeks) did it last after delivery?']. The questionnaire applied was validated concerning the 6-month period prevalence of pregnancy and delivery independent of UI. Response rate: 3900/6468 (60.3%)	20- to 59-year-old women Denmark	Prevalence UI Post partum: 23% 6 months after delivery: 2.7%
Landi, 2003[131] Observational II-2	Subject selection: Data was analyzed from a large collaborative observational study group, the Italian Silver Network Home Care project, that collected data on patients admitted to home care programs (n=5418). A total of 22 Home Health Agencies participated in this project evaluating the implementation of the Minimum Data Set for Home Care instrument.	Patients were Caucasian. Women: 59% Mean age: 78.6 (+-9.5 years) Women had a mean age of 79.5 (+-9.5) years and were approximately 2 years older than men	Prevalence UI was recorded in 51% of patients, with a greater number of women than men showing this problem (52%vs 49%, respectively; P=0.01). Three potentially reversible causes of UI showed the strongest association in both men and women: These are: UTI (adjusted OR, 3.46; 95% CI, 2.65–4.51), Use of physical restraints (adjusted OR, 3.20; 95% CI,2.19–4.68),

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
		(77.4"9.4 years; P-0.001). Marital status was substantially different between the two groups, with a higher prevalence of widowed among women compared to men. (58% vs. 24% respectively; P-0.001).Prevalence	Environmental barriers (adjusted OR, 1.53; 95% CI, 1.15–2.02).
Maffezini, 2003[132] Observational II-2	Subject selection: A total of 300 consecutive patients with histologically proven carcinoma of the prostate, staged as clinically organ-confined cT2 or less, underwent radical retropubic prostatectomy with the anatomic approach. Definition: Patients were considered continent if they needed no protection to keep outer garments dry. Patients were also considered continent if they occasionally leaked a few drops with abdominal straining.7 Patients who usually wore protection were considered as having stress incontinence. Patients who needed to use four or more pads during the day were considered incontinent.	Men Age Median:65.5 years Range:47 to 73 Italy	Prevalence Twenty-six patients (8.8%) had a varying degree of stress incontinence requiring them to wear one to three pads per day. 7 patients (2.3%) were incontinent, needing four or more pads per day. Of the 262 continent patients, 128 (48.2%) achieved complete urinary continence within the first day of catheter removal; the median time to recovery for the remaining 134 patients was 4 weeks (range 2 to 16).
Mawajdeh, 2003[133] Observational II-2	Subject selection: The study was designed as a two-phase survey. The first phase consisted of a structured personal interview and the second phase was a follow-up physical examination. 317 women were randomly selected and answered a questionnaire in the first phase of the study. 301 (95%) of the 317 eligible women consented to the general examination. Two hundred sixty agreed to both the general physical and pelvic examination. The main outcome measures were selected reproductive and related nonreproductive morbidities. Single women (n=7) and those suspected or	Women n=317 Age: 18-49 yrs Jordan	Prevalence UI: 24%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
	confirmed pregnant (n=40) were not eligible for the pelvic exam due to cultural beliefs. 270 women were eligible for the pelvic exam of which 260 consented to the exam. Definition: UI Passing urine when laughing or coughing.		
Miller, 2003[134] Observational (cohort) II-2	Subject selection: Five hundred participants were randomly selected from women in the young (aged 18-22 in 1996), mid-age (45-50), and older (70-75) cohorts of the Australian Longitudinal Study of Women's Health (ALSWH) who had reported leaking urine in the 1996 baseline survey. Definition: Eligible respondents were defined as presently incontinent'' if they had leaked even small amounts of urine in the previous month (or as ''incontinent in the past'' otherwise). Those with past incontinence were excluded from measurement of type and severity. Response rates: 50, 83, and 80% in the young, mid-age, and older women, respectively. The survey was completed by 50% of women sampled in the young cohort, 83% of the mid-age sample, and 80% of the sample of older women. Of those sampled in the young, mid-age, and older cohorts, 3.4, 0.4, and 1.2%, respectively, were ineligible for inclusion, either because they were deceased (n=2) or they reported ''never having leaked even small amounts of urine.'' Combining all age groups, 89% said they had leaked urine in the month before the survey.	1500 women Comprise women from three age cohorts: young (then aged 18-22 years, but aged 21-26 at the time of the present study), mid-age (45-50, now 48-53 years), and older (70-75, now 73-79 years). Australia	Prevalence MUI Young:86.6% Mid-age:92.3% Older:91.1% SUI: Young:10.7% Mid-age:6.4% Older:2.0% UUI: Young:2.7% Mid-age:1.3% Older:6.1%
Miller, 2003[135] Observational II-2	Subject selection: The sample for this study comprised 1,000 women who are current participants in the ALSWH, recruited in 1996 through random selection from the Medicare database. Five hundred participants were randomly selected from those in each of the mid-age and older cohorts who reported leaking urine "often" in the 1996 baseline survey of the ALSWH. Definition: A screening question asking whether the participant had ever leaked even small amounts of	The ALSWH sample included women in three age cohorts: young (then aged 18–22 years), mid-age (then aged 45–50, but aged 48–53 years at the time of this study), and older (70–75, now 73–79 years).	Leaked urine Mid-age:94% Older women:91% Sought help or advice about their UI Mid-age:72.2% Older women:73.1%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
	urine was included at the beginning of the survey to identify participants who may have responded inaccurately at baseline and were thus ineligible for inclusion in the study. For the purposes of this study, respondents who had leaked even small amounts of urine in the month prior to completing the survey were considered presently "incontinent." Those who indicated that they had not leaked in the last month were excluded from measurement of type and severity (because the scale for measuring type and severity asks about experience of symptoms "in the last month"), but they were asked to complete the remaining items about their previous experience of the problem and assistance sought. The survey was completed by 83% of the mid-age women and 80% of the older women sampled. Of those sampled in the mid-age and older cohorts, 0.4% and 1.2%, respectively, were ineligible for inclusion—either because they were deceased or they reported "never having leaked even small amounts of urine."	Australia	
Nuotio, 2003[136] Cross-sectional II-2	Subject selection: The data come from the third wave of the Tampere longitudinal Study on Ageing (TamELSA) conducted in 1999 and included 429 survivors. The response rate was 92.8%. Stress incontinence was defined as having urinary leakage during exertion, for example coughing or lifting. Urge incontinence as having urinary leakage associated with a strong urge to urinate. Mixed incontinence was defined as reporting both stress and urge incontinence.	171 men 227 women Median age Men SUI: 80.5 UUI: 77 Mixed: 78 Women SUI: 76 UUI: 79 Mixed: 78 The median age for men without incontinence was 75 and for women 76 years. Finland	Prevalence SUI Men:2% Women:23% UUI Men:17% Women:6% MUI Men:6% Women:30%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
Nuotio, 2003[137] Prospective, Observational II-2	Subject selection: The baseline data come from the second wave of the Tampere Longitudinal Study on Ageing (TamELSA), a population-based prospective study of living conditions, health, functioning, life styles, and use of services among older people in the city of Tampere, Finland. A total of 1036 persons aged 60–99 years were eligible to be interviewed face to face, using a structured questionnaire. Response rate was 80%. After exclusion of 53 subjects already living in institutions and 3 subjects without data on urinary symptoms, the baseline material consisted of 775 community-dwelling persons, of whom 366 were men and 409 were women. Definition To define urge incontinence, the following question was asked: ‘‘Do you ever have trouble getting to the lavatory in time—yes or no?’’ In the case of a positive response, the following question was asked: ‘‘Do you have urinary leakage, either in the daytime or during the nights—never, rarely, frequently?’’ Urge incontinence was defined as having trouble getting to the lavatory in time with urinary leakage.	Men and women Aged 60–99 years Finland	Prevalence UUI Men:5.2% Women: 14.7%
Parazzini, 2003[138] Observational(Case-control) II-2	Subject selection: Cases,1,062 women with urinary incontinence or overactive bladder consecutively observed in first level gynecological centers. Controls, 1,143 women observed in the same centre after the identification of the cases, without any symptoms related to UI or overactive bladder. Definition: UI as answering “yes” to the following question: “Have you had any involuntary urinary loss during the last month?” OAB without UI as answering “yes” to 1 or 2 of the following questions: “On average, do you urinate more than 8 times a day and/or >1 time/night?“ or Have you any urgency symptoms?”, but answering no to the question: “Have you had any involuntary urinary loss during the last month?”	Women Age Cases: 40 years or more (mean age 62.3 years, range 40–88) Controls: Mean age 58 years, range 40–86)	Prevalence Overall SUI: 2,58/1,062= 24.3% UUI: 1,95/1,062= 18.4% MUI: 4,86/1,062= 45.8% OAB: 123/1,062= 11.6% Age related SUI UUI ≤52yrs:40.7% 35.4% 53-61:36.4% 30.8% ≥62: 22.9% 33.9% MUI OAB ≤52yrs:30.9% 38.2% 53-61:29.4% 33.3% ≥62: 39.7% 28.5%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
Peters, 2003[139] Cross sectional II-2	An age–sex–practice stratified random sample of 1420 patients registered with four general practices in South Bristol was selected. Forty-four patients were excluded because of illness, death or removals out of the area not yet amended on practice records.. Response rates for the four practices varied at 56%, 62%, 68% and 71%, respectively. The majority of respondents were married (54%) and one-third was widowed (33%). A minority were single, cohabiting or were divorced. Just over a third of people were living alone (38%) and nearly half had access to a car (48%). The majority of respondents were living in their own home (63%), with the next largest group (24%) living in local authority rented housing.	White: 99% A total of 915 responses were received (402 males and 513 females), of whom 496 (54%) were in the 65–74 years age range, and 419 (46%) were 75 years or older. UK	Prevalence UI: 39%
Rortveit, 2003[140] Observational(Cohort) II-2	Subject selection: The EPINCONT study, is part of the Nord-Trøndelag health Study 2 (HUNT 2), which was conducted in a county of Norway between 1995 and 1997. All women older than 20 years of age (a total of 47,313 women) received a mailed invitation to visit a screening station. The source population for the EPINCONT study consisted of the 34,755 community-dwelling women who attended the screening. Women were asked to complete a questionnaire at home, and 27,936 women (80 percent) answered questions related to incontinence. Definition If a woman answered yes to an entry question about any involuntary loss of urine, she was asked about the frequency of leakage (less than once a month, once or more per month, once or more per week, or every day, every night, or both), the amount of leakage each time (drops, small amounts, or large amounts), the circumstance of leakage (which could include coughing, sneezing, laughing, and lifting heavy items), whether leakage was accompanied by a sudden and strong urge to urinate, and to what extent she considered leakage a problem (no problem, a small nuisance, some bother, much bother, or a major problem).	Women Age Range: 20-64yrs Norway	Prevalence Any incontinence: 20.7% Moderate /Severe incontinence: 8.7% SUI:12.2% UUI:1.8% MUI:5.9%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
Dallosso, 2003[14] longitudinal, Prospective cohort II – 2B	United Kingdom women age ≥40 living at home Part of the Leicestershire MRC Incontinence Study on prevalence and incidence including men and women. This study was women only. 19,239 eligible women; 65.3% returned N= 12,565. 6,424 responded to f/u questionnaire 7,046 women baseline with follow up collected from 6,426 1 yr later = began 10/98 with f/u in 10/99 Postal survey with usual definitions of SI. OAB defined by ICS and for this study as one or both of the sxs urge leakage and urgency. Subgroups of OAB and SI Excluded nursing home or residential pts and SI at baseline was excluded from analysis of onset of SI	Age: 40-49 - 26% 50-59 27.4% 60-69 23.3% 70-79 17.1% >80 6.2% BMI Acceptable 48.4% Underwt 7% Overwt 31.4% Obese 13.3% Smoking Never 54.3 Exsmoker 30.3 Current 15.2	Prevalence of UI at baseline: Stress:17.3% OAB: 16.3% Prevalence of OAB increased with age but no marked change in SI..3% reported SI at baseline.
Stewart, 2003[141] Observational (Case-control) II-2	Subject selection: National telephone survey using a clinically validated interview and a follow-up nested study comparing overactive bladder cases to sex- and age-matched controls. A total of 17,231 households were contacted (includes 2,427 households where eligible members met criteria for region-sex-age-specific strata in which the sampling quota was filled) between November 2000 and January 2001. Response rate: 68% (11,740/17,231) Eligible: 5,539 (47%) Definition: OAB without urge incontinence was defined by a feeling of urgency ≥4 times in the past 4 weeks and either >8 micturitions/day or the use ≥1 of the following coping strategies: restricting fluid intake, locating bathrooms in a new place, limiting travel, or defensive voiding. OAB with urge incontinence included the criteria for OAB without urge incontinence plus ≥3 episodes of urinary leakage in the past 4 weeks that was typical (i.e., frequency of episodes) and was not exclusively due to stress incontinence.	Men and women >18years USA	Prevalence Overall OAB: 16.5% OAB with UUI: 6.1% OAB without UUI: 10.4% Women OAB: 16.9% OAB with UUI: 9.3% OAB without UUI: 7.6% Men OAB: 16.0% OAB with UUI: 2.6% OAB without UUI: 13.4%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
Talcott, 2003[142] Prospective Observational (Cohort) II-2	Subject selection: Recruited patients who consulted physicians at participating sites for advice on primary therapy of pathologically-confirmed, untreated early (nonmetastatic) PC at the Massachusetts General Hospital, the Dana-Farber Cancer Institute, and affiliated clinics of the Joint Center for Radiation Therapy. Baseline questionnaires from 613 eligible patients were returned within 7 days of initiating treatment, a requirement to ensure that the reported baseline symptoms were free from the effects of therapy. 91 enrolled patients (14.9%) dropped out or died of unrelated causes (4 patients) before first follow-up questionnaire at 3 months after treatment, leaving 522 participating patients. Of the remaining patients, 27 patients (11%) had not yet been followed for 24 months, 66 patients (12.5%) dropped out before completing the 24-month questionnaires, and 429 patients (76.6%) continued through 24 months. Definition: The urinary incontinence index assessed the degree of urinary control and the frequency and magnitude of leakage in men who had less than "complete control." Five items assessed urinary obstruction and irritation: hesitancy, frequency of urination during the day, nocturia (urination at night), dysuria, and urgency.	Men 46-82 years Boston, MA USA	Prevalence UI after radical prostatectomy Baseline: 4.9% 3 months: 34.9% 12 months: 23.9% 24 months: 23.4%
Bogner, 2002[143] Cross-sectional Adjusted for age, gender, ethnicity, chronic health conditions, education, ADL status Level of evidence: II-3A	Epidemiologic Catchment Area (ECA) Program, a survey of psychiatric disorders in the general population between 1980 and 1984 at 1 of the 5 university-based sites in US (East Baltimore); data obtained from follow-up interviews which occurred in 1993 to 1996, with most in 1994 Randomly selected blocks based on expected number of households, with a random sample of households, and a randomly selected member within a household Over sampled older people by interviewing all persons in a household aged 65 and older Structured interview in respondent's home by trained lay interviewers	Age range 50-96 years with mean age 67.2 (SD 10.8); Baltimore, MD, USA 502 women (64%) 279 men ((36%) 540 whites (69%) 207 African-Americans (27%) 26 American Indians, Hispanics, or Asians (4%)	20% (n=158) reported UI in past year • 127 women (25.3%) • 30 men (10.8%) 18% (n=29) reported condition-specific functional loss related to UI; 14 people reported 1 limitation, 7 reported 2 limitations, 5 reported 3 limitations, and 3 reported 4 limitations; not specified by gender Adjusting for age, gender, ethnicity, and education, persons with UI were more likely to have psychological distress as measured by the General Health Questionnaire than person without UI (OR 1.56, 95% CI: 1.00-2.43) However, there was no significant difference between those with UI and those without in

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
	781/820 persons aged 50 and over who had complete information on UI (95% analyzed) Excluded: unable to determine continence status in past year; missing GHQ scores UI Measurement: Have you ever had any difficulty in controlling your water, that is, losing your urine or having trouble getting to the bathroom in time during the past 12 months? Condition-Specific Functional Loss (4 questions): Because of UI, did they: avoid social gatherings, visiting friends, or going to church; avoid travel; not going shopping; and avoiding physical activities. Condition-specific functional loss due to UI was a positive response to any of the 4 questions		psychological distress after adjusting for IADL impairment and chronic medical conditions; Results were similar for men and women when considered separately Among persons with UI, persons with persistently elevated General Health Questionnaire scores were more likely to report condition-specific functional impairment from UI (adjusted OR: 6.55, 95% CI: 1.94-22.12)
Buchsbaum., 2002[144] Retrospective cohort Adjusted for confounding factors Level of evidence: II-2C	149/190 nuns (78.4%) residing in two motherhouses Self-administered survey UI Measurement: Respondents asked if they had a current problem with urine loss SUI and UUI determined from items on the IIQ	Women ages 39-91 years, with a mean age of 68, SD: 11.7; Rochester, NY, USA 93.3% white (148/149)	74/149 (49.7%) 63% slightly bothered 25% moderately bothered 4% greatly bothered 52% used sanitary pads 10.3% leaked once a day 19.1% leaked several times a day 29.7% SUI (n=22) 24.3% UUI (n=18) 35.1% MUI (n=26) 10.8% UI unknown origin (n=8)
Finkelstein, 2002[145] Cross-sectional Adjusted by sampling weights, age, gender, income, and other confounding factors but not BMI which was not found to be associated with UI Level of evidence: II-2C	Secondary analysis of responses to the second wave of the National Population Health Survey which surveyed Canadian households in 1996-97 27,263 households participated in 1994-95 (88.7% response rate); In 1996-97, 93.6% response rate Mailed survey UI Measurement: Do you have UI diagnosed by a health professional?	Men and women aged 30 years and older; Canada (10 provinces) Race not specified	Prevalence n reporting UI/ N of subjects and estimated rate per 100 using sampling weights Men 30-39 years: 35/7657, 0.2 40-49 years: 40/6072, 0.4 50-59 years: 56/4438, 1.1 60-69 years: 121/,365, 2.7 70-79 years: 150/2614, 5.7 80+ years: 81/963, 6.4 Women: 30-39 years: 73/8218, 0.6 40-49 years: 116/6223, 1.6 50-59 years: 150/4948, 2.1 60-69 years: 190/4328, 3.9 70-79 years: 272/3892, 6.8 80+ years: 222/1901, 11.1

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
Landi, 2002[146] Cross-sectional Adjusted by age, gender, ADL, cognitive performance, delirium, constipation, alcohol use, medications associated with increased UI risk) Level of evidence: II-2C	Population-based, longitudinal, multilinked database that comprises the Minimum Data Set for Home Care (MDS-HC) and their medications coded with the Anatomical Therapeutic Chemic classification system 4,583/4,717 patients admitted to home care programs in 22 home care agencies from 1997 to 2001 who participated in the National Silver Network Project (97.2% analyzed) Excluded: < 65 years, comatose, paraplegic, permanent indwelling catheter UI Measurement: Any involuntary loss of urine, regardless of amount, that occurred 2 or more times per week	Men and women ages 65 and over with mean age 77.1 (SD 11.9); Italy 58% female (n=2658) 42% male (n=1925) 100% white	UI prevalence: 33% of all patients 21% age 60-74 38% age 75 and over 63% women (n=935)
Langa, 2002[82] Cross-sectional Adjusted by: Age, Race Gender, Net worth Living situation Chronic conditions Care giving received Level of evidence: III	Community-dwelling people ≥70 years, from the AHEAD cohort of the Health and Retirement Study by the University of Michigan. Response rate: 80.4% (n=7443) Data source: In person or over the phone interviews. Incontinence as, "Any loss of urine beyond your control in the last 12 months."	Age: 70+ Gender: Male and female Race: White, African-American, and Other Ethnicity: Not reported Residency: Michigan	Prevalence: Overall: 19.4% By Gender: Male: 13% Female: 24% By impact on life: Use of pads: 9.9% No use of pads: 9.5%
Liu, 2002[147]2 Prospective cohort Level of evidence: II-2C	Randomly selected, Age-stratified population-based sample using the State Electoral Data Base of adults aged 70 and over in 1992; also included people living with the original selected persons Health surveys at baseline, 12 and 24 months 2272/4187 responded to initial mailed letter (53.2%) 2087/2272 (91.9%) completed all 3 surveys Unclear survey method at baseline and 24 months; 12 month survey conducted using a computer-assisted telephone interview UI Measurement:: UUI: Do you have any difficulty holding your urine until you get to the toilet? (often, occasionally, never) SUI: Do you accidentally pass urine? (often, occasionally, never)	Men and women ages 70 years and over living in South Australia Age stratified by 70-74, 75-79, 80-84, and 85 and over Number of men and women not specified Race not specified	Unable to determine SUI and MUI prevalence because of problems with SUI definition UUI in men across 3 waves: • Often: 6.6%, 8.5%, 6.2% • Occasionally: 25.2%, 22.1%, 29.0% • Never: 68.3%, 69.4%, 64.8% UUI in women across 3 waves: • Often: 10.2%, 10.6%, 8.9% • Occasionally: 31.2%, 32.0%, 39.1% • Never: 58.5%, 57.3%, 52.1% UUI in all and age-adjusted, respectively across 3 waves • Often: 8.4%, 7.7% • Occasionally: 28.2%, 27.5%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
	MUI: Answer yes to both questions SUI definition according to currently accepted definitions is not SUI—interpreted as UI		• Never: 63.5%, 64.8%
Nuotio, 2002[148] Cross-sectional Adjusted by age and gender Level of Evidence: II-2C	Randomly selected, age and gender stratified population-based sample of home-dwelling and institutionalized adults aged 70 years and over from the third wave of the from the Tampere Longitudinal Study on Aging (TamELSA) in 1999 398/429 survivors from original study initiated in 1979 (92.8% response rate) Interview UI Measurement: UUI: Urine leakage associated with a sudden urge to urinate, regardless of the frequency of urine loss (Does the urge to urinate ever become so strong that there is urinary leakage before you reach the lavatory? [no, yes, sometimes, frequently]	171 men and 227 women aged 70-98 years; Tampere, Finland Race not specified	Weighted UUI prevalence by age and gender: Men • Age 70-79 years: 21.1% • Age 80-98: 34.3% • All ages: 28.9% Women • Age 70-79: 31.2% • Age 80-98: 45.6% • All ages: 41.8%
Peyrat, 2002[149] Cohort Adjusted?? Level of evidence: II-2C	1,700/2,800 (60.7% response rate) women employees in academic hospital assessed during annual exam with staff physician in 1998 Self-administered questionnaire UI Measurement: Do you currently have some involuntary leakage of urine?	Women ages 20-62 (mean age 39.7 SD 8.0); France Race not specified	UI: 27.5% (n=467; CI: 25.4-29.7) reported UI SUI: 12.4%, n=210, CI: 10.8-14.0) UUI: 1.6% (n=28, CI: 1.1-2.4) MUI: 13.5% (n=229, CI: 11.9-15.2) Prevalence by Age and UI Type • Any UI o < 25: 2/32 (6%) o 25-39: 150/823 (18.2%) o 40-55: 266/699 (38.0%) o > 55: 16/34 (47%) • SUI o < 25: 1/32 (3%) o 25-39: 68/823 (8.3%) o 40-55: 121/699 (17.3%) o > 55 8/34 (24%) • UUI o < 25: 0 o 25-39: 12/823 (1.5%) o 40-55: 12/699: (1.7%) o > 55: 0 • MUI o <25: 1 (3%) o 25-39: 70 (8.5%)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
			o 40-55: 133 (19.0%) o > 55: 8 (24%) Prevalence Below and Above Age 40 by UI Type • ≤40: Any UI: 152/855 (17.8%); SUI: 69 (8.1%); UUI: 12 (1.4%); MUI: 71 (8.3%) • > 40: Any UI: 282/733 (38.5%); SUI: 210 (12.4%): UUI: 28(1.6%); MUI: 229 (13.5%) By Frequency: • Occasional: Any UI: 429 (91.9%); SUI: 209 (99.5%); UUI: 24 (85.7%) MUI: 196 (85.6%) • Permanent (e.g., frequent: defined as 2 episodes of urethral loss every day): Any UI: 38 (8.1%); SUI: 1 (0.5%); UUI: 4(14.3%); MUI: 33 (14.4%)
Pregazzi, 2002[150] Case control Adjusted for maternal age, parity, induced labor with prostaglandins, type of vaginal delivery, dysuria, urgency, frequency, pre-pregnancy maternal weight, pregnancy weight gain Level of evidence: II-3	Consecutive sample of 537 women who had a vaginal delivery between April 1999 and February 2000 In-person interview and underwent a urogynecologic examination 3 months after vaginal delivery UI Measurement: SUI: loss of urine on physical effort UUI: loss of urine associated with a strong desire to void	537 women aged 19-44 years; Italy Race not specified	SUI: • Total: 63 (11.7%) • Primparae: 31 (8.2%) • Multiparae: 32 (20.3%) • P =.0001 UUI: • Total: 41 (7.6%) • Primparae: 21 (5.5%) • Multiparae: 20 (12.7%) • P =.004
Sampselle, 2002[151] Prospective cohort Adjusted for confounding factors, site, age, and ethnicity Level of evidence: II-2A	3302 participants ages 42-52 from the Study of Women's Health Across the Nation (SWAN) which studied the natural history of the menopausal transition Included: Intact uterus with one ovary, pre-or early menopause, not currently using exogeous hormone preparations affecting ovarian function, self-identification with one of each site's designated race/ethnic groups, use of English, Spanish, Japanese, Cantonese, and ability to give verbal consent Random sampling from 7 cities using census lists, commercial electric utility household lists, Kaiser Permanente membership lists, or random digit	Women with a mean age of 46.4 (SD 2.7) from 7 USA cities (Boston, Chicago, Detroit, Los Angeles, Newark, Pittsburgh, Oakland, CA) 47.0% white (n=1530) 28.1% Black (n-915) 7.6% Chinese (n=249) 8.7% Hispanic (n=284) 8.6% Japanese	Any UI: • 56.9% of total group • 66.0% white • 49.5% black • 50.2% Chinese • 41.4% Hispanic • 52.9% Japanese Mild UI • 32.1% total group • 36.9% white • 26.0% black • 34.1% Chinese • 22.3% Hispanic

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
	dialing depending on site Self-administered questionnaire UI Measurement: In the past year, have you ever leaked even a very small amount of urine involuntarily? UI severity derived by multiplying frequency of urine loss score by volume score; slight UI= score of 1 or 2; moderate UI: 3-4; severe UI: >4	(n=280)	• 34.4% Japanese Moderate UI • 14.6% total • 16.8% white • 14.1% black • 11.6% Chinese • 9.6% Hispanic • 11.8% Japanese Severe UI • 9.9% total • 12.1% white • 8.8% black • 4.4% Chinese • 9.2% Hispanic • 6.4% Japanese 25% wear protection or change undergarments on several days per week UI severity strongly associated with bother (mild as reference): • Moderate UI: OR 3.61, 2.84-4.57) • Severe UI: OR 16.93, 11.60-24.70 Ethnicity and bother (white women as reference) • Black: OR 1.26, 0.95-1.67 • Chinese: OR .69, .39-1.22 • Hispanic: OR 5.70, 2.70-12.03 • Japanese: OR 1.55, .92-2.61
Sebesta, 2002[152] Retrospective Cohort No adjustment Level of evidence: II-2C	TRICARE/CHAMPUS claims database searched to identify 1,000 patients who underwent radical prostatectomy for localized prostate cancer between 1995 and 1996; Prostatectomy had to be within 18 months of study initiation; patients were < 65 years at time of surgery and had at least 18 months of follow-up Out of 1,000 patients, 136 surveys were undeliverable because of the patient's death or inaccurate address 674/864 (78% response rate) Mailed questionnaire	Men < 65 years of age at time of surgery; USA in multiple states Race not specified	UI in past week: • None: 295 (43.7%) • Several per week: 73 (10.8%) • < 1/day: 131 (19.4%) • 1/day: 113 (16.8%) • > 1/day: 62 (9.2%) • 56.3% reported at least one UI episode in past week—this differs from above which relates to how the questions were worded With physical exertion: 343 (50.8%) UUI only: 35 (5.2%) Sudden urge/no time: 117 (17.4%)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
	UI Measurement: Questioned only about postoperative continence by eliciting information regarding the frequency, time, and type of leakage, and use of protective devices and incontinence treatment		While in bed/running to bathroom: 51 (7.6%) 31.7% use pads or other protective devices • 8% of these used 2 or more pads/day 12% reported UI was a problem
Sze, 2002[153] Cross-sectional Adjusted by age and parity Level of evidence: II-2C	Women seeking gynecologic care between May 2000 and June 2001 at the Brody Medical School Clinic and Office of East Caroline University Women's Physicians Excluded: urogynecologic and obstetric clinic patients 2370 women (response rate not reported) Self-administered questionnaire UI Measurement: Do you lose urine when you cough, sneeze, lift, jump, or get up from a bed or chair? Do you wear a pad or protective undergarment because you lose urine when you cough, sneeze, lift, jump, or get up from a bed or chair? Do you lose urine less than 5 minutes after you feel the urge to urinate more than once per week?	Women ranging in age from 15-91; North Carolina, USA 34% Black (n=799) 39% white (n=932) 639 Hispanic (n=639)	UI prevalence by race (P < .001): • 41% White • 31% Black • 30% Hispanic SUI: (P <.001) • 39% white • 27% Black • 24% Hispanic UUI: (P = NS) • 19% white • 16% Black • 16% Hispanic
Thompson, 2002[154] Prospective cohort with 24 week postpartum follow-up Adjusted for delivery method and parity Level of evidence: II-2A	All women living in the Australian Capital Territory who gave birth to a live baby between March to Oct 1997 in one of the two public hospitals and completed 4 questionnaires; study was part of a project to determine risk factors for postnatal depression Measurement on 4th postpartum day, at 8, 16, and 24 weeks postpartum 1295 women (70%) agree to participate, and of these 1193 (92%) retained in the cohort through 24 weeks postpartum Mailed questionnaire UI Measurement: Thinking about your health and how you have been feeling over the past 8 weeks, have any of the following been a problem for you? UI (e.g., hard to hold urine when coughing, sneezing, or exercising)	Women aged 16 years and over	Point prevalence of UI by delivery method at 8, 16, and 24 weeks postpartum • Unassisted vaginal delivery o 0-8 weeks: 178 (21%) o 9-16 weeks: 109 (13%) o 17-24 weeks: 14 (3%)
Van der Vaart, 2002[155]2 Cross-sectional cohort	Random population-based sample of women ages 35-70 years obtained from the population registration office of a suburban area in Netherlands	Women ages 35-70 years; Central Netherlands	Overall UI: (P <.01) • Non-hysterectomy: 902/1417, 49.3%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
study Adjusted by age, educational level, parity, and hysterectomy status Level of evidence: II-2C	1626/2322 women (70% response rate) Mailed questionnaire UI Measurement: Urogenital distress Inventory SUI: Do you experience urine leakage related to physical activity, coughing, or sneezing? UUI: Do you experience urine leakage related to a feeling of urgency? Overall UI: having SUI or UUI	Race not specified	• Hysterectomy: 133/209, 64.0% SUI: (P=NS) • Non-hysterectomy: 716/1417, 50.5% • Hysterectomy: 118/209, 57.0% • Bothersome SUI: 120, 8.5%, P=NS UUI: (P <.0001) • Non-hysterectomy: 320/1417, 22.6% • Hysterectomy: 80/209, 38.3% • Bothersome UUI: 21, 9.7%, P <.0001
Van der Vaart, 2002[156]? Cross-sectional cohort Not adjusted Level of evidence: II-2	Random, population-based sample of women aged 20-45 years obtained from the population registration office of a suburban area in 1999 1029/1393 (73.9% response rate) Mailed questionnaire UI Measurement: Urogenital Distress Inventory: SUI: do you experience urine leakage related to physical activity, coughing, or sneezing? UUI: do you experience urine leakage related to the feeling of urgency?	Women aged 20-45; Mean age 34.2, SD 3.2 years; Central Netherlands Race not specified	365 (39.1%) SUI 143 (15.3%) UUI Prevalence without (n=1417) and with hysterectomy (n=209), respectively, *P*-value: • Overall UI: 902 (49.3%) vs. 133 (64.0%) P < .01 • SUI: 716 (50.5%) vs. 118 (57.0), NS • Bothersome SUI: 120 (8.5%) vs. 23 (11.1%), NS • UUI: 320 (212.6%) vs. 80 (38.3%), P <.0001 • Bothersome UUI: 44 (3.1%) vs. 21 (9.7%), P <.0001
Van Oyen, 2002[157] Retrospective cohort Prevalence estimates weighted by age and gender distribution of Belgian population age 15 and over	Multistage sampling using the National population Register 7,706 participants who were part of the 1997 Belgian Health Interview Survey ≥15 years Excluded: Proxy reports Participation was 60% at household level; once a household participated, the refusal rate was 2.5% 7,266 eligible subjects all participated Interview at home using WHO-instrument UI measurement: Do you sometimes lose control of your bladder? If yes, how often do you lose control of your bladder? (at least once a week, less than once a week but at least once a month, less than once a month	3,462 men and 3,804 women ages 15 and over; Belgium Race not specified	Weighted prevalence to Belgium population of age 15 years and over: • 1.4% men (n=92) • 4.6% women (n=234) UI in men by age and frequency: • 15-24: .1% (n=443); <1/mo: 100% • 25-34: 0 (n=680) • 35-44: .6% (n=705); 100% at least 1 x/mo • 45-54: 0.9% (n=599); 33.3% at least 1x/mo, 66.7% at least 1x/wk • 55-64: 2.7% (n=428), 15.4% < 1x/mo, 21.2% at least 1x/mo, 63.5% at least 1x/wk • 65-74: 5.2% (n=384); 6.8% < 1x/mo, 18.8% at least 1x/mo; 73.7% at least 1x/wk • 75+: 13.3% (n=223), 6.8% < 1x/mo, 18.8% at least 1x/mo, 73.7% at least 1x/wk • TOTAL: 1.4% (n=3462), 14.3% < 1x/mo,

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
			28.6% at least 1x/mo, 57.1% at least 1x/wk UI in women by age and frequency: • 15-24: 0.2 (n=481), 100% at least 1x/wk • 25-34: 1.8% (n=753), 22.2% < 1x/mo, 16.7% at least 1x/mo, 61.1% at least 1 x/wk • 35-44: 2.3% (n=709), 8.7% < 1x/mo, 26.1% at least 1x/mo, 65.2% at least 1x/wk • 45-54: 3.8% (N=557), 21.1% at least 1x/mo, 21.1% at least 1x/mo, 57.9% at least 1x/wk • 55-64: 8.6% (n=461), 31.4% < 1x/mo, 12.8% at least 1x/mo, 55.8% at least 1x/wk • 65-74: 11.7% (n=509); 22.2% < 1x/mo, 26.5% at least 1x/mo; 50.4% at least 1x/wk • 75+: 21.0% (n=334), 4.3% < 1x/mo, 58.6% at least 1x/mo, 37.6% at least 1x/wk • TOTAL: 4.6% (n=3904) 17.4.3% < 1x/mo, 30.4% at least 1x/mo, 52.2% at least 1x/wk
Maggi, 2001[158] Cross-sectional Adjusted by: Age Gender Marital status Education Mental health Physical health BMI Self-rated health Sleep medications Alcohol use Cigarette smoking Diarrhea Co-morbidity ADL disability Mobility disability COPD Parkinsonism Hip fracture Night awakening Level of evidence: III	Subjects were randomly selected from non-institutionalized individuals aged 65 and older. The names and addresses were obtained by resident lists maintained by the municipalities of Northeastern Italy. Response rate: 89% (n=2,402) Data source: At home interviews Incontinence was defined by the interviewer asking, "If they had UI problems, and how often they occurred."	Age: 65 and older Mean age (Men): 75.2 Mean age (Women): 76.9 Gender: Male and female Male: 36% Female: 64% Race: Not reported Ethnicity: Not reported Residency: Veneto Region, Italy	Prevalence: Overall Male=11.2% -Female=21.6% By Age Group: Male: Age Group — Prevalence % 65-69 — 4.6 70-74 — 12.6 75-79 — 12.3 80-84 — 22.2 85+ — 23.6 Total — 11.5 Female: Age Group — Prevalence % 65-69 — 16.4 70-74 — 17.8 75-79 — 24.8 80-84 — 23.9 85+ — 34.7 Total — 21.6

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
Maral, 2001[159] Cross-sectional Adjusted by: Age Gender Parity Systemic disease Previous surgery Level of evidence: III	Subjects were selected from people at an education and research health district in Turkey >15.years Response rate: 90.8% (n=2261) Data source: Self-reported interviews. Incontinence was defined as, "Urinary leakage while coughing, straining, sneezing, or lifting heavy objects." (Stress)	Age: ≥15 years Gender: Male and Female Race: Not reported Ethnicity: Not reported Residency: Turkey	Prevalence (Stress): Overall: 11.1% Male: 1.0% Female: 20.8% By Age: 15-24: Male: 0% Female: 8.3% 25-34: Male: 0% Female: 20.4% 35-44: Male: 0.9% Female: 24.9% 45-54: Male: 1.2% Female: 29.6% 55-64: Male: 3.8% Female: 28.3% 65 and older: Male: 4.9% Female: 33.7%
MacLennan, 2000[84] Cross-sectional Adjusted by: Age, Sex, Income, Country of birth, Method of delivery, BMI, Coughing, Osteoporosis, Arthritis Pelvic floor surgery Level of evidence: III	Subjects were randomly selected from households as part of the 1998 South Australian Health Omnibus Survey. The person with most recent birthday in selected household was interviewed. Response rate: 73.3% (n=3,010) Data source: At home interviews by trained female interviewers. Incontinence as, "lost urine when coughing, laughing, or sneezing or accidentally wetting before reaching the toilet."	Age: 15-97 years old Gender: Male and female Male: 48.7% Female: 51.3% Race: Not reported Ethnicity: Not reported Residency: Australia	Male: UI Type — Prevalence % Stress — 1.5 Urge — 1.9 Mixed — 1 Total — 4.4 Female: UI Type — Prevalence % Stress — 20.8 Urge — 2.9 Mixed — 11.6 Total — 35.3
Muscatello, 2001[160] Cross-sectional Adjusted by:	Subjects were selected from randomly selected households as part of the 1997 NSW Health Survey of Australia. One person was randomly selected from	Age: 41 and over 41-49: 35% 50-59: 26%	Male: Type/Age — Prevalence % Urge

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life	
Age Sex Country of birth Language Marital status Education Insurance access Self-reported health Mental health status Smoking Alcohol consumption Physical activity Bodyweight Diabetes Hysterectomy status Level of evidence: III	each household. Selection was from central Sydney. Response rate: 68% Data source: Computer assisted telephone interviews relying on self-reported data. Incontinence was defined as, "Sudden and unexpected need to urinate (Urge)," and "Leaking urine during physical activity, coughing, or sneezing (Stress)." The symptoms needed to occur within the past month.	60-69: 17% 70+: 22% Gender: Male and female Male: 47% Female: 53% Race: Not reported Ethnicity: Not reported Residency: Sydney, Australia	41-49 50-59 60-69 70+ Total Stress 41-49 50-59 60-69 70+ Total Female: Type/Age Urge 41-49 50-59 60-69 70+ Total Stress 41-49 50-59 60-69 70+ Total	7 2 18 17 9 7 2 25 11 9 Prevalence % 18 33 38 32 29 29 42 46 27 35
Patel, 2001[161] Prospective Observational II-2	324 incident cases of stroke with incontinence 1 week post-stroke identified from South London stroke register from January 1, 1995, to December 31, 1998. Definition: indwelling catheter within 48hrs of assessment or loss of bladder control.	Men and Women UK	Prevalence of UI 39%	
Schmidbauer, 2001[62] Cross-sectional Adjusted by: Age, Gender, BMI, Education, Weight, , Alcohol, Smoking, Urgency, Frequency, Nocturia, Intermittency, Reduced Stream, Childbirth, Incontinence Surgery,	Subjects were selected from free of charge health examinations sponsored by the city of Vienna. Response rate: Not reported (n=2,498) Data source: Self-reported questionnaire Incontinence was defined as, "Any involuntary loss of urine within the past four weeks."	Age: 20 years and older Male mean: 48.6 (SD: 13.0) Female mean: 49.7 (SD: 13.6) Gender: Male and Female Male: 49.5% Female: 50.5%	Prevalence: Overall: Male: 5% Female: 26.3%	

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
Hysterectomy, Vaginal surgery, Prostatectomy, Blood pressure, Serum triglyceride, Fasting glucose Level of evidence: III		Race: Not reported Ethnicity: Not reported Residency: Vienna, Austria	
Stoddart, 2001[162] Cross-sectional Adjusted by: Age Sex Level of evidence: III	Subjects were randomly selected from a stratified sample of 2000 community living elderly from 11 general practices in a British city. Response rate: 79% (n=1,521) Data source: Self-reported mailed questionnaire Incontinence was defined as subjects, "Reporting that in the last month they leaked urine or indicated how much leakage occurred, that they protected themselves against leakage, or that leakage happened at a defined time."	Age: 65 years and older Gender: Male and female Male: 51.3% Female: 48.7% Race: Not reported Ethnicity: Not reported Residency: Great Britain	Male Age group — Prevalence % 65-69 — 12 70-74 — 21 75-79 — 22 80+ — 34 Total — 23 Severity Underwear damp — 17.4 Underwear wet — 2.2 Wet outer clothes/floor — 1 Whether UI a problem Y — 11.4 By Type Stress — 3.3 Urge — 10.1 Female Age group — Prevalence % 65-69 — 29 70-74 — 22 75-79 — 31 80+ — 42 Total — 31 Severity Underwear damp — 20.3 Underwear wet — 4.5 Wet outer clothes/floor — 2.8 Whether UI a problem Y — 16 By Type Stress — 17.7 Urge — 16.9
Aggazzotti, 2000[163] Cross-sectional Adjusted by:	Subjects were selected from institutionalized people living in the district of Modena, Italy. Figures provided by the Social and Health Care Authority	Age: Mean: 82 (SD: 10; Range: 33-102) Gender: Male and	Prevalence: Overall: 54,500 / 100,000 (54.5%)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
Age Gender Mental orientation Mobility Urinary tract infection Constipation Fecal incontinence Neurologic disease Psychiatric disease Hypertension Diabetes Cardiovascular disease Bone fracture Level of evidence: III	were used to identify and survey 14 institutions. Response rate: 89.8% (n=839) Data source: Questionnaire prepared specifically for the study. Data was collected from both clinical records and from physicians and nurses of the residents. Urinary incontinence was defined as, "the involuntary loss of urine occurring at least twice a week."	female Race: Not reported Ethnicity: Not reported Residency: Institutions in Modena, Italy	By Gender: Male: 39,200 / 100,000 (39.2%) Female: 59,800 / 100,000 (59.8%)
Alling-Moller, 2000[164] Case-control Adjusted by: Age Physical activity BMI Abortion Parity Fetal weight Episiotomy Lesion of anal sphincter Repair of uterine prolapse Cystocele repair Hysterectomy Constipation Straining at stool Hormonal inactivity Use of diuretics Cystitis treated w/antibiotics Medication for noninfectious urinary symptoms County Level of evidence: II-3	Subjects were selected randomly from women in the Danish Civil Registration System, which contains everyone living in Denmark. The subjects were selected from the urban county Copenhagen and the rural county Storstroms. All subjects were between 40 and 60 years of age. Response rate: Cases: 97% (n=487) Controls: 76% (n=564) Data source: Validated, self-reported questionnaire Definition of incontinence: "The definitions of stress and urge incontinence were those defined by the International Continence Society."	Age: 40-60 years of age 40-44: 22% (n=228) 45-49: 20% (n=207) 50-54: 21% (n=216) 55-59: 20% (n=211) 60: 18% (n=189) Gender: Female Race: Not reported Ethnicity: Not reported Residency: Counties of Copenhagen and Storstroms, Denmark	Prevalence: Overall: 46,300 / 100,000 (46.3%) By Type (of those who are incontinent): Stress Incontinence: 64,300 / 100,000 (64.3%) Urge incontinence: 35,500 / 100,000 (35.5%) Continuous incontinence: 14,100 / 100,000 (14.1%) Nightly incontinence: 4,000 / 100,000 (4%)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
Bortolotti, 2000[165] Cross-sectional Adjusted by: Age, Sex, BMI, Education, Smoking, Alcohol and Coffee consumption, Abdominal or Pelvic surgery, BPCO, Diabetes, Urinary infections, Perineal trauma, Enuresis, Neurological disease, Parity Level of evidence: III	Subjects were selected from randomly identified individuals from a network of general practitioners in Italy from 3/97-10/97. Computer generated random number lists were used. Response rate: "Practically 100%" (n=5,488) Data source: At home interviews Incontinence was defined as, "Loss of urine in the last year."	Age: ≥40 (Female) ≥50 (Male) Gender: Male: 49.6% Female: 50.4% Race: Not reported Ethnicity: Not reported Residency: Italy	Males: Age category: Prevalence % 51-60: 2 61-70: 2.6 70+: 6.6 Total: 3.4 Females: Age category: Prevalence % 40-50: 7.2 51-60: 11.8 61-70: 9.5 70+: 15.9 Total: 11.4
Hannestad, 2000[166] Cross-sectional Adjusted by: Age Level of evidence: III	Subjects were selected from all females in a particular county. The study was a part of the HUNT 2 survey. Response rate: 80% (n=27,936) Data source: Self-reported questionnaire Incontinence defined as, "Involuntary loss of urine."	Age: ≥20 years Gender: Female Race: Not reported Ethnicity: Not reported Residency: Norway	Age group / Prevalence % / Stress / Urge / Mixed 20-24: 10 / 48 / 13 / 33 25-29: 14 / 54 / 13 / 28 30-34: 18 / 59 / 10 / 27 35-39: 21 / 60 / 7 / 29 40-44: 24 / 60 / 8 / 29 45-49: 28 / 65 / 7 / 27 50-54: 30 / 55 / 7 / 36 55-59: 28 / 52 / 9 / 37 60-64: 26 / 42 / 10 / 46 65-69: 27 / 38 / 16 / 44 70-74: 30 / 33 / 16 / 48 75-79: 34 / 34 / 19 / 44 80-84: 35 / 32 / 21 / 40 85-89: 35 / 28 / 23 / 40 90+: 40 / 28 / 12 / 48 Total: 25 / 50 / 11 / 36 By Severity Age group / Unknown / Slight / Moderate / Severe 20-24: 0.3 / 6.3 / 2.5 / 1.3 25-29: 0.6 / 8 / 4.5 / 1.2 30-34: 1 / 10.7 / 4.9 / 1.6 35-39: 1.1 / 11.5 / 6 / 2.6 40-44: 1.6 / 11.6 / 7.5 / 3.3 45-49: 2.4 / 13.7 / 8.3 / 4.1

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods (survey, screening, case finding, definition)	Subject age, gender, race, ethnicity, residency	Prevalence (%) of urinary incontinence, overall and by type, severity, and impact on life
			50-54 3 12.3 8.8 6.1 55-59 3.1 9.3 8.4 6.8 60-64 3.6 7.8 7.6 7.2 65-69 4.8 5.6 8.3 8.7 70-74 4 5.7 8.1 12.1 75-79 4.2 7 8.1 14.6 80-84 5.2 5.9 8.1 16.1 85+ 5.7 2.6 8.2 19.3 Impact on life Prevalence of impact % No problem 5 Small nuisance 11.3 Some bother 5.7 Much bothered 1.4 Great problem 1
Gavira-Iglesias, 2000[167] Cross-sectional Adjusted by: Age Marital status Educational level Living status Urethral catheter use Level of functioning Level of evidence: III	Subjects were randomly selected from a representative sample of people ≥65years in the Basic Health Zone of Cabra in Spain. Response rate: 95% (n=827) Data source: Home health interview conducted by the investigators and relying on self-reported symptoms. Incontinence was defined as a positive response to the question, "Do you ever have involuntary or unexpected leakages of urine without being able to control them?" Or a positive response to the question, "Do you ever wet or dampen your underwear, clothes, or bedclothes against your will?" In addition, anyone using a urinary catheter or absorbent pads was also considered incontinent.	Age: Mean: 77.7 (SD: 8.1) Gender: Male and Female Male: 41% (n=341) Female: 59% (n=486) Race: Not reported Ethnicity: Not reported Residency: Municipal districts or Cabra, Dona Mencia, and Nueva Carteya in Spain.	Gender Prevalence % Male 28.7 Female 41.6 Male: Frequency Prevalence % <Monthly 0.2 Monthly 7.8 Weekly 12.4 Daily 5.8 Unknown 2.5 Severity Prevalence % Drops or small amount 20.8 Large amount 7.9 Female: Frequency Prevalence % <Monthly 0.9 Monthly 7.5 Weekly 20.1 Daily 8.9 Unknown 4.2 Severity Prevalence % Drops or small amount 28.8 Large amount 12.8

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
Roe, 2000[168] Cross-sectional Adjusted by: Age Gender Social class Ethnicity Physical function Social function Mental health Energy Pain Health perceptions Level of evidence: III	Subjects were selected from random samples of the adult populations generated from patient registers of the Family Health Services Authorities in the UK. Response rate: 53% (n=6,139) Data source: Self-reported mailed questionnaire Incontinence was defined as leaking urine twice or more a month.	Age: 18-98 Gender: Male and female Race: Not reported Ethnicity: White: 98% Black Caribbean: 0.3% Black other: 0.1% Indian: 0.5% Pakistani: 0.1% Chinese: 0.2% Other Asian: 0.1% Other: 0.7% Residency: United Kingdom	Age group / Prevalence % 18-29: 3.1 30-34: 5.1 35-39: 6.6 40-44: 6.8 45-49: 10.4 50-54: 7.5 55-59: 10.1 60-64: 14.1 65-69: 10.6 70-74: 10.4 75-79: 14.7 80+: 20.3 Total current incontinent: 9 Total ever incontinent: 23
Smoger, 2000[169] Cross-sectional Adjusted by: Age Ethnicity Prostate cancer Prostate surgery Bladder surgery Diuretics Antispasmodic agents Prostate active agents Level of evidence: III	Male patients at primary care clinics (VA Medical Center), during a 14-week period. Investigators randomly selected morning or afternoon clinics and approached all patients seen within the selected clinic session. Response rate: 81.6% (n=809) Data source: anonymous, self-reported written survey without interviewer assistance. Incontinence defined as, “Urine loss in the last 12 months.”	Age: Mean: 59.8 (Range: 25-93) Gender: Male Race: Not reported Ethnicity: White: 82.1% African-American: 16.5% Other: 1.4% Residency: Louisville, Kentucky	Prevalence (Overall): 32,300/100,000 (32.3%) By frequency: <1/month: 19,500/100,000 (19.5%) About 1/month: 4,700/100,000 (4.7%) <1/week: 3,300/100,000 (3.3%) About 1/week: 6,800/100,000 (6.8%) Almost every day: 7,000/100,000 (7%) By severity: Few drops: 19,500/100,000 (19.5%) Wet my underwear: 7,800/100,000 (7.8%) Wet outer clothing: 2,200/100,000 (2.2%) Wet the floor: 700/100,000 (0.7%)
Smoger, 2000[169] Cross-sectional Adjusted by: Age Ethnicity Prostate Cancer Prostate surgery Bladder surgery Diuretics	investigators randomly selected morning or afternoon clinics and approached all patients in waiting room at primary care clinics in VA Medical Center over a 14-week period. Response rate: 81.6% (n=809) Data source: self-reported written anonymous survey without assistance. UI as, “Urine loss in the last 12 months.”	Age: Mean: 59.8 (Range: 25-93) Gender: Male Race: Not reported Ethnicity: White: 82.1% African-American: 16.5% Other: 1.4%	Ethnicity / Prevalence % White: 32 African-American: 33.1 Other: 36.4 Overall: 32.3

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
Antispasmodic agents Prostate active agents Level of evidence: III		Residency: Louisville, Kentucky	
Temml. 2000[170] Cross-sectional Adjusted by:, Age, Gender Medical history, Concurrent medical therapies Weight, Height, BMI Heart rate Blood pressure Echocardiogram Marital status Cigarette smoking Alcohol consumption Education Sportive activities Stress factors Level of evidence: III	Subjects were selected from voluntary health examinations sponsored by the city of Vienna. The exams are regularly organized and are offered free of charge. Response rate: 100% (n=2,498) Data source: Self-reported questionnaires (based on Bristol LUTS questionnaire) Urinary incontinence was defined as, "Any involuntary loss of urine within the past 4 weeks."	Age: ≥20 years (Mean age female: 49.7 SD: 13.6) (Mean age male: 48.6 SD: 13.0) Gender: Male and Female (Male: 49.5%) (Female: 50.5%) Race: Not reported Ethnicity: Not reported Residency: Vienna, Austria	Prevalence (Overall): Female: 26.3%, Male: 5.0% By type (Of incontinent individuals): Female: Stress-92.0%, Urge-53.7% Male: Stress-29.5%, Urge-53.4% Women% (n . 332) / Men% (n . 62) Stress incontinence 92 / 29.5 Urge incontinence 53.7 / 53.4 Post-void dribbling 16.2 / 66.7 Nocturnal incontinence 4.4 / 15.3 Pure stress incontinence 39.8 / 5.9 Pure urge incontinence 6.9 / 26.5 Pure nocturia 0.4 / 0 Pure post-void dribbling 0 / 44.1 "Negative impact on quality of life:" Males-58.3%, Females-65.7% (incontinent individuals) Women% (n . 332) / Men% (n . 62) Not at all 34.3 / 41.7 A little 47.4 / 41.7 Moderate 11.6 / 8.3 Severe 6.7 / 8.3 By severity: Frequency — Women% (n . 332) / Men% (n . 62) <1/week 45.8 / 42.1 2-3/week 24.6 / 21.5 1/day day 10.5 / 10.9 >1/day 21.1 / 20.3 Permanent 1.8 / 1.9
Tseng, 2000[171] Cross-sectional Adjusted by: Age Gender Education Fitness	Subjects were randomly selected from elderly residents of Taiwan, residing in Tungkang. Response rate: 80% (n=504) Data source: Face to face interviews by registered nurses. Incontinence was defined as, "Inappropriate leakage of urine."	Age: 65 years and older Gender: Male and female Male: 49.2% Female: 50.8% Race: Not reported	**By gender** — **Prevalence %** Male 15.0 Female 27.7 Total 21.6 **By Type** — **% of incontinent subjects** Stress 30.7 Urge 30.7 Mixed 22.8

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
Parity UI experience UI perception Treatment intention Level of evidence: III		Ethnicity: Not reported Residency: Tungkang, Taiwan	Undetermined 15.8 **Male** Age group **Prevalence %** <70 13.8 70+ 15.5 **Female** Age group **Prevalence %** <70 24 70+ 29.9
Ueda, 2000[172] Cross-sectional Adjusted by: Age Gender Stroke Angina Diabetes Cystitis Ability to change clothes Ability to walk outside Hysterectomy Constipation Level of evidence: III	Subjects were selected from a random sample of 40-80 year olds living in 7 towns of Shiga Prefecture, Japan. Response rate: 52.5% (n=1,836) Data source: self-reported, mailed questionnaires Urinary incontinence was defined as a positive answer to the question, "Do you suffer from involuntary loss of urine?"	Age: 40-80 Gender: Male and female Male: 46% Female: 54% Race: Not reported Ethnicity: Not reported Residency: Japan	Prevalence: Overall Male: 10.5% Female: 53.7%
Chiarelli, 1999[173] Cross-sectional study (Nested within a large randomized cohort known as the WHA project.) Confounding factors: Parity, Constipation, Other bowel problems, BMI, Urine that burns or stings, Surgery (In mid-age and older cohort) Level of Evidence: III	Randomly selected from national health insurance database, including all women in Australia. To increase the number of rural residents, over-sampling of remote areas was done. Response rate: Youngest (18-23): 48%, Mid-age 45-50): 54%, Oldest (70-75): 41% Self-report survey questionnaires from WHA project. UI as, "Experiencing the leaking of urine in the last year". Responses: never, rarely, sometimes, or often.	Age: 35.4 % in youngest cohort (18-23) (n=14,761) 33.7% in mid-age cohort (45-50) (n=14,070) 30.9% in oldest cohort (70-75) (n=12,893) Gender: Women Race/ Ethnicity: Not reported Residency: Broadly representative of all States and Territories of Australia	Age group Prevalence % 18-23: 12.8 45-50: 36.1 70-75: 35 Prevalence: Overall- Youngest: 12,800/100,000 (12.8%) Mid-age: 36,100/100,000 (36.1%) Oldest: 35,000/100,000 (35%) The question asked "Did not allow differentiation between the different types of incontinence experienced by women, namely stress, urge, or mixed incontinence."

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
Dolan, 1999[174] Cross-sectional Adjusted by: Age Parity Employment status Pelvic floor exercises Gynecological operations Level of evidence: III	Subjects were randomly selected from a computerized register of family practice general practitioners living in four geographical areas of Northern Ireland. Response rate: 65.6% (n=689) Data source: Self-administered postal questionnaire Incontinence was defined as, "Leaking of urine within the past 2 years."	Age: 35-74 Gender: Female Race: Not reported Ethnicity: Not reported Residency: Northern Ireland	Age: % — 35-44: 56; 45-54: 69; 55-64: 55; 65-74: 44; Total: 56.9 # of pregnancies: % — 0: 44; 1: 47; 2: 61; 3: 64; 4: 63; Total: 57.9 By Frequency: % Sometimes: 33.5 Often: 23.4
Foldspang, 1999[175] Cross-sectional Adjusted by: Pregnancy Vaginal childbirth Age at childbirth Obstetric procedures (Episiotomy, perineal suturing, forceps delivery, vacuum delivery) Level of evidence: III	Subjects were selected from the Danish Central Population Registry. Subjects were randomly selected and age-stratified. All subjects lived in the municipalities of Aarthus and Randers. Response rate: 75.5% (n=4,710 respondents) Data source: Mailed, self-administered questionnaire. Women were asked, "Whether they had experienced urinary incontinence during the previous year." If so, they were then asked whether the "episodes were generally provoked by physical stress or accompanied by a feeling of urge."	Age: 20-59 years of age Gender: Female Race: Not reported Ethnicity: Not reported Residency: Municipalities of Aarthus and Randers, Denmark.	Prevalence: Overall: 17,700 / 100,000 (17.7%) Stress UI: 15,100 / 100,000 (15.1%) Urge UI: 8,700 / 100,000 (8.7%) Mixed UI: 6,800 / 100,000 (6.8%)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life	
Damian, 1998[176] Cross-sectional Adjusted by: Age Gender Marital status Education Occupation BMI Number of children + miscarriages Self-rated health U.I. related chronic conditions General mobility Level of evidence: III	Subjects were randomly selected from community dwelling individuals ≥65 years, registered on the Madrid City Roll. Response rate: 71.2% Response by age group: 65-74: 71.4% 75-84: 73.1% 85 and over: 67.1% Response by gender: Males: 78.0% Females: 64.5% Data source: At home interviews by trained, gender-matched professionals. Incontinence was determined by a positive answer to the question, "Do you currently experience any difficulty in controlling your urine? In other words, does your urine escape involuntarily?"	Age: ≥65 years. (n of each age group not reported) Gender: Male and female (n of each gender not reported) Race: Not reported Ethnicity: Not reported Residency: All respondents are community dwelling residents of Madrid, Spain	Prevalence: Overall: (15.5%) By Gender: Male: (14.5%) Female: (16.1%) Of those that are incontinent: Urge: (26.6%) Stress: (12.5%) Mixed: (16.1%) Other: (15.5%) Of those that are incontinent, by gender: Male Urge: (52.2%) Male Stress: (10.6%) Male Mixed: (16.1%) Male Other: (21.1%) Female Urge: (12.3%) Female Stress: (13.5% Female Mixed: (61.8%) Female Other: (12.3%)	
Koyama, 1998[177] Cross-sectional Adjusted by: Age Gender Parity Living area Level of evidence: III	Subjects from residents >60 years in 3 different communities. Questionnaires were distributed through the town or village office. Response rate: Rural: 98.4% (n=937) Suburban: 65% (n=934) Nursing home: Not reported (n=433) Data source: Self reported questionnaires. In the nursing home, some subject data was obtained from the nurse or caregiver of the patient. Incontinence as, "even a small amount of leakage at a time when there was no intention of urinating."	Age: 60 and older Gender: male and female Race: not reported Ethnicity: Not reported Residency: Japan (Suburban, rural, and nursing home residents).	Prevalence: Overall: Male: 4.7% Female: 11.3% By age: 60-69: Male: 0.7% Female: 7.9% 70-79: Male: 6.3% Female: 10.2% 80+: Male: 9.1% Female: 20.2%	In nursing home Overall: Male: 16.2% Female: 23.2% Male: 8.7% Female: 23.5% Male: 20.5% Female: 21.0% Male: 15.8% Female: 24.6%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
Koskimaki, 1998[178] Cross-sectional Adjusted by: Age Level of evidence: III	Subjects were selected from all men born in 1924, 1934, and 1944 living in Tampere, Finland or one of the rural or semi-rural municipalities within the same county. Subjects were identified from the National Population Register. Response rate: 68% (n=2,128) Data source: Self-reported mailed questionnaire Incontinence was measured on a 4 item scale, from 0 points for no symptom to 3 points for severe symptoms. Urge incontinence, stress incontinence, and other incontinence were classified as mild when they were reported to occur rarely, and moderate to severe when occurring more often.	Age: 50: (38%, n=806) 60: (34%, n=732) 70: (28%, n=590)) Gender: Male Race: Not reported Ethnicity: Not reported Residency: Tampere, Finland	Age-adjusted prevalence: By type: Urge incontinence: 17,000 / 100,000 (17%) Stress incontinence: 9,000 / 100,000 (9%) Other incontinence: 10,000 / 100,000 (10%) By severity: Urge incontinence: Mild: 16,000 / 100,000 (16%) Moderate/severe: 1,000 / 100,000 (1%) Stress incontinence: Mild: 8,000 / 100,000 (8%) Moderate/severe: 1,000 / 100,000 (1%) Other incontinence: Mild: 9,000 / 100,000 (9%) Moderate/severe: 1,000 / 100,000 (1%)
Kuh, 1999[179] Design: Nationally representative prospective cohort. Confounders: Childhood enuresis, Information on the data of the birth of children, Caesarian deliveries, BMI, Kidney or bladder infections, Menopausal status, Health status (Self-reported), Socioeconomic status Level of evidence: II-2B	Selected from participants in the Medical Research Council Survey of Health and Development. Response rate: 93% (n=1,378)). Measured using a mailed self-administered questionnaire. Definition of UI: Severe as occurring ≥2/month in the previous year and reporting loss of more than a few drops of urine. Moderate as 1 but not both of the aforementioned symptoms. Mild or none at all: reporting milder symptoms or none at all. Stress as yes to: "Do you ever lose urine when you cough, sneeze, laugh, run, or exercise?" Urge as yes to: "Do you ever have an urgent and strong desire to pass urine which is difficult to control?" and follow up question, "Do you ever lose any urine before you reach the toilet?"	Age: 48 years old Gender: Female Race: Not reported Ethnicity: Not reported Residency: General population sample of women living in England, Scotland, and Wales.	Prevalence % Severe 8 Urge 22.4 Stress 49.9 Overall 54.8 By Impact on life Prevalence % Bothered a little 15.5 Bothered a lot 4.7

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
Stenberg, 1999[180] Cross-sectional Adjusted by: "Socio-demographic factors," obstetrical and gynecological history, somatic diseases, previous surgery, previous fractures, current medications, and estrogen treatment Level of evidence: III	Subjects were selected from all women born in a county in Sweden between December 1921 and January 1923 (71 year old group) as well as born between December 1911 and January 1913 (81 year old group). Names and addresses were obtained from the population register. Response rate: 87% (Of those aged 71) (n=1,084) 62% (Of those aged 81) (n=611) Data source: Mailed, self-reported questionnaire. Definition of incontinence used in study not reported, but the article claims that the "questionnaire covered all urinary incontinence problems." Symptoms were classified as, "none, trivial, moderate, severe, or unbearable."	Subject age: 71 years of age and 81 years of age Gender: Female Race: Not reported Ethnicity: Not reported Residency: Uppsala County, Sweden	Prevalence: Overall: 71-year-old group: 46,000 / 100,000 (46%) 81-year-old group: 45,000 / 100,000 (45%) Mixed incontinence: 71-year-old group: 20,000 / 100,000 (20%) 81-year-old group: 20,000 / 100,000 (20%) Urge and stress UI prevalence not reported. UI of considerate severity: (Symptoms were deemed considerate when the respondent marked, "moderate, severe, or unbearable" on their response sheet) 71-year-old group: 48,000 / 100,000 (48% of those women experiencing urinary incontinence deemed their UI considerately severe. General population prevalence not reported. "N" not reported either.) 81-year-old group: 59,000 / 100,000 (59% of those women experiencing urinary incontinence deemed their UI considerately severe. General population prevalence not reported. "N" not reported either.)
Swithinbank, 1999[181] Cross-sectional Adjustment factors not reported. Level of evidence: III	Women ≥19 years registered at a general practice were selected and mailed a questionnaire. The practice was chosen because it had near average social and demographic patterns for the city. Response rate: 80% Data source: Validated, self-completed questionnaire. Incontinence defined using the Bristol Female Lower Urinary Tract Symptoms questionnaire (BFLUTS), asking about symptom occurrence during the previous month with a five point likert scale; the 2nd part asks about the degree to which the symptom causes a problem, on a 4-point scale. This definition of UI, was not reported in the article.	Age: 52 (Mean), 19-97 (Range) Gender: Female Race: Not reported Ethnicity: Not reported Residency: a major British city(Not identified in article).	Prevalence: Overall: 69,000/100,000 (69%) By Type: Stress incontinence: 60,000/100,000 (60%) Urge incontinence: 46,000/100,000 (46%) Impact on life: Incontinence having a social or hygienic impact (as per ICS definition of incontinence): 30,000 / 100,000 (30%) Of those women reporting incontinence, 61% reported that it was "problematic." (61,000/100,000) Overall, 40% of women surveyed reported that they experienced incontinence that was "problematic." (40,000/100,000)
Jitapunkul, 1998[182] Cross-sectional Adjusted by: Age, Gender	Selected from all elderly persons living in the Klong Tuey slum in Thailand. Response rate: 72.6% (n=114) Data source: At home interviews	Age 60+ (Mean: 69.3) Gender: Male and female (Male: 33%, Female	Prevalence: Overall: 16.2% Male: 10.8% Female: 18.9 By type, Stress: Overall: 2.84 Male: 0.43 Female: 4.03

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
Marital status, Literacy Work and Perceived health status Life satisfaction Level of evidence: III	Incontinence as: "During the last 12 months, does urine ever drip unexpectedly without your being able to stop it and you get wet?"	67%) Race: Not reported Ethnicity: Asian Residency: Thailand	By type, Urge: Overall: 9.53 Male: 7.33 Female: 10.62 By type, Mixed: Overall: 2.13 Male: 1.72 Female: 2.33
Roberts, 1998[183] Cross-sectional Adjusted by: Age Gender Self-rated health status Level of evidence: III	Random individuals ≥ 50 years in Olmsted County, MN. Selected using records from the Rochester Epidemiology Project. There was a separate cohort for men and for women. A third cohort included men ≥40 years. Response rate: 66% (n=1,540) Data source: Self-reported, validated questionnaires (incontinence as), "In the last year " - "Were there any days when you leaked more than a few drops of urine?" – "If yes, how many days did you leak more than a few drops of urine?" - " Have you had slow leakage or dribbling throughout the day?" - "Have you had leakage when you coughed or sneezed?" "When leakage has occurred, were you aware of the need to urinate before the leakage occurred?" Response options: never, I<25%, >25%, and >75%	Gender: Male and Female Age: ≥50 years 3rd cohort of men ≥40 years. Race: Not reported Ethnicity: Not reported Residency: Olmsted County, MN	Prevalence: Male 50+ Cohort: (24.3%) Female 50+ Cohort: (48.7%) Male 40+ Cohort: (17.3%) By type: Women: Stress incontinence: (13.2%) Urge incontinence: (5.4%) Mixed incontinence: (77.9%) Neither stress nor urge (3.4%) Men: Stress incontinence: (3.5%) Urge incontinence: (40.8%) Mixed incontinence: (24.9%) Neither stress nor urge: (30.8%) By severity: Men: Mild: (77.8%) Moderate/severe: (22.2%) Women: Mild: (69.7%) Moderate/severe: (30.3%)
Talcott, 1998[184] Prospective cohort study Adjusted by: Age Marital status Employment status Income Education Radiotherapy Radical prostatectomy Sexual dysfunction Level of evidence: II-2A	Subjects were selected from August 1990-May 1994 from men seeking physician advice on early prostate cancer. Patients needed a tissue diagnosis of adenocarcinoma of the prostate, a radionuclide bone scan free of metastatic cancer, and no prior surgery or radiotherapy for prostate cancer to be eligible. All study enrollments occurred at Harvard Medical School, although treatments often occurred elsewhere. Response rate: 72% (n=279) Data source: Initial self-reported questionnaire. Medical records. Follow-up questionnaires at 3 and 12 months.	Age: Mean: 64.6 Median: 65 Range: 41-86 Gender: Male Race: Not reported Ethnicity: Not reported Residency: USA	Prevalence of incontinence: Baseline and by treatment: Prostatectomy: 64 or less: 2,000 / 100,000 (2%) 65 or more: 3,000 / 100,000 (3%) Radiotherapy: 64 or less: 0 / 100,000 (0%) 65 or more: 1,000 / 100,000 (1%) At 3 months: Prostatectomy: 64 or less: 24,000 / 100,000 (24%) 65 or more: 24,000 / 100,000 (24%) Radiotherapy: 64 or less: 0 / 100,000 (0%)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
	Incontinence was defined as "dribbling or leaking" and also by the use of "absorptive pad worn in the past week."		65 or more: 2,000 / 100,000 (2%) At 12 months: Prostatectomy: 64 or less: 9,000 / 100,000 (9%) 65 or more: 15,000 / 100,000 (15%) Radiotherapy: 64 or less: 0 / 100,000 (0%) 65 or more: 2,000 / 100,000 (2%) By severity (Absorptive pad worn in the past week): Baseline and by treatment: Prostatectomy: 64 or less: 2,000 / 100,000 (2%) 65 or more: 3,000 / 100,000 (3%) Radiotherapy: 64 or less: 0 / 100,000 (0%) 65 or more: 2,000 / 100,000 (2%) At 3 months: Prostatectomy: 64 or less: 57,000 / 100,000 (57%) 65 or more: 61,000 / 100,000 (61%) Radiotherapy: 64 or less: 0 / 100,000 (0%) 65 or more: 6,000 / 100,000 (6%) At 12 months: Prostatectomy: 64 or less: 35,000 / 100,000 (35%) 65 or more: 36,000 / 100,000 (36%) Radiotherapy: 64 or less: 0 / 100,000 (0%) 65 or more: 7,000 / 100,000 (7%)
Bogren, 1997[185] Prospective cohort Level of evidence:	Swedish population from a Primary Health Care District, SW Sweden, 54000 people in this area 458 persons, 65yrs and older questionnaire mailed to home – history of UI defined as involuntary voiding of urine, type of UI 76% response rate after 1st mailing, 1st reminder answered by 14% and 2nd by 6%.	225 women 233 men Prevalence of UI, gender differences Women% men % p neuro disease 3% 10% NS diabetes 5 heart dis. 7 14	Prevalence = 28% women, 9% men p<.0001 33% women reported sig. more SI than men 10% p <.05 as well as more Urge Incontinence 66% than men 40% p<.05

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
		back pain 52% 57% current UTI 34 10 <.05 surgery bladder 5 14 surgery genital 43 14 <.05 diuretics 15 14 sedatives 8 5 hypnotics 20 <.05 sex hormones 36	
Brandeis, 1997[186] Cross-sectional Adjusted by: Age Gender Race Anti-depressant use Impaired mobility ADL's Specific diseases (fecal impaction, CHF, UTI, diabetes, pedal edema, delirium, dementia) Level of evidence: III	Subjects were selected from a representative sample of Medicaid-certified American nursing homes, drawn from ten states. A random sample of residents was selected from each of the 270 nursing homes studied. Response rate: 92.6% (n=2,014) Data source: Standardized forms called the Minimum Data Set (MDS). Registered nurses were trained on data collection using that form. Data was collected from chart review, interview with nursing home staff, and observation of residents. Incontinence was defined as, "at least two episodes per week of involuntary urine loss within the past two weeks."	Age: Residents 60 years of age or older Mean: 84.3 (SD: 8.7) Gender: Male (24.5%) and female (75.5%) Race: White: 81.9% Black: 12.7% Other not reported Ethnicity: Not reported Residency: Nursing home residents in ten states in the USA	Prevalence of urinary incontinence: Overall: 49,000 / 100,000 (49%) Men: 45,100 / 100,000 (45.1%) Women: 78,400 / 100,000 (78.4%) Type, severity, and impact of incontinence not reported.
Brieger, 1997[187] Cross-sectional Adjusted by: Age Height Weight BMI Place of birth Parity	Subjects were randomly selected from telephone directories in the regions of Hong Kong Island, Kowloon, and the New Territories. Response rate: 43% Data source: Telephone survey with a previously validated and tested questionnaire. Incontinence was defined as "involuntary loss of urine which is socially or hygienically unacceptable."	Age: Mean: 45 (SD: 15) Gender: Female Race: Not reported Ethnicity: Chinese Residency: Hong Kong, China	Prevalence: Overall: 13,000 / 100,000 (13%) By Type: Stress Incontinence: 10,000 / 100,000 (10%) Urge Incontinence: 700 / 100,000 (0.7%)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
Employed Constipation Smoking Level of Evidence: III			
Malmsten, 1997[188] Cross-sectional Adjusted by: Age Marital status Foreign extraction Place of residence Urinary tract infections Level of evidence: III	Subjects were randomly selected from the total population of men 45 and older living in Goteborg, Sweden in 1992. The subjects were selected from the population register, and were selected by year of birth. Several cohorts were obtained at 5-year intervals. A sample was taken from those born in: 1947, 1942, 1937, 1932, 1927, 1922, 1917, and 1912. All men born in 1907 or earlier were included to obtain a more comprehensive sample of older men. Response rate: 74% (n=7,763) Data source: Self-reported, mailed questionnaire Urinary incontinence was defined according to the International Continence Society and was confirmed by a 48-hour pad test and voiding lists.	Age: ≥45 years Mean: 63.1 (SD: 19.0) Gender: Male Race: Not reported Ethnicity: Not reported Residency: Goteborg, Sweden	Age (years) Prevalence % 45 3.6 50 4.1 55 3.3 60 5.1 65 6.1 70 7.3 75 9.6 80 19.7 85-89 21.8 90+ 28.2 Total 9.2 Overall: 9,200 / 100,000 (9.2%) By severity (Of incontinent men): Daily leakage: 64,100 / 100,000 (64.1%) 2-3 times/week: 12,600 / 100,000 (12.6%) Once weekly: 8,200 / 100,000 (8.2%) Once monthly: 15,100 / 100,000 (15.1%) By impact on life: Men who considered their UI to “Limit their social life:” 31,000 / 100,000 (31%)
Mozes, 1997[189] Adjusted by: Age Origin Education Economic status Urinary symptoms Co-morbidities (Heart disease, diabetes, respiratory disease, hypertension, joint disease, peptic disease, renal disease, cancer) Level of evidence: III	Subjects were randomly selected from all Israeli cities and settlements over 5,000. Areas were stratified by region and population size. Within selected cities, the sampling unit was according to dwelling. Within dwellings, individuals were recruited using quotas for socioeconomic status and age. Response rate: 93.3% (n=896) Data source: Personal interviews in homes of respondents with a validated questionnaire. This study looked at “urinary symptoms.” The only question dealing specifically with incontinence was, “Do you experience involuntary urination while coughing or laughing?” Stress incontinence was the only type of incontinence measured.	Age: 45-75 years old Gender: Male Race: (Listed as “origin” in report) Asia-Africa: 43.2% Europe-America: 47.7% Israel: 9.1% Ethnicity: Not reported Residency: Israeli cities and settlements	Prevalence: Stress Incontinence: 2,100 / 100,000 (2.1%) By Severity: (Of any urinary symptoms, which include: weak stream, frequency, hesitancy, dribbling, dysuria, incomplete emptying, nocturia, stress incontinence, urinary retention) Bothersome: Mild: 86,500 / 100,000 (86.5%) Moderate: 8,900 / 100,000 (8.9%) Severe: 4,600 / 100,000 (4.6%)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
Nakanishi, 1997[190] Cross-sectional Adjusted by: Gender Age General health status Stroke Diabetes Dementia Social activity Anxiety "No life worth living" Level of evidence: III	Subjects were randomly selected from all residents of Settsu, Japan aged 65 or older. Subjects were identified from a computerized age/sex register. Response rate: 95.4% (n=1405) Data source: At home interviews Incontinence was determined by a positive response to the question, "Do you wet or soil yourself?"	Age: 65 and older Gender: Male and Female Race: Not reported Ethnicity: Not reported Residency: Settsu, Japan	Male Daily or more 65-74 0.3 75-84 1.2 85+ 0 Male Less than daily 65-74 0.5 75-84 7.9 85+ 9.7 Female Daily or more 65-74 0 75-84 1.8 85+ 3.4 Female Less than daily 65-74 2.2 75-84 6.4 85+ 8.5
Samuelsson, 1997[191] Cross-sectional Adjusted by: Age Marital status Education Work status Smoking Coffee consumption History of disease and medication, including HRT Parity Obstetric history Menopausal age Gynecological symptoms Gynecological operations Level of evidence: III	Subjects were selected from all women scheduled for a gynecological health examination by midwives in a primary health care district during one year. Subjects were mailed a questionnaire if they were between 20-59. Exclusions were women who were pregnant or lactating, had a cervical smear in the last year, or who had mental retardation. Response rate: 77% (n=491) Data source: Self-reported postal questionnaire. Urinary continence was defined as a positive answer to the question, "Do you suffer from involuntary loss of urine?" Stress incontinence was defined as, "leakage during effort," and urge incontinence was defined as, "leakage with sense of urge." Mixed incontinence was the presence of both. Unspecific incontinence was defined as, "leakage, but not during effort or with sense of urge."	Age: Subjects were 20-59 years of age. By age group: 20-29: 153 30-39: 118 40-49: 87 50-59: 133 Gender: Female Race: Not reported Ethnicity: Not reported Residency: Sweden	Prevalence: Overall: 27,700 / 100,000 (27.7%) By type: Stress incontinence: 15,700 / 100,000 (15.7%) Urge incontinence: 2,000 / 100,000 (2%) Mixed incontinence: 5,300 / 100,000 (5.3%) Unspecific incontinence: 4,700 / 100,000 (4.7%) By severity: Daily leakage: 3,500 / 100,000 (3.5%) Once a week: 4,900 / 100,000 (4.9%) Once a month: 4,100 / 100,000 (4.1%) Seldom: 15,200 / 100,000 (15.2%)
Schulman, 1997[192] Cross-sectional Adjusted by:	Subjects were selected randomly using a sampling technique based on the Multi Method Multi Stage program. Quotas were established based on age,	Age: 30-34: 699 (13.3%) 35-49: 1,792 (34%)	Prevalence: Overall: 10,900 / 100,000 (10.9%) By Gender:

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
Age Gender Parity Professional status Level of evidence: III	sex, and profession. Response rate: 89% (n=5,269) Data source: Self-completed questionnaires Urinary incontinence was determined by participant's responses to the following: "Arriving too late to the toilet" (urge incontinence), "losing urine when laughing or coughing too much" (stress incontinence), "continuously losing some urine" (permanent incontinence), "losing some urine after micturition" (postmicturition incontinence).	50-64: 1,478 (28%) 65+: 1,299 (24.7%) Gender: Male: 2,499 (47.4%) Female: 2,770 (52.6%) Race: Not reported Ethnicity: Not reported Residency: Belgium residents	Male: 5,200 / 100,000 (5.2%) Female: 16,300 / 100,000 (16.3%) By type (Based on persons who are incontinent) Stress incontinence: 42,000 / 100,000 (42%) Male: Not reported Female: 53,000 / 100,000 (53%) Urge incontinence: Overall not reported Male: 45,000 / 100,000 (45%) Female: 55,000 / 100,000 (55%) By severity (Based on persons who are incontinent): Considered "bothersome:" 30,000 / 100,000 (30%) Considered "more or less bothersome:" 70,000 / 100,000 (70%) Permanent incontinence: 3,500 / 100,000 (3.5%) Several daily episodes: 17,400 / 100,000 (17.4%) One episode a day: 8,500 / 100,000 (8.5%) 2-3 weekly episodes: 18,600 / 100,000 (18.6%) 2-3 monthly episodes: 34,500 / 100,000 (34.5%) No response: 17,500 / 100,000 (17.5%)
Thom, 1997[193] Adjusted by: Age Race BMI Parity Hysterectomy before age 45 Estrogen replacement Parturition variables (parous women only) Level of evidence: III	Subjects were selected from a random sample of women aged 60 years and older who were members of Kaiser Permanente Medical Care Plan of Northern California. Response rate: 74.7% Data source: Self-reported, mailed questionnaire Incontinence was defined as "at least one episode of incontinence in the past 12 months." Stress incontinence was, "incontinence triggered by one or more activities associated with increased intra-abdominal pressure, with leakage usually occurring immediately and without a sense of urgency." Urge incontinence was defined as, "experiencing a sense of urgency prior to the incontinence." Those with both types had mixed incontinence.	Age: Mean: 69.6 (SD: 7.0) Gender: Female Race: White: 77% Hispanic: 5% Black: 8% Asian: 6% Other: 5% Ethnicity: Not reported Residency: Northern California	Prevalence: Overall: 72,600 / 100,000 (72.6%) By type: Stress: 16,900 / 100,000 (16.9%) Urge: 23,900 / 100,000 (23.9%) Mixed: 23,600 / 100,000 (23.6%) Other: 8,300 / 100,000 (8.3%) By Severity: Less than once/month: 14,300 / 100,000 (14.3%) Monthly: 23,900 / 100,000 (23.9%) Weekly: 21,800 / 100,000 (21.8%) Daily: 12,200 / 100,000 (12.2%)
Brown, 1996[194] Cross-sectional Adjusted by: Age,	From population-based listings in 4 areas, previously participating in a study on osteoporotic fractures. Response rate: Not reported (n=7,949) Data source: interview, self report questionnaire, and	Age: 70+ Mean: 76.9 (SD: 5.0) Gender: Female	**Prevalence %** Overall 41.3 **Severity** **Prevalence %** Daily 14.2

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
Menopausal status, Hysterectomy, BMI, Poor health, COPD, Stroke, Diabetes, CHF, Parkinson, Oral estrogen, Diuretics, Coffee, Smoking, Alcohol consumption, Exercise, Gait speed, Muscle strength Level of evidence: III	physical exam. UI as, "During the last 12 months, have you ever leaked or lost control of your urine?"	Race: Not reported Ethnicity: Not reported Residency: Baltimore, Minneapolis, Monongahela Valley by Pittsburgh, and Portland, USA	Infrequent 27.1 Total 41.3
Umlauf, 1996[195] Cross-sectional Adjusted by: Age, Ethnicity Functional status Prostate problems Surgery, Diuretic use Caffeine use, Nocturia Symptoms of urinary retention Level of evidence: III	Selected from men ≥55 years enrolled in a hospital based senior citizens group. Response rate: 28% (n=1,490) Data source: Mailed, self-reported questionnaires Incontinence was defined as, "Uncontrolled urine leakage during the month before the survey."	Age: ≥52 years (Mean: 71.6) Gender: Male Race: Not reported Ethnicity: White, Black, Latino, Other Residency: USA	Prevalence: Overall: 29% By age: 52-64: 19.7% 65-74: 26.1% 75-84: 38.1% 85-94: 31.4% 95-99: 66.7% By severity: Mild: 86.4% Moderate: 9.1% Severe: 4.5%
Seim, 1995[196] Cross-sectional Adjusted by: Age Level of evidence: III	Subjects were selected from all women ≥20 years. Response rate: 77% (n=1,820) Data source: Self-reported mailed questionnaires Incontinence was defined as, "Any frequency or amount of leakage."	Age: 20 years and older Gender: Female Race: Not reported Ethnicity: Not reported Residency: Rural community, Rissa Norway	Prevalence % **Overall** 29 **By type** % of incontinent subjects Stress 48.8 All other types 51.2 **Severity** % of incontinent subjects Slight or moderate 64.7 Severe 24% Unknown 11.3
Kutner, 1994[197] Cross-sectional Adjusted by: Age, Gender Marital status, Ethnicity, Education Cognitive functioning Depression	Selected from data provided by the National Institute on Aging, in cooperation with FICSIT and NCNR (community dwelling elderly persons). (n=352) Response rate: Not reported Baseline data from the Frailty and Injuries: Cooperative Studies of intervention study. Incontinence as "≥1episodes/week of loss of urine	Age: Mean: 77.1 Gender: Male and Female Race: Not reported Ethnicity: Not reported	Prevalence: Overall: Male: 4.5% Female: 17.9%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
Chronic health conditions Level of evidence: III	control."	Residency: USA	
Mommsen, 1994 [198] Cross-sectional Adjusted by:, Age, BMI, Menopausal status, Parity Abdominal or gynecologic surgery Cystitis, Occupation Level of evidence: III	Subjects were selected from an age-stratified random sample of women 30-59. Response rate: 84.5% (n=2,631) Data source: Self-reported, mailed questionnaire. Incontinence as, "Experiencing UI during the year 1987."	Age: 30-59 years Gender: Female Race: Not reported Ethnicity: Not reported Residency: Aarhus. Denmark	Prevalence: Overall: 17% By Type: Stress: 15% Urge: 9% Mixed: 7%
Brocklehurst, 1993 [199] Cross-sectional Adjusted by: Age Sex Recency of symptom Level of evidence: III	Randomly selected in 3 geographically stratified points. Response rate: Not reported (n=4,007) Data source: home interviews by trained interviewers. UI as yes to question about "bladder problems e.g. leaking, wet pants, damp pants."	Age: 30 years and older Gender: Male and female Male: 47% Female: 53% Race: Not reported Ethnicity: Not reported Residency: Great Britain	Male: Age category / Prevalence: Ever / Previous year / Previous 2 months / Previous week 30-49: 2 / 1.5 / 0.8 / 0.8 50-59: 5.4 / 2.5 / 2.5 / 2.5 60+: 13.3 / 7.3 / 5.3 / 3.7 Total: 6.6 / 3.8 / 2.8 / 2.2 Female: Age category / Prevalence ever / Previous year / Previous 2 months / Previous week 30-49: 10.9 / 7.2 / 5.4 / 3.6 50-59: 15.4 / 9.1 / 6.3 / 5.2 60+: 16.8 / 11.7 / 10.2 / 8.3 Total: 14 / 9.3 / 7.5 / 5.7
Lagace, 1993[200] Cross-sectional Adjusted by: Age Gender Level of evidence: III	Selected from all ≥20 years seeking health care for any reason at 5 family practices during an 11 week period. Response rate: 77.8% (n=2,830) Data source: Self-reported, anonymous questionnaire UI as, "Any degree of incontinence in the past 12 months."	Age: ≥20 years Gender: Male and female Race/ ethnicity: Not reported Residency: Upper Peninsula Research Network of Michigan)	Prevalence: 33% By gender: Male: 11% Female: 43% By impact on life: Considered a "Social or hygienic problem" (For purposes of the investigators, this was also considered "Significant" in terms of severity): Male: 5% Female: 23%
Milsom, 1993[201] Cross-sectional Adjusted by: Age Parity	Subjects were randomly selected from all women in the city of Goteborg, Sweden using the population register. Women were sampled from birth cohorts 1900, 1905, 1910, 1915, 1920, 1930, and 1940. Response rate: 74.6% (n=7,459)	Age: 46-86 years old Gender: Female Race: Not reported Ethnicity: Not reported	**Birth cohort** / **Prevalence %** 1900 / 24.6 1905 / 22.1 1910 / 17.5 1915 / 15.1 1920 / 13.9

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life	
Oral contraception Hysterectomy Menopausal status Level of evidence: III	Data source: Self-reported mailed questionnaires. Incontinence was defined as, “inappropriate leakage of urine,” and was validated by a sub sample of women by objectively confirming by a 48 hour pad test, micturition lists, and a cough provocation test.	Residency: Goteborg, Sweden	1930	12.1
			1940	12.1
			Birth cohort 1930	
			Yrs Oral Contraception	Prevalence
			0	11.5
			1-3	13.9
			4-6	11
			7+	14
			Parity	
			0	7.7
			1	11.1
			2	13.1
			3+	14
			Premenopausal	13
			Postmenopausal	10.1
			Birth cohort 1940	
			Years Oral Contraception	Prevalence
			0	11.3
			1-3	15.3
			4-6	7.5
			7+	10.7
			Parity	
			0	5.5
			1	10.6
			2	12.1
			3+	16.4
			Premenopausal	11.6
			Postmenopausal	12
			Birth cohort **Hysterectomy**	**Prevalence %**
			1900 Y	32.3
			N	22.8
			1905 Y	27.1
			N	21.8
			1910 Y	24.5
			N	16.7
			1915 Y	18.3
			N	14.7
			1920 Y	15.6
			N	13.5
			Total Y	20.8
			N	16.4

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
Kok, 1992[202] Cross-sectional Adjusted by: Age Mobility Frequency Nocturia Urgency Fecal incontinence Level of evidence: III	Subjects were recruited from women ≥60 years. A random sample of 30 women born each year was obtained from the population register. Response rate: 69% (n=719) Data source: Self administered postal questionnaires. Incontinence as, "Involuntary loss of urine at least twice a week."	Age: 60 years and older Gender: Female Race: Not reported Ethnicity: Not reported Residency: Amstelveen, Netherlands	Age group — Prevalence % 60-64: 20 65-69: 19 70-74: 16.8 75-79: 22.7 80-84: 26.5 85-89: 30.8 90+: 28.4 Overall: 23.5
Rekers, 1992[203] Cross-sectional Adjusted by: Age Marital status Menopausal status Genito-urinary symptoms Pelvic area surgery Vaginal deliveries Level of evidence: III	Subjects were selected from a stratified sample of women drawn from the Bureau for Population Registration in the Netherlands. Response rate: 67.7% (n=1,299) Data source: Self-reported, mailed questionnaires "Serious incontinence was defined as incontinence occurring at least once a week and in larger amounts than a few drops of urine. All other incontinence was deemed to be minor."	Age: 35-80 Gender: Female Race: Not reported Ethnicity: Not reported Residency: Zoetermeer, Netherlands	Pre-menopausal / Post-menopausal **Prevalence** (Overall): 25.1 / 26.4 **Frequency**: <1/month: 7.5 / 7 >1/month-<1/week: 6.7 / 5.1 >1/week-<1/day: 7.8 / 7.2 >1/day: 3.1 / 7.1 **Amount lost**: Drops only: 12 / 13.4 A little: 11.1 / 12 A lot: 2 / 1 **Type**: Stress: 5.9 / 5.1 Urge: 3.9 / 4.5 Mixed: 11.1 / 13 Unknown: 4.2 / 3.8
Burgio, 1991[204] Prospective cohort Adjusted by: BMI, Parity Race, Caffeine intake Alcohol intake, Smoking Physical activity, Age Menopausal status Hysterectomy Gynecological surgery Level of evidence: II-2B	Subjects were selected from participants in the University of Pittsburgh Healthy Women Survey, a 5-year prospective study. Participants were recruited from women with driver's licenses in selected zip codes of the Pittsburgh area. Response rate: 60% (n=541) Data source: Nurse administered interview questionnaire Incontinence was defined as, "Ever leaked even a small amount of urine involuntarily."	Age: Mean: 47 years Gender: Female Race: White: 90.6% Other (Not reported): 9.4% Ethnicity: Not reported Residency: Pittsburgh, USA	Prevalence % Overall: 58.4 Stress: 47.9 Mixed: 35.8 Urge: 11.7 Uncategorized: 4.6 Frequency — Prevalence % Never: 41.6 <1/month: 26.7 >1/month: 13.4 >1/week: 10.5

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
			Daily 6.8
Ju, 1991[205] Cross-sectional Adjusted by: Age Gender Ethnicity Level of evidence: III	Selected from all residents, ≥65 years living in a public housing estate. Data obtained from the National Registry Department. Response rate: 80.4% (n=919) Data source: At home interviews Incontinence was defined as, "Leakage of urine 2 or more times in the past month."	Age: 65+ Gender: Male and female (Male: 47.3%, Female: 52.7%) Race: Not reported Ethnicity: Chinese: 83.5% Malay: 9.7% Indian: 6.6% Eurasians: 0.2% Residency: Singapore	Prevalence: Overall: 4.6% Male: 4.4% Female: 4.8% By age group: 65-69: 3.1% 70-74: 3.2% 75-79: 6.7% 80-84: 8.4% 85+: 9.8% By ethnicity: Chinese: 5.2% Malay: 1.1% Indian: 1.6% Eurasian: 0% By type: Pure urge: 1.3% Mixed: 0.3%
Lagro-Janssen, 1990[206] Cross-sectional Adjusted by: Age, Marital status, Parity, Education, Employment Perceived health status, Hypertension, Diabetes, COPD, Obesity, Varicose veins, CHF Symptoms of loco motor system Hysterectomy Level of evidence: III	Selected from 2,400 randomly selected practice files of 75 general practitioners. Response rate: 60% (n=1,442) Data source: Self reported data from home interviews conducted by trained interviewers. Urinary incontinence defined as, "involuntary loss of urine more than twice a month." No attempt was made to classify based on type.	Age: 50-65 Gender: Female Race: Not reported Ethnicity: Not reported Residency: Eastern Netherlands	Prevalence % Overall 22.5 **By Severity:** None 77.5 Mild 8 Moderate 7.8 Severe 6.7

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Author Sample	Subject Selection, Response Rate, Data Source, Measurement Methods(survey, screening, case finding, definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) of Urinary Incontinence, Overall and by Type, Severity, and Impact on Life
Molander, 1990[207] Cross-sectional Adjusted by: Age Urinary tract infections Other urogenital symptoms Estrogen treatment Level of evidence: III	Subjects were selected from a random sample of women born in 1900-1920 at five-year intervals in the city using the population register. Response rate: 70.1% (n= 4,206) Data source: Self-reported, mailed questionnaires UI definition on the mailed form was not reported. However, the first 300 women to report UI were invited to attend a clinic where UI was confirmed by detailed medical history, examination, a 48 hour pad test, micturition lists, and a cough provocation test.	Age: 65-84 years Gender: Female Race: Not reported Ethnicity: Not reported Residency: Goteborg, Sweden	Birth cohort 1900 Prevalence % 24.6 1905 22.1 1910 17.5 1915 15.1 1920 13.9 Total 16.9 Frequency % of incontinent women Daily 55.6 2-3 times/week 13.2 1/week 5.4 1-3 times/month 18.9 By Type % of incontinent women Stress 24 Urge 49 Mixed 27
Herzog, 1990[41] Prospective cohort Adjusted by: Age Sex General health status Level of evidence: II-2C	Subjects all non-institutionalized persons ≥60 years in a stratified probability sample. Response rate: 66% (n=1,956) 1 year follow-up: 69% 2 year follow-up: 72% Data source: At home interviews by interviewers trained at the U of Michigan School of Public Health. UI as, “any uncontrolled urine loss within the previous 12 months.”	Age: 60 years and older Gender: Male and female Males: 41% Females: 59% Race: Not reported Ethnicity: Not reported Residency: Washtenaw County, Michigan	Gender Baseline prevalence Male 18.80% Female 37.70% Prevalence at 1 year Male 19.2 Female 48.7 Prevalence at 2 years Male 29.7 Female 56.7
Lagro-Janssen, 1990[206] Cross-sectional Adjusted by: Age, Marital status, Parity, Education, Hysterectomy, Employment, Perceived health status, Hypertension, Diabetes, COPD, Obesity, Varicose veins, CHF, Symptoms of loco motor system Level of evidence: III	Subjects were selected from 2,400 randomly selected practice files of 75 general practitioners. Response rate: 60% (n=1,442) Data source: Self reported data from home interviews conducted by trained interviewers UI defined as, “involuntary loss of urine >2/month.” No attempt was made to classify based on type.	Age: 50-65 Gender: Female Race: Not reported Ethnicity: Not reported Residency: Eastern Netherlands	Prevalence: 22.5% By impact on life: “Not worried about it”: 77.8% By severity: Mild: 8.0% Moderate: 7.8% Severe: 6.7%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1-c. Prevalence of UI in adults in the community (continued)

Multiple logistic regression of 'long term' UI and delivery mode history[67]

Variable	Incontinence Total	N	%	Odds ratio	(95% CI)	P
Delivery mode history						
All other histories	2,707	1263	(46.7)	1.0	Reference	
Only caesarean section(s)	435	141	(32.4)	0.50	(0.40-0.63	0.001
Any forceps	1,029	480	(46.6)	0.96	(0.83-1.11	0.567
Maternal age at first birth						
<25	1,432	568	(39.7)	1.0	Reference	0.001
25-29	1,697	766	(45.1)	1.34	(1.15-1.55	0.001
30-34	835	427	(51.1)	1.88	(1.57-2.25	0.001
>35	207	123	(59.4)	2.98	(2.18-4.07	0.001
Number of births						
One	528	202	(38.3)	1.0	Reference	0.001
Two	2,202	993	(45.1)	1.30	(1.07-1.59	0.001
Three	1,025	490	(47.8)	1.61	(1.29-2.02	0.001
Four or more	416	199	(47.8)	1.73	(1.31-2.27)	0.001
Number of women	5 4171					
Number symptomatic	5 1884					
Symptoms are yes at 6 years						

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)

F1d. Prevalence and incidence of fecal incontinence in adults

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
Uustal Fornell, 1996 [208] Comparative case control	51 Females with rupture of anal sphincter during vaginal delivery. 31 Females without rupture of anal sphincter during vaginal delivery, rupture groups were subdivided into incomplete sphincter rupture and complete sphincter rupture for some analyses. **Methods:** Questionnaires at 6 months after delivery. **Definition:** 6 point scale, 6= complete continence, 1 = total incontinence, incontinence of gas, liquid stool, solid stool, soiling, no operational definitions were given.	**Age:** With Rupture, Median= 27 years, Range=20-38 years, Without rupture, Median=26 years, Range=20-35 years **Gender:** Female **Residency:** Sweden	Incontinence of Liquid Stool 16% of the 51 with a rupture 13% of the 31 without a rupture Liquid Stool on the 6 Point Scale Unable to determine median severity score for no rupture group Median severity for incomplete rupture group = 5 Median severity of liquid stool incontinence for complete rupture group = 4.5 Solid Stool = 0% per test (These results above are presented by box plots)
Pescatori, 1990 [209] Prospective, observational **Adjustment For:** No determination of whether patients had fecal incontinence pre-operatively was reported.	207 patients who underwent restorative proctocolectomy and ideo-anal reservoir between March 1980 and May 1989 who were in the Italian registry, 156 patients where studied. **Definition:** Disordered continence, occasional soiling of mucus or feces, permanent soiling of mucus or feces, total minor leak, total major leak. None of these were operationally defined; "totals" appear to be mucus and feces	**Age:** <45 years (n=123) >45 years (n=33) **Residence:** Italy	Fecal Soiling: Soiling in those <45 years old=6% of 123 Soiling in those >45 years old=15% of 33 Bivariate analysis of risk, n = stool frequency. Pouchitis 70 patients with fecal soiling, of those with <5 stools/day = 4%, n = 4 of 108 70 patients with fecal soiling, of those with >5 stools/day = 17% (n = 8) Pouchitis: 22% (4/18) patients who had pouchitis had fecal soiling while 6% of those without pouchitis (8/138) had fecal soiling. No significant difference in any risk.
Belmonte-Montes, 2000 [210] Prospective, descriptive, observational **Adjustment For:** Females with a history of anal sphincter damage, diabetes, neurological disease, needing a C section, or history of	98 primiparous females of obstetrics out-patient clinic of medical specialties, Center of Mexican army and air force between May of 1996-1999. **Methods:** Interview, clinical exam, and endo-anal ultrasound that were done 4-6 weeks before and 6 weeks after delivery. **Definition:** Incontinence of gas, mucus, liquid and solid stool, frequency ≥1 x 1 week, ≥2 x 1 month,	**Age:** Average = 22.4 years SD = 3.56, range = 16-34 **Gender:** all Female **Residency:** Mexico	Fecal Incontinence 21 had some fecal incontinence after delivery but gas and mucus leaks are mixed in here so not included. "Major" fecal incontinence later defined as "accidental bowel movements" was in 5 women. **Risks:** 14 women with a sphincter defect on ultrasound had fecal incontinence but 7 did not. Results state there was a strong association between sphincter defect on ultrasound and incontinence. P <.0001 but no "r" or other statistic is reported.

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
previous anarectal or vaginal surgery were excluded.	1 x 1 month		
Ho, 1995[211] Cross section Listed as not eligible	602 consecutive patients who had a curative resection for colorectal cancer ≥12 months prior to survey. **Methods:** mailed questionnaire. **Definition:** used grading classification, grade 3 = occasional liquid soiling, 4 = frequent liquid or mild soiling, 5 = incontinence of solids.	**Age**: x = 64.5 years, SEM = .7 **Gender:** F = 41.3%, M = 58.7% **Residency**: Singapore	No overall % was reported. After R hemicolectomy: Grade 3 = 16.4% of 55 patients After L hemicolectomy: Grade = 9.6%, Grade 5 = 1.9% of 53 patients Sigmoid colectomy: Grade 3 = %.4%, Grade 5 = 3.6% of 56 patients Low anterior resection: Grade 3 = 19.9%, Grade 4 = 5%, Grade 5 + 4.3% of 143 patients
O'Keefe, 1995[212] Cross sectional **Adjustment For:** data were adjusted to age and gender specific proportions in 1980, US census	Random sample of 704 Olmsted County residents ≥ 65 years old 530 responded, 478 completed section containing fecal incontinence information **Method of Measurement-** mailed survey. **Definition: f**ecal incontinence as leakage of stool once per week or more or use of a pad to prevent soiling. The second part of the definition doesn't require leaking, only an intent to prevent it.	**Age:** x = 75 years, range = 65-98 **Gender:** 49% female **Residency:** Olmsted County, MN	Fecal incontinence Overall + 8.2% (5.5, 10.8), 95% CI Men = 8.1 % (4.3, 11.8) Female = 7.9 (4.4, 11.4) Impact on life Functional status and health of those with fecal incontinence did not differ from those with any of the GI condition and did not appear to be significantly different from controls (no p values given). Other Findings: 16% of those with diarrhea had fecal incontinence, 12% of those with IBS had fecal incontinence, no denominators were reported
Hinds, 1990[213] Point prevalence	Every 4th person on mailing list of National MS Society of Allegheny County, 78 persons in Allegheny hospital work force non MS controls. **Methods:** mailed questionnaire, 1 follow up mailed questionnaire to MS patients with fecal incontinence **Definition:** Involuntary passage of stool at least once during preceding 3 months	**Age:** 280/with MS 339 responded, 78 non MS, age MS = 48 years (19-77), non MS = 42 years (22-64) **Gender:** Female = 77% of MS, Female = 78% non MS **Residency:** Allegheny County PA	Prevalence of Fecal Incontinence Overall MS = 51% Mild MS = 25% Non MS = 4% 50/147 MS patients responded to follow up: Fecal incontinence occurred most often when stools were semi-formed as liquid (no data reported) Fecal incontinence frequency: daily = 2%, 1 to several times a week = 22%, ≤1/week - 7.33 months = 23%, once every 3 months = 50%
Kok, 1992[202] Survey, point prevalence	1049 questionnaires were mailed to women ≥60 years in Amstelveen, Netherlands; a random sample of 30 women born each year was selected **Methods:** Mailed survey	**Age:** 60-84 years **Gender:** Female **Residency:** Amstelveen,	Fecal Incontinence; <85 = 4.2% of 625, ≥85 = 16.9% Urinary Incontinence; daily = 14% (n = 96) 60-85 years, fecal incontinence = 8 (8.5%) of those with urinary incontinence, fecal incontinence = 11 (2.9%) of those without urinary incontinence

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
	Definition: Occasional involuntary loss of feces	Netherlands	≥85 years, fecal incontinence = 9 (21.4%) of those with urinary incontinence, fecal incontinence = 15 (12.2% of those w/o urinary incontinence.
Talley, 1992[214] Survey, point prevalence **Adjustment For:** age and sex adjusted using 1980 US white population	Age and sex stratified random sample of non-institutionalized residents in Olmsted Country MN aged 65-93 years. **Methods:** mail questionnaire **Definition:** Stool leakage; clinical significant incontinence was defined as once a week or more, or if wearing a pad is needed	**Age:** not reported **Gender:** not reported **Race and Ethnicity:** all white **Residency:** Olmsted County, MN	Fecal Incontinence; Once/week = 3.7% (1.6-5.9) 1/ week and needs to wear a pad = 7% (4.1-9.9) wear a pad for fecal incontinence- 6.1% (3.3-8.8) **Of the 7%** : Fecal Incontinence and constipation w/o obstructive features = 4% Fecal incontinence and constipation with obstructive features = 17% Fecal Incontinence and diarrhea = 42% Fecal Incontinence without constipation or diarrhea = 42% Age Adjusted Women: Fecal Incontinence >once/week = 3.1 (.39-5.9) Fecal Incontinence and pad = 6.7% (2.9-10.6) Age Adjusted Men: Fecal Incontinence >once/week = 4.5% (1.3-7.7) Fecal Incontinence and pad = 4.6% (1.4-7.8)
Hojberg, 2000[215] Cross sectional	All women getting routine antenatal cure at Aarhus University Hospital from January 1993-April 1996. 7,557 completed questionnaire **Methods:** Questionnaire **Definition:** fecal incontinence as involuntary loss of flatus, liquid, or solid stool in the past year.	**Age:** 15-24 years = 1302 (17%), 25-29 = 3162 (42%), 30-34 = 2292 (30%), 735 = 801 (11%) **Gender:** all female **Residency:** Denmark	Fecal Incontinence: Liquid Stool = 2.3% Solid Stool = .06% Note- Multiple logistic regression was done for flatus incontinence only
Faltin, 2001[216] Cross sectional	All women who attended the maternity outpatient clinics at Geneva University Hospital in Switzerland from August 1st to September 30th, 1996. 1,228 responded **Methods:** Structured questionnaire **Definition:** fecal incontinence as involuntary loss of solid or loose stools or flatus occurring ≥once/month, asked to report type of incontinence: flatus and/or liquid and/or solid stool	**Age:** not reported for whole sample **Gender:** All female **Residency:** Switzerland	Fecal Incontinence M = 38 had solid or loose stools: 38/99 who had any anal incontinence = 38%, 38/1228 = 3% Note: 8% of the 1228 respondents had any anal incontinence
Kirk, 1997 [217]Cross sectional **Adjustment For:** stratified sampling by	171, patients with spinal cord injury ≥1 year duration. **Source:** discharge list from acute rehabilitation, inpatient facility and an	**Age:** x = 39.5 years, SD = 14.5, range= 18-81 years **Gender:** 75% male, n =	Incontinence 30% had incontinence in the past month 65% had incontinence in the past year (only a bar graph reported findings, no exact percentage was given)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
duration of spinal cord injury, 1-5 years spinal cord injured = 85 points, 75 years = 86 points	advertisement in newsletter of local chapter of National Spinal Cord Injury Association. **Methods:** phone survey **Definition:** the inability to control bowel elimination to achieve voluntary, predictable, and spontaneous fecal evacuation. Paraplegics = 47.4% (n = 81), tetraplegics = 52.6% (n = 90)	128 **Residency:** United States	Total number of incontinence problems per month is x = .9, SD = 2.9, median = 0, range = 0-30
Curless, 1994[218] Cross sectional comparison of cases and controls	273 with colorectal CA selected consecutively from 2 hospitals' histology records and surgical admission lists since 1989. 273 controls matched for sex and age $\pm$ 2 years, from the general practitioner's register; unrelated to cases, excluded for colorectal adenoma, carcinoma or inflammatory bowel disease. **Methods:** Interview **Definition:** none reported	**Age:** median age overall = 68 years, Range = 25-93 years. 123 cases (45%) $\geq$70 ("old"), 125 controls (46%) $\geq$70 years, "young" <70years **Gender:** 153 males/120 females in each group **Race:** all white **Residency:** England	Fecal Incontinence 27/150 patients of young cases (< 70) 0/148 patients of young controls 23/123 of old cases 8/125 of old controls Odds ratio (95% confidence interval) for young cases versus controls = 32.3 (8.5, 121.9); for old cases versus controls = 3.4 (1.5, 7.6)
Enck, 1991[219]	138 controls, employees of government office in Dusseldorf without any symptoms per a questionnaire in past month. Patient groups considered at risk for fecal incontinence were consecutive patients with lower gastrointestinal complaints suggestive of carbohydrate mal-absorption referred for hydrogen breath testing; N = 29, x age = 39, N = 16; consecutive patients with inflammatory bowel disease in outpatient clinic, N = 108, x age = 31.2 years, N = 39; consecutive patients with diabetes from inpatient and outpatient clinic of diabetes research institute; type 1 diabetes, N = 90, x age = 32.6, N = 41; Type 2 diabetes, N = 109, x age =	**Age:** controls x age = 37.7 years, range = 19-60 years **Gender:** sex of controls male = 73, female = 65 **Residency:** Germany	Fecal Incontinence Controls with any fecal incontinence = 5% (m = 7), >mild fecal incontinence = (1.4% m = 2) Inflammatory bowel disease with any fecal incontinence = 28% (n = 31), >mild fecal incontinence = 12.9% (n = 14) Type 1 diabetes with any fecal incontinence = 1.1% (m = 1), >mild fecal incontinence = 1.1% (m = 1) Type 2 diabetes with any fecal incontinence = 11% (m = 12), >mild fecal incontinence = 4.5% (n = 5) Lower gastrointestinal patients with any fecal incontinence = 20% (n = 33), >mild fecal incontinence = 9.7% (n = 16) Upper gastrointestinal patients with any fecal incontinence = 20.7% (n = 6), >mild fecal incontinence = 6.9% (n = 2) any fecal incontinence in inflammatory bowel disease vs. controls p = .001, >mild fecal incontinence

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
	62.4, N = 47 **Methods:** Questionnaire **Definition:** Uncontrolled loss of stool during day or uncontrolled loss of stool during night, or fecal soiling. 1 of the 3 needed, if only fecal soiling fecal incontinence considered "mild".		
Franssen, 1997[220] Cross sectional **Adjustment For:** Patients who developed a stroke during follow up were excluded	784 Patients in an ongoing study of aging and Alzheimer's disease. **Source:** Findings are from the most recent evaluation regardless of baseline or follow up **Methods:** Interview **Definition:** Incipient incontinence-urinary incontinence and/or fecal incontinence that is increasingly apparent but not yet permanent or needing assistance by a caregiver in toileting to prevent incontinence. Note: Results did not separate urinary incontinence only from findings so incipient incontinence is ineligible to be included. Permanent double incontinence = score of 7a or greater on fast scale meaning always doubly incontinent without external intervention.	**Age:** Median age = 72.2, SD =9.5 **Gender:** N = 283 and F = 501 **Race:** 90% Caucasian (N = 709), 8% African American (N = 63), 1,5% = other (N = 12) **Residency:** United States	Permanent Double Incontinence 9.6% of females and 5% of males Of the 244 normals (fast score 1 and 2) or mildly impaired (fast score 3 and 4) none had double incontinence. Of the 470 who had Alzheimer's (fast score 4-7) 13% had permanent double incontinence.
Fine, 1997[221] Cross sectional	78 patients with celiac sprue treated with a gluten free diet $\geq$12 months, 11 patients who qualified agreed to further studies **Methods:** Mail survey or telephone interview, patients who reported having diarrhea were asked to undergo further study **Definition:** Self report of fecal incontinence by history or inability to hold a liquid enema	**Age:** x and median age = 52 years, range = 19-77 years **Gender:** 59 female, 19 male **Residency:** Texas, United States	1/11 patients had fecal incontinence

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
Oberwalder, 2006[222] Cross sectional, retrospective	Patients who underwent anal sphincter repair between 1988 and 2000 and had 3 months of follow-up, N= 131, 38 had external anal sphincter and internal anal sphincter defects, 93 had external anal sphincter defect only **Methods:** Medical record review **Definition:** Fecal Incontinence-Cleveland Clinic, Florida, incontinence score- 0 = continent, 20 = completely incontinent, score 0-10 = post-operatively success, 11-20 = post-operatively failure	**Age:** EAs and IAs = 48.3 years **Gender:** All female **Residency:** United States	Incontinence Score = 16.1 in external anal sphincter and internal anal sphincter group. IS = 16.7 in EAs only, group not significant. No significant difference in fecal incontinence success rate post-operatively. 68.4% had success in external anal sphincter and internal anal sphincter group. 55.9% had success in external anal sphincter group.
Rose, 2002[223] Cross sectional	150 patients undergoing laproscopic or laproscopic assisted surgery for rectal prolapse in 1995 **Definition:** "Incontinence" since problem is rectal prolapse and would assume fecal incontinence.	**Age:** Range- 52-91 years, Females = 64.5 $\pm$ 11.3 **Gender:** 131 females	Pre-operatively m = 46 (30.7%)
Campbell, 1990[224] Cross sectional	Residents >65 years in statutory residences (n = 157), voluntary residential homes (n = 60), private residence home (n = 55), private nursing home (n = 94), hospital geriatric continuing care words (n = 141) **Methods:** Survey **Definition:** (type unspecified) 0 = no disability, 2 = maximum disability.	**Age:** 70% were $\geq$80 years and more than half of these were $\geq$85 years	Incontinence Statutory residence; 0 = 55.6%, 1 = 32.7%, 2 = 11.8% Voluntary residential homes; 0 = 85%, 1 = 10%, 2 = 5% Private Residence; 0 = 69.1%, 1 = 21.8%, 2 = 9.1% Private Nursing Home; 0 =55.3%, 1 = 12.8%, 2 = 31.9 Hospital Wards; 0 = 13.5%, 1 = 14.9%, 2 = 71.9%
Klotz, 2002[225] Cross sectional	Tetraplegic spinal cord injured patients participating in a multicenter epidemiological study who are $\geq$16 years at injury and $\geq$18 years at survey **Methods:** Survey **Definition:** "Have you had any embarrassing bowel leakages?" (never/sometimes/often) "Have you ever had any awkward urinary leakages?" (never/sometimes/often)	**Age:** (at survey) = 43.6 (13.5) x(SD) **Gender:** M = 80% **Residency:** France	Urinary incontinence none = 44% (m = 700), sometimes = 37% (m = 589), often = 18.9% (m = 301) Fecal Incontinence None = 63.5% (m = 1016), sometimes = 32% (m = 512), often = 4.5% (m = 72%)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
Marcello, 1993[226] Cohort	Patients who had construction of an ileo-anal pouch from 6180-12191 N = 460 **Methods:** Interview at office visit or buy phone and mail questionnaire **Definition:** "leakage" is reported, no question re: fecal incontinence is reported that was used in interview or questionnaire	**Age:** mean (SD) = 31 (9) **Gender:** Male = 251 (55%)	Incidence of fecal incontinence Overall fecal incontinence after 1 year = 10% (m = 31) Fecal incontinence 1-3 months after surgery = 18% of 395 patients, 1-3 years after surgery = 10% of 326 patients, > 5 years after surgery = 17% of 137 patients 58% (n = 18) patients soiled only at night Frequency of leakage occurred 3 $\pm$ 2 days per week. Note: Pre-operative fecal incontinence was not reported
Giordano, 2002[227] Cohort	151 women who had anterior over lagging repair because of obstetric injury, 115 had no previous repair, 36 had a previous repair **Methods:** telephone, interview or mail questionnaire **Definition:** Cleveland Clinic Florida fecal incontinence score, incontinence score between 0-5 = "good" outcome, 6-10 = "adequate", 11-20 = "poor" outcome	**Age:** median = 46 years, Range = 20-68 years **Gender:** Female **Residency:** United States (Florida)	Incidence of fecal incontinence No previous repair (n = 115), pre-operative incontinence score = 18, post-operative incontinence score = 5 ($p < .0001$) Previous repair, pre-operative incontinence score = 17.5, post-op incontinence score = 7 ($p < .0001$) Duration of incontinence in mos. (unclear whether incontinence is pre-operative or post-operative in those with previous repair) No previous repair group = 96.5 (1-456) mos. Previous repair group = 60 (6-468 mos.) median (range)
Mazouni, 2005[228] Cohort	Primiparas who underwent instrumental childbirth delivery, N = 159 responded to questionnaire about fecal incontinence. **Methods:** Questionnaire by mail or telephone interview **Definition:** Solid and/or liquid stool incontinence buy question on questionnaire was not reported.	**Age:** 29.4 years **Gender:** Female **Ethnicity:** African = 13.2%, European = 59.8%, Maghreb = 27% **Residency:** France	Incidence of Fecal Incontinence New fecal incontinence = 8.8%
Guenin, 2005[229] Cohort	Patients who had conventional hemorrhoidectomy between 1/1/93 - 12/31/97, N = 514 **Methods:** Record review then mail questionnaire for fecal incontinence **Definition:** Question and answer on survey "Do you have loss of feces (soiling)?" Not present, light, moderate, or severe	**Age:** x= 52 years Range 22-96 years **Gender:** 195 females	Prevalence of fecal incontinence Fecal incontinence light in 86 (21.2%) Moderate in 25 (6.1%) Severe in 4(.98%) No fecal incontinence in 291 (71.7%)
Tocchi, 2004[230] Cohort	164 patients treated for chronic anal fissure with surgery	**Age:** x= 37 years	Fecal Incontinence Early fecal soiling occurred in 15 patients (19.1%). Continence was

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
	Methods: Interview and physical exam **Definition:** No definition of fecal incontinence was reported, "early" fecal incontinence- present within 1 month after surgery and spontaneously resolved, "late" fecal incontinence- occurred after 1 month after surgery and required some type of corrective procedure	Range 18-44 years **Gender:** 93 males **Residency:** Italy	restored within 3 months in 12/15 patients. Note: there is no report of pre-operative continence status
Wagenius, 2003[231] Retrospective case-control **Adjustment:** Case and controls matched for age parity, vaginal delivery birth weight, and year of birth	218 women with a history of obstetric anal sphincter rupture and repair between 1994-1999, 436 women with no rupture **Methods: m**ail questionnaire **Definition:** no definition reported	**Age:** Median(range) = for total n (534) = 29(18-42) years, cases n = 186 = 30(18-40) years, controls m = 348 = 29(18-42) years **Gender:** All female **Residency:** Sweden	Urinary Incontinence Cases = 24 (13%), Controls = 33 (9%) Not significant OR(ci) = 1.41(.81-2.47) Fecal incontinence of liquid stools Cases = 39 (21%), Controls = 26 (7%) p < .0001, 3.29 (1.93-5.6) Fecal incontinence of solid stool Cases = 8 (4%), Controls = 8 (2%) Not Significant = 1.91 (.71-5.170)
Quander, 2005[232] Cross sectional	Chicago Health and Aging Project = 6,099, 1993-1997 time period. **Methods:** In-home interview. **Definition:** Interview question and answer = "In the past few months, have you ever lost control of your bowels when you didn't want to?"	**Age:** 65-74 years = 59%, 75-84 years = 30%, >85 years = 11% **Gender:** 61% female **Subject Race and Ethnicity:** 62% Black, N = 6 American Indian, N = 9 Pacific Islander, N = 41 Hispanic **Residency:** United States	Fecal Incontinence in 585 (9.6%) Multivariate analysis (logistic regression) adjusting for age, sex, and race, fecal incontinence = 1.7 times greater in diabetics vs. non-diabetics (ci = 1.4, 2.1) and 2.8 times greater in stroke vs. non-stroke residents (ci = 2.2, 3.5) Medication use adjusted for sex, age, race, history of diabetes and stroke in multivariate analysis. Antidepressants, 21% using, 1.9(1.2, 3.0) Antipsychotics, 33% using, 3.9(2.5, 6.2) Narcotics, 17% using, 1.7(1.2, 2.5) Hypnotics, 26% using, 3.1(1.8, 4.8) Antiparkinson, 33% using, 4.3(2.5, 3 Anticonvulsant, 22% using, 1.9(1.9, 3.2) Income and Education and Fecal Incontinence Prevalence Fecal incontinence income < $10,000 = 14.3%, $10,000-$20,000 = 8.6%, > $20,000 = 6.8%, x^2 = 65.5 p <.0001 Fecal incontinence in people with 0-8 years education = 12.9%, 9-12 years education = 8.8%, >13 years education = 8.7%, x^2 = 19 p <.0002 "No significant difference in prevalence of fecal incontinence in men vs. women once adjusted for age". "In prevalence of fecal incontinence with age was greater among blacks

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
			than whites (p = .0006)". Among those 85 years and older, fecal Incontinence in white females = ~17%, white Males = 19%, black females = 24%, black Males = 16%. Fecal incontinence in stroke patients = 21.5%, No stroke = 8.3% p < .0001, diabetics = 13.2%, Non-diabetics = 8.8%.
Schweitzer, 2005[233] Retrospective, descriptive	128 women who had surgery for pelvic organ prolapse. **Source:** 3 hospitals **Methods:** postal questionnaire **Definition:** no definition reported; findings report urinary incontinence after surgery	**Subject Age:** N = 112 women ≥80 years, responded (88%), x(range) = 83(80-92) years **Gender:** Female **Residency:** Netherlands	Urinary Incontinence Strenuous urinary incontinence = 14% (12/87) Urge urinary incontinence = 10% Mixed urinary incontinence = 31% No urinary incontinence = 40% Unknown = 5% Note: 36% n = 46 patients had "incontinence" before surgery
Sangalli, 2000[234] Retrospective, descriptive, and cohort	448 women who had a partial (30) or complete (40) tear during delivery between January 1982 and December 1983, 178 responders; 129 had 3rd degree tear, 49 had 4th degree tear **Methods:** Telephone interview >10 years after delivery **Definition:** fecal incontinence response was recorded only if the women perceived the incontinence as bothersome	**Age:** x = 27.7 years in 1982/83, in 1995 age = x = 40.7 years, range = 32-54 years **Gender:** Female **Residency:** Switzerland	Fecal Incontinence Of the 129 with 3 degree tears, 6.2% (n = 8) had fecal incontinence of liquid stools and 0.8% (n = 1) had fecal incontinence of solid stools Of the 48 with the 4 degree tears, 10.2% (n = 5) had fecal incontinence of liquid stools and 6.1% (n = 3) had fecal incontinence of solid stools All were non-significant
Siproudhis, 2005[235] Cross sectional	10,000 people ≥15 years received a household survey in May-June 2003, N = 7,196 responded, 2,915 had anorectal problems **Methods:** mail questionnaire. **Definition: (**question and answer) "During the past 12 months have you ever experienced an uncontrolled anal leakage of stool?" Quality of life = 10cm visual analog scale for professional life, social life, sexual/partner life, family life	**Subject Age:** mean age(SD) = 45.8(23.1) years, 2,388 <35 years, 2,332 >54 years 1,440 ≥65 years (20%) **Gender:** 3,455 males **Residency:** France	Fecal incontinence = 513/2,915 (17%), 513/7,196 (7.1%) Usual stool consistency in those with fecal incontinence. Loose = 18%, Hard = 20%, Very hard = 5%, Normal = 15% (findings reported in graph only) Stool consistency of people with fecal incontinence differed from those without any anorectal problems, p <.01 Usual stool consistency in those with no problems Loose = 7%, Hard = 3%, Normal = 50% Frequency of Fecal Leakage ≥1/day = 11 (2.2%) 1/day to 1/week = 25 (4.8%), 1/week to 1/month = 41 (8%), <1/month = 420 (82%), not applicable = 15 (2.9%) Quality of life for "incontinence" includes gas and stool leakage so unable to determine effect of fecal incontinence on quality of life.
Buchanan, 2002[236]	N= 79, 418 admission MDS forms of Nursing Home residents with Parkinsons's disease from June 23,	**Age:** x = 79.7 years, SD = 9.0 **Gender:** 48.4% male	Prevalence of fecal incontinence = 48% Prevalence of urinary incontinence = 39% Frequent urinary incontinence = 16.8%,

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
	1998 - September 12, 2000 **Methods:** MDS data **Definition:** MDS items for bladder and bowel incontinence	**Subject Race:** white = 89.4%, black = 5.1%, Asian = 1.4%, American Indian = 4%	Occasional urinary incontinence = 9.8% Frequent fecal incontinence = 8.6% Occasional fecal incontinence = 6.5%
Stenzelius, 2007[237] Cross sectional	N = 248, age $\geq$ 75 years **Methods:** Postal questionnaire to people who reported they had fecal incontinence in past 3 months on a different (previous) questionnaire. **Definition:** No definition reported	**Subject Age:** x = 82, SD = 5.19 **Gender:** Female = 142, Male = 106 **Residency:** Sweden	Fecal Incontinence. Fecal Incontinence in 56.4% of respondents. Daily/weekly fecal incontinence: Women = 18.6% Men = 4.9% (p = .01) Overall = 12.8% non-significant Large or medium amount of fecal incontinence: Women = 18.2 Men = 6%, p = .01 Overall = 43.6% non-significant Fecal incontinence did not have significant impact on quality of life.
Sullivan, 1992[238] Cross sectional	N = 109 runners who ran an average of 18 miles per week in a runners club; inclusion criteria was running 3 times per week. **Methods:** Questionnaire. **Definition:** none.	**Age:** 39 $\pm$ 13 Male, 34 $\pm$ 9 Female **Gender:** Male = 78, Female = 31 **Residency:** Canada	Fecal Incontinence in 12% (n = 13) 10 males, 3 females during or after running
Otegbayo, 2006[239] Cross Sectional	Consecutive patients with stroke selected over 18 months (N = 54), controls = normal, volunteers or in-patients (N = 46) without fecal incontinence. **Methods:** Interview or chart.	**Age:** Stroke patients = 58.7 (10.6) control = 52(10.9) **Gender:** Stroke male = 46.3%, control male = 69.6% **Residency:** Africa	Prevalence of Fecal Incontinence Stroke = 5.6% Control = 0% P = .10 No difference in % fecal incontinence by type of stroke (ischemic vs. hemorrhagic, p = .20) or right vs. left side of brain with stroke p = .51
Ween, 1996[240] Cross Sectional	Consecutive admissions of stroke patients to Braintree Hospital in 1993; N = 423 **Methods:** Chart review **Definition:** Report of incontinence by nurses on flow sheet in chart	**Age:** 73 $\pm$ 12 **Gender:** 55% female	Prevalence of incontinence 41% were incontinent at admission Only bivariate analyses were reported primarily x^2 Urinary incontinence was associated with stroke p < .0003 Fecal incontinence was associated with urinary incontinence p < .0001 (80%) and dysphagia p < .0001 (81%) Fecal incontinence was associated with functional impairment as measured by an AFIM score, p < .0001 of those with an AFIM score = >80, 1% had fecal incontinence If AFIM score 60-80, 17% had fecal incontinence If AFIM score 40-60, 66% had fecal incontinence If AFIM score <40, 94% had fecal incontinence

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
			Urinary incontinence on admission was associated with UTI p < .001 18% 50% of residents admitted with incontinence remained incontinent on discharge
Bharucha, 2005[241] Cross-Sectional **Adjustment For:** Results were adjusted by age and the 2000 US white female population on the US census	2800 of 5300 women (53%) responded to survey; sample included NH residents women were ≥ 20 years old **Methods:** Questionnaire to age stratified random sample of women in a Rochester epidemiology project **Definition:** QA: "In the past 12 months have you experienced accidental leakage of solid or liquid stool? Fecal Incontinence severity score was calculated (max score = 13) using a summative scale: an MD assigned a severity score to self-reported fecal incontinence symptoms, no question was reported for any fecal incontinence history Quality of Life: 15 domains with 4 levels 0 = none, 1 = mild, 2 = moderate, 3 = severe Quality of Life: QAs were not tested for validity or reliability	**Gender:** All female **Subject Race:** White **Residency:** Olmsted County, MN	Prevalence of Incontinence Age adjusted fecal incontinence prevalence in last year = 12.1% (I = 11.0 - 13.1) Prevalence of any fecal incontinence history = 14% (I = 12.8 - 15.1) Fecal incontinence frequency m = 503 < 1 per month 55%, adjusted prevalence 6.7(5.8 - 7.5) 1 per month 24%, adjusted prevalence 2.9(2.3-3.4) 1 per week 12%, adjusted prevalence 1.4(1.0-1.8) Several times a week 9%, .9(.6-1.2) Daily 2%, adjusted prevalence .2(.1-.3) Amount m = 502 Small (stain underwear only) 60%, 7.3(6.5-8.2) Moderate (need to change underwear but not clothing) 33%, 3.8(3.2-4.4) Large (change outer clothing) 7%, 0.8(0.5-1.1) 23% of respondents reported fecal incontinence had moderate or severe impact on quality of life in > 1 domain; there was no significant difference in impact of fecal incontinence on specific quality of life domains.
Johannsson, 2002[242]	556 consecutive patients who had Milligan-Morgan hemorochoidectomy at 4 clinics in Sweden between 1987-1995; 40 died, 9 lost to follow up so 507 received questionnaires - ok **Methods:** Questionnaire mailed **Definition:** Anal incontinence	**Age:** x = 51 years, range = 20-82 **Gender:** Male = 231 (55%), Female = 187 (45%) **Residency:** Sweden	Prevalence of Fecal Incontinence overall 56 were incontinent of liquid feces 11 were incontinent of solid feces 72 were incontinent of gas Note: pre-operative incontinence was not reported 25 patients who leaked liquid stool related it to the surgery 6 who leaked solid stool related it to surgery
Karasick, 1997[243] Retrospective cross sectional	Cases of 354 consecutive female patients who had fluoroscopically guided defecograpy between March 1986 and March 1996 **Methods:** Chart review for fecal incontinence telephone interview for OB history and surgery	**Age:** X(SD) = 57.7(16.3) years **Gender:** All female **Residency:** United States	Prevalence of Fecal Incontinence 40% m = 108 No multivariate analysis of risks only correlations

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
	Definition: Fecal Incontinence = widened anal canal (> 2 cm) with barium leakage at rest		
Cavaliere, 1995[244] Retrospective chart review **Adjustment For:** Follow up was 50 months	Records from Cleveland Clinic and Mayo clinic, 178 patients undergoing protocsigmoidscopy and manual colorectal anastomsis for rectal cancer 1981-1990 study n = 68 **Methods:** Questionnaire **Definition:** Not reported Residents ≥ 65 years in 241 nursing homes or hospitals; (N = 6,079) number of acutely ill = 627	**Age:** not reported **Gender:** not reported **Residency:** not reported	Incidence of Fecal Incontinence 57% m = 18 had fecal incontinence Note: Whether patients had fecal incontinence before surgery was not reported Prevalence of Incontinence Urinary incontinence = 27%
Peet, 1995[245] Cross Sectional	**Methods:** "Census" probably means "observation" **Definition:** none reported	**Age:** x = 82.7 years, SD = 7.8 years **Residency:** Leicester, UK	Fecal Incontinence = 1.8% Urinary incontinence and fecal incontinence = 34.3% Note: I did not include those with a urinary catheter as having urinary incontinence Residents > 65 years in 241 nursing homes or hospitals
Fialkow, 2003[246] **Adjustment For:** Exclusions	University of Washington Medical Center - Roosevelt Urology and Urogynecology Clinic; All new adult community patients to clinic between 6/13/2000 and 7/1/2002 were sent a questionnaire; ages 18-90 years **Methods:** questionnaire, N = 7732 **Definition:** Wexner scale of fecal incontinence severity I-QOL for urinary incontinence QoL 3 day voiding diary for urinary incontinence Urinary incontinence severity was measured by questions on questionnaire on 5 point Likert scale 1 = mild, 5 = severe SF12 measured functional status	**Age:** x = 55.9, SD = 14.3 **Gender:** all female **Subject Race:** 80% white **Residency:** United States	Prevalence of Incontinence Fecal incontinence n = 18 Urinary incontinence m = 342 Double incontinence m = 65 mean (SD) Wexner Score for fecal incontinence = 12.33 (4.7) Urinary incontinence severity score = 3.1(1.3) in those with UI I-QOL total score; urinary incontinence = 62.9, double incontinence = 46.4, p = < .001 I-QOL avoid/limit score; urinary incontinence = 59.9, double incontinence = 43.8, p = < .001 I-QOL psychosocial; urinary incontinence = 71.6, double incontinence = 53.2, p = < .001 I-QOL embarrassment; urinary incontinence = 50.4, double incontinence = 37.9, p = < .001 SF-12 PCS12 (physical); fecal incontinence = 45.5, urinary incontinence = 42.4, double incontinence = 38.6, p = .027 SF12 MCS12 (mental); fecal incontinence = 46.9, urinary incontinence = 50.4, double incontinence = 46.4, p = .032
Bek, 1992[247]	152 women who had a complete obstetric tear of anal sphincter at 1 hospital and 121 responded, 56 had another vaginal delivery so study	**Age:** not reported **Residency:** Denmark	Prevalence of Incontinence Fecal incontinence after tear N = 3 but fecal incontinence was only transient Fecal incontinence after next delivery m = 9

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
	sample equals these - 56 **Methods:** questionnaire by mail **Definition:** anal incontinence included flatus but separated fecal soiling results for incidence but not for repression analysis, those results are not included Note: incontinence before sphincter tear was not reported		
Goode, 2005[248] Cross Sectional	Medicare lists of 5 counties (3 rural, 2 urban) of west central Alabama; N = 1,000 community living people **Methods:** interview using a structured questionnaire **Definition:** Fecal incontinence = affirmative response to QA: "In the past year, have you had any loss of control of your bowels, even a small amount that stained the underwear?" Mild fecal incontinence = < 1 x 1 month Urinary incontinence definition was not reported	**Subject Race:** Stratified as 25% black female, 25% black male, 25% white female, 25% white male **Residency:** Alabama, U.S.	Prevalence of fecal incontinence Overall fecal incontinence = 12% 12.4% = male 11.6% = female 11.2% = white male 13.5% = African American male 14% = white female 9.2% = African American female no significant difference 77.6% of women with fecal incontinence and urinary incontinence vs. 48% without fecal incontinence p = .001 50% of men with fecal incontinence had urinary incontinence vs. 34.9% without fecal incontinence p = .02 Moderate /severe fecal incontinence in m = 5.8% and in F = 4.6% p = .40 and no difference by race p = .57 In Women Chronic diarrhea OR = 4.55(2.03-10.20) Urinary incontinence OR = 2.65(1.34-5.25) Hysterectomy and oopharectomy 1.93(1.06-3.54) Poor self perceived health status 1.88(1.01-3.5) Comorbidity scale OR = 1.29(1.07-1.55) In Men Chronic diarrhea OR = 6.08(2.29-16.16) swelling in feet and legs OR = 3.49(1.8-6.76) TIA 3.11(1.3-7.41) Depression score > 5 OR = 2.83(1.27-6.28) Lives alone OR = 2.38(1.23-4.62) Prostate disease OR = 2.29(1.04-5.02) Poor self perceived health 2.18(1.13-4.20)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
Bergmark, 2002[249] Cross Sectional	332 women registered at 7 departments of gynecologiocal - oncology having early cervical cancer between November 1996 and May 1997; N = 256 responses (77%) **Methods:** Questionnaire **Definition:** 6 category response distress about symptom was reported only Distress about fecal leakage by women treated with surgery alone: much = 2% (2/93); moderate = 3% (3/93) Distress after treatment with radical radiation alone: much = 10% (2/20); moderate = 15% (3/20)	**Age:** x(SD)age = 51(.77) **Gender:** all female **Residency:** Sweden	Impact of incontinence on life. Women treated with surgery and external radiotherapy reported fecal leakage (distress). Much distress = 14% (11/78) Moderate distress = 19% (15/78)
Guren, 2005[250] Cross Sectional	Patients in Norwegian Rectal Cancer Registry who had anterior resection for rectal cancer between 11/03 and 12/01; N = 319 respondents 80% **Methods:** Mail questionnaire	**Age:** Median = 73, Range = 39-94 years **Gender:** Male = 179, Female = 140 **Residency:** Norway	Prevalence of Fecal Incontinence Incontinence of loose stools Anastomsis level $\leq$ 3 cm Never = 12 < 1 per week = 7 1-6 per week = 8 Every day = 3 Anastomosis level 4.6 cm Never = 51 < 1 per week = 30 1-6 per week = 23 Every day = 4 Anastomosis level 7-8 cm Never = 28 < 1 per week = 15 1-6 per week = 3 p = .07 Incontinence of solid stool Anastomosis level $\leq$ 3 cm Never = 19 < 1 per week = 7 1-6 per week = 2 Every day = 2 Anastomosis level 4.6 cm

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
			Never = 87 < 1 per week = 14 1-6 per week = 9 Every day = 3 Anastomosis level 7.8 cm Every day = 0 p = .01
Gunther, 2003[251] Comparative, cohort, retrospective	All patients seen in clinic who under-went operation for familial adeno-matous polyposis between 1971 and 2000; N = 151 candidates data available for 59 patients **Methods:** Telephone interview **Definition:** Jorge-Wexner least-worst score (0-4 scale) and Jostarndt score (0-6 scale) 2 surgeries compared: IRA (ileorectal anastomosis) N = 22: IPAA (ideal pouch anal anastomosis) N = 37 Note: No risks or quality of life could be reported because they used total Wexner and Jostarndt scores which include incontinence of gas	**Age:** IRA x age = 53 years; IPAA = 45 years **Gender:** IRA: Male = 11, Female = 11; IPAA: Male = 22, Female = 15 **Residency:** Germany	Incidence of Fecal Incontinence Wexner Score for incontinence for liquid stool IRA = .11, IPAA = .73 Wexner Scores for Incontinence of Solid Stool IRA = 0, IPAA = .38 Jostarndt score for incontinence of liquid stool IRA = 5.84, IPAA = 5.05 Jostarndt score for incontinence of solid stool IRA = 6, IPAA = 5.68
Adolfsson, 1998[252] Cohort, comparison **Adjustment For:** Analysis adjusted for age as a 3 category variable	CA (prostate cancer) group: men aged 50-80 years diagnosed in 1992 with prostate cancer with prostate cancer in Stockhold region in CA and population. Control Group: men in population registry in Stockholm randomly selected in a stratified fashion to have an age distribution similar to CA patients; mailings N = 431 men with CA, N = 435 men without CA Respondents: 342 men with CA (79%) and 314 controls (72%) **Methods:** Mail questionnaire **Definition:** Not defined specifically, 1 question of questionnaire	**Gender:** All male **Residency:** Sweden	Prevalence of Incontinence Fecal leakage in men with prostate cancer: 8% (27/321); control men 4% (13/292) Urinary leakage in men with prostate cancer: 30% (93/313); control men: 14% (42/291) Relative risk for fecal leakage: men with prostate cancer = 2.2(1.2-2.4); control men = 1.0 Note: multiple variable analysis was not performed

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
Ellerkmann, 2001[253] Descriptive	237 consecutive patients with symptomatic pelvic organ prolapse who were examined within a 24 month period **Methods:** Questionnaire at clinic **Definition:** Likert scale was used for incontinence severity, 0 = none, 3 = severely	**Age:** x = 57.2 years, range 23-93 years **Gender:** all female	Prevalence of Incontinence Urinary incontinence = 73% of whom 13% had stress urinary incontinence; 5% urge urinary incontinence, 76% double urinary incontinence Fecal incontinence = 31% 46 women with fecal incontinence (63%) said fecal incontinence interfered with normal activities
Garcia-Aguilar, 1996[254] Cross Sectional	864 patients with open (N = 521) vs. closed (N = 343) sphincterotomy were surveyed and 63.5% (N = 549) responded of whom 62/2% had open technique **Methods:** Questionnaire **Definition:** soiling of underclothing and accidental bowel movement Note: pre-op fecal incontinence rates were not reported	**Age:** x = 44 years, open = 44 years, closed = 44.7 years **Gender:** of all patients females = 57% **Residency:** United States	Incidence of Fecal Incontinence in "open" surgery: soiling of underclothing occurred in 26.7% vs. 16.1% of closed surgery ($p < .05$) Accidental bowel movement occurred in 11.8% of open surgery patients vs. 3.1% of closed ($p < .05$)
Amdur, 1990[255] Retrospective	225 patients treated by external beam irradiation at the University of Florida between 1964 and 1982 for localized adenocarcinoma of the prostate **Methods:** Chart review **Definition:** moderate = requiring a minor surgical procedure or significant medical management and/or producing minor disability severe = resulting in major surgical procedure or causing significant disability	**Age:** no demographic information given **Gender:** All male	Incidence of fecal incontinence Moderate fecal incontinence = 5 patients Severe fecal incontinence = 2 patients Note: baseline prevalence of fecal incontinence was not reported
Sobhgol, 2007[256] Cross Sectional	N = 319 women at 2 clinics aged 15-49 years, married, non-pregnant, non-breast feeding **Methods:** Questionnaire by interview in clinic **Definition:** Not defined	**Age:** 15-49 years x(SD) = 33.8(8.3) **Gender:** All female **Residency:** Iran	Prevalence of Fecal Incontinence Fecal incontinence in women with dyspareunia (pain after intercourse) = 3/179 = 1.7% Fecal incontinence in women without dyspareunia = 1/145 (0.7%)
Drossman, 1993[257] Cross Sectional	Purchased mailing list of consumer households in 48 US states; stratified probability random sample of 8250 households quotas of sampling were	**Age:** x(SD) = 49(15.1) years **Gender:** 51% female **Subject Race:**	Prevalence of Fecal Incontinence Fecal soiling = 7.1%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
	according to age, gender, income, household density and size was selected; 5430 respondents (66%) **Methods:** Mail survey **Definition:** Results reported as fecal soiling and gross incontinence	Database lease represents white households **Residency:** United States	
Nicholls, 1990[258] Cohort	205 patients operated on during 1977 to 1987 for ulcerative colitis, familial adenomataus polyps or functional bowel disease; 3 pouches were constructed: S, J, W **Methods:** Patient chart **Definition:** Not reported	**Age:** 33.5(12-16), x(SD) years **Gender:** 116 males, 89 females **Residency:** London, England	Incidence of Fecal Incontinence Fecal leakage occurred in 2/174 Note: preoperative fecal incontinence was not reported
Crook, 1996[259] Cross Sectional	202 prostate CA patients treated consecutively from 3/87-2/93 who had a minimum of 1 year follow up N = 192 95% response **Methods:** Mail questionnaire **Definition:** Fecal incontinence and urinary incontinence were not defined	**Age:** x = 70 years, range = 49-87 years **Gender:** All male **Residency:** Canada	Prevalence of Fecal Incontinence Prevalence of "Bowel incontinence" 13-23 months after treatment = 8% 24-35 months after treatment = 8% 36-47 months after treatment = 8% 48-59 months after treatment = 9% Prevalence of Urinary incontinence daily 13-23 months after treatment = 14% 24-35 months after treatment = 19% 36-47 months after treatment = 18% 48-59 months after treatment = 16% $\geq$ 60 months 25% Prevalence of Urinary incontinence $\geq$ 1 Tbl 13-23 months = 9% 24-35 months = 7% 36-47 months = 8% 48-59 months = 8% $\geq$60 months 10%
Schwartz, 2002[260] Cross sectional, comparative Time between end of treatment and interview was x = 286 days; range = 0-965 days.	Part of a case-control study o occupational risk factors and prostate cancer; letters were sent to 501 men in a population based cancer registry. (79.4%) 398 cancer patients and 181 controls were interviewed. Those with radical prostatectomy (RP) were compared to those with radiation treatment (RT).	**Age:** **Gender:** All male **Residency:** Wayne County, MI	CA group Age 50-59 RP = 39/130 (30%) RT = 13/115 (11.3% Controls = 47/181 (26%) Age 60-69 RP = 80/130 (61.5%) RT = 46/115 (40%) Controls = 89/181 (19.2%)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
	Convenience samples of controls from the parent study were invited to participate or some were randomly selected from Medicare recipients .		Age ≥ 70 RP = 11/130 98.5%) RT = 56/115 (48.7%) Controls = 45/ 181 (24.8%) P value < .001 Race - Black RP = 58 (44.6%) RT = 60 (52.2%) Controls = 72 (39.8%) Race - White RP = 69 (53.1%) RT = 52 (45.2%) Controls = 101 (55.8%) Race - Other RP = 3 (7.3%) RT = 3 (2.6%) Controls = 8 (4.4%) Stool Leakage at baseline and past treatment (%) Stool Leakage Baseline RP group = 1.5% Post treatment = 6.2% p = (.049) Baseline RT group = 2.6% Post treatment = 18.3% p = .001 Any urinary incontinence Baseline RP group = 19.2% Post treatment = 53.8% Baseline RT group = 25.2% Post treatment = 37.7% p = .047 Multivariate Results of Treatment type and Risk of Complication Bowel Incontinence (RT vs. RP) All Odds ratio = 3.61 95% CI = 1.54-8.47 White Odds ratio = 4.88 95% CI = 1.19-19.96 Black Odds ratio = 2.38 95% CI = .77-7.34 Urinary Incontinence (RP vs. RT)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
			All Odds ratio = 2.87 95% CI = 1.52-5.44 White Odds ratio = 6.59 95% CI = 2.09-20.80 Black Odds ratio = 2.38 95% CI = 1.00-5.67
Talley, 1992[214] Cross sectional **Adjustment For:** age and sex adjusted to population of whites in US in 1980 census.	Random sample of 500 persons who attended Mayo Clinic in 1987-1990. Stratified by age (equal numbers in 5 year age groups) and gender (equal numbers in each age groups) **Methods:** Postal questionnaire **Definition:** Fecal incontinence as stool leakage; clinically significant fecal incontinence as leakage ≥1 time/week or need to wear a pad. Note: even though fecal incontinence definition as ≥1 time per week results are reported as >1 time/week.	**Age:** ≥65 years N = 328 (66% response rate) **Subject Race:** White only **Residency:** Olmsted County, MN	Prevalence of fecal incontinence Fecal Incontinence >1 time/week = 3.7% (95% CI = 1.6-5.9) Fecal incontinence >1 time/week or need to wear a pad = 7% (4.1-9.9) Fecal Incontinence >1 time/week Age adjusted fecal incontinence in females = 3.1(0.39-5.9) Age adjusted fecal incontinence in males = 4.5(1.3-7.7) Overall age and sex adjusted = 3.7(1.6-5.9) Wears a Pad.
Gurbuz, 2005[261] Cross sectional	**Methods:** Questionnaire **Definition:** Answer 1021 patients who were admitted to gym clinic of authors between 3/01 and 4/02 (N = 1021) agreed to complete questionnaire about urinary incontinence and fecal incontinence (92.6%). of yes to question: Do you currently have some involuntary loss of urine? Fecal incontinence question: Do you accidentally lose stool from the rectum, occurring once a month or more frequently?	**Age:** x = 42.48 years, SD = 10.6 years **Gender:** All female **Residency:** Turkey	Age adjusted fecal incontinence in females = 6.7(2.9-10.6) Age adjusted fecal incontinence in males = 4.6(1.4-7.8) Overall age and sex adjusted = 6.1(3.3-8.5) M for fecal incontinence = 1017 patients overall fecal incontinence prevalence = 3.1% (N = 32); had enuresis in childhood? Fecal incontinence: Yes = 13(5.7%),No = 19(2.4%),Total = 32(3.1%) Urinary incontinence: Yes = 181(79%),No = 678(85.6%),Total = 85.9(84.1%) Stress urinary incontinence: Yes = 28(12.2%), No = 51(6.4%), Total = 79(7.8%) Urge urinary incontinence: Yes = 11(4.9%), No = 39(5%), Total = 50(4.9%) Mixed urinary incontinence: Yes = 9(3.9%), No = 24(3%), Total = 33(3.2%)
Hahnloser, 2004[262] Comparative **Adjustment For:**	Females <40 years at time of ideal pouch anastomosis for ulcerative colitis between 1981 and 1995 (N =	**Gender:** All female **Residency:** Mayo clinic	Fecal Incontinence in those with ≥1 vaginal delivery vs. C section No fecal incontinence Vaginal delivery = 76, C section = 85

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
Multivariate analyses did not compare groups	544), 83% response rate (450 responded), 135 had pregnancies. **Methods:** Mail questionnaire **Definition:** None reported	in Minnesota and Zurich hospital in Switzerland	Occasional fecal incontinence Vaginal delivery = 20, C section = 13 Frequent fecal incontinence Vaginal delivery = 4, C section = 2, p = .3 Fecal incontinence during the day before pregnancy: None = 79, Occasional = 20, Frequent = 1 Fecal Incontinence during the day first follow up after pregnancy: None = 77, Occasional = 21, Frequent = 1, Fecal incontinence during the day - most recent follow-up: None = 64, Occasional = 36, Frequent = 0, p = .01 Fecal incontinence at night before pregnancy: None = 59, Occasional = 33, Frequent = 8 Fecal incontinence at night - first follow up after pregnancy None = 52, Occasional = 39, Frequent = 9 Fecal incontinence at night - most recent follow up None = 37
Dayton, 1996[263] Cohort	Patients who underwent ideal pouch anal anastomosis between 1983 and early 1996; N = 355. **Methods:** Prospective collection of data then review of data registry. **Definition:** Not defined	**Age:** <55 years = 423; >55 years = 32 **Residency:** Utah, USA	Occasional = 63 Frequent = 0 p = .06 Percent with Daytime Incontinence At 3 months, < 55 years Occasional = 6 Often = 2 Daily = 2 Never = 90 At 3 months, > 55 years Occasional = 26 ** Often = 5 Daily = 0 Never = 68 ** At 6 months, < 55 years Occasional = 4 Often = 2 Daily = 1 Never = 93 At 6 months, > 55 years Occasional = 10 Often = 10 * Daily = 1 Never = 93

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
			At 12 months, < 55 years Occasional = 4 Often = 1 Daily = 2 Never = 93 At 12 months, > 55 years Occasional = 6 Often = 0 Daily = 0 Never = 94 Percent with Night Incontinence At 3 months, < 55 years Occasional = 24 Often = 6 Daily = 3 Never = 68 At 3 months, > 55 years Occasional = 42 Often = 21** Daily = 5 Never = 32** At 6 months, < 55 years Occasional = 18 Often = 8 Daily = 4 Never = 70 At 6 months, > 55 years Occasional = 22 Often = 33** Daily = 0 Never = 44* At 12 months, < 55 years Occasional = 17 Often = 4 Daily = 5 Never = 74 At 12 months, > 55 years Occasional = 16 Often = 15** Daily = 10

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
Cukier, 1997[264] Cross Sectional and comparative	Patients with a diagnosis of IBS or IDI (Idiopathic detrusor instability) during 1993-95 at 1 hospital; controls were recruited from the day surgery unit N(controls) = 55 responses N(IBS or IDI) = 49 responses **Methods:** Mail questionnaire	**Residency:** UK	Never = 60 * = p <.05 ** = p <.01 Incontinence of Solid Stool Male IBS = 0/23 Female IBS = 3/41 (7%) Male IDI = 2/20 (10%) Female IDI = 5/25 (20%) Male controls = 0/23 Female controls = .31 Incontinence of Liquid Stool Male IBS = 0/23 Female IBS = 1041 (24%) Male IDI = 6/20 (30%)
Lovatsis, 2002[265] Retrospective chart review	293 patients who had sacrospinus vault suspension at 1 hospital between 11/93 and 12/98 Results report anal incontinence that includes flatus but a subgroup with fecal incontinence of solid stool	**Age:** X = 61.7 years; Range = 30-88 years **Gender:** All female **Residency:** Toronto, Canada	Female IDI = 6/25 (24%) Male controls = 0/23 Female controls = 0/31 Severity of fecal and urinary incontinence 30 patients who had fecal incontinence of solid stool only before surgery reported a "cure" - no fecal incontinence after surgery An additional 4 who had fecal incontinence of solid stool only reported no change after surgery
Menter, 1997[266] Cross Sectional	Patients injured ≥20 years who received rehab at spinal center at 1 of 2 hospitals who participated in a study in both 1990 and 1993; m = 221. **Methods:** Questionnaire and chart review **Definition:** Fecal incontinence = bowel movement of any consistency- including diarrhea like stool- occurring without preparation or intent and not due to recent GI acute illness such as influenza or food poisoning and not attributable to recent food intake such as spicy foods, etc.	**Age:** Tetraplegia, ABG(m = 65), age = 51 years Paraplegia, ABC = 56.3 years (m = 109) Tetraplegia or paraplegia grade D (n = 47), age = 56.6 years **Residency:** UK	Prevalence of Fecal Incontinence Bowel accidents (FI) Tetraplegics n = 19(29%) Paraplegics n = 30 (27.5%) All DS n = 11(23.4%) Total = 60/221 (27.1%)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
Gupta, 2005[267] Retrospective	1,000 patients with grade III or IV hemorrhoids treated with radio frequency ablation followed by plication. **Methods:** Chart review	**Age:** x(SD) = 39.8, (13.6) years **Gender:** 524 females **Residency:** India	Fecal incontinence = 0%
Malone, 1996[268] Cross sectional	144 patients with Spina bifida randomly selected from database of spina bifida association, 109 analyzed. **Methods:** Questionnaire by mail **Definition:** as 'Soiled' which represented urinary incontinence or fecal incontinence,	**Age:** x = 23.5 years range = 9-47.8 years **Gender:** 67 female 42 male **Residency:** UK	Prevalence of Incontinence 55/104 (53%) regularly soiled (urinary or fecal incontinence) Fecal and urinary incontinence = 31 (30%) Fecal incontinence only = 24 (23%) Urinary incontinence only = 24 (23%) Moderate Soiling = 25 (45%) Severe Soiling = 18 (33%)
Helgason, 1996[269] Cross sectional and comparative	450 men in 1992 in Stockholm, 50-80 years who had diagnosis of prostate cancer and same number of men randomly selected from same geographic area. N = 314 controls analyzed N = 342 prostate CA analyzed **Methods:** Mail questionnaire **Definition:** Not defined	**Age:** Prostate cancer x = 72 years Range = 51-80 Controls x = 68 years Range = 50-80 years **Gender:** Men only **Residency:** Sweden	Prevalence of Incontinence Fecal incontinence in prostate cancer men = 12/321 (4%) Urinary incontinence in prostate cancer men = 45/313 (14%) Fecal incontinence in control men = 6/292 (2%) Urinary incontinence in controls = 10/291 (3%)
Buchanan, 2002[270] Cross sectional and comparative	14,009 admission MDS records from 6/22/98 - 12/31/2001 in NY state **Definition:** MDS items	**Age:** x(SD) age of MS Residents = 57.5 (13.9) years All others = 76(15.3) years **Gender:** MS residents = 70.3% female All other = 62.4% female **Residency:** NY state	Prevalence of Incontinence Bowel continence in MS residents Fecal incontinence = 39.1% Frequent fecal incontinence = 7.5% Occasional fecal incontinence = 5.5% Usual continence = 5.6% Continent = 42.3% Urinary incontinence in MS residents Urinary incontinence = 21.4% Frequent urinary incontinence = 9.3% Occasional urinary incontinence = 5.6% Usual continence = 4.8% Continence = 59% All others (non MS) Fecal incontinence = 22.5% Frequent incontinence = 6.8% Occasional incontinence = 5.2% Usual continence = 5.7%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
			Continent = 59.8% Urinary incontinence = 19.1% Frequent incontinence = 11.9% Occasional incontinence = 7.7% Usual continence = 7.2% Continence = 54% White Non Hispanics: MS = 85.1%, All others = 81.2% Black: MS = 11.4%, All others = 11.4% Hispanic: MS = 2.3%, All others = 4.8% American Indian/Alaska native: MS = ≤11%, All others ≤11% Asian: MS ≤1%, All others = 1.9%
Zorzon, 1999[271]	108 patients with MS consecutively selected from a clinic, 97 patients with chronic disease (arthritis, lupus, ankylosing spondylitis) seen in rheumatic diseases center, 110 healthy volunteers (health professionals and friends/relatives of patients and investigators). **Methods:** Structured interview **Definition:** no definition of fecal incontinence or urinary incontinence was reported	**Age and Gender:** MS patients; 70 females; x(SD) age = 40.5 (11.2) years Chronic disease patients; 65 females = 41(11.9) years Healthy controls; 71 females = 41.1 (12.6) years	Prevalence of Incontinence MS patients Urinary incontinence = 31 (28.7%) Female = 18 (25.7%) Male = 13 (34.2%) Fecal Incontinence = 10 (9.3%) Female = 9 (12.9%) Male = 1 (2.6%) Chronic Disease patients Urinary incontinence = 3 (3.1%)* Female = 2 (3.1%)* Male = 1(3.1%)** Fecal incontinence = 0** Healthy Controls Urinary incontinence = 2 (1.8%)* Female = 2 (2.8%)* Male = 0 Fecal incontinence = 0* *p < .0001 **p .01
Nelson, 1995[272] Cross sectional	The population in Wisconsin sampled in the Wisconsin Family Health Survey, 6959 individuals and 2570 households responded. **Methods:** Phone interview **Definition:** "Have you or anyone in your household experienced unwanted, unexpected or embarrassing loss of control of	**Age:** >65 years **Gender:** 30% men 63% female	Incidence of Fecal Incontinence 153 were incontinent of stool or gas (anal incontinence) 36% of 153 were incontinent of solid stool; 54% of 153 were incontinent of liquid stool. Note: risk factors were reported for anal incontinence and are not included here.

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
	bowels or gas?" although fecal incontinence was outcome, results are reported separately for stool and gas incontinence.		
Giebel, 1998[273] Cross sectional	Sample size = 500: 275 consecutive patients from the emergency department, 62 hospital employees, 115 patients who had arthroscopies, and 48 relatives of the above groups. **Methods:** Questionnaire	**Residency:** Germany	Prevalence of fecal incontinence 35.1% had soiling of underwear, more frequent in men ($p < .01$) but % in men and women not reported 4.8% were unable to control solid stool 6.6% were unable to control pasty stool 6.7% were unable to control liquid stool Lack of control of pasty and liquid stool less common in women $p < .05$ and $p < .01$
Brandeis, 1994[274] Fecal incontinence was measured cross-sectionally, this was a prospective cohort study of pressure ulcers	Residents >60 years old admitted to national Healthcare Nursing homes during 1988 and 1989. Sample = 4,232 people **Definition of Incontinence:** Fecal incontinence as accidental loss of feces greater than once per week. Urinary incontinence as accidental loss of urine greater than once per week.	**Age:** mean 81 $\pm$ 8 years old 73% female	Prevalence of Incontinence 48% of residents had fecal incontinence 57% had urinary incontinence at baseline
Longstreth, 1993[275]	Members of a large health maintenance organization (HMO) having a routine health exam. Response rate = 64.9%, 1,264 of 1,956 responded, fecal incontinence information was available on 1,195. **Methods:** Questionnaire **Definition:** "Do you ever lose control of your bowels (including soiling your underwear)?"	**Age:** Mean = 51.8 years **Gender:** 54.3% female **Subject Race:** White = 82.1% Asian = 4.7% Black = 4.5% Other = 2.1% Hispanic = 6.6% **Residency:** California	Prevalence of Fecal incontinence Number of men with fecal incontinence = 159 Number of women with fecal incontinence = 154
Khullar, 1998[276] Cross sectional	All women referred to a urodynamic clinic during a 4 month period; sample size = 465 **Methods:** Postal questionnaire and interview **Definition:** "Do you leak from the back passage?" liquid, solid, or flatus		26% (N = 121/465) had fecal incontinence to liquid or solid stool on postal questionnaire 15% (N = 71/456) had fecal incontinence to liquid or solid stool when asked on interview Note: fewer women admitted having fecal incontinence when asked vs. mail study

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
Edwards, 2001[277] Cross sectional	Random sample of 1,000 people aged 65 and older from each of 3 Family Health Service registers; sample = 2,818 **Methods:** Interview **Definition:** Fecal incontinence as "Do you have any difficulty controlling your bowels?" Urinary incontinence as "Do you ever wet yourself if you are unable to get to the lavatory as soon as you need to, or when you are asleep at night, or when you cough or sneeze?"	**Age:** 58% were 65-74 years and 42% were ≥75 years **Gender:** 61% female **Residency:** England and Wales	Prevalence of Incontinence 2% of those 65-74 years old had fecal incontinence 3% of those ≥75 years had fecal incontinence 1% of men and 4% of women had fecal incontinence (p <.0005). 18% had urinary incontinence. 1% of 1,099 men and 2.5% of 1,695 women had fecal and urinary incontinence. 69% of those who had fecal incontinence also had urinary and 17% of those without fecal incontinence had urinary incontinence (p <.000001) Note: only bivariate analyses were done and no multivariate analyses.
Lynch, 2001[278] Cross sectional	1,500 adults randomly selected from the electoral roll; response rate = 48%, 717 respondents. **Methods:** Postal questionnaire	**Age:** Median = 46 years, Range = 18-70 **Gender:** 388 males 329 females **Residency:** New Zealand	Prevalence of Fecal Incontinence Fecal incontinence of solid stool was in 70(9.8%) Fecal incontinence of liquid stool was in 91(12.7%)
Perry, 2002[279] Cross sectional	15,904 people aged 40 or more randomly selected from households in patient registry of the health authority. 10,116 surveys were analyzed **Methods:** Postal questionnaire **Definition:** Major fecal incontinence = soiling of underwear, outer clothing, furnishing or bedding several times per month or more Minor fecal incontinence = staining of underwear several times a month or more	**Age:** Range = 40-80+ **Gender:** 54% female **Subject Race:** White = 93.2% South Asian = 5.7%, Other = 1.1% **Residency:** UK	Prevalence of monthly or more leakage was 3.3% and soiling was 2.7% Men soiling underwear = 9.6% vs. women = 7.5% Prevalence of major fecal incontinence = 1.4% Prevalence of minor fecal incontinence = 1.7% A lot of impact on life Major fecal incontinence = 51.7% Minor fecal incontinence = 16% None or a little impact Major fecal incontinence = 48.3% Minor fecal incontinence = 84%
Okonkwo, 2002[280] Cross sectional	Patients who presented to the gynecology clinic (N = 3963) in 3 states in Nigeria and whose symptoms were not related to pelvic organ prolapse. **Methods:** Structured questionnaire	**Age:** Range = 20-50+ years **Gender:** All female **Residency:** Nigeria	Prevalence of fecal incontinence of liquid stool = 2.67% and for solid stool = 2.17% Parity had no relation to fecal incontinence in bivariate analyses

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
Henningsohn, 2002[281] Cross sectional	Patients who had urinary bladder cancer treated with radical radio therapy before 1995 (N = 58); patients with radical cystectomy and urostomy (N = 251; and people randomly selected from general population (N = 310) as controls. **Methods:** Questionnaire **Definition:** Fecal incontinence as fecal leakage at least every month.	**Age and Gender:** age of radio therapy group (mean ± standard error of mean) at follow up Male = 78.1 ± 0.8, Female = 80.5 ± 1.2 Cystectomy: Male = 73.6 + 0.5 Female = 76 + 0.7 Controls: Male = 75.6 ± 0.4 Female = 76.8 ± 0.6	"Fecal leakage at least every month" Radiotherapy group prevalence = 8/48 (17%) Cystectomy group = 16/169 (10%) Controls = 4/256 (2%)
Sakakibara, 2001[282]	115 consecutive patients with Parkinson's disease seen at neurology clinic controls were 391 locals undergoing an annual health survey **Methods:** Questionnaire **Definition:** "Do you leak feces?"	**Age:** controls = 30-69 years, Parkinson patients age = 35-69 years **Gender:** controls = 271 males and 120 females, Parkinson patients gender = 52 men and 63 females **Residency:** Japan	Prevalence of Incontinence Parkinson Patients Fecal incontinence prevalence = ~6% in females and ~10% in males Stress urinary incontinence = ~38% in females and ~2% in males Urge urinary incontinence = ~26% in females and 30% in males Controls Prevalence of fecal incontinence = 0% in females and 4% in males Stress urinary incontinence = 30% in females and 2% in males Urge urinary incontinence = 6% in females and ~5% in males Note: findings are in bar graphs without values
Eason, 2002[283] Cross sectional	Pregnant women who gave birth in 5 hospitals in 1995-1996 in Quebec Women were part of another study about perineal massage. **Methods:** Mail questionnaire 3 months after delivery, 1,198 received a questionnaire.	Sample size = 949 women	Incidence of Incontinence Fecal incontinence occurred in 3.1% overall Fecal incontinence occurred at least once daily in 0.3% Fecal incontinence was present in 1.8% who had a C section and 2.9% of those with vaginal delivery Note: multivariate analysis for fecal incontinence was not done due to small number affected
Teunissen, 2004[119] Cross sectional	Patients >60 years old in 9 general practices from Jan. 1999-Aug. 2001 **Methods:** Questionnaire **Definition:** Urinary incontinence = involuntary loss of urine twice or more per month Fecal Incontinence = involuntary loss of feces twice or more per month Double Incontinence = Urinary incontinence + fecal incontinence twice or more per month.	**Age**: ≥60 years or over **Gender:** Female = 3,159 Male = 5,748 **Residency:** Netherlands	Prevalence of Incontinence Fecal incontinence of solid stool = 36% Liquid stool = 19% Mucoid stool = 45% Overall fecal incontinence = 6% Solid Stool Fecal Incontinence Men = 30% N = 41 Women = 42% N = 52 Liquid Stool Fecal Incontinence Men = 10% N = 13 Women = 29% N = 37

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
			Mucoid Fecal Incontinence Men = 60% N = 80 Women = 29% N = 37 Overall Urinary Incontinence = 19% Overall Double Incontinence = 3%
Chen, 2003[284]	Taiwanese women in a community in August 1999-March 2001, sample size = 1,247 **Methods:** Door to door survey and interview **Definition:** Fecal incontinence = flatus incontinence and anal incontinence	**Age:** mean = 43.2 years, SD = 15.1 **Gender:** All female **Subject Race:** All Asian Subject **Residency:** Taiwan	Prevalence of fecal incontinence = 2.8% Prevalence of flatus = 8.6% Impact on life = 8.6% had fecal incontinence considered troublesome to their daily lives (N = 30 of 35) Note: risk factors were only reported for anal incontinence
Goldberg, 2003[285] Cross sectional	Mothers of multiples attending the National Organization of Twins Clubs in 2001, Sample size = 733 **Methods:** Survey **Definition:** Fecal incontinence or flatal incontinence	**Age:** median = 37, range = 22-75 years **Subject Race:** 94% white 2.3% African American 0.6% Asian American, 1% Hispanic **Residency:** United States	Fecal Incontinence in women with a C-section only = 5.8% Fecal incontinence in previous vaginal delivery = 11% In multivariate analysis, age was the only significant correlate; fecal incontinence increased by a factor of 2 per 10 years, p = .0001 Overall fecal incontinence = 10% Fecal incontinence of liquid stool only = 5.9% Fecal incontinence of solid and liquid stool = 1.6%
Chiarelli, 2003[286] Cross sectional	586 women who had an instrumental delivery and/or delivered an infant 4000g or more at teaching hospitals, 913 women were approached **Methods:** Survey **Definition:** Fecal incontinence (solid and/or liquid stool) at 12 months post partum	**Age:** 15-44 years **Gender:** All female **Residency:** Australia	Fecal Incontinence Prevalence = 6.9% 2.6% had solid stool fecal incontinence and 4.9% had liquid stool fecal incontinence Risks for fecal incontinence at 12 months postpartum Urinary incontinence at 12 months post partum OR = 6.03 CI = 2.37-15.33 Constipation OR = 2.46 (1.11-5.46) Joint hypermobility OR = 2.75 (1.05-7.19)
Fenner, 2003[287] Cross sectional, retrospective	Primiparous women who delivered vaginally at a University Medical Center from 1/1/97 to 3/30/00; 2,941 were mailed and 943 completed the urinary questionnaire and 831 completed the bowel questionnaire **Methods:** Mail questionnaire about	**Age:** mean = 27.34 years **Gender:** All female **Residency:** United States	Incidence of urinary incontinence overall 0.42% had a worse major problem of urinary incontinence bladder control 5.41% had a worse occasional inconvenience of urinary incontinence bladder control 21.74% had worse minor inconvenience 16.2% had urge urinary incontinence alone 14.6% had mixed stress and urge urinary incontinence

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
	urinary incontinence and fecal incontinence; charts were reviewed for anal sphincter tears Definition: Questions about urinary incontinence "I wet myself", "I may have an accident:, "I may leak urine in them" Note: I did not include results about fecal incontinence because there was no definition of fecal incontinence like for Urinary incontinence; findings were too vague describing "bowel function" or "bowel control"		
Korman, 2004[288]	150 consecutive patients who underwent radical retro-pubic (RRP) or radical perineal prostatectomy (RPP) and 75 age-matched controls who were biopsied; response rate was 89% N = 201 **Methods:** Questionnaire- the bowel function domain of the Expanded Prostate Cancer Index composite Definition: uncontrolled leakage of stool or feces	**Age:** Age (years) and range RPP group = 61 (42-44) RRP group = 63 (32-35) Controls = 61 (35-39) **Residency:** United States	Prevalence of Fecal Incontinence RPP group = 5.4% (4/75) RRP group = 6.4% (4/63) Controls = 4.8% (3/61) No significant difference
Delaney, 2003[289] Cohort	1,895 patients who had ileal pouch anal anastomosis (IPAA) and were followed for > 6 months **Methods:** Questionnaire **Note:** This study did not report fecal incontinence per se, they report never incontinence and seepage at night.	**Age:** <45 years = 1,410/ and 766 male 46-55 years = 289/ and 174 male 56-65 years = 154/ and 100 male >65 years = 42/ and 31 male	Bowel movement/night (1 year) <45 = 1.4 46-55 = 1.8 56-65 = 2.1 >65 = 1.9 Total = 1.5 P <0.001 Multivariable = 0.001 Never Incontinent (1 year) <45 = 78 46-55 = 68 56-65 = 54 >65 = 44 Total = 73 P <0.001 Multivariable ≤0.001 (3 year)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
			<45 = 74 46-55 = 66 56-65 = 49 >65 = 36 Total = 69 P <0.001 Multivariable ≤0.001 (5 year) <45 = 69 46-55 = 52 56-65 = 48 >65 = 20 Total = 64 P <0.001 Multivariable ≤0.001 Seepage at night (1 year) <45 = 34 46-55 = 44 56-65 = 50 >65 = 44 Total = 38 p = 0.001 Multivariable = 0.001 (3 year) <45 = 31 46-55 = 37 56-65 = 46 >65 = 58 Total = 34 p = 0.006 (5 year) <45 = 35 46-55 = 39 56-55 = 48 >65 = 64 Total = 47 p = .22 Multivariable = .013
Lunniss, 2004[290] Retrospective cohort analysis.	Patients referred to a tertiary center for physiological assessment of fecal incontinence between January 1995 and June 2002; sample size = 629	**Age:** Median age = 53 years, range of 15-88 years (457 females)	Prevalence of passive fecal incontinence = 27% (N = 168) Urge fecal incontinence = 27% (N = 170) Post defecation fecal incontinence = 7% (N = 43)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)
F1d. Prevalence and incidence of fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence)	Subject Age, Gender, Race, Ethnicity, Residency	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
	Methods: medical history and anorectal physiological assessment. **Definitions of Incontinence:** Passive fecal incontinence = fecal incontinence without patient's knowledge. Post defecation fecal incontinence = fecal incontinence related to defecation. Wage fecal incontinence = fecal incontinence with awareness.	**Median age:** 53 years Range of 14-92 years (154 males)	
Chou, 2000[904] Cross Sectional and comparative	Women who had surgery for pelvic organ prolapse and/or urinary incontinence between June 1996 and February 1996 by 4 OB-gynecologists enterocele group (E) = 77 NOE = 233 patients **Methods:** Questionnaire **Definition:** Unreported	**Age:** E = 67 median, range (31-90 years), No E = 59(28-83) **Gender:** All female	Prevalence of Fecal Incontinence in E = 12/72 (17%) no E = 31/215 Note: not all not E answered question

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)

F1e. Prevalence of combined urinary and fecal incontinence in adults

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence	Prevalence (%) or Incidence of Combined Incontinence, Overall: by Type, Severity, and Impact on Life
Thomas, 2001[291] Cross sectional. Adjustment for age, sex, cognitive function, alcohol abuse, diabetes, stroke, hypertension, cardiac SUS, respiratory problems, cancers, history of falling, current depression, hearing or visual impairments. Age: >65 years N = 4,178	Canadian study of Health and Aging data set of 1990 of elderly > 65 years old, N=2,923 community living and institutionalized residents, 1, 255 = institutionalized **Method of Measurement:** Survey. **Definition of incontinence:** stool incontinence, urine incontinence.	Stool Incontinence Adjusted Prevalence. No overall % was reported No dementia = 1.78 (.97-2.59) Cognitive impairment but no dementia = 4.60 (3.25-5.95) Cognitive impairment with dementia = 31.9 (28.87-34.93) Urine Incontinence Adjusted Prevalence No dementia = 13.34 (11.27-15.41) Cognitive impairment without dementia = 22.68 (199.99-25.37 Cognitive impairment with dementia = 49.29 (46.05-52.53)
MacArthur, 1997[292] Cross sectional Age: not reported N = 760 100% female	All women who delivered a baby between April and September, 1992 at a maternity hospital in Birmingham, United Kingdom, who had some adverse post partum symptoms were interviewed about fecal incontinence. **Data Source:** Interview for fecal incontinence took place a mean of 45 weeks after birth. **Definition of Incontinence:** Frank incontinence- "no warning that she needed to go" Soiling or staining on underwear, Urgency = felt the need to go but could not hold on.	Fecal Incontinence Prevalence (present before child birth = 6.1%) Incidence (after childbirth) = 4% or 36 Total n = 36 Soiling = 36% Frank Incontinence = 19% Daily Symptoms not defined by type = 39% Symptoms on some days of the week = 36% 22% said fecal incontinence affected their life style Soiling only = 8% Frank incontinence only = 3% Urgency only = 53% Soiling and urgency = 19% Frank incontinence and urgency = 8% All 3 = 8%
Point prevalence study of patients with clinical MS attending a clinic for management of symptomatic bowl dysfunction in the United Kingdom. Age range: 28-73 years (Mean = 47 years) N = 77 61% female	**Method of Measurement:** Interview using a questionnaire **Definition of FI:** Current fecal incontinence = involuntary passage of stool at least once during preceding 3 months, Previous fecal incontinence = same definition except that occurred at least once more than 3 months previously	Fecal Incontinence Current = 16/77 Previous = 23/77 Current and Urgency urinary incontinence = 16/77 Previous and urgency urinary incontinence = 23/77
Buchanan, 2002[293] Cross section of residents in hospice care in the U.S. Average age: 76.4 (SD 13.9)	Residents in hospice care, N = 40,622 **Method of Measurement:** MDS admission records	Bowel Incontinence; Continent = 43.6% Usually continent = 5.7% Occasionally incontinent = 5.7%

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community
F1e. Prevalence of combined urinary and fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence	Prevalence (%) or Incidence of Combined Incontinence, Overall: by Type, Severity, and Impact on Life
59% female 85% white, 10% black, 1.1% American Indian, <1% Asian, 3% Hispanic	**Definition of Incontinence:** MDS items for continence-bowel, continence-bladder	Frequently incontinent = 7.4% Incontinent = 37.6% Bladder Incontinence Continent = 54.4% Usually continent = 5.9% Occasionally incontinent = 6.3% Frequently incontinent = 9.4% Incontinent = 24%
Buchanan, 2001[294] Cross sectional study of nursing home residents with MS at time of their admission from 6/22/98 - 1/17/2000 in U.S. (in New York from 1/11/98 – 1/17/2000). Age: 57.98 (SD = 14.19) years N = 9,013 70.2% female White = 84.7%, Black = 11.2%, American Indian/Alaska native, Asian ≤1%, Hispanic = 2.4%	**Method of Measurement:** MDS **Definition of Incontinence:** MDS item for continence - bowel, MDS item for continence - bladder	Bowel Incontinence Occasionally incontinent = 5.4% Frequently incontinent = 7.3% Incontinent = 38.8% Continent = 42.7% Usually continent = 5.8% Bladder Incontinence Occasionally incontinent = 5.6% Frequently incontinent = 9% Incontinent = 21.3% Continent = 58.9% Usually continent = 5.2%
Ostlbye, 2004[28] Cohort of Canadian community living elderly (>65 years) in 1991-92; (over sampled very old 75-84 years 1.5 times; > 85 years 2 times m = 8,949) Age: 77.3 years (mean for females) 75.3 years (mean for males) Total N (female) = 5,322	**Method of Measurement:** Survey **Definition of Incontinence:** Questions and answers from the survey, Urinary Incontinence = "Do you ever lose control of your bladder? "Fecal Incontinence = "Do you ever lose control of your bowels? "Double Incontinence = urinary incontinence and fecal incontinence, prevalence determined at survey wave 1, survey wave 2 was in 1996 and wave 3 was in 2001 Survey questions and answers risk factors or correlations Cognitive status by modified mini mental exam 3MS? Medical conditions- stroke or effects of stroke, arthritis or	Prevalence of Fecal and Urinary Incontinence Overall urinary incontinence = 9% n = 314 Overall fecal incontinence = 3% N = 119 Prevalence by age and sex Urinary incontinence 65-69 years 14.2% - 167/1177 of females, 6.3% - 64/1020 of males 70-74 years 15.9% - 156/982 of females, 7.2% - 54/752 of males 75-79 years 19.7% - 285/1446 of females, 9% - 88/950 of males 80-84 years 25% - 202/808 of females, 11.2% - 53/475 of males 85-89 years 24.6% - 180/733 of females, 16.6% - 55/332 of males 90+ years 29% - 51/176 of females, 16.9% -11/65 of males Fecal Incontinence in Females 65-69 years - 3.3% of females, 1.8% of males 70-74 years - 3.8% of females, 2.1% of males 75-79 years - 5.1% of females, 5.2% of males 80-84 years - 6.8% of females, 5.3% of males 85-89 years - 9.6% of females, 6.9% of males 90+ years - 8.5% of females, 10.8% of males Double Incontinence

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community
F1e. Prevalence of combined urinary and fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence	Prevalence (%) or Incidence of Combined Incontinence, Overall: by Type, Severity, and Impact on Life
	rheumatism, kidney trouble, diabetes, trouble with feet or ankles Lifestyle- "Do you engage in regular exercise?" Have you been a regular coffee drinker (every day)? Have you smoked cigarettes regularly (nearly every day)? On average, how many packs per day?" Cognitive Status: normal, moderately, or severely impaired Lifestyle - yes/no Number of packs smoked- <1 per day, 1 per day, > 1 per day	65-69 years - 1.0% of females, 0.6% of males 70-74 years - 1.1% of females, 0.5% of males 75-79 years - 2.4% of females, 1.3% of males 80-84 years - 2.2% of females, 1.7% of males 85-89 years - 4.2% of females, 3.6% of males 90+ years - 3.4% of females, 4.6 % of males Cumulative incidence was reported = persons continent at baseline who were incontinent both in wave 2 and 3 and in 1 follow up wave (2 or 3) Overall cumulative incidence Wave 2- urinary incontinence = 33% n = 76/741, fecal incontinence = 13% n = 11/757 Wave 3- New urinary incontinence = 22% n = 16/1170, remained urinary incontinence from wave 2 = 29% (n = 16), new fecal incontinence = 13% n = 4/1189, remained fecal incontinence from wave 2 = 14% n = 1 Wave 3- Urinary incontinence in wave 2 decreased in wave 3 = 49% n = 27/1170, fecal incontinence in wave 2 decreased in wave 3 = 72% m = 5 Urinary Incontinence Female- 65-74 years = 14.3% (wave 2), 18.3% (wave 3); 75-84 years = 20.5% (wave 2), 20% (wave 3); 85+ years = 24.3% (wave 2), 34.4% (wave 3) Male- 65-74 years = 8.6% (wave 2), 13.3% (wave 3); 75-84 years = 12.3% (wave 2), 18.3% (wave 3); 85+ years = 23.2% (wave 2), 13.2% (wave 3) Fecal Incontinence Female- 65-74 years = 5.3% (wave 2), 7% (wave 3); 75-84 years = 7.2% (wave 2), 11.1% (wave 3); 85+ years = 13% (wave 2), 15.3% (wave 3) Male- 65-74 years = 4.1% (wave 2), 5.3% (wave 3); 75-84 years = 5.5% (wave 2), 9.7% (wave 3); 85+ years = 13.2% (wave 2), 20% (wave 3) Double Incontinence Female- 65-74 years = 4.2% (wave 2), 4.1% (wave 3); 75-84 years = 6.5% (wave 2), 8.6% (wave 3); 85+ years = 14.9% (wave 2), 13.9% (wave 3) Male- 65-74 years = 2.8% (wave 2), 2.8% (wave 3); 75-84 years = 4.3% (wave 2), 5.2% (wave 3), 85+ years = 11.8% (wave 2), 5.6% (wave 3) Significant Correlates Female Urinary Incontinence 3 children or = 1.75, ci = 1.29, 2.38 2 children 1.52(1.13, 2.03) age 75-84 = 1.47(1.2, 1.79) 85+ years 1.78(1.35, 2.37) smoke > 1 pack per day 1.41 (1.06, 1.87) Coffee drinker 1.23(1.01, 1.51)

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community
F1e. Prevalence of combined urinary and fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence	Prevalence (%) or Incidence of Combined Incontinence, Overall: by Type, Severity, and Impact on Life
		Medical Stroke 1.61(1.07, 2.43) Arthritis 1.32(1.08, 1.61) Kidney 3.36(2.69, 4.21) Correlates of Fecal Incontinence in Females 75-84 years 1.55(1.06, 2.26) 85+ years 1.91(1.14, 3.17) Foot and ankle trouble 2.01(1.18, 3.44) Correlates of Urinary Incontinence in Males 85+ years 2.46(1.5, 4.02) Diabetes 1.72(1.10, 2.66) Kidney problems 4.29(2.99, 6.16) Risks for Cumulative Incidence Reported For Urinary Incontinence in Women Stroke 1.58(1.13, 2.22) Kidney Problems 1.69(1.22, 2.33) Foot and ankle trouble 1.36(1.04, 1.78) Fecal Incontinence in Women-Risks for cumulative incidence Cognitive status 50 < 3MS < 78 1.80(1.02, 3.20) Stroke 2.07(1.44, 2.98) Cumulative Incidence Risks of Urinary Incontinence in Males 75-84 years 2.97(1.64, 5.39) 85+ years 3.41(1.44, 8.11) Smoke > 1 pack per day 2.03(1.05, 3.9) Diabetes 2.49(1.32, 4.69) Foot or ankle trouble 2.01(1.18, 3.44) Risks of Fecal Incontinence in Males 85+ years 2.51(1.26, 5.01)
Chiang, 2000[295] Retrospective chart review, cross sectional design. Multivariate regression models controlled for patient characteristics of age, gender, Medicaid insurance status, and chronic disease conditions of CHF, emphysema, diabetes of stay in nursing home in U.S. Separate models compared double	**Method of Measurement**: Chart abstractions and MDS data were used. **Definition of Incontinence:** Double incontinence included residents with indwelling urinary catheters; no other definitions of incontinence were given. Fecal incontinence only group was dropped from analysis due to small Number	Prevalence Urinary incontinence only = 13% Fecal incontinence only = 6% Double incontinence = 54% Continent = 27% p < .05 on pair wise comparisons Cognitive impairment Double incontinence = 90%, C = 59%, urinary incontinence = 62% Alzheimer's Disease Double incontinence = 25%, C = 13%, urinary incontinence = 9% Dementia diagnosis

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community
F1e. Prevalence of combined urinary and fecal incontinence in adults (continued)

Author, Year, Design, Adjustment for Confounding Factors	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of incontinence	Prevalence (%) or Incidence of Combined Incontinence, Overall: by Type, Severity, and Impact on Life
incontinence residents with urinary incontinence only residents and continent (group C) residents. Average age: = 84 N = 413	Double incontinence group: x = 84 years; 77% female Urinary Incontinence only group: x age = 83 years; 77% female C group: x age = 85 years; 72% female Urinary incontinence only = 53, Fecal incontinence only = 9, fecal incontinence and urinary incontinence = 237, no incontinence = 114 = C group, residents were in 20 nursing homes in 3 states who were in another study about primary care	Double incontinence = 46%, C = 22%, urinary incontinence = 17% Impairment in transfer Double incontinence = 94%, C = 54%, urinary incontinence = 77% Locomotion impairment Double incontinence = 86%, C = 54%, urinary incontinence = 68% Bed Mobility impairment Double incontinence = 80%, C = 33%, urinary incontinence = 47% Stroke Double Incontinence = 33%, C = 18% Emphysema Double incontinence = 5%, C = 19%, urinary incontinence = 19% Adjusted regression values are reported here with population mean value and SD Number of hospital stays per year: x(SD) = 1.11(4.4) Double incontinence = 2.92 Urinary incontinence = 9.74 C = 2.10 Number of emergency room visits per year: x(SD) = .26(.81) Double incontinence = .66, urinary incontinence = 1.34, C = .74 Beta Values Number of hospital stays per year Double incontinence vs. C = .07 Double incontinence vs. urinary incontinence = -.19 Number of Emergency room visits per year Double incontinence vs. C = .04 Double incontinence vs. urinary incontinence = -.10
Chiai, 1995[296] Cross section of consecutive patients with clinically significant MS attending national hospital in London, UK for management of bladder dysfunction. Age: 28-73 (average 47 years) N = 77 61% female (n = 47)	**Method of Measurement:** data about fecal incontinence was obtained using a questionnaire. **Definition of Incontinence:** Current fecal incontinence as involuntary passage of stool at least once in preceding 3 months. Previous fecal incontinence as involuntary passage of stool at least once more than 3 months previously.	Prevalence of fecal incontinence. Current fecal incontinence only; n = 12. Previous fecal incontinence only; n = 12. Constipation and current fecal incontinence; n = 4. Constipation and previous fecal incontinence; n = 11. Normal bowel function; n = 25. Constipation only; n = 13. Note: all have "bladder dysfunction" also but this wasn't defined.

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community (continued)

F1f. Risk factors of fecal incontinence in adults

Author Sample	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of Incontinence. Definition of Risk Factors.	Level of Risk Factors	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
Abramowitz, 2000[297] Prospective, descriptive, observational study in France. N = 259 100% female No age given	Consecutive females 6 weeks before and 8 weeks after delivery. **Exclusion criteria:** No history of ano-rectal disease. Neurologic disease, or diabetes **Method of Measurement:** Questionnaire **Definition of incontinence:** fecal incontinence = incontinence of flatus and liquid or solid stools	Sphincter defects by endoanal ultrasound	Incidence of Incontinence of Liquid Stools After Delivery Primiparous = 0.9% Secundiparous = 1.7% Multiparous = 2.1% Total incontinence of liquid stools = 1.4% Sphincter defects by endoanal ultrasound Various conditions of childbirth but although risk factors were assessed, they were for "anal incontinence" and not just leakage of stools
Zetterstrom, 1999[298] Cohort study in Sweden. 100% female. Age: X (SD) = 30 (4.1) years	Of 345 primiparous women, 278 responded to questions about fecal incontinence, 38 had sphincter tears, 240 had non-sphincter tears. Questionnaires 1 day, 5 months, and 9 months after delivery.	Maternal age. Continuous duration of labor >12 hours (yes/no), 2nd stage of labor >1 hour (yes/no), use of oxytocin (yes/no), fundal pressure to assist delivery (yes/no), instrumental vaginal delivery (yes/no), sphincter tear (yes/no), lithotomy position (yes/no) Fecal incontinence at 5 months risk factors per multivariate analysis. Maternal age 2.7(1.2, 6.0). 2nd stage of labor >1 hour 2.2(1.1, 4.2) Instrumental delivery 3.1(1.3, 7.4), Sphincter tear 3.0(1.3, 6.7) Factor in Univariate Analysis. Maternal age at 5 months 3.4(1.6, 7.1), at 9 months 3.1(1.5, 6.6). Labor > 12 hours at 5 months 2.6(1.4, 5.1). 2nd stage labor > 1hour at 5 months 2.7(1.4, 5.0) Use of oxytocin at 5 months 2.1(1.02, 4.2). Fundal pressure 2.3 at 5 months(1.3, 4.4) Instrumental delivery at 5 months	Prevalence of Fecal Incontinence Before Pregnancy Fecal incontinence = 2(1%) total 1(3%) those with a sphincter tear 18(8%) those with no sphincter tears No fecal incontinence = 92%, fecal incontinence < once per week = 1%, fecal incontinence > once per week = 0 Prevalence of Fecal Incontinence at 5 months after delivery Fecal incontinence = 5(2%) total 1(3%) in those with tear 4(2%) in no sphincter tear No fecal incontinence = 73%, fecal incontinence < once per week = 1%, fecal incontinence > once per week = 0.5% Prevalence of Fecal

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community
F1f. Risk factors of fecal incontinence in adults (continued)

Author Sample	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of Incontinence. Definition of Risk Factors.	Level of Risk Factors	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
		4.9(2.2, 10.8). Sphincter tear at 5 months 3.8(1.8, 8.1), at 9 months 2.4(1.1, 5.2). Lithotomy position at 5 months 3.2(1.2, 8.5). Fecal incontinence at 9 months risk factors per multivariate analysis. Maternal age 3.0(1.4, 6.4), Sphincter 2.4(1.04, 4.9).	Incontinence at 9 months after delivery Fecal incontinence = 3(1%) total 0 in sphincter tear women 3(1%) in no sphincter tear No fecal incontinence = 73%, fecal incontinence < once per week = 1%, fecal incontinence > once per week = 0
Galandiuk, 1991[299] Retrospective chart review of delayed IPAA group of patients at Mayo Clinic, MN. N = 43 females N = 52 males Age: 14-60 years (Average = 31 years)	95 patients had a previous partial or subtotal colectomy (delayed IPAA group) Prior to a total chronic colectomy for ulcerative colitis-staged surgical procedure. **Method of Measurement:**, no definition of FI was reported. 776 patients had an ideal pouch anastomosis at the time of a total colectomy (IPAA concurrent group). **Definition of Risk Factors:** Delayed or concurrent IPAA.	Level of risk appears dichotomous. Yes/no for delayed IPAA yes/no for IPAA concurrent	3% of delayed IPAA group had severe incontinence during the day and 8% had severe incontinence at night 3% of those with IPAA concurrent had severe incontinence during the day and 10% at night
Nelson, 2001[300] Cross Sectional, Survey, secondary data analysis from Wisconsin nursing homes. N = 18,170 (1992) N = 17,117 (1993) 71% female (1993) 72% female (1992)	**Data Source:** Secondary analysis of data from 1992 (181 homes) and 1993 (177 homes)Wisconsin Center for Health Statistics Annual Nursing Home Survey **Definition of Incontinence:** Urinary Incontinence; listed on MDS as being frequently or always incontinent. Fecal Incontinence; "defined in a manner similar to urinary incontinence". Risk Factors were: age, gender, race, health indicators, body mass index in kg, history of heart disease, dementia, stroke, depression, vision impairment, arthritis, diabetes, constipation, diarrhea, fecal impaction, ulcers. Functional Status Indicators: ability to dress oneself, feed oneself, maintain personal hygiene, locomotion, mobility, use toilet transfer from bed to chair, tube feeding, trunk restraints. Age and BMI were continuous; all other risks	Correlates of UI 1992: Odds Ratio (95%CI) Fecal Incontinence 20.5 (18.6-22.6) Trunk restraints: 2.5 (2.3-2.8) Dementia 1.5 (1.4-1.7) Impaired vision 1.4 (1.3-1.5) Stroke: 1.3 (1.2-1.4) Constipation (1.2-1.4) Age 0.99 (0.98-0.99) Diarrhea 0.7 (0.5-0.8) Male sex 0.8 (0.7-0.9) Correlates of Urinary Incontinence in 1993 Fecal incontinence 17.8 (16.1-19.7) Trunk restraints 2.4 (2.1-2.7) Dementia 1.5 (1.4-1.7) Impaired vision 1.4 (1.3-1.6) Stroke 1.4 (1.2-1.5) Constipation 1.3 (1.2-1.4) Age 0.98 (0.98-0.99)	Urinary Incontinence: 1992 = 53.9% 1993 = 61% Age of those with urinary incontinence: 1992 = 85.9 years 1993 = 85.2 years. Age of continent residents: 1992 = 84.4 years 1993 = 85.2 years Prevalence by Severity of Urinary Incontinence: 1992: Occasionally = 8% Frequently = 15% 1993 Occasionally = 8.2% Frequently = 16.7% 1992: 93% Caucasian 1993: 95% Caucasian

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community
F1f. Risk factors of fecal incontinence in adults (continued)

Author Sample	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of Incontinence. Definition of Risk Factors.	Level of Risk Factors	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
	were dichotomous	Diarrhea 0.7 (0.6-0.9) Male sex 0.8 (0.7-0.8) Tube feeding 0.7 (0.5-0.9)	
Borrie, 1992[301] Cross sectional study of long term care hospital in Canada. N = 447 Average age: Male = 73.6 Female = 73.8 27% female	474 bed long term care hospital in 1986 N = 457 patients (the majority (240) were male veterans), 447 questionnaires were returned. **Method of Measurement:** nurse manager and primary nurse rated degree of patient's incontinence. **Definition of Incontinence:** a condition in which involuntary loss of urine or feces is a social or hygienic problem and is objectively demonstrable Urinary/Fecal incontinence = 1-2 incontinent events per week or 3-7 events per week.	Hierarchic regression was used: Step 1 = 10 most common diagnoses entered as a set. Step 2 = meds as a set. Step 3 = mobility and mental function. Mobility (4 levels): 1) independent, 2) supervised, 3) assistance, 4) immobile. Mental impairment (4 levels): 1) none, 2) mild, 30 moderate, 4) severe.	Overall UI prevalence = 62% Fecal incontinence = 46% Double incontinence = 44% UI in men = 61% UI in females = 65% Urinary incontinence: diagnosis accounted for 12% variance. F = 5.72 p <.001, meds for 5% F = 2.15 p <.05, mobility and mental impairment = 44% F = 207.0 p <.001 For Fecal Incontinence diagnosis = 11% of variance F = 5.3 p <.001 meds = 5% F = 2.33 p <.01, mobility and mental function = 40% F = 202.2 p <.001
Mecocci, 2005[302] Longitudinal, cross sectional study from hospitals in Italy. N = 13,729 Age: ≥65 Female = 73.3	81 community and university hospitals in Italy; data collected May-June and November-December for 5 years: N= 13,729 **Methods of Measurement:** Questionnaire completed by study MD daily and chart review. **Definition of Incontinence:** Incontinence had to be absent at admission and present at discharge; reported in patient's chart.	Age = 3 categories Length of stay in weeks = 3 categories ADL = 3 categories Others yes/no	Prevalence of Incontinence: Urinary incontinence = 22.3%; Males = 19.9% Females = 24.5% Cognitive impairment: 5.3(2.3-12.0) CVA = 2.4(1.1-5.3) Age > 85 years 3.2(1.1-9.8) Length of Stay >3 weeks 6.5(2.8-15.5) Totally dependent in ADL 2.9(1.1-7.6)
Jackson, 1997[303] Patients recruited from clinics of Cleveland Clinic Foundation. Average age: 53.3 (SD	Patients recruited from urogynecology and gynecology clinics of Cleveland Clinic Foundation; N = 247 F **Methods of Measurement:** Questionnaire and MD interview,	All levels not reported but appear to be yes/no for UI and IBS Sphincter tone levels; normal, diminished, absent. Correlates of fecal incontinence: urinary	Prevalence of Incontinence Fecal incontinence: n = 42 (17%) Urinary incontinence: n = 100 Double incontinence: n = 31

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community
F1f. Risk factors of fecal incontinence in adults (continued)

Author Sample	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of Incontinence. Definition of Risk Factors.	Level of Risk Factors	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
= 15.2 years) N = 247 (91% white; 9% black) 100% female	**Definition of Incontinence:** Involuntary loss of feces sufficient to be considered a problem by the patient. 91% white, (n = 225), 9% black, (n = 22)	incontinence OR = 4.6 CI = 1.9, 11.2 IBS OR = 8.3 CI = 2.1-32.8 Abnormal sphincter tone; OR = 2.3; 1.1,5.1	
Endo, 2002[304] Retrospective analysis of patient records in a U.S. geriatric clinic (1991-1999). Age: 78.6 (SD 6.5) 96.1% White 2.7% Black 1.2% Other N = 929 records 72.2% female	N = 929 patients records source: clinic records 1991-1999. **Definition of Incontinence:** Urinary incontinence; involuntary loss of urine sufficient to be a problem. Fecal Incontinence; involuntary loss of stool sufficient to be a problem. Double Incontinence; urinary and fecal incontinence. Isolated fecal incontinence; without urinary incontinence. Isolated urinary incontinence; without fecal incontinence. Any urinary incontinence; (with or without fecal incontinence).	IADSs MMSE CIRS: (cumulative illness rating scale and age were continuous variables Serum B12 1 ≥300 pg/ml 0 ≤300 pg/ml Medications = yes/no	Prevalence: Any urinary incontinence = 38.6% total; male = 30.6% female = 41.7% Isolated urinary incontinence = 34% total; male = 25.9% and female = 37.1% Any fecal incontinence = 11% total; male = 11.6% and female = 10.7% Isolated fecal incontinence = 4.2% total, male = 5.6% and female = 3.6% Double incontinence = 12.5% total; male = 10.6% and female = 13.3% Any incontinence = 41.2% total; male = 34.5% and female = 43.8% Correlates of Incontinence Isolated urinary incontinence Factor = anticonvulsants OR (CI) = 4.529 (1.230-16.675) Factor = Diuretics OR (CI) = 1.481 (1.016-2.158) Factor = antihistamines OR (CI) = 1.909 (1.013-3.599) Factor = IADLS OR (CI) = 0.956 (.929-.984) Isolated Fecal incontinence Factor = modified CIRS OR (CI) = 1.204 (1.056-1.373) Factor = Biz level

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community
F1f. Risk factors of fecal incontinence in adults (continued)

Author Sample	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of Incontinence. Definition of Risk Factors.	Level of Risk Factors	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
			OR (CI) = 2.225 (1.243-3.982) Factor = IADLs OR (CI) = .821 (.777-.867) Factor = Cathartic/laxative use OR (CI) = 1.902 (1.078-3.355) Factor = Diuretic use OR (CI) = 2.226 (1.264-3.921)
Chassagne, 1999[305] Cross sectional projective study in 13 French long term care facilities. Age: ≥60 years N = 1,186. % female unknown	**Methods of Measurement:** Medical records and observation. **Definition of Incontinence:** "at least one involuntary loss of feces". "Long-lasting fecal incontinence was not defined". **Exclusion criteria:** Fecal incontinence at start of surveillance.	Levels of risk were not reported Variables that were candidates for the multivariate regression analysis were not reported. 234 with fecal incontinence 83.5 years mean (SD). 952 without fecal incontinence = 82.9 (8.7) years. 171 females in those with fecal incontinence = 73%. 669 females without fecal incontinence = 70%.	Baseline prevalence of Fecal incontinence = 1,416 residents 234 residents developed fecal incontinence over 296 days Cumulative incidence = 20% 5 risks were associated with fecal incontinence Urinary incontinence RR = 20 (CI = 1.5, 2.6) Presence of neurological disease RR = 1.9 (1.0, 3.4) Poor Mobility RR = 1.7 (1.2, 2.4) MMSE < 15 RR = 1.4 (1.1, 1.9) Age > 70 years RR = 1.7 (1.0, 2.8) Risks for "long lasting" fecal incontinence history of urinary incontinence RR = 2.9 (1.8, 4.6) Decreased mobility RR = 1.8 (1.1, 3.0) MMSE score < 15 RR = (1.4, 4.4) History of dementia RR = 2.1 (1.2, 3.5) 68% of those with fecal incontinence had urinary incontinence 81% of those without fecal incontinence had urinary incontinence

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community
F1f. Risk factors of fecal incontinence in adults (continued)

Author Sample	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of Incontinence. Definition of Risk Factors.	Level of Risk Factors	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
Nelson, 1998[306] Cross sectional, Minimum Data Set (MDS) data of Wisconsin nursing home residents in 1992 and 1993; nursing homes. 1992, N = 18,224 1993, N = 17,127 % female not reported	**Methods of Measurement:** MDS questions. **Definition of Incontinence:** Fecal incontinence as; 1) usually continent, 2) occasionally incontinent, 3) frequently incontinent, or 4)incontinent. Similar definition for urinary incontinence. Number of residents:	All variables except age and body mass index (BMI) were dichotomous. Age and BMI were continuous. 1992: 71% = Fecal incontinence 1993: 72% female **Subject Race:** 1992:	Prevalence of Fecal Incontinence 1992: 47% had fecal incontinence. 1993: 46% had fecal incontinence. Associations with Fecal Incontinence in Wisconsin Nursing Homes: Minimum Data Set Reports from 1992 to 1993 Urinary Incontinence: 1992- 12.6; 11.5-13.7 1993- 11.3; 10.3-12.4 Tube feeding 1992- 7.6; 5.6-10.4 1993- 8.8; 6.3-12.3 Loss of ADL 1992- 6.0;4.7-7.7 1993- 7.3; 5.5-9.7 Diarrhea 1992-3.3; 2.7-4.2 1993-2.4; 1.9-3.1 Trunk restraints 1992- 3.2; 4.7-7.7 1993- 3.0; 2.7-9.8 Pressure Ulcer 1992- 2.6; 2.2-3.0 1993- 2.3;2.0-2.6 Dementia 1992- 1.5; 1.4-1.7 1993- 1.4; 1.3-1.5 Impaired Vision 1992- 1.5; 1.4-1.7 1993- 1.4; 1.3-1.5 Fecal impaction 1992- 1.5; 1.1-2.1 1993- 2.1; 1.3-3.3 Constipation 1992- 1.4; 1.3-1.6

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community
F1f. Risk factors of fecal incontinence in adults (continued)

Author Sample	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of Incontinence. Definition of Risk Factors.	Level of Risk Factors	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
			1993- 1.3; 1.2-1.4 Stroke 1992- 1.3; 1.2-1.5 1993- 1.2; 1.1-1.3 Male Gender 1992- 1.2; 1.1-1.3 1993- 1.3; 1.1-1.4 Non-Caucasian race 1992- NS 1993- 1.3; 1.0-1.7 Age 1992; 1.1-1.01 1993; 1.0; 1.0-1.01 Body mass index 1992- 1.0; 1.0-1.3 1993- 1.0; 1.0-1.04 Diabetes 1992- NS 1993- NS Heart disease 1992- 0.9; 0.8-1.0 1993- NS Arthritis 1992- 0.9; 0.8-1.0 1993- 0.8; 0.7-0.9 Depression 1992- NS 1993- 0.9; 0.8-1.0 NS = not statistically significant
Eason, 2002[283] Cross sectional study in Quebec hospitals N = 949 100% female	Target population of pregnant women who gave birth in 5 Quebec hospitals in 1995-1996 and had previously participated in a study of perineal massage. **Method of Measurement:** 1,198 received a mailed questionnaire 3 months after delivery..		
DeLeeuw, 2001[307] Retrospective cohort, comparative study of women in a Netherlands Hospital.	171 women who underwent primary repair of a 3rd and 4th degree perineal rupture between Jan 1971 and Dec 1990 were eligible as cases; controls were women matched for parity to cases who had a vaginal	Candidate variables: Extent of anal sphincter damage 3 levels: 1) partial rupture, 2) complete rupture with intact mucosa, and 3) complete rupture of sphincters mucosa.	Prevalence of complaints Anorectal complaints Cases (n = 125) = 50 (40) Controls (n = 125) = 19 (15) Mantel-Haenzel common

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community
F1f. Risk factors of fecal incontinence in adults (continued)

Author Sample	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of Incontinence. Definition of Risk Factors.	Level of Risk Factors	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
Median age at delivery: Cases; 26 (18-41) Control: 28 (19-38) N = 125 pairs 100% female	delivery without anal sphincter damage in the same hospital. Sample of 125 case and control pairs. **Method of Measurement:** Postal questionnaire and surgical records **Definition of Incontinence:** Parks classification of fecal incontinence	Presence of medio-lateral episiotomy, (yes/no). Subsequent vaginal delivery, (yes/no).	Odds-Ratio [95%-CI] = 3.64 [1.87-7.09] Fecal Incontinence Cases (n = 125) = 39 (31) Controls (n = 125) = 16 (13) Mantel-Haenzel common Odds-Ratio [95%-CI] = 3.09 [1.57-6.10] Grade-II Cases (n = 125) = 28 (22) Controls (n = 125) = 14 (11) Grade-III Cases (n = 125) = 10 (8) Controls (n = 125) = 2 (2) Grade-IV Cases (n = 125) = 1 (1) Controls (n = 125) = 0 Fecal urgency Cases (n = 125) = 32 (36) Controls (n = 125) = 7 (6) Mantel-Haenzel common Odds-Ratio [95%-CI] = 7.25 [2.55-20.62] Fecal soiling Cases (n = 125) = 12 (10) Controls (n = 125) = 1 (1) Mantel-Haenzel common Odds-Ratio [95%-CI] = 12.00 [1.56-92.29] Urinary incontinence Cases (n = 125) = 65 (52) Controls (n = 125) = 52 (42) Mantel-Haenzel common Odds-Ratio [95%-CI] = 1.46 [0.91-2.37] Stress-incontinence Cases (n = 125) = 63 (50) Controls (n = 125) = 50 (40) Mantel-Haenzel common Odds-Ratio [95%-CI] = 1.46

Table F1. Incidence, risk factors, and prevalence for urinary and fecal incontinence in adults in long term care setting and in the community
F1f. Risk factors of fecal incontinence in adults (continued)

Author Sample	Subject Selection, Data Source, Methods to Measure Incontinence (survey, screening, case finding), Definition of Incontinence. Definition of Risk Factors.	Level of Risk Factors	Prevalence (%) or Incidence of Fecal Incontinence, Overall: by Type, Severity, and Impact on Life
			[0.91-2.37] Urge-incontinence Cases (n = 125) = 32 (26) Controls (n = 125) = 28 (22) Mantel-Haenzel common Odds-Ratio [95%-CI] = 1.16 [0.68-1.98] Results are odds ratio and confidence interval for multivariate analysis: extent of perineal damage = 2.54 (1.45-4.45) Mediolateral episiotomy in primiparous women .17 (.05-.61)

F1g.Evidence tables of the association between risk factors and prevalence of fecal incontinence in adults in the community and in long-term care settings

Author, Study Design Adjustment for Confounding Factors	Subject election, Data Source, Measurement Methods, Definitions	Subject Age, Gender	Levels of Risk Factors		Prevalence and Incidence of FI and UI Incontinence, Odds Ratio
Bliss,2004[308] Design Cross sectional Adjustment for confounding factors: Numerous; age, sex etc.	1,352 elderly subjects selection: Elderly visiting HMO Clinics Methods to measure incontinence: survey distributed at clinics Definition of FI: accidental stool leakage during past 12 mos. Severity/type: amount of leakage Type of leakage Frequency of leakage	Mean age (SD) = 75(6) 60% female	Amount of leakage: Soils underwear, outerwear or shoes/floor FI frequency: ≥1/day Several times per week Several times per month One or more times per year Type: loose/liquid, formed, mucus		Overall prevalence = 26.3% 19% had FI ≥1/year; 1.5% had daily FI Prevalence of double incontinence = 1.7%
			Freq, Type, Amount	**Risk Factors with Cut Offs**	**Odds Ratio**
			Solid	urgency always	20 (2.9; 11)
				urgency most times	4.3 (0.9; 17)
			Loose liquid	hemorrhoid surgery	2.5 (1.4; 4.3
				urgency most times	3.1 (1.7; 5.8)
				urgency sometimes	2.1 (1.4; 3.2)
				loose liquid stool	2.8 (1.3; 6.1)
				Ref is no FI	**1 (1; 1)**
			Severity, frequency ≥1/day	loose or liquid stool	2.4 (1.3; 4.3)
				bowel resection	3.2 (1.5; 6.6)
				hemorrhoids	1.6 (1.1; 2.3)
			Frequency ≥1/day	stool softener for constipation	2.1 (1.1; 3.7)
				Urinary incontinence	2.5 (1.8; 3.4)
				self rate health as poor	1.2 (1; 1.4)
				urgency always	11 (5.1; 26)
				urgency most times	4.7 (2.8; 7.6)
				urgency sometime	3 (2.1; 4.3)
			Severity amount	Ref is no FI	**1 (1; 1)**
				loose liquid stool	3 (1.5; 5.8)
				bowel resection	2.2 (1.1; 4.5)
				mild memory problems	2.1 (1.4; 3)
				Moderate/severe memory problems	2.3 (1.4; 3.9)
				low back pain or sciatica	1.5 (1.1; 2.1)
				hemorrhoids	1.5 (1.1; 2.1)
				overweight	1.4 (1; 2)
				urgency sometime	2.8 (2; 4.1)
				urgency most times	5 (3; 8.6)
				urgency always	12 (4.9; 29)

Table F2. Prevalence of UI in community dwelling males by country, type, and definition of UI (the results from individual studies)

Author	Location	Age	N	Prevalence (%) 95%CI
Total				
Van Oyen, 2002[157]	Belgium	15-24	443	0.1 (0.10; 0.10)
Temml, 1999[170]	Austria	20-29	59	1.7 (1.67; 1.73)
Diokno, 2007[89]	USA	18-34	3,177	7.25 (7.24; 7.26)
Andersson, 2004[10]	Sweden	18-34	9,836	3 (3.00; 3.00)
Van Oyen, 2002[157]	Belgium	25-34	680	0 (0.00; 0.00)
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	<39	2,792	2.4 (2.39; 2.41)
Schulman, 1997[192]	Belgium	30-34	2,499	0.8 (0.80; 0.80)
Smoger, 2000[169]	USA	<40	67	25.4 (25.30; 25.50)
Temml, 2000[170]	Austria	30-39	184	2.7 (2.68; 2.72)
Schulman, 1997[192]	Belgium	35-39	2,499	2.6 (2.59; 2.61)
Brocklehurst, 1993[199]	Great Britain	30-49	867	2 (1.99; 2.01)
Diokno, 2007[89]	USA	35-44	4,295	7.17 (7.16; 7.18)
O'Brien, 1991[309]	UK	35-44	576	2.4 (2.39; 2.41)
Van Oyen, 2002[157]	Belgium	35-44	705	0.6 (0.59; 0.61)
Lagace, 1993[200]	USA	>20	922	11.3 (11.28; 11.32)
Schulman, 1997[192]	Belgium	40-44	2,499	2 (1.99; 2.01)
Andersson, 2004[10]	Sweden	35-49	9,836	6 (6.00; 6.00)
MacLennan, 2000[84]	Australia	15-97	1,464	4.4 (4.39; 4.41)
Temml, 2000[170]	Austria	40-49	458	3.9 (3.88; 3.92)
Ueda, 2000[172]	Japan	40-49	180	5 (4.97; 5.03)
Malmsten, 1997[188]	Sweden	45	1,151	3.6 (3.59; 3.61)
Smoger, 2000[169]	USA	41-50	165	30.9 (30.83; 30.97)
Schulman, 1997[192]	Belgium	45-49	2,499	2.3 (2.29; 2.31)
Roe, 2000[168]	UK	18-98	2,660	5.3 (5.29; 5.31)
Temml, 2005[310]	USA	20-91	1,199	1.8 (1.79; 1.81)
Andersson, 2004[10]	Sweden	18-79	9,836	10 (9.99; 10.01)
Temml, 2000[170]	Austria	20-96	1,236	5 (4.99; 5.01)
Schmidbauer, 2001[62]	Austria	20-91	1,236	5 (4.99; 5.01)
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	>18	8,130	5.4 (5.40; 5.40)
Diokno, 2007[89]	USA	45-54	4,510	10.98 (10.97; 10.99)
O'Brien, 1991[309]	UK	45-54	511	5.5 (5.48; 5.52)
Van Oyen, 2002[157]	Belgium	45-54	599	0.9 (0.89; 0.91)
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	40-59	3,096	5.2 (5.19; 5.21)
Malmsten, 1997[188]	Sweden	50	945	4.1 (4.09; 4.11)
Schulman, 1997[192]	Belgium	50-54	2,499	4.9 (4.89; 4.91)
Brocklehurst, 1993[199]	Great Britain	>30	1,883	6.6 (6.59; 6.61)
Schulman, 1997[192]	Belgium	>30	2,499	5.2 (5.19; 5.21)
Temml, 2000[170]	Austria	50-59	294	3.7 (3.68; 3.72)
Brocklehurst, 1993[199]	Great Britain	50-59	315	5.4 (5.38; 5.42)

Table F2. Prevalence of UI in American males by type and time period (continued)

Author	Location	Age	N	Prevalence (%) 95%CI
Ueda, 2000[172]	Japan	50-59	197	6.6 (6.57; 6.63)
Roberts, 1998[311]	USA	50-59	225	16.9 (16.85; 16.95)
O'Brien, 1991[309]	UK	>35	2,496	7.4 (7.39; 7.41)
Malmsten, 1997[188]	Sweden	55	779	3.3 (3.29; 3.31)
Bortolotti, 2000[165]	Italy	51-60	1,222	2 (1.99; 2.01)
Smoger, 2000[169]	USA	51-60	137	31.4 (31.32; 31.48)
Schulman, 1997[192]	Belgium	55-59	2,499	4.9 (4.89; 4.91)
Andersson, 2004[10]	Sweden	50-64	9,836	13 (12.99; 13.01)
Umlauf, 1996[195]	USA	52-64	223	20 (19.95; 20.05)
Ueda, 2000[172]	Japan	40-80	818	10.5 (10.48; 10.52)
Diokno, 2007[89]	USA	55-64	3,113	15.58 (15.57; 15.59)
O'Brien, 1991[309]	UK	55-64	584	5.7 (5.68; 5.72)
Van Oyen, 2002[157]	Belgium	55-64	428	2.7 (2.68; 2.72)
Roberts, 1998[311]	USA	40-79	2,150	17.3 (17.28; 17.32)
Boyle, 2003[121]	France	40-79	1,217	7.8 (7.78; 7.82)
	Netherlands	40-79	1,233	16.2 (16.18; 16.22)
	UK	40-79	990	14 (13.98; 14.02)
	South Korea	40-79	1,360	10 (9.98; 10.02)
Smoger, 2000[169]	USA	25-93	809	32.3 (32.27; 32.33)
		25-93	660	32 (31.96; 32.04)
		25-93	133	33.1 (33.02; 33.18)
		25-93	11	36.4 (36.16; 36.64)
Aggazzotti, 2000[163]	Italy	<65	217	19.1 (19.05; 19.15)
Perry, 2000[312]	UK	>40	6,941	8.9 (8.89; 8.91)
Malmsten, 1997[188]	Sweden	60	775	5.1 (5.08; 5.12)
McGrother, 2003[26]	UK	>40	42,939	14.2 (14.20; 14.20)
Teunissen, 2004[119]	Netherlands	60-64	2,137	5 (4.99; 5.01)
Schulman, 1997[192]	Belgium	60-64	2,499	5.5 (5.49; 5.51
Stothers, 2005[116]	USA	60-64	5,037,678	11 (11.00; 11.00)
Roberts, 1998[311]	USA	>50	766	26.4 (26.37; 26.43)
Goluboff, 1998[313]	Columbia		480	13.1 (13.07; 13.13)
Malmsten, 1997[188]	Sweden	45-99	7,763	9.2 (9.19; 9.21)
Temml, 1999[170]	Austria	60-69	132	7.6 (7.56; 7.64)
Ueda, 2000[172]	Japan	60-69	281	11.4 (11.36; 11.44)
Roberts, 1998[311]	USA	60-69	270	23.7 (23.65; 23.75)
Diokno, 1990[314]	USA	60-69	489	18.2 (18.17; 18.23)
Koyama, 1998[177]	Japan	60-69	308	1.3 (1.29; 1.31)
Bortolotti, 2000[165]	Italy	>50	2,721	3.4 (3.39; 3.41)
Jorgensen, 2005[114]	Norway	31-93	136	4 (3.97; 4.03)
Malmsten, 1997[188]	Sweden	65	739	6.1 (6.08; 6.12)
Bogren, 19979464154	Sweden	65	233	9 (8.96; 9.04)

Table F2. Prevalence of UI in American males by type and time period (continued)

Author	Location	Age	N	Prevalence (%) 95%CI
Bortolotti, 2000[165]	Italy	61-70	768	2.6 (2.59; 2.61)
Smoger, 2000[169]	USA	61-70	237	36.3 (36.24; 36.36)
Teunissen, 2004[119]	Netherlands	65-69	2,137	6 (5.99; 6.01)
Stoddart, 2001[162]	Great Britain	65-69	167	12 (11.95; 12.05)
Schulman, 1997[192]	Belgium	65-69	2,499	8.5 (8.4; 8.51)
Maggi, 2001[158]	Italy	65-69	867	4.6 (4.59; 4.61)
Stothers, 2005[116]	USA	65-69	4,731,187	11 (11.00; 11.00)
Haltbakk, 2005[315]	Norway	39-91	480	36.7 (36.66; 36.74)
Brocklehurst, 1993[199]	Great Britain	60+	701	13.3 (13.27; 13.33)
Teunissen, 2004[119]	Netherlands	>60	2,137	9 (8.99; 9.01)
Tseng, 2000[171]	Taiwan	<70	65	13.8 (13.72; 13.88)
		>70	181	15.5 (15.45; 15.55)
Adolfsson, 1998[252]	Sweden	50-80	656	20.6 (20.57; 20.63)
Joly, 1998[316]	Netherlands	51-82	65	9 (8.93; 9.07)
Jitapunkul, 1998[182]	Thailand	>60	232	16.81 (16.76; 16.86)
Diokno, 2007[89]	USA	65-74	2,260	23.82 (23.80; 23.84)
Aggazzotti, 2000[163]	Italy	65-74	217	22.7 (22.64; 22.76)
O'Brien, 1991[309]	UK	65-74	506	12.1 (12.07; 12.13)
Umlauf, 1996[195]	USA	65-74	724	26 (25.97; 26.03)
Van Oyen, 2002[157]	Belgium	65-74	384	5.2 (5.18: 5.22)
Herzog, 1990[41]	USA	>60	802	18.8 (18.77; 18.83)
Diokno, 1990[314]	USA	>60	802	18.8 (18.77: 18.83)
Diokno, 1991[317]	USA	>60	655	20.2(20.17; 20.23)
Sgadari, 1997[40]	Denmark	>60	1,799	51.2 (51.18; 51.22)
	France	>60	167	46 (45.93; 46.07)
	Iceland	>60	377	64.4 (64.35; 64.45)
	Italy	>60	586	36 (35.96; 36.04)
	Japan	>60	539	51.6 (51.56; 51.64)
	Sweden	>60	436	61.4 (61.35; 61.45)
	USA	>60	12,6070	44.5 (44.50; 44.50)
Van Oyen, 2002[157]	Belgium	>15	3,462	1.4 (1.40; 1.40)
Malmsten, 1997[188]	Sweden	70	776	7.3 (7.28; 7.32)
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	>60	2,029	10.4 (10.39; 10.41)
Ouslander, 1990[318]	USA		60	37 (36.88; 37.12)
Umlauf1996[195]	USA	52-99	1,490	29 (28.98; 29.02)
Teunissen, 2004[119]	Netherlands	70-74	2,137	8 (7.99; 8.01)
Stoddart, 2001[162]	Great Britain	70-74	194	21.1 (21.04; 21.16)
Maggi, 2001[158]	Italy	70-74	867	12.6 (12.58; 12.62)
Stothers, 2005[116]	USA	70-74	3,320,840	19 (19.00; 19.00)
Andersson, 2004[10]	Sweden	65-79	9,836	21 (20.99; 21.01)
Schulman, 1997[192]	Belgium	70+	2,499	13.8 (13.79; 13.81)

Table F2. Prevalence of UI in American males by type and time period (continued)

Author	Location	Age	N	Prevalence (%) 95%CI
Tseng, 2000[171]	Taiwan	>65	248	15 (14.96; 15.04)
Damian, 1998[176]	Spain	>65	589	14.5 (14.47; 14.53)
Stothers, 2005[116]	USA	>65	1,8231,934	17 (17.00; 17.00)
Nakanishi, 1997[190]	Japan	>65	1,405	8.7 (8.69; 8.71)
Ju, 1991[205]	Singapore	>65	435	4.4 (4.38; 4.42)
Borrie, 1992[301]	Canada		326	61 (60.95; 61.05)
Roberts, 1998[311]	USA	70-79	217	35.9 (35.84; 35.96)
Diokno, 1990[319]	USA	70-79	229	18.8 (18.75; 18.85)
Koyama, 1998[177]	Japan	70-79	378	8 (7.97; 8.03)
Bortolotti, 2000[165]	Italy	>70	731	6.6 (6.58; 6.62)
Ueda, 2000[172]	Japan	>70	160	20 (19.94; 20.06)
Stoddart, 2001[162]	Great Britain	>65	781	23.4 (23.37; 23.43)
Malmsten, 1997[188]	Sweden	75	583	9.6 (9.58; 9.62)
Maggi, 2001[158]	Italy	>65	867	11.5 (11.48; 11.52)
Smoger, 2000[169]	USA	71-80	178	33.2 (33.13; 33.27)
Koyama, 1998[177]	Japan	>60	856	6.1 (6.08; 6.12)
Nuotio, 2003, [136]	Finland	>70	171	25 (24.94; 25.06)
Iglesias, 2000[167]	Spain	>65	341	32.3 (32.25; 32.35)
Teunissen, 2004[119]	Netherlands	75-79	2,137	14 (13.99; 14.01)
Stoddart, 2001[162]	Great Britain	75-79	198	22.2 (22.14; 22.26)
Maggi, 2001[158]	Italy	75-79	867	12.3 (12.28; 12.32)
Stothers, 2005[116]	USA	75-79	2,748,396	27 (27.00; 27.00)
Kutner, 1994[197]	USA	>65	113	4.5 (4.46; 4.54)
Stenzelius, 2004[54]	Sweden	75-79	655	31.2 (31.16; 31.24)
O'Brien, 1991[309]	UK	>75	319	15.4 (15.36; 15.44)
Van Oyen, 2002[157]	Belgium	>75	223	13.3 (13.26; 13.34)
Adelmann, 2004[50]	USA	>65	163	25.8 (25.73; 25.87)
		>65	22	13.6 (13.47; 13.73)
		>65	100	72 (71.91; 72.09)
Langa, 2002[82]	USA	>70	2,812	13 (12.99; 13.01)
Aggazzotti, 2000[163]	Italy	75-84	217	51.8 (51.73; 51.87)
Umlauf, 1996[195]	USA	75-84	452	38 (37.96; 38.04)
Malmsten, 1997[188]	Sweden	80	360	19.7 (19.66; 19.74)
Temml, 2005[310]	USA	>70	106	5.7 (5.66; 5.74)
Maggi, 2001[158]	Italy	80-84	867	22.2 (22.17; 22.23)
Aggazzotti, 2000, [163]	Italy	33-102	217	39.2 (39.14; 39.26)
Stothers, 2005[116]	USA	80-84	1,478,414	27 (27.00; 27.00)
Stenzelius, 2004[54]	Sweden	80-84	554	32.5 (32.46; 32.54)
Stoddart, 2001[162]	Great Britain	>80	222	34.2 (34.14; 34.26)
Roberts, 1998, [311]	USA	>80	54	40.7 (40.57; 40.83)
Boyington, 2007[43]	Southeastern USA	>65	22,539	72.2 (72.19; 72.21)

Table F2. Prevalence of UI in American males by type and time period (continued)

Author	Location	Age	N	Prevalence (%) 95%CI
Temml, 1999[170]	Austria	>70	109	15.6 (15.53; 15.67)
Stenzelius2004[54]	Sweden	>75	1,642	34.8 (34.78; 34.82)
Brandeis, 1997[186]	USA	60-105	474	24.1 (24.06; 24.14)
Teunissen, 2004[119]	Netherlands	>80	2,137	21 (20.98; 21.02)
Diokno, 1990[319]	USA	>80	85	22.4 (22.31; 22.49)
Koyama, 1998[177]	Japan	>80	170	10.6 (10.55; 10.65)
Diokno, 2007[89]	USA	75-97	1,386	30.19 (30.17; 30.21)
Smoger, 2000[169]	USA	80-93	25	20 (19.85; 20.15)
Malmsten, 1997[188]	Sweden	85-89	1,279	21.8 (21.78; 21.82)
Stenzelius, 2004[54]	Sweden	85-89	300	43.6 (43.54; 43.66)
Stothers, 2005[116]	USA	>85	915,419	31 (31.00; 31.00)
Aggazzotti, 2000[163]	Italy	85-94	217	52.4 (52.33; 52.47)
Umlauf, 1996[195]	USA	85-94	51	31 (30.88; 31.12)
Maggi, 2001[158]	Italy	>85	867	23.6 (23.57; 23.63)
Stenzelius, 2004[54]	Sweden	>90	133	41.9 (41.82; 41.98)
Malmsten, 1997[188]	Sweden	90-99	376	28.2 (28.15; 28.25)
Aggazzotti, 2000[163]	Italy	95+	217	57.1 (57.03; 57.17)
Umlauf, 1996[195]	USA	95-99	3	66 (65.65; 66.35)
Mixed				
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	<39	2,500	0.4 (0.40; 0.40)
MacLennan, 2000[84]	Australia	15-97	1,464	1 (0.99; 1.01)
Ueda, 2000[172]	Japan	40-49	180	0 (0.00; 0.00)
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	>18	8,167	0.6 (0.60; 0.60)
		40-59	3,000	0.4 (0.40; 0.40)
Diokno, 2007[89]	USA	18-97	21,590	1.8 (1.80; 1.80)
Ueda, 2000[172]	Japan	50-59	197	0.4 (0.39; 0.41)
		40-80	818	1.5 (1.49; 1.51)
		60-69	281	0.7 (0.69; 0.71)
Diokno, 1990[319]	USA	60-69	489	5.3 (5.28; 5.32)
Bortolotti, 2000[165]	Italy	>50	2,721	20 (19.98; 20.02)
Roberts, 1998[311]	USA	>50	775	6.7 (6.68; 6.72)
Jitapunkul, 1998[182]	Thailand	>60	232	1.72 (1.70; 1.74)
Diokno, 1990[319]	USA	>60	802	5.5 (5.48; 5.52)
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	>60	2,250	1.2 (1.20; 1.20)
Umlauf, 1996[195]	USA	52-99	1,490	13.1 (13.08; 13.12)
Damian, 1998[176]	Spain	>65	589	2.3 (2.29; 2.31)
Ju, 1991[205]	Singapore	>65	435	0 (0.00; 0.00)
Diokno, 1990[319]	USA	70-79	229	4.4 (4.37; 4.43)
Ueda, 2000[172]	Japan	>70	160	0.4 (0.39; 0.41)
Nuotio, 2003[136]	Finland	>70	171	6 (5.96; 6.04)
Diokno, 1990[319]	USA	>80	85	9.4 (9.34; 9.46)

Table F2. Prevalence of UI in American males by type and time period (continued)

Author	Location	Age	N	Prevalence (%) 95%CI
Stress				
Maral, 2001[159]	Turkey	15-24	273	0 (0.00; 0.00)
	Turkey	25-34	182	0 (0.00; 0.00)
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	<39	3,000	0.1 (0.10; 0.10)
Maral, 2001[159]	Turkey	35-44	235	0.9 (0.89; 0.91)
MacLennan, 2000[84]	Australia	15-97	1,464	1.5 (1.49; 1.51)
Ueda, 2000[172]	Japan	40-49	180	0.2 (0.19; 0.21)
Engstrom, 2003[125]	UK	40-49	687	1 (0.99; 1.01)
Muscatello, 2001[160]	Australia	41-49	232	7 (6.97; 7.03)
Maral, 2001[159]	Turkey	>15	1,000	1 (0.99; 1.01)
Temml, 1999[170]	Austria	20-96	1,236	1.5 (1.49; 1.51)
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	>18	8,167	0.6 (0.60; 0.60)
Mozes, 1997[189]	Israel	45-54	363	0.3 (0.29; 0.31)
Maral, 2001[159]	Turkey	45-54	169	1.2 (1.18; 1.22)
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	40-59	2,833	0.6 (0.60; 0.60)
Diokno, 2007[89]	USA	18-97	21,590	2.4 (2.40; 2.40)
Muller, 2005[320]	USA	30-70	1,001	2 (1.99; 2.01)
Corcos, 200[12]	Canada	>35	1,566	0.8 (0.80; 0.80)
Ueda, 2000[172]	Japan	50-59	197	0.5 (0.49; 0.51)
Muscatello, 2001[160]	Australia	50-59	232	2 (1.98; 2.02)
Engstrom, 2003[125]	UK	50-59	717	2 (1.99; 2.01)
	UK	40-80	2,217	2 (1.99; 2.01)
Mozes, 1997[189]	Israel	45-75	896	2.1 (2.09; 2.11)
Ueda, 2000[172]	Japan	40-80	818	1.3 (1.29; 1.31)
Mozes, 1997[189]	Israel	55-64	241	2.9 (2.88; 2.92)
Maral, 2001[159]	Turkey	55-64	80	3.8 (3.76; 3.84)
Muscatello, 2001[160]	Australia	>40	232	9 (8.96; 9.04)
Koskimaki, 1998[178]	Finland	50-70	2,128	9 (8.99; 9.01)
Goepel, 2001[321]	Germany	>40	211,648	11.6 (11.60; 11.60)
Ueda, 2000[172]	Japan	60-69	281	0.5 (0.49; 0.51)
Muscatello, 2001[160]	Australia	60-69	232	25 (24.94; 25.06)
Diokno, 1990[319]	USA	60-69	489	1.4 (1.39; 1.41)
Engstrom, 2003[125]	UK	60-69	465	4 (3.98; 4.02)
Bortolotti, 2000[165]	Italy	>50	2,721	6 (5.99; 6.01)
Roberts, 1998[183]	USA	>50	775	0.9 (0.89; 0.91)
Jitapunkul, 1998[182]	Thailand	>60	232	0.43 (0.42; 0.44)
Mozes, 1997[189]	Israel	65-75	293	3.8 (3.78; 3.82)
Diokno, 1990[319]	USA	>60	802	1.4 (1.39; 1.41)
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	>60	1,813	1.6 (1.59; 1.61)
Umlauf, 1996[195]	USA	52-99	1,490	0.5 (0.50; 0.50)
Tseng, 2000[171]	Taiwan	>65	248	1.2 (1.19; 1.21)

Table F2. Prevalence of UI in American males by type and time period (continued)

Author	Location	Age	N	Prevalence (%) 95%CI
Damian, 1998[176]	Spain	>65	589	1.5 (1.49; 1.51)
Maral, 2001[159]	Turkey	>65	61	4.9 (4.85; 4.95)
Diokno, 1990[319]	USA	70-79	229	1.7 (1.68; 1.72)
Ueda, 2000[172]	Japan	>70	160	0.1 (0.10; 0.10)
Muscatello, 2001[160]	Australia	>70	232	11 (10.96; 11.04)
Engstrom, 2003[125]	UK	70-80	348	5 (4.98; 5.02)
Koyama, 1998[177]	Japan	>60	856	0.7 (0.69; 0.71)
Nuotio, 2003[136]	Finland	>70	171	2 (1.98; 2.02)
Diokno, 1990[319]	USA	>80	85	0 (0.00; 0.00)
Urge				
Maral, 2001[159]	Turkey	15-24	273	1.1 (1.09; 1.11)
	Turkey	25-34	182	0 (0.00; 0.000
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	<39	2,500	0.4 (0.40; 0.40)
Corcos, 2004[12]	Canada	35-44	591	11.1 (11.07; 11.13)
Maral, 2001[159]	Turkey	35-44	235	1.3 (1.29; 1.31)
MacLennan, 2000[84]	Australia	15-97	1,464	1.9 (1.89; 1.91)
Ueda, 2000[172]	Japan	40-49	180	0.9 (0.89; 0.91)
Engstrom, 2003[125]	UK	40-49	687	1 (0.99; 1.01)
Muscatello, 2001[160]	Australia	41-49	232	7 (6.97; 7.03)
Maral, 2001[159]	Turkey	>15	1,000	2.7 (2.69; 2.71)
Temml, 1999[170]	Austria	20-96	1,236	2.7 (2.69; 2.71)
Moorthy, 2003[118]	Asia (China, Hong Kong, India, Indonesia, Malaysia, Pakistan, Philippines, Singapore, South Korea, Taiwan, and Thailand)	>18	2,369	13 (12.99; 13.01)
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	>18	8583	1.2 (1.20; 1.20)
Corcos, 2004[12]	Canada	45-54	4,63	14.3 (14.27; 14.33)
Maral, 2001[159]	Turkey	45-54	169	3.6 (3.57; 3.63)
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	40-59	3,154	1.3 (1.30; 1.30)
Diokno, 2007[89]	USA	18-97	21,590	4.3 (4.30; 4.30)
Stewart, 2002[141]	USA	>18	2,469	2.6 (2.59; 2.61)
Ueda, 2000[172]	Japan	50-59	197	0.7 (0.69; 0.71)
Muscatello, 2001[160]	Australia	50-59	232	2 (1.98; 2.02)
Engstrom, 2003[125]	UK	50-59	717	5 (4.98; 5.02)
Lee, 1998[322]	Korea	50-59	232	9.9 (9.86; 9.94)
Engstrom, 2003[125]	UK	40-80	2,217	6 (5.99; 6.01)
Ueda, 2000[172]	Japan	40-80	818	7.7 (7.68; 7.72)
Corcos, 2004[12]	Canada	55-64	265	17.5 (17.45; 17.55)
Maral, 2001[159]	Turkey	55-64	80	11.3 (11.23; 11.37)
Muscatello, 2001[160]	Australia	>40	232	9 (8.96; 9.04)
Koskimaki, 1998[178]	Finland	50-70	2,128	17 (16.98; 17.02)
Sladden, 1999[323]	Australia	40-80	330	4 (3.98; 4.02)
Goepel, 2001[321]	Germany	>40	211,648	14.3 (14.30; 14.30)

Table F2. Prevalence of UI in American males by type and time period (continued)

Author	Location	Age	N	Prevalence (%) 95%CI
Ueda, 2000[172]	Japan	60-69	281	2.7 (2.68; 2.72)
Muscatello, 2001[160]	Australia	60-69	232	18 (17.95; 18.05)
Diokno, 1990[319]	USA	60-69	489	6.7 (6.68; 6.72)
Engstrom, 2003[125]	UK	60-69	465	9 (8.97; 9.03)
Lee, 1998[322]	Korea	60-69	181	14.9 (14.85; 14.95)
Bortolotti, 2000[165]	Italy	>50	2,721	20 (19.98; 20.02)
Roberts, 1998[311]	USA	>50	775	10.8 (10.78; 10.82)
Lee, 1998[322]	Korea	>50	519	14.2 (14.17; 14.23)
Jitapunkul, 1998[182]	Thailand	>60	232	7.33 (7.30; 7.36)
Stewart, 2002[141]	USA	65-74	232	8.2 (8.16; 8.24)
Corcos, 2004[12]	Canada	65-74	151	21.5 (21.44; 21.56)
Diokno, 1990[319]	USA	>60	802	6.6 (6.58; 6.62)
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	>60	2,080	2.5 (2.49; 2.51)
Umlauf, 1996[195]	USA	52-99	1,490	10.6 (10.58; 10.62)
Tseng, 2000[171]	Taiwan	>65	248	5.6 (5.57; 5.63)
Damian, 1998[176]	Spain	>65	589	7.6 (7.58; 7.62)
Ju, 1991[205]	Singapore	>65	435	0.5 (0.49; 0.51)
Maral, 2001[159]	Turkey	>65	61	9.7 (9.63; 9.77)
Nuotio, 2002[148]	Finland	60-89	524	5.3 (5.28; 5.32)
Diokno, 1990[319]	USA	70-79	229	7.4 (7.37; 7.43)
Nuotio, 2002[148]	Finland	70-79	171	21.1 (21.04; 21.16)
Ueda, 2000[172]	Japan	>70	160	3.4 (3.37; 3.43)
Muscatello, 2001[160]	Australia	>70	232	17 (16.95; 17.05)
Engstrom, 2003[125]	UK	70-80	348	15 (14.96; 15.04)
Koyama, 1998[177]	Japan	>60	856	3.7 (3.69; 3.71)
Lee, 1998[322]	Korea	>70	106	23.5 (23.42; 23.58)
Nuotio, 2003[136]	Finland	>70	171	17 (16.94; 17.06)
Stewart, 2002[141]	USA	>75	128	12.8 (12.74; 12.86)
Corcos, 2004[12]	Canada	>75	90	29.5 (29.41; 29.59)
Nuotio, 2002[148]	Finland	70-98	171	28.9 (28.83; 28.97)
Diokno, 1990[319]	USA	>80	85	3.5 (3.46; 3.54)
Nuotio, 2002[148]	Finland	80-98	171	34.3 (34.23; 34.37)
Homma, 2005[113]	Japan	40-100	2,100	6 (5.99; 6.01)
Other type of UI				
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	<39	2,933	1.5 (1.50; 1.50)
	Canada, Germany, Italy, Sweden, and the UK	>18	8,207	2.9 (2.90; 2.90)
	Canada, Germany, Italy, Sweden, and the UK	40-59	3,033	3 (2.99; 3.01)
Diokno, 2007[89]	USA	18-97	21,590	1.2 (1.20; 1.20)
Koskimaki, 1998[178]	Finland	50-70	2,128	10 (9.99; 10.01)
Diokno, 1990[319]	USA	60-69	489	4.7 (4.68; 4.72)
Roberts, 1998[311]	USA	>50	775	8.3 (8.28; 8.32)

Table F2. Prevalence of UI in American males by type and time period (continued)

Author	Location	Age	N	Prevalence (%) 95%CI
Diokno, 1990[319]	USA	>60	802	5.4 (5.38; 5.42)
Irwin, 2006[96]	Canada, Germany, Italy, Sweden, and the UK	>60	1,981	5.2 (5.19; 5.21)
Damian, 1998[176]	Spain	>65	589	3.1 (3.09; 3.11)
Diokno, 1990[319]	USA	70-79	229	5.2 (5.17; 5.23)
Koyama, 1998[177]	Japan	>60	856	1.6 (1.59; 1.61)
Diokno, 1990[319]	USA	>80	85	9.4 (9.34; 9.46)

Table F3. Prevalence of UI in American males by type and time period of involuntary loss of urine (the results from individual studies)

Author	Time Involuntary Leakage of Urine Reported (months)	Sample Size	Prevalence (%) 95%CI
Total UI			
Median age of sample: 19-44 years			
Diokno, 2007[89]	1	3,177	7.25 (7.24; 7.26)
	1	4,295	7.17 (7.16; 7.18)
Smoger, 2000[169]	12	67	25.40 (25.30; 25.50)
Lagace, 1993[200]	12	922	11.30 (11.28; 11.32)
Median age of sample: 45-64 years			
Diokno, 2007[89]	1	4,510	10.98 (10.97; 10.99)
Umlauf, 1996[195]	1	223	20.00 (19.95; 20.05)
Diokno, 2007[89]	1	3,113	15.58 (15.57; 15.59)
Smoger, 2000[169]	12	165	30.90 (30.83; 30.97)
Roberts, 1998[311]	12	225	16.90 (16.85; 16.95)
Smoger, 2000[169]	12	137	31.40 (31.32; 31.48)
Roberts, 1998[183]	12	2,150	17.30 (17.28; 17.32)
Smoger, 2000[169]	12	809	32.30 (32.27; 32.33)
Roberts, 1998[311]	12	766	26.40 (26.37; 26.43)
	12	270	23.70 (23.65; 23.75)
Diokno, 1990[314]	6 days/12	489	18.20 (18.17; 18.23)
Stothers, 2005[116]	ever	5,037,678	11.00 (11.00; 11.00)
Temml, 2005[310]	ND	1199	1.80 (1.79; 1.81)
Median age of sample: ≥65 years			
Diokno, 2007[89]	1	2,260	23.82 (23.80; 23.84)
Umlauf, 1996[195]	1	724	26.00 (25.97; 26.03)
Umlauf, 1996[195]	1	1,490	29.00 (28.98; 29.02)
	1	452	38.00 (37.96; 38.04)
Smoger, 2000[169]	12	237	36.30 (36.24; 36.36)
Herzog, 1990[41]	12	802	18.80 (18.77; 18.83)
Roberts, 1998[311]	12	217	35.90 (35.84; 35.96)
Smoger, 2000[169]	12	178	33.20 (33.13; 33.27)
Langa, 2002[82]	12	2,812	13.00 (12.99; 13.01)
Diokno, 1990[314]	6 days/12	802	18.80 (18.77; 18.83)
Diokno, 1991[317]	6 days/12	655	20.20 (20.17; 20.23)
Diokno, 1990[314]	6 days/12	229	18.80 (18.75; 18.85)
Stothers, 2005[116]	ever	4,731,187	11.00 (11.00; 11.00)
		3,320,840	19.00 (19.00; 19.00)
		18,231,934	17.00 (17.00; 17.00)
		2,748,396	27.00 (27.00; 27.00)
Kutner, 1994[197]	ND	113	4.50 (4.46; 4.54)
Adelmann, 2004[50]	ND	163	25.80 (25.730; 25.87)
		22	13.60 (13.47; 13.73)
Median age of sample: ≥80 years			
Diokno, 2007[89]	1	1,386	30.19 (30.17; 30.21)
Umlauf, 1996[195]	1	51	31.00 (30.88; 31.12)
	1	3	66.00 (65.65; 66.35)
Roberts, 1998[311]	12	54	40.70 (40.57; 40.83)
Diokno, 1990[314]	12	85	22.40 (22.31; 22.49)
Smoger, 2000[169]	12	25	20.00 (19.85; 20.15)
Brandeis, 1997[186]	2 episodes/week	474	24.10 (24.06; 24.14)
Stothers, 2005[116]	ever	1,478,414	27.00 (27.00; 27.00)
		915,419	31.00 (31.00; 31.00)
Boyington, 2007[43]	ever	22,539	72.20 (72.19; 72.21)
Temml, 2005[310]	ND	106	5.70 (5.66; 5.74)
Mixed UI			
Median age of sample: 45-64 years			
Diokno, 2007[89]	1	21,590	1.80 (1.80; 1.80)
Diokno, 1990[314]	6 days/12	489	5.30 (5.28; 5.32)

Table F3. Prevalence of UI in American males by type and time period of involuntary loss of urine (the results from individual studies) (continued)

Author	Time Involuntary Leakage of Urine Reported (months)	Sample Size	Prevalence (%) 95%CI
Median age of sample: ≥65 years			
Diokno, 1990[314]	6 days/12	802	5.50 (5.48; 5.52)
	6 days/12	229	4.40 (4.37; 4.43)
Umlauf, 1996[195]	1	1,490	13.10 (13.08; 13.12)
Roberts, 1998[183]	12	775	6.70 (6.68; 6.72)
Median age of sample: ≥80 years			
Diokno, 1990[314]	6 days/12	85	9.40 (9.34; 9.46)
Stress UI			
Median age of sample: 45-64 years			
Diokno, 2007[89]	1	21,590	2.40 (2.40; 2.40)
Diokno, 1990[314]	12	489	1.40 (1.39; 1.41)
Muller, 2005[320]	ND	1,001	2.00 (1.99; 2.01)
Median age of sample: ≥65 years			
Diokno, 1990[314]	6 days/12	802	1.40 (1.39; 1.41)
	6 days/12	229	1.70 (1.68; 1.72)
Umlauf, 1996[195]	1	1,490	0.50 (0.50; 0.50)
Roberts, 1998[183]	12	775	0.90 (0.89; 0.91)
Median age of sample: ≥80 years			
Diokno, 1990[314]	6 days/12	85	0.00 (0.00; 0.00)
Urge UI			
Median age of sample: 45-64 years			
Diokno, 1990[314]	6 days/12	489	6.70 (6.68; 6.72)
Diokno, 2007[89]	1	21,590	4.30 (4.30; 4.30)
Stewart, 2003[141]	ND	2,469	2.60 (2.59; 2.61)
Median age of sample: ≥65 years			
Diokno, 1990[314]	6 days/12	802	6.60 (6.58; 6.62)
	6 days/12	229	7.40 (7.37; 7.43)
Umlauf, 1996[195]	1	1,490	10.60 (10.58; 10.62)
Roberts, 1998[183]	12	775	10.80 (10.78; 10.82)
Stewart, 2003[141]	ND	232	8.20 (8.16; 8.24)
	ND	128	12.80 (12.74; 12.86)
Median age of sample: ≥80 years			
Diokno, 1990[314]	6 days/12	85	3.50 (3.46; 3.54)

Table F4. Prevalence of UI by severity in age groups of the American men (the results from individual studies)

Author	Time Involuntary Leakage of Urine Reported (months)	Frequency	Amount	Age	Sample Size	Prevalence (%) 95%CI
Median age: 19-44 years						
Smoger, 2000[169]	12	<1/month		<40	67	11.90 (11.82; 11.98)
Lagace, 1993[200]	12	<Once/month	Loss of a few drops	>20	922	2.30 (2.29; 2.31)
		<Once/month	Wet outerwear	>20	922	0.30 (0.30; 0.30)
		<Once/month	Wet underwear	>20	922	1.00 (0.99; 1.01)
Smoger, 2000[169]	12	About 1/month		<40	67	1.50 (1.47; 1.53)
Lagace, 1993[200]	12	Monthly	Loss of a few drops	>20	922	2.10 (2.09; 2.11)
		Monthly	Wet outerwear	>20	922	0.20 (0.20; 0.20)
		Monthly	Wet underwear	>20	922	5.00 (4.99; 5.01)
		Monthly	Wet underwear	>20	922	0.50 (0.50; 0.50)
Smoger, 2000[169]	12	<1/week		<40	67	1.50 (1.47; 1.53)(
		About 1/week		<40	67	1.50 (1.47; 1.53)
Lagace, 1993[200]	12	Weekly	Loss of a few drops	>20	922	0.90 (0.89; 0.91)
		Weekly	Wet outerwear	>20	922	0.20 (0.20; 0.20)
		Weekly	Wet underwear	>20	922	0.80 (0.79; 0.81)
Smoger, 2000[169]	12	Almost every day		<40	67	9.00 (8.93; 9.07)
Lagace, 1993[200]	12	Daily	Loss of a few drops	>20	922	0.80 (0.79; 0.81)
		Daily	Wet outerwear	>20	922	0.80 (0.79; 0.81)
		Daily	Wet underwear	>20	922	1.50 (1.49; 1.51)
Smoger, 2000[169]	12		Wet my underwear	<40	67	9.00 (8.93; 9.07)
			Wet outer clothing	<40	67	3.00 (2.96; 3.04)
Roberts, 1998[183]	12		Wet underclothing	40-79	2,150	10.80 (10.79; 10.81)
Median age: 45-64 years						
Smoger, 2000[169]	12	<1/month		41-50	165	6.10 (6.06; 6.14)
		<1/month		51-60	137	6.60 (6.56; 6.64)
		<1/month		25-93	809	6.60 (6.58; 6.62)
		About 1/month		41-50	165	4.80 (4.77; 4.83)
		About 1/month		51-60	137	5.10 (5.06; 5.14)
		About 1/month		25-93	809	4.70 (4.69; 4.71)
Stothers, 2005[116]	Ever	Few times/month		60-64	5,037,678	1.00 (1.00; 1.00)
		Few times/year		60-64	5,037,678	2.00 (2.00; 2.00)
Smoger, 2000[169]	12	<1/week		41-50	165	4.20 (4.17; 4.23)
		<1/week		51-60	137	2.90 (2.87; 2.93)
		<1/week		25-93	809	3.30 (3.29; 3.31)
		About 1/week		41-50	165	7.30 (7.26; 7.34)
		About 1/week		51-60	137	8.00 (7.96; 8.04)
		About 1/week		25-93	809	6.80 (6.78; 6.82)

Table F4. Prevalence of UI by severity in age groups of the American men (the results from individual studies).

Author	Time Involuntary Leakage of Urine Reported (months)	Frequency	Amount	Age	Sample Size	Prevalence (%) 95%CI
Stothers, 2005[116]	Ever	Few times/week		60-64	5,037,678	4.00 (4.00; 4.00)
Smoger, 2000[169]	12	Almost every day		41-50	165	4.80 (4.77; 4.83)
		Almost every day		51-60	137	4.40 (4.37; 4.43)
		Almost every day		25-93	809	7.00 (6.98; 7.02)
Stothers, 2005[116]	Ever	Daily		60-64	50,37,678	4.00 (4.00; 4.00)
		Do not know		60-64	50,37,678	0.00 (0.00; 0.00)
Roberts, 1998[183]	12		A few drops	40-79	2,150	4.20 (4.19; 4.21)
Smoger, 2000[169]	12		Few Drops	<40	67	13.40 (13.32; 13.48)
			Few Drops	41-50	165	13.90 (13.85; 13.95)
			Few Drops	51-60	137	21.20 (21.13; 21.27)
			Few Drops	25-93	809	19.50 (19.47; 19.53)
			Wet my underwear	41-50	165	10.90 (10.85; 10.95)
			Wet my underwear	51-60	137	8.00 (7.96; 8.04)
			Wet my underwear	25-93	809	7.80 (7.78; 7.82)
Roberts, 1998[183]	12		Wet outer clothes/floor	40-79	2,150	2.20 (2.19; 2.21)
Smoger, 2000[169]	12		Wet outer clothing	41-50	165	4.20 (4.17; 4.23)
			Wet outer clothing	51-60	137	0.70 (0.69; 0.71)
			Wet outer clothing	25-93	809	2.20 (2.19; 2.21)
			Wet the floor	<40	67	0.00 (0.00; 0.00)
			Wet the floor	41-50	165	0.00 (0.00; 0.00)
			Wet the floor	51-60	137	0.00 (0.00; 0.00)
			Wet the floor	25-93	809	0.70 (0.69; 0.71)
Median age: ≥65 years						
Smoger, 2000[169]	12	<1/month		61-70	237	7.60 (7.57; 7.63)
		<1/month		71-80	178	4.50 (4.47; 4.53)
		About 1/month		61-70	237	5.90 (5.87; 5.93)
		About 1/month		71-80	178	3.40 (3.37; 3.43)
Stothers, 2005[116]	Ever	Few times/month		65-69	4,731,187	2.00 (2.00; 2.00)
		Few times/month		70-74	3,320,840	4.00 (4.00; 4.00)
		Few times/month		75-79	2,748,396	6.00 (6.00; 6.00)
		Few times/month		>65	18,231,934	3.00 (3.00; 3.00)
		Few times/month		>65	14,790,935	3.00 (3.00; 3.00)
		Few times/month		>65	1,436,582	2.00 (2.00; 2.00)
		Few times/month		>65	559,680	1.00 (1.00; 1.00)
		Few times/month		>65	429,299	10.00 (10.00; 10.00)
		Few times/month		>65	1,015,438	8.00 (8.00; 8.00)
		Few times/year		65-69	4,731,187	2.00 (2.00; 2.00)
		Few times/year		70-74	3,320,840	3.00 (3.00; 3.00)

Table F4. Prevalence of UI by severity in age groups of the American men (the results from individual studies).

Author	Time Involuntary Leakage of Urine Reported (months)	Frequency	Amount	Age	Sample Size	Prevalence (%) 95%CI
		Few times/year		75-79	2,748,396	3.00 (3.00; 3.00)
		Few times/year		>65	18,231,934	3.00 (3.00; 3.00)
		Few times/year		>65	14,790,935	3.00 (3.00; 3.00)
		Few times/year		>65	1,436,582	2.00 (2.00; 2.00)
		Few times/year		>65	559,680	1.00 (1.00; 1.00)
		Few times/year		>65	429,299	0.00 (0.00; 0.00)
		Few times/year		>65	1,015,438	1.00 (1.00; 1.00)
Smoger, 2000[169]	12	<1/week		61-70	237	3.80 (3.78; 3.82)
		<1/week		71-80	178	2.80 (2.78; 2.82)
		About 1/week		61-70	237	5.50 (5.47; 5.53)
		About 1/week		71-80	178	9.60 (9.56; 9.64)
Stothers, 2005[116]	Ever	Few times/week		65-69	4,731,187	3.00 (3.00; 3.00)
		Few times/week		70-74	3,320,840	3.00 (3.00; 3.00)
		Few times/week		75-79	2,748,396	4.00 (4.00; 4.00)
		Few times/week		>65	18,231,934	4.00 (4.00; 4.00)
		Few times/week		>65	14,790,935	3.00 (3.00; 3.00)
		Few times/week		>65	1,436,582	7.00 (7.00; 7.00)
		Few times/week		>65	559,680	3.00 (3.00; 3.00)
		Few times/week		>65	429,299	15.00 (15.00; 15.00)
		Few times/week		>65	1,015,438	6.00 (6.00; 6.00)
Smoger, 2000[169]	12	Almost every day		61-70	237	8.90 (8.86; 8.94)
		Almost every day		71-80	178	8.40 (8.36; 8.44)
Stothers, 2005[116]	Ever	Daily		65-69	4,731,187	4.00 (4.00; 4.00)
		Daily		70-74	3,320,840	9.00 (9.00; 9.00)
		Daily		75-79	2,748,396	14.00 (14.00; 14.00)
		Daily		>65	18,231,934	7.00 (7.00; 7.00)
		Daily		>65	14,790,935	7.00 (7.00; 7.00)
		Daily		>65	1,436,582	8.00 (8.00; 8.00)
		Daily		>65	559,680	9.00 (9.00; 9.00)
		Daily		>65	429,299	9.00 (9.00; 9.00)
		Daily		>65	1,015,438	7.00 (7.00; 7.00)
		Do not know		65-69	4,731,187	0.00 (0.00; 0.00)
		Do not know		70-74	3,320,840	0.10 (0.10; 0.10)
		Do not know		75-79	2,748,396	0.30 (0.30; 0.30)
		Do not know		>65	18,231,934	0.20 (0.20; 0.20)
		Do not know		>65	14,790,935	0.20 (0.20; 0.20)
		Do not know		>65	1,436,582	0.60 (0.60; 0.60)
		Do not know		>65	559,680	0.30 (0.30; 0.30)
		Do not know		>65	429,299	0.00 (0.00; 0.00)

Table F4. Prevalence of UI by severity in age groups of the American men (the results from individual studies).

Author	Time Involuntary Leakage of Urine Reported (months)	Frequency	Amount	Age	Sample Size	Prevalence (%) 95%CI
		Do not know		>65	1,015,438	0.00 (0.00; 0.00)
Smoger, 2000[169]	12		Few Drops	61-70	237	24.50 (24.45; 24.55)
			Few Drops	71-80	178	21.30 (21.24; 21.36)
Roberts, 1998[183]	12		Mild	>50	775	20.10 (20.07; 20.13)
Smoger, 2000[169]	12		Wet my underwear	61-70	237	6.30 (6.27; 6.33)
			Wet my underwear	71-80	178	5.60 (5.57; 5.63)
			Wet outer clothing	61-70	237	2.10 (2.08; 2.12)
			Wet outer clothing	71-80	178	1.70 (1.68; 1.72)
			Wet the floor	61-70	237	1.30 (1.29; 1.31)
			Wet the floor	71-80	178	1.10 (1.08; 1.12)
Median age: ≥80 years						
Smoger, 2000[169]	12	<1/month		80-93	25	0.00 (0.00; 0.00)
		About 1/month		80-93	25	8.00 (7.90; 8.10)
Stothers, 2005 [116]	Ever	Few times/month		80-84	1,478,414	4.00 (4.00; 4.00)
	Ever	Few times/month		>85	915,419	8.00 (8.00; 8.00)
		Few times/year		80-84	1,478,414	4.00 (4.00; 4.00)
		Few times/year		>85	915,419	3.00 (3.00; 3.00)
Smoger, 2000[169]	12	<1/week		80-93	25	4.00 (3.93; 4.07)
		About 1/week		80-93	25	4.00 (3.93; 4.07)
Stothers, 2005[116]	Ever	Few times/week		80-84	1,478,414	9.00 (9.00; 9.00)
		Few times/week		>85	915,419	5.00 (5.00; 5.00)
	12	Almost every day		80-93	25	4.00 (3.93; 4.07)
	Ever	Daily		80-84	1,478,414	9.00 (9.00; 9.00)
		Daily		>85	915,419	15.00 (15.00; 15.00)
		Do not know		80-84	1,478,414	1.00 (1.00; 1.00)
		Do not know		>85	915,419	2.00 (2.00; 2.00)
Smoger, 2000[169]	12		Few Drops	80-93	25	4.00 (3.93; 4.07)
			Wet my underwear	80-93	25	12.00 (11.88; 12.12)
			Wet outer clothing	80-93	25	0.00 (0.00; 0.00)
			Wet the floor	80-93	25	4.00 (3.93; 4.07)

Table F5. Severity of FI in LTC facilities

Author Sample	Population Subgroup	Severity of Fecal incontinence	Prevalence (%)
Brocklehurst, 1998[324] N = 497	Nursing homes	Fecal incontinence, <1/week	23.0
	Nursing homes, residents with arthritis/fracture femur	Fecal incontinence, >1/week	16.0
	Nursing homes, residents with congestive heart failure/Ischemic heart disease	Fecal incontinence, >1/week	5.0
	Nursing homes, residents with dementia	Fecal incontinence, >1/week	45.0
	Nursing homes, frail	Fecal incontinence, >1/week	16.0
	Nursing homes, residents with stroke	Fecal incontinence, >1/week	25.0
	Nursing homes	Fecal incontinence, 1-3 days/week	13.0
	Nursing homes	Fecal incontinence, 4-7 days/week	16.0
Bharucha, 2005[241] N = 2,800	Nursing homes, women	Moderate fecal incontinence	8.1
Haas, 2005[325] N = 837	Residents with spinal cord injury	Spontaneous bowel evacuation	12.4

Table F6. Prevalence of FI in community dwelling women by type of incontinence

Author	Prevalence (%)	95% CI
Flatus		
Chaliha, 1999[326] N = 549	0.5	0.19; 1.59
Alnaif, 2001[327] N = 229	34.9	29.05; 41.31
N = 298, <60 years old	5.3	3.33; 8.54
Faltin 2001[328] N = 984, total	4.4	3.26; 5.83
Hojberg, 2003[329] N = 7,557	7.1	6.5; 7.65
Walter, 2002[330] N = 577	9.9	7.70; 12.59
Eva, 2003[127] N = 529	42.0	37.83; 46.21
Boreham, 2005[331] N = 457	25.6	
Ballester, 2005[332] N = 115	7.0	
Bradley, 2006[64] N = 297	33.0	
Gordon, 1999[333] N = 283	14.0	
Roche, 2002[334] N = 418	6.7	4.67; 9.51
MacLennan, 2000[84] N = 1,546	10.9	9.41; 12.52
Lam, 1999[335] N = 359	7.5	5.22; 10.72
Kjolhede, 1997[336]excluded in endnote N = 44	0.0	0; 8.03
Lopes, 1997[337] N = 103	8.7	4.67; 15.78
Combined urge and passive fecal incontinence		
Bharucha, 2005[241] (N = 2,800)	1.0	
Liquid feces		
Boreham, 2005[331] N = 457	12.9	
Ballester, 2005[332] N = 115	5.2	
Bharucha, 2005[241] N = 2,800	5.3	
Bradley, 2006[64] N = 297	11.1	
Gordon, 1999[333] N = 283	6.0	
Melville, 2005[338] N = 3,444	3.4	
Alnaif, 2001[327] N = 229	2.6	1.21; 5.6
Chaliha, 1999[326] N = 549	0.2	0.03; 1.02
Hojberg, 2003[329] N = 7,557	2.5	2.14; 2.85
Eva, 2003[127] N = 639	29.0	25.57; 32.59

Table F6. Prevalence of FI in community dwelling women by type of incontinence (continued

Author	Prevalence (%)	95% CI
Walter, 2002[330] N = 577	1.0	0.48; 2.25
Kalantar, 2002[339] N = 353	8.8	6.26; 12.2
Roche, 2002[334] N = 418	4.8	3.12; 7.27
Kjølhede, 1997[336] N = 44	0.0	0; 8.03
Passive fecal incontinence		
Bharucha, 2005[241] N = 2,800	0.8	
Solid and liquid feces		
Melville, 2005[338] N = 3,444	2.2	
Roberts, 1999[340] N = 762	15.2	12.85; 21.87
Eva, 2003[127] N = 670	9.0	7.02; 11.36
Lopes, 1997[337] N = 103	7.8	3.9; 14.58
Kok, 1992[202] N = 625	7.2	5.42; 9.50
Diokno, 1990[314] N = 969	8.3	7.62; 11.28
Walter, 2002[330] N = 274	0.7	0.20; 2.62
Thomas, 1984[341] N = 1,562	2.9	2.16; 3.83
Verhagen, 2001[342] N = 3,345	8.0	7.11; 8.95
Edwards, 2001[277] N = 1,695	4.0	2.92; 4.73
Wetle, 1995[343] N = 2,360	7.8	6.78; 8.95
O'Keefe, 1995[212] N = 260	8.1	5.34; 12.03
Solid feces		
Boreham, 2005[331] N = 457	13.1	
Bharucha, 2005[241] N = 2,800	5.6	
Bradley, 2006[64] N = 297	1.7	
Gordon, 1999[333] N = 283	9.0	
Melville, 2005[338] N = 3,444	1.7	
Alnaif, 2001[327] N = 229	0.0	0; 2
Chaliha, 1999[326] N = 549	0.7	0.03; 1.02
Hojberg, 2003[329] N = 7,557	1.4	1.13; 1.65
Eva, 2003[127] N = 639	9.0	5.39; 9.29
Walter, 2002[330] N = 577	0.0	0; 0.66

Table F6. Prevalence of FI in community dwelling women by type of incontinence (continued

Author	Prevalence (%)	95% CI
Kalantar, 2002[339] N = 353	1.1	0.4; 2.9
Okonkwo, 2002[280] N = 3,963	2.2	1.76; 2.67
Roche, 2002[334] N = 418	1.7	0.81; 3.42
Rizk, 2001[344] N = 450	5.6	3.79; 8.07
Kjolhede, 1997[336] N = 44	0.0	0; 8.03
Solid or liquid feces		
Alnaif, 2001[327] N = 229	2.6	1.21; 5.6
Faltin, 2001[328] N = 298	1.4	0.52; 3.40
Hojberg, 2003[329] N = 7,557	2.7	2.36; 3.09
Enck, 1991[219] N = 73	1.4	0.24; 7.36
Thomas, 1984[341] N = 6,205	1.0	0.79; 1.30
Kalantar, 2002[339] N = 353	11.6	8.68; 15.38
Okonkwo, 2002[280] N = 3,963	4.8	4.22; 5.56
Perry, 2002[279] N = 5,483	2.7	2.3; 3.16
Roche, 2002[334] N = 418	6.5	4.48; 9.23
Manning, 2001[345] N = 148	9.1	5.72; 15.25
Rizk, 2001[344] N = 450	11.3	8.73; 14.60
MacLennan, 2000[84] N = 1,546	3.5	2.69; 4.54
Mann, 2000 [346] N = 130	8.5	4.79; 14.52
Soligo, 2000[347] N = 101	4.9	2.13; 11.07
Lam, 1999[335] N = 359	5.6	3.64; 8.45
Kjolhede, 1997[336] N = 44	0.0	0; 8.03
Drossman, 1993[257] N = 2,791	0.9	0.61; 1.32
Bharucha, 2005[241] N = 2,800	7.1	
Bradley, 2005[64] N = 297	20.3	
Urge fecal incontinence		
Bharucha, 2005[241] (N = 2,800)	6.2	
Vaginal or perineal splinting to defecate by age categories		
Bradley, 2005[64] N = 297	<64 years = 4.0	
	>72 years = 8.1	
	64-67 years = 3.0	
	68-72 years = 5.1	

Table F7. Prevalence of FI in community dwelling women by severity of incontinence

Author Sample	Severity	Prevalence (%)	95% CI
Ballester, 2005[332] N = 115	Fecal incontinence, <1 episode/month	6.1	
	Fecal incontinence, >1/month	0.9	0.39; 5.9
Talley, 1992[214] N = 328	Fecal incontinence more than once a week	3.1	2.9; 10.6
	Wear a pad for fecal incontinence	6.7	
Bharucha, 2005[241] N = 2,800	Fecal incontinence, <1/month	9.6	
Melville, 2005 [338] N = 3,444	Fecal incontinence, >1/month	4.6	
	Fecal incontinence, >1/week	2.7	
Bharucha, 2005[241] N = 2,800	Fecal incontinence, >1/week	1.6	
	Fecal incontinence, 1/month	4.3	
	Fecal incontinence, 1/week	2.2	
Bradley, 2005[64] N = 297	Fecal incontinence, 1-3 times monthly	4.0	
	Fecal incontinence, 1-6 times weekly	3.4	
	Fecal incontinence, daily	1.4	
Bharucha, 2005[241] N = 2,800	Fecal incontinence, daily	0.4	
Bradley, 2005[64] N = 297	Fecal incontinence, ever	34.0	
Bharucha, 2005[241] N = 2,800	Fecal incontinence, large to change clothes	1.3	
Bradley, 2005[64] N = 297	Fecal incontinence, less than once a month	25.3	
Bharucha, 2005[241] N = 2,800	Fecal incontinence, moderate	5.9	
	Fecal incontinence, underwear stains only	10.7	
Ballester, 2005[332] N = 115	Liquid feces, <1 episode/month, age 20-64	3.5	
	Liquid feces, >1 episode/month, age 20-64	1.7	
Bharucha, 2005[241] N = 2,800	Moderate fecal incontinence, age 20-29	0.3	
	Moderate fecal incontinence, age 30-39	0.7	
	Moderate fecal incontinence, age 40-49	1.3	
	Moderate fecal incontinence, age 50-59	1.8	
	Moderate fecal incontinence, age 60-69	2.0	
	Moderate fecal incontinence, age 70-79	1.9	31.95; 44.43
Alnaif 2001[327] N = 229	Underwear staining	38.0	0.24; 7.36
Enck 1991[219] N = 73	Underwear staining	1.4	12.35; 17.08
Walter 2002[330] N = 852	Underwear staining	14.5	0.10; 1.32
Chaliha, 1999[326] N = 549	Underwear staining	0.4	6.83; 8.22
Perry, 2002[279] N = 5,483	Underwear staining	7.5	
Ballester, 2005[332] N = 115	Wear pad	1.7	

Table F8. Prevalence of FI in community dwelling adults (men and women)

Author Sample	Age Categories	Prevalence (%)	95% CI
Combined urinary and fecal incontinence			
Teunissen, 2004[119] N = 4,650	60–64	2.0	1.4; 2.8
	65–69	3.0	2.1; 4.3
	70–74	4.0	2.8; 5.6
	75–79	6.0	4.2; 8.4
Brittain, 2006[348] N = 39,519		0.9	
Anal incontinence			
Nelson, 1995[272] N = 6,959	<65	1.6	
	>65	0.7	
		2.2	
Damon, 2006[349] N = 706		5.1	3.6; 7.0
Brittain, 2006[348] N = 39,519		2.9	
Johanson, 1996[350] N = 881	<30	12.3	
	>18	18.4	
	>70	19.4	
Teunissen, 2004[119] N = 4,650	60–64	5.0	4.0; 6.3
	65–69	5.0	3.9; 6.4
	70–74	8.0	6.3; 10.1
Teunissen, 2004[119] N = 4,650	75–79	8.0	6.1; 10.5
Liquid feces			
Giebel, 1998[273] N = 500	>18 years	6.7	
Soiling underwear			
Giebel, 1998[273] N = 500	>18 years	3.1	
Solid feces			
Giebel, 1998[273] N = 500	>18 years	4.8	
Bytzer, 2001[351] N = 8,185	18-101	0.8	
Solid or liquid feces			
Campbell, 1985[352] N = 559	>65	3.1	
Bytzer, 2001[351] N = 8185	18-101	3.8	
Giebel, 1998 [273] N = 500	>18 years	6.7	
Flatus			
Giebel, 1998[273] N = 500	>18 years	5.5	

Table F9. Prevalence of FI in community dwelling adults (men and women) by severity

Author Sample	Definition	Age Categories	Prevalence (%)
Johanson, 1996[350] N = 881	Fecal incontinence, <1/month		7.1
	Fecal incontinence, daily		2.7
	Fecal incontinence, weekly		4.5
	Wear pad		22.7
Talley, 1992[214] N = 328	Fecal incontinence, >1/week	>65	3.7
	Wear pad	>65	7.0
Brittain, 2006[348] N = 39,519	Fecal incontinence, furnishing or bedding	1,483 after stroke	11.0
	Fecal incontinence, outer clothing	1,483 after stroke	6.0
	Major fecal incontinence		1.5
Lynch, 2001[278] N = 717	Flatus, <1/day	<60	6.1
	Flatus, <1/month	<60	28.7
	Flatus, <1/week	<60	27.8
	Flatus, >1/day	<60	1.4
	Lifestyle alteration, <1/day	<60	1.4
	Lifestyle alteration, <1/month	<60	4.6
	Lifestyle alteration, <1/week	<60	2.1
	Liquid, <1/day	<60	0.7
	Liquid, <1/month	<60	7.4
	Liquid, <1/week	<60	4.2
	Liquid, >1/day	<60	0.4
	Wear pad, <1/month	<60	1.3
	Wear pad, <1/week	<60	0.3
	Wear pad, <1/day	<60	0.1
	Solid, <1/day	<60	1.1
	Solid, <1/month	<60	5.4
	Solid, <1/week	<60	2.8
	Solid, >1/day	<60	0.4
Damon, 2006[349] N = 706	Flatus, <1/month		13.2
	Flatus, <1/week		7.9
	Flatus, <1/week		6.6
	Liquid feces, <1/month		8.3
	Liquid feces, <1/week		0.5
	Liquid feces, <1/week		0.6
	Sold feces, <1/month		0.9
	Sold feces, <1/week		0.4
	Sold feces, <1/week		0.1
	Wear pad, <1 month		1.3
	Wear pad, <1 week		0.8
	Wear pad, <1 week		0.2
Giebel, 1998[273] N = 500	Frequent stools after meal	>18 years	20.1
	Frequent stools due to stress	>18 years	44.8
	Frequent flatus during micturition	>18 years	56.5

Table F10. Prevalence of FI in community dwelling adults by race

Author Sample	Race	Definition	Prevalence (%)
Men and women			
Nelson, 1995[272] N = 6,959	White	Anal incontinence	2.1
Men			
Goode, 2005[248] N = 1,000	African-American	Fecal incontinence	13.5
	White	Fecal incontinence	11.2
Women			
Goode, 2005[248] N = 1,000	African-American	Fecal incontinence	9.2
	White	Fecal incontinence	14
Huang, 2006[70] N = 345	Asians	Anal incontinence	21.2
	Asians	Combined urinary and anal incontinence	10.7
	Asians	Fecal incontinence	4.1
	Asians	Flatus	19.4
Huang, 2006[70] N = 1,003	White	Anal incontinence	28.6
	White	Combined urinary and anal incontinence	19.9
	White	Fecal incontinence	6.8
	White	Flatus	25.5
Jackson, 1997[303] N = 16	African-American	Fecal incontinence	18.8
Jackson, 1997[303] N = 184	White	Fecal incontinence	21.2
Melville, 2005[338] N = 3,444	Non-white race	Fecal incontinence	0.8

Table F11. Association between age and UI in women

Author, Sample	Age	Definition of Severity	Age	Odds Ratio (95%CI)
Incident UI , Total				
Jackson, 2004[22] N = 1,584	70-79	At least weekly	75-79 vs. 70-74	1.5 (0.98; 2.3)
Ostbye, 2004[28]	>65	In the last 12 months	75-84 vs. <75	1.11 (0.9; 1.37)
N = 5,322		In the last 12 months	85+ vs. <75	1.17 (0.81; 1.69)
Prevalent UI				
Brown, 1999[353] N = 2,763	Mean: 67 (SD: 7)	Within the past week	Age (per 5 y)	**1.1 (1.02; 1.18)**
Prevalent UI, Stress				
Brown, 1999[353] N = 2,763	Mean: 67 (SD: 7)	Within the past week	Age (per 5 y)	0.93 (0.85; 1.03)
McGrother, 2006[6] N = 12,570	>40	Monthly or more	Age (10-year increase)	0.9 (0.7; 1)
Moller, 2000, [354]	40-60	Sometime or more often	45 vs. <45	1.4 (0.9; 2)
N = 3,208			50s. <45	**1.6 (1.1; 2.2)**
			55s. <45	**1.9 (1.3; 2.7)**
			60s. <45	**1.6 (1.1; 2.3)**
Chen, 2003[123] N = 1,247	>20	Within the past 2 weeks	> 65 vs. <65	0.8 (0.3; 1.8)
Rohr, 2005[107]	>45	Within the past month	60-80 vs. <60	**1.33 (1.09; 1.62)**
N = 5,795		Within the past month	>80 vs. <60	**2.39 (1.97; 2.9)**
Prevalent UI, Total				
Holtedahl, 1998[355] N = 507	50-74	1-2 = Slight, 3-4 = Moderate, 6-8 = Severe	Age (per year increase)	0.98
		1-2 = Slight, 3-4 = Moderate, 6-8 = Severe	Age (per year increase)	0.97
Nygaard, 2003[79] N = 5,701	50-69	Mild-moderate incontinence - Incontinence on 15 or fewer days in the last month In the last 12 months, have you lost any amount of urine beyond your control	Age(per year increase)	**0.97 (0.95; 0.99)**
		Severe incontinence-incontinence on more than 15 days in the last month	Age(per year increase)	0.77 (0.29; 2.03)
Waetjen, 2007[49] N = 3,302	42-52	Frequency: at least monthly	Age(per year increase)	1.03 (0.99; 1.06)
		Frequency: >weekly/daily	Age(per year increase)	**1.06 (1.01; 1.12)**
Hvidman, 2003[356]	20-59	Within the past seven days	Age per year	**1.06 (1.03; 1.08)**
Brown, 2006[95] N = 7,949	69-101	Daily UI	Per 5 year	**1.3 (1.2; 1.5)**
Brown, 2006	>20	Weekly urinary incontinence	Age (per 5 years)in	1.19 (0.96; 1.48)

Table F11. Association between age and UI in women (continued)

Author, Sample	Age	Definition of Severity	Age	Odds Ratio (95%CI)
[95] N = 1,461			diabetics	
Melville, 2005[112] N = 3,596	30-90	Frequency: at least monthly. Severe: Sandvik severity index score of 6-8	Age, per decade	**1.4 (1.1; 1.2)**
			Age, per decade	**1.2 (1.1; 1.4)**
Van Oyen, 2002[157] N = 3,804	≥15	At least once a week, at least once a month, less than once a month	25-34 vs. 15-24	1.87 (0.51; 6.85)
			35-44 vs. 15-24	2.09 (0.58; 7.5)
Danforth, 2006[68] N = 83,355	25-54	Occasional: 1-3 times a month.	40-44 vs. <40	**1.2 (1.1; 1.3)**
		Frequent: At least weekly.	40-44 vs. <40	**1.2 (1.1; 1.2)**
		Severe: Wet underwear.	40-44 vs. <40	**1.3 (1.2; 1.4)**
Maclennan, 2000[84] N = 3,010	15-97	Within the past year	35-54 vs. 15-34	**2.1 (1.5; 3)**
Danforth, 2006[68] N = 83,355	25-54	Occasional: 1-3 times a month.	45-49 vs. <40	**1.3 (1.2; 1.4)**
		Frequent: At least weekly.	45-49 vs. <40	**1.3 (1.3; 1.4)**
		Severe: Wet underwear.	45-49 vs. <40	**1.7 (1.6; 1.8)**
Van Oyen, 2002[157] N = 3,804	≥15	At least once a week, at least once a month, less than once a month	45-54 vs. 15-24	3.03 (0.88; 10.49)
Fitzgerald, 2002[81] N = 265	40	Leaked urine at least monthly	>50 years	3.09 Sign
Sampselle, 2002[151] N = 3,302	42-52	Frequency and volume: frequency score is multiplied by volume score	48-52 y vs. 42-47 y	1.18 (1; 1.38)
Grodstein, 2003[129] N = 27,936	≥20 years	Occasional leaking - leaking one to three times per month	50-55 vs. < 50 years	1.07 (0.97; 1.17)
		Occasional leaking - leaking one to three times per month at least enough to wet underwear	50-55 vs. < 50 years	1.01 (0.9; 1.13)
		Frequent leaking is defined as at least once per week	50-55 vs. < 50 years	0.96 (0.88; 1.06)
Danforth, 2006[68] N = 83,355	25-54	Occasional: 1-3 times a month.	50-54 vs. <40	**1.4 (1.3; 1.5)**
		Frequent: At least weekly.	50-54 vs. <40	**1.4 (1.3; 1.4)**
		Severe: Wet underwear.	50-54 vs. <40	**1.8 (1.7; 2)**
Grodstein, 2003[129] N = 27,936	≥20 years	Frequent leaking - at least once per week at least enough to wet underwear	50-55 vs. < 50	0.95 (0.85; 1.05)
Maclennan, 2000[84] N = 3,010	15-97	Within the past year	≥ 55 vs. 15-34	**3.1 (2.1; 4.5)**
Muscatello, 2001[160] N = 262	>16	>1 symptom: nocturia, urgency, stress UI, urge UI	50-59 vs. 41-49 years	**3.7 (1.7; 8.2)**
Grodstein, 2003[129] N = 27,936	≥20 years	Occasional leaking -leaking one to three times per month	56-60 vs. < 50	1.1 (0.99; 1.21)
		Frequent leaking - at least once per week at least enough to wet underwear	56-60 vs. < 50	1.07 (0.95; 1.21)
		Occasional leaking - leaking one to three times per month at least enough to wet underwear	56-60 vs. < 50	1.07 (0.94; 1.22)
		Frequent leaking - at least once per week	56-60 vs. < 50	1.08 (0.98; 1.2)
Van Oyen, 2002[157]	≥15	At least once a week, at least once a month, less than once a month	55-64 vs. 15-24	**4.85 (1.41; 16.67)**

Table F11. Association between age and UI in women (continued)

Author, Sample	Age	Definition of Severity	Age	Odds Ratio (95%CI)
N = 3,804				
Fornel, 2004[208] N = 1,336	40 yr and 60 yr	Leakage weekly or more often	60 cohort vs. 40 cohort	**1.9 (1.2; 3.2)**
Jackson, 2006, [100] N = 1,017	55-75	Severe: Sandvik score of 6-8 over the past year	60-64 vs. 55-59	1.4 (0.7; 2.7)
Grodstein, 2003[129] N = 27,936	≥20 years	Occasional leaking - leaking one to three times per month	61-65 vs. <50	**1.2 (1.08; 1.32)**
		Occasional leaking - leaking one to three times per month at least enough to wet underwear	61-65 vs. <50 years	**1.22 (1.07; 1.39)**
		Frequent leaking - at least once per week	61-65 vs. <50 years	**1.22 (1.1; 1.35)**
		Frequent leaking -at least once per week at least enough to wet underwear	61-65 vs. <50 years	**1.24 (1.1; 1.4)**
Jackson, 2006[100] N = 1,017	55-75	Any leakage in the past year	60-64 vs. 55-59	0.8 (0.6; 1.2)
Muscatello, 2001[160] N = 262	>16	>1 symptom: nocturia, urgency, Stress UI, urge UI	60-69 vs. 41-49	1.9 (0.7; 5.2)
Grodstein, 2003[129] N = 27,936	≥20 years	Frequent leaking is defined as at least once per week at least enough to wet underwear	66-70 vs. <50 years	**1.56 (1.39; 1.76)**
		Frequent leaking is defined as at least once per week	66-70 vs. < 50 years	**1.49 (1.34; 1.64)**
Jackson, 2006[100] N = 1,017	55-75	Any leakage in the past year	65-69 vs.55-59	1 (0.7; 1.5)
		Severe: Sandvik score of 6-8 over the past year	65-69 vs. 55-59	1.7 (0.9; 3.2)
Grodstein, 2003[129] N = 27,936	≥20 years	Occasional leaking is defined as leaking one to three times per month	66-70 vs. < 50 years	**1.28 (1.16; 1.42)**
		Occasional leaking is defined as leaking one to three times per month at least enough to wet underwear	66-70 vs. < 0 years	**1.37 (1.2; 1.56)**
Van Oyen, 2002[157] N = 3,804	≥15	At least once a week, at least once a month, less than once a month	65-74 vs. 15-24	**7.22 (2.15; 24.21)**
Maggi, 2001[158] N = 1,531	>65	Rarely, 1 to 2 times per month, ≥1/week, or every day	>70 years	**1.49 (1.11; 2.02)**
Muscatello, 2001[160] N = 262	>16	>1 symptom: nocturia, urgency, stress UI, urge UI	>70 vs. 41-49 years	**2.9 (1.1; 7.6)**
Grodstein, 2003[129] N = 27,936	≥20 years	Occasional leaking is defined as leaking one to three times per month	>70 vs. < 50 years	**1.45 (1.29; 1.63)**
		Occasional leaking is defined as leaking one to three times per month at least enough to wet underwear	>70 vs. < 50 years	**1.56 (1.35; 1.81)**
		Frequent leaking is defined as at least once per week	>70 vs. < 50 years	**1.67 (1.49; 1.87)**
		Ft least once per week at least enough to wet underwear	>70 vs. < 50 years	**1.81 (1.59; 2.07)**
Rohr, 2005[107] N = 5,795	>45	Within the past month	60-80 vs. <60	**1.54 (1.29; 1.84)**
Jackson, 2006[100] N = 1,017	55-75	Any leakage in the past year	70-76 vs. 55-59	1 (0.7; 1.4)
		Severe: Sandvik score of 6-8 over the past year	70-76 vs. 55-59	1.4 (0.8; 2.4)
Van Oyen, 2002[157] N = 3,804	≥15	At least once a week, at least once a month, less than once a month	75+ vs. 15-24	**6.89 (2; 23.71)**

Table F11. Association between age and UI in women (continued)

Author, Sample	Age	Definition of Severity	Age	Odds Ratio (95%CI)
Ostbye, 2004[28] N = 5,322	>65	In the last 12 months, have you lost any amount of urine beyond your control	75-84 vs. <75	**1.47 (1.2; 1.79)**
Landi, 2003[131] N = 3,194	79.5+-9.5	0 (complete control)-4 (inadequate control with multiple daily episodes)	75-84 vs. 65-74	0.91 (0.63; 1.32)
Fultz, 1999[357] N = 3,991	>70	Mild=0-6 days/month Have you ever lost urine when you were not able to get to the toilet on time?, have you ever lost urine when you are asleep?, have you ever lost urine when you laugh, cough or sneeze?, and if they stated they leaked urine at least monthly	>80 years	**0.77 (0.61; 0.97)**
		Moderate=7-20days/month Have you ever lost urine when you were not able to get to the toilet on time?, have you ever lost urine when you are asleep?, have you ever lost urine when you laugh, cough or sneeze?, and if they stated they leaked urine at least monthly	>80 years	1.34 (0.89; 2.02)
		Severe ≥21 days/month Have you ever lost urine when you were not able to get to the toilet on time?, have you ever lost urine when you are asleep?, have you ever lost urine when you laugh, cough or sneeze?, and if they stated they leaked urine ≥1/month	>80 years	**1.46 (1.09; 1.94)**
Rohr, 2005[107] N = 5,795	>45	Within the past month	>80 vs. <60	**2.89 (2.42; 3.45)**
Ostbye, 2004[28] N = 5,322	>65	In the last 12 months, have you lost any amount of urine beyond your control	85+ vs. <75	**1.78 (1.35; 2.37)**
Landi, 2003[131] N = 3,194	79.5+-9.5	0 (complete control)-4 (inadequate control with multiple daily episodes)	>85 vs. 65-74	**1.61 (1.15; 2.2 6)**
Prevalent UI, Urge				
Brown, 1999[353] N = 2,763	Mean: 67 (SD: 7)	Within the past week	Age (per 5 y)	**1.19 (1.09; 1.31)**
Huang, 2006[70] N = 345 Asian women	40-69	At least weekly incontinence to recall the number of episodes in the past 7 days	Age (per 10 y)	**1.79 (1.34; 2.4)**
Moller, 2000[354] N = 3,208	40-60	Sometime or more often	45s. <45	1.6 (0.9; 2.7)
		Sometime or more often	50s. <45	**2.1 (1.2; 3.5)**
Ueda, 2000[172] N = 968	40-75	1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Very Often	50-59 vs. 40-49	0.739 (0.506; 1.079)
Moller, 2000[354] N = 3,208	40-60	Sometime or more often	55s. <45	**2.4 (1.4; 3.9)**
		Sometime or more often	60s. <45	**2.7 (1.6; 4.5)**
Ueda, 2000[172] N = 968	40-75	1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Very Often	60-69 vs. 40-49	**0.468 (0.319; 0.685)**
		1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Very Often	70+ vs. 40-49	**0.426 (0.259; 0.7)**
Rohr, 2005[107] N = 5,795	>45	Within the past month	60-80 vs. <60	**1.84 (1.45; 2.34)**
Jackson, 2004[21] N = 1,584	70-79	Within the past week	75-79 (y) vs. 70-74	**1.6 (1.11; 2.3)**
Rohr, 2005[107] N = 5,795	>45	Within the past month	>80 vs. <60	**4.01 (3.17; 5.08)**

Bold- significant results at 95%confidence level

Table F12 Association between race and prevalent UI in women

Author, Sample	Age	Definition of UI	Race vs. Caucasian	Odds Ratio (95%CI)
Mixed UI				
Brown, 1999[353] N – 2,763	Mean: 67 ±7	UI within the past week	White vs. other	2.14 (1.48; 3.08)
Waetjen, 2007[49] N = 3,302	42-52	UI at least monthly	African American	0.35 (0.23; 0.53)
			Chinese	0.38 (0.21; 0.7)
			Japanese	3.19 (0.55; 18.29)
			Hispanic	0.12 (0.05; 0.27)
Sampselle, 2002[151] N = 3,302	42-52	Frequency score is multiplied by volume score	African American	0.88 (0.67; 1.16)
			Chinese	0.7 (0.4; 1.21)
			Hispanic	0.65 (0.34; 1.28)
			Japanese	1.13 (0.68; 1.88)
Stress UI				
Brown, 1999[353] N – 2,763	Mean: 67 ±7	UI within the past week	White vs. other	2.84 (1.6; 5.05)
Jackson, 2004[21] N = 1,584	70-79	UI within the past week	White vs. other	4.11 (2.53; 6.67)
Thom, 2006[99] N = 2,109	40-69	UI at least weekly	Hispanic	1.42 (0.98; 2.06)
			African American	0.36 (0.23; 0.57)
			Asian-American	0.54 (0.34; 0.86)
Waetjen, 2007[49] N = 3,302	42-52	UI at least monthly	African American	0.26 (0.19; 0.36)
			Chinese	0.47 (0.31; 0.7)
			Japanese	0.77 (0.55; 1.12)
			Hispanic	0.27 (0.17; 0.42)
Urge UI				
Brown, 1999[353] N – 2,763	Mean: 67 (SD: 7)	UI within the past week	White vs. other	1.26 (0.83; 1.91)
Jackson, 2004[21] N = 1,584	70-79	UI within the past week	White vs. other	3.09 (1.99; 4.78)
Thom, 2006[99] N = 2,109	40-69	UI at least weekly	Hispanic	1.37 (0.85; 2.19)
			African American	1.19 (0.79; 1.81)
			Asian-American	0.86 (0.52; 1.43)
Waetjen, 2007[49] N = 3,302	42-52	UI at least monthly	African American	0.98 (0.65; 1.48)
			Chinese	0.43 (0.22; 0.84)
			Japanese	0.37 (0.18; 0.74)
			Hispanic	0.1 (0.03; 0.34)

Figure F1. Prevalent UI in Asian women compared to Caucasian women

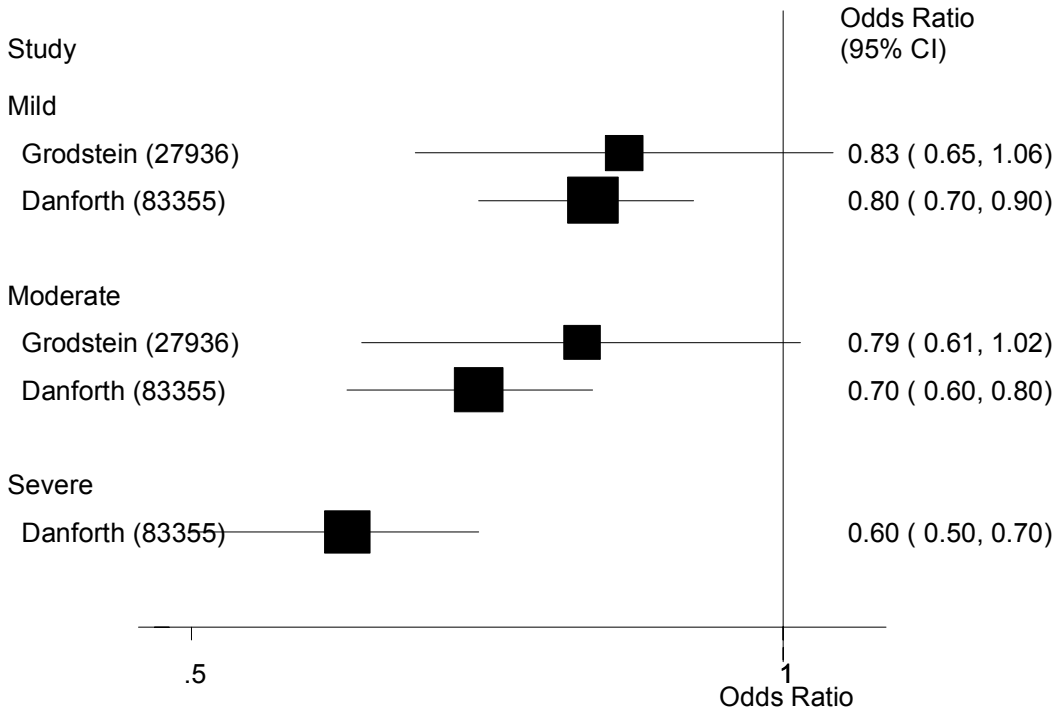

Table F13. Association between body mass index and UI in females

Author, Sample	Age	Definition of Severity	Strata of Risk Factors with Cut Offs	Odds Ratio (95%CI)
Incident UI				
Waetjen, 2007[49] N = 3,302	42-52	UI at least monthly	BMI per 1 unit increase	**1.09 (1.04; 1.13)**
Dallosso, 2003[14] N = 6,424	>40	UI at least several times a month	Underweight vs. normal weight	0.69 (0.38; 1.3)
			Overweight vs. normal weight	1.3 (0.94; 1.7)
			Obese vs. normal weight	**1.7 (1.2; 2.5)**
		UI at least monthly	BMI per 1 unit increase	**1.06 (1.03; 1.1)**
		UI >weekly/daily	BMI per 1 unit increase	**1.12 (1.06; 1.19)**
Prevalent Urge UI				
Mommsen, 1994[198] N = 2,589	30-59	UI in the past year	BMI per 1 unit increase	**1.08 (1.05; 1.11)**
Waetjen, 2007[49] N = 3,302	42-52	UI at least monthly	BMI per 1 unit increase	1.03 (1; 1.06)
Brown, 1999[353] N = 2,763	Mean: 67 (SD: 7)	UI within the past week	BMI per 5 unit increase	1.09 (0.99; 1.22)
Kuh, 1999Kuh, 1999[179] N = 1,333	48	UI at least two hourly during the day and at least twice a night	BMI per 5 unit increase	1.2 (0.98; 1.3)
Huang, 2006[70] N = 345	40-69	UI at least weekly	BMI 25 kg/m2 in Asian women	**3.35 (1.22; 9.18)**
Rohr, 2005[107] N = 5,795	>45	UI in the past month	BMI 25-30 vs. <25	**1.4 (1.19; 1.64)**
Huang, 2006[70] N = 345 Asian women	40-69	UI at least weekly	BMI >25	**1.71 (1.04; 2.82)**
Rohr, 2005[107] N = 5,795	>45	UI in the past month	BMI>30 vs. <25	**1.84 (1.41; 2.39)**
Stress UI				
Persson, 2000[358] N = 1,492		Ever had incontinence surgery	BMI <19.8	1 (1; 1)
			BMI <19.8	**1.41 (1.16; 1.71)**
			BMI 19.8-26	0.8 (0.6; 1.06)
			BMI 19.8-26	**1.34 (1.02; 1.76)**
			BMI >26	1 (1; 1)
			BMI >26	1 (1; 1)
Chen, 2003[123] N = 1,247	>20	UI in the past week	BMI ≥75th percentile with symptoms of uterovaginal prolapse vs. <75th percentile and no prolapse	**33 (12.5; 87.1)**
Total UI				
Brown, 2006[95] N = 1,461	>20	UI at least weekly	BMI (kg/m2)in diabetics	1.05 (0.97; 1.14)

Table F13. Association between body mass index and UI in females (continued)

Author, Sample	Age	Definition of Severity	Strata of Risk Factors with Cut Offs	Odds Ratio (95%CI)
Moghaddas, 2005[359] N = 6,642	50-64	Ever UI	BMI <20 vs. 20-25;Women with depression	**0.58 (0.4; 0.86)**
		Ever UI	BMI >25 vs. 20-25;Women with depression	**1.56 (1.32; 1.85)**
Muscatello, 2001[160] N = 262	>16	>1 symptom: nocturia, urgency, stress UI, urge UI	BMI >30 vs. 25	1.5 (0.5; 4.6)
		>1 symptom: nocturia, urgency, stress UI, urge UI	BMI 25 vs. <19	**0.3 (0.1; 0.8)**
		>1 symptom: nocturia, urgency, stress UI, urge UI	BMI> 29 vs. 25-29	1.2 (0.6; 2.4)
Holtedahl, 1998[355] N = 507	50-74	1-2 = Slight, 3-4 = Moderate, 6-8 = Severe	BMI per 1 unit increase	1.06
		1-2 = Slight, 3-4 = Moderate, 6-8 = Severe	BMI per 1 unit increase	1.09
Van Oyen, 2002[157] N = 3,804	≥15	At least once a week, at least once a month, less than once a month	BMI > 30 vs. 20-25	**2.23 (1.51; 3.29)**
Sampselle, 2002[151] N = 3,302	42-52	Frequency score is multiplied by volume score	BMI per 1 unit increase	**1.05 (1.04; 1.07)**
			BMI per 1 unit increase	**1.04 (1.03; 1.06)**
Fultz, 1999[357] N = 3,991	>70	Moderate=7-20 days/month	BMI >28.1 vs. <22.1	**2.37 (1.48; 3.8)**
Danforth, 2006[68] N = 83,355	25-54	Severe: Wet underwear.	BMI < 22 vs. 22-24	**0.7 (0.7; 0.8)**
		Severe: Wet underwear.	BMI ≥ 30 vs. 22-24	**3.1 (2.9; 3.3)**
		Severe: Wet underwear.	BMI 25-29 vs. 22-24	**1.5 (1.4; 1.6)**
Jackson, 2006[100] N = 1,017	55-75	Severe: Sandvik score of 6-8 over the past year	BMI > 29 vs. <25	1.5 (0.9; 2.4)
		Severe: Sandvik score of 6-8 over the past year	BMI 25-29 vs. <25	1.5 (0.9; 2.4)
Fultz, 1999[357] N = 3,991	>70	Severe ≥21 days/month	BMI >28.1 vs. <22.1	**1.65 (1.31; 2.1)**
Fitzgerald, 2002[81] N = 265	40	UI at least monthly	BMI ≥ 25 vs. <25	1.8 (Significance)

Bold- significant results at 95%confidence level

Table14. Association between behavioral and environmental factors and UI in women

Author, Sample	Age	Definition UI	Risk Factors	Odds Ratio (95%CI)
Incident UI, Physical activity, Total UI				
Ostbye, 2004[28] N = 5,322	>65	UI in the last 12 months	Exercise	1.04 (0.85; 1.29)
Danforth, 2007[44] N = 1,566	54–79	UI in the last 12 months	Physical activity (MET-h/wk) 2 vs.1 quantile	1.04 (0.92; 1.18)
			Physical activity (MET-h/wk) 3 vs.1 quantile	0.9 (0.79; 1.02)
			Physical activity (MET-h/wk) 4 vs.1 quantile	**0.85 (0.75; 0.98)**
			Physical activity (MET-h/wk) 5 vs.1 quantile	**0.81 (0.71; 0.93)**
			Walking (MET-h/wk) 2 vs.1 quantile	1.01 (0.88; 1.14)
			Walking (MET-h/wk) 2 vs.1 quantile	0.91 (0.8; 1.04)
			Walking (MET-h/wk) 2 vs.1 quantile	0.9 (0.78; 1.04)
			Walking (MET-h/wk) 2 vs.1 quantile	**0.74 (0.63; 0.88)**
Incident UI, Physical activity, Stress				
Danforth, 2007[44] N = 1,566	54–79	UI in the last 12 months	Physical activity (MET-h/wk) 2 vs.1 quantile	1.22 (0.99; 1.5)
			Physical activity (MET-h/wk) 3 vs.1 quantile	0.91 (0.73; 1.13)
			Physical activity (MET-h/wk) 4 vs.1 quantile	0.86 (0.68; 1.08)
			Physical activity (MET-h/wk) 5 vs.1 quantile	**0.71 (0.56; 0.91)**
			Walking (MET-h/wk) 2 vs.1 quantile	1.21 (0.97; 1.5)
			Walking (MET-h/wk) 2 vs.1 quantile	1.18 (0.95; 1.48)
			Walking (MET-h/wk) 2 vs.1 quantile	1.01 (0.79; 1.28)
			Walking (MET-h/wk) 2 vs.1 quantile	0.76 (0.57; 1.02)
Incident UI, Physical activity, Urge				
Danforth, 2007[44] N = 1,566	54–79	UI in the last 12 months	Physical activity (MET-h/wk) 2 vs.1 quantile	0.8 (0.57; 1.13)
			Physical activity (MET-h/wk) 3 vs.1 quantile	0.74 (0.52; 1.04)
			Physical activity (MET-h/wk) 4 vs.1 quantile	0.94 (0.68; 1.31)
			Physical activity (MET-h/wk) 5 vs.1 quantile	0.96 (0.69; 1.34)
			Walking (MET-h/wk) 2 vs.1 quantile	0.81 (0.58; 1.13)
			Walking (MET-h/wk) 2 vs.1 quantile	**0.65 (0.45; 0.93)**
			Walking (MET-h/wk) 2 vs.1 quantile	0.95 (0.68; 1.33)
			Walking (MET-h/wk) 2 vs.1 quantile	0.76 (0.51; 1.14)
Incident UI, Physical activity, Mixed				
Danforth, 2007[44] N = 1,566	54–79	UI in the last 12 months	Physical activity (MET-h/wk) 2 vs.1 quantile	0.96 (0.73; 1.27)
			Physical activity (MET-h/wk) 3 vs.1 quantile	0.84 (0.63; 1.12)
			Physical activity (MET-h/wk) 4 vs.1 quantile	0.81 (0.6; 1.1)
			Physical activity (MET-h/wk) 5 vs.1 quantile	0.76 (0.56; 1.04)
			Walking (MET-h/wk) 2 vs.1 quantile	1.06 (0.8; 1.41)
			Walking (MET-h/wk) 2 vs.1 quantile	0.83 (0.61; 1.12)
			Walking (MET-h/wk) 2 vs.1 quantile	0.87 (0.64; 1.2)
Incident UI, Social support				
Waetjen, 2007[49] N = 3,302	42-52	UI at least monthly	Social support <25th percentile vs. >25th percentile	1.42 (0.96; 2.09)

Table14. Association between behavioral and environmental factors and UI in women (continued)

Author, Sample	Age	Definition UI	Risk Factors	Odds Ratio (95%CI)
Prevalent UI, Education				
Fultz, 1999[357] N = 3,991	>70	Mild=0-6 days/month	Education (>12 years)	**1.34 (1.05; 1.7)**
		Moderate=7-20days/month	Education (>12 years)	1.06 (0.66; 1.7)
		Severe ≥21 days/month	Education (>12 years)	0.94 (0.68; 1.3)
Kuh, 1999Kuh, 1999[179] N = 1,333	48	Stress ≥2/hour during the day and ≥2/night	Educational level (o-no education, 4-degree level)	**1.3 (1.2; 1.5)**
		≥2/hour during the day and ≥2/night	Educational level (o-no education, 4-degree level)	0.86 (0.72; 1)
Bortolotti, 2000[165] N = 2,767	≥40	Within the past year	Secondary/higher vs. none/primary	0.7 (0.5; 1)
Schmidbauer, 2001[62] N = 1,262	≥20	Within the past 4 weeks	Secondary/higher vs. primary	1.12 (0.91; 1.38)
Nygaard, 2003[79] N = 5,701	50-69	Mild-moderate incontinence - ≤15 days/last month	Education	**1.3 (1.04; 1.63)**
		Severe incontinence- >15 days in the last month	Education	NS
Moghaddas, 2005[359] N = 6,642	50-64	Any leakage	Education (university)	**2.04 (1.8; 2.32)**
		Any leakage	Education (university);Women with depression	**1.98 (1.68; 2.35)**
		Any leakage	Education (university)	**2.12 (1.75; 2.56)**
Waetjen, 2007[49] N = 3,302	42-52	Urge UI at least monthly	High school or less vs. college or more	0.72 (0.51; 1.03)
Sampselle, 2002[151] N = 3,302	42-52	Frequency score is multiplied by volume score	College and above vs. below college level	**1.31 (1.1; 1.57)**
Prevalent UI, Employment type				
Chen, 2003[123] N = 1,247	>20	Stress UI in the past 2 weeks	Labor work vs. non-labor work	0.5 (0.2; 1)
Prevalent UI, Environmental barriers				
Landi, 2003Landi, 2003 #937} N = 3,194	79.5+-9.5	0 (complete control)-4 (inadequate control with multiple daily episodes)	Yes	**2.95 (1.75; 4.96)**
Prevalent UI, Marital status				
Muscatello, 2001[160] N = 262	>16	>1 symptom: nocturia, urgency, stress UI, urge UI	Widowed/divorce/separated vs. Married with partner	0.7 (0.3; 1.5)
		>1 symptom: nocturia, urgency, stress UI, urge UI	Never married vs. Married with partner	2.5 (1; 6.5)
		>1 symptom: nocturia, urgency, stress UI, urge UI	No private health insurance vs. yes	**2.6 (1.4; 5)**
Prevalent UI, Physical activity				
Brown, 1996[194] N = 7,949	69-101	Daily	Physical exercise (prior year) vs. no regular exercise	0.9 (0.7; 1.1)
Schmidbauer, 2001[62]	≥20	Within the past 4 weeks	Physical activity1+ per week	0.97 (0.78; 1.2)

Table14. Association between behavioral and environmental factors and UI in women (continued)

Author, Sample	Age	Definition UI	Risk Factors	Odds Ratio (95%CI)
N = 1,262				
Van Oyen, 2002[157] N = 3,804	≥15	≥1/week, ≥1/month, <1/month	Physical activity ,sport < 4 hrs/wk or light activities	1.19 (0.04; 2.35)
			Physical activity Sedentary activities	1.85 (0.69; 3)
			Physical activity sport <4 hrs/wk or light activities	3.98 (0.96; 16.51)
			Physical activity Sedentary activities	**4.49 (1.07; 18.83)**
Ostbye, 2004[28] N = 5,322	>65	In the last 12 months, have you lost any amount of urine beyond your control	Exercise	0.96 (0.8; 1.16)
Prevalent UI, Social support				
Nuotio, 2003[136] N = 227	>70	Stress UI, ever	Low social activity (< 3 events or visits vs. 3+)	0.6 (0.3; 1.4)
Waetjen, 2007[49] N = 3,302	42-52	Frequency: at least monthly	Social support < 25th percentile vs. >25th percentile	**1.39 (1.06; 1.81)**
		Frequency: >weekly/daily	Social support < 25th percentile vs. >25th percentile	**1.87 (1.32; 2.66)**
		Mixed UI at least monthly	Social support <25th percentile vs. >25th percentile	**1.95 (1.32; 2.89)**
Prevalent UI, Psychological Stress				
Schmidbauer, 2001[62] N = 1.262	≥20	Within the past 4 weeks	Feeling stressed	1.3 (1.06; 1.59)
Muscatello, 2001[160] N = 262	>16	>1 symptom: nocturia, urgency, stress UI, urge UI	High stress vs. low	**2.7 (1.1; 7)**
Prevalent UI, Body composition				
Waetjen, 2007[49] N = 3,302	42-52	Mixed UI, at least monthly	Waist circumference, cm per cm increase	1.04 (1.01; 1.07)
Brown, 1999[353] N = 2,763	Mean: 67 (SD: 7)	Mixed UI in the past week	Waist/hip ratio (per 0.1 unit)	1.09 (0.96; 1.23)
Waetjen, 2007[49] N = 3,302	42-52	Stress UI at least monthly	Waist circumference, cm per cm increase	1.04 (1.02; 1.06)
Brown, 1999[353] N = 2,763	Mean: 67 (SD: 7)	Stress UI in the past week	Waist/hip ratio (per 0.1 unit)	1.18 (1; 1.39)
Waetjen, 2007[49] N = 3,302	42-52	Frequency: at least monthly	Waist circumference, cm per cm increase	1.03 (1.01; 1.05)
		Frequency: >weekly/daily	Waist circumference, cm per cm increase	**1.05 (1.02; 1.07)**
Brown, 1999[353] N = 2,763	Mean: 67 (SD: 7)	Total UI within the past week	Waist/hip ratio (per 0.1 unit)	1.06 (0.91; 1.23)

Bold- significant results at 95% confidence level

Table F15. Association between dietary intake and UI in women

Author, Sample	Age	Definition of UI	Risk Factors	Odds Ratio 95%CI
Incident UI				
Ostbye, 2004[28] N = 8,949)	>65	UI in the last 12 months	Coffee drinker	0.86 (0.69; 1.06)
Dallosso, 2003[14] N = 6424	>40	Stress UI at least several times a month	Bread daily vs. less than daily	**0.76 (0.61; 0.96)**
			Carbonated drinks 1/week vs. < 1	1.1 (0.8; 1.5)
			Carbonated drinks 2-6/week vs. <1	1.1 (0.81; 1.5)
			Carbonated drinks daily vs. < 1	**1.6 (1.2; 2.2)**
Prevalent UI				
Brown, 1996[194] N= 7949	69-101	Daily UI	Alcohol use (drinks/wk per SD)	0.9 (0.8; 1)
Fultz, 1999[357] N = 3991	>70	UI at least monthly; mild = 0-6 days/month	Daily use of alcohol	1.48 (0.96; 2.29)
		UI at least monthly; moderate = 7-20days/month		1.6 (0.72; 3.57)
		UI at least monthly; severe ≥21 days/month		0.87 (0.48; 1.59)
Schmidbauer, 2001[62] N = 1262	≥20	Leakage within the past 4 weeks	1-6 drinks per week vs. 0	1.28 (0.94; 1.74)
			Daily alcohol vs. never	**1.83 (1.27; 2.63)**
Muscatello, 2001[160] N = 262	>16	>1 symptom: nocturia, urgency, stress UI, urge UI	Current occasional alcohol drinker vs. non drinker	0.8 (0.4; 1.8)
			Current regular drinker vs. non drinker	0.4 (0.2; 1)
Teleman, 2004[360] N = 2682	50-59	UI at least occasionally	Low alcohol consumption	**0.7 (0.6; 0.9)**
			Moderate alcohol consumption	**0.6 (0.5; 0.9)**
Bortolotti, 2000[165] N = 2767	≥40	UI in the last 12 months	Alcoholic drinks/week is 1-7 vs. 0	0.7 (0.4; 1)
			Alcoholic drinks/week is 8-14 vs. 0	1 (0.5; 1.7)
			Alcoholic drinks/week is 15-21 vs. 0	0.7 (0.3; 2.1)
			Alcoholic drinks/week is ≥22 vs. 0	0.5 (0.1; 2.2)
Van Oyen, 2002[157] N = 3804	≥15	UI at least once a wee	Alcohol (# glasses per week) 1-7	0.82 (0.6; 1.14)
			Alcohol (# glasses per week) 8-14	0.55 (0.29; 1.05)
			Alcohol (# glasses per week) 15-21	0.62 (0.23; 1.69)
			Alcohol (# glasses per week) ≥22	1.34 (0.55; 3.22)
Brown, 1996[194] N = 7949	69-101	Daily UI	Coffee drinker vs. non-coffee drinker	0.9 (0.8; 1.1)
Bortolotti, 2000[165] N = 2767	≥40	UI in the last 12 months	Coffee cups/day 1 vs. 0	0.6 (0.4; 1.1)
			Coffee cups/day 2 vs. 0	0.5 (0.3; 1)
			Coffee cups/day ≥3 vs. 0	0.4 (0.3; 0.8)
Ostbye, 2004[165] N = 5322	>65	UI in the last 12 months	Coffee Drinker	**1.23 (1.01; 1.51)**

Bold –significant associations

Table F16. Association between smoking and UI in women

Author, Sample	Age	Definition UI	Smoking	Odds ratio (95%CI)
Mixed UI				
Hannestad, 2003[361] N = 27,936	≥20	Moderate UI daily leakage of drops	Cigarettes/day current, 1-19 vs. never	1.1 (1; 1.3)
			Cigarettes/day current, 20+ vs. cigarettes/day never	**1.6 (1.2; 2.1)**
			Cigarettes/day former, >20 vs. never	**2.2 (1.7; 2.8)**
			Cigarettes/day Former, 1-19 vs. never	1.2 (1; 1.3)
			Pack years current, .15+ vs. never	**1.4 (1.2; 1.6)**
			Pack years current, <15 vs. never	1 (0.9; 1.2)
			Pack years Former, <15 vs. never	1.1 (1; 1.3)
			Pack years former, 15+ vs. never	**1.6 (1.3; 2.1)**
			Smoking Current vs. never	1.2 (1; 1.3)
			Smoking Former vs. never	**1.2 (1.1; 1.4)**
Stress UI				
Hannestad, 2003[361] N = 27,936	≥20	Moderate UI daily leakage of drops	Cigarettes/day current, 1-19 vs. never	**0.8 (0.7; 0.9)**
			Cigarettes/day current, 20+ vs. never	1.2 (1; 1.5)
			Cigarettes/day former, >20 vs. never	1.3 (1; 1.7)
			Cigarettes/day Former, 1-19 vs. never	1.1 (1; 1.2)
			Pack years current, .15+ vs. never	1 (0.9; 1.2)
			Pack years current, <15 vs. never	**0.7 (0.6; 0.8)**
			Pack years Former, <15 vs. never	1.1 (1; 1.2)
			Pack years former, 15+ vs. never	**1.3 (1.1; 1.6)**
			Smoking Current vs. never	**0.8 (0.8; 0.9)**
			Smoking Former vs. never	1.1 (1; 1.2)
Total UI				
Danforth, 2006[68] N = 83,355	25-54	Occasional: 1-3 times a month.	Current vs. never	0.9 (0.9; 1)
		Frequent: At least weekly.	Current vs. never	**1.2 (1.1; 1.3)**
		Severe: Wet underwear.	Current vs. never	**1.3 (1.3; 1.5)**
		Occasional: 1-3 times a month.	Former vs. never	1 (1; 1.1)
		Frequent: At least weekly.	Former vs. never	**1.1 (1.1; 1.2)**
		Severe: Wet underwear.	Former vs. never	**1.1 (1.1; 1.2)**
Van Oyen, 2002[157] N = 3,804	≥15	≥1/week	<20 cig/day vs. never	0.77 (0.46; 1.32)
		≥1/week	≥20 cig/day vs. never	**1.78 (1.05; 3.03)**
Schmidbauer, 2001[62] N = 1,262	≥20	Within the past 4 weeks	Cigarettes/day 1+ vs. 0	1.23 (0.75; 2.02)
Bortolotti, 2000[165] N = 2,767	≥40	Within the past year	Cigarettes/day >10-20 vs. 0	0.9 (0.5; 1.7)
			Cigarettes/day >20 vs. 0	0.8 (0.4; 1.5)
			Cigarettes/day >5-10 vs. 0	0.9 (0.4; 2.1)
Schmidbauer, 2001[62] N = 1,262	≥20	Within the past 4 weeks	Cigarettes/day 1-20 vs. 0	0.91 (0.69; 1.2)

Table F16. Association between smoking and UI in women (continued)

Author, Sample	Age	Definition UI	Smoking	Odds ratio (95%CI)
Bortolotti, 2000[165] N = 2,767	≥40	Within the past year	Cigarettes/day1-5 vs. 0	0.9 (0.4; 2)
Hannestad, 2003[361] N = 27,936	≥20	Moderate = daily leakage of drops	Cigarettes/day current, 1-19 vs. never	0.9 (0.9; 1)
			Cigarettes/day current, 20+ vs. never	**1.3 (1.1; 1.6)**
			Cigarettes/day former, 1-19 vs. never	1.1 (1; 1.2)
Fultz, 1999[357] N = 3,991	>70	UI at least monthly	Current smoker	0.65 (0.41; 1.04)
		Moderate UI: 7-20days/month	Current smoker	1.12 (0.52; 2.41)
		Severe UI >21 days/month	Current smoker	1.21 (0.76; 1.91)
Bortolotti, 2000[165] N – 2,767	≥ 40	UI within the past year	Current smokers vs. never smokers	0.8 (0.5; 1.4)
Schmidbauer, 2001[62] N = 1,262	≥20	UI within the past 4 weeks	Current smokers vs. never smokers	1 (0.77; 1.3)
Swanson, 2005[106] N = 606	45-81	UI within the past month	Ever smoked cigarettes	1.7 (1; 2.7)
			Ever smoked cigarettes	1.5 (1; 2.1)
Bortolotti, 2000[165] N = 2,767	≥ 40	Within the past year	Ex smokers vs. never smokers	0.9 (0.5; 1.7)
Schmidbauer, 2001[62] N = 1,262	≥20	Within the past 4 weeks	Ex smokers vs. never smokers	1.3 (1; 1.68)
Hannestad, 2003[361] N = 27,936	≥20	Moderate = daily leakage of drops	Cigarettes/day former, >20 vs. never	**1.7 (1.4; 2)**
			Pack years current, .15+ vs. never	1.2 (1; 1.3)
			Pack years current, <15 vs. never	0.9 (0.8; 1)
			Pack years Former, <15 vs. never	1.1 (1; 1.2)
			Pack years former, 15+ vs. never	**1.5 (1.3; 1.7)**
Van Oyen, 2002[157] N = 3,804	≥15	UI at least once a week	Past smoker vs. never	1.39 (0.98; 1.98)
Ostbye, 2004[28] N = 5,322	**>65**	UI in the last 12 months	Smoked < 1 pack/days	1.02 (0.82; 1.26)
			Smoked < 1 pack/ days	1.15 (0.91; 1.45)
			Smoked 1+ packs/ days	**1.41 (1.06; 1.87)**
			Smoked 1+ packs/ days	0.94 (0.67; 1.32)
Nygaard, 2003[79]	**50-69**	UI 15 or fewer days in the last month	Smoking	NS
N = 5,701	**50-69**	UI> 15 days in the last month	Smoking	**1.48 (1.08; 2.03)**
Moghaddas, 2005[359] N = 6,642	50-64	any leakage	Smoking (yes)	0.85 (0.73; 1)
			Smoking (yes)	0.86 (0.67; 1.1)
			Smoking (yes);Women with depression	0.85 (0.7; 1.04)
Hannestad, 2003[361] N = 27,936	≥20	All: (Slight = drops of urine a few times a month, Moderate = daily leakage of drops, Severe = larger amounts at least once a week).	Smoking Current vs. never	1 (0.9; 1)
			Smoking Former vs. never	**1.1 (1.1; 1.3)**
			Cigarettes/day current, 1-19 vs. never	1.2 (1; 1.5)
			Cigarettes/day current, 20+ vs. never	1.3 (0.8; 1.4)
			Cigarettes/day Former, 1-19 vs. never	1.1 (0.9; 1.4)
			Former, >20 vs. never	**1.9 (1.2; 3.2)**

Table F16. Association between smoking and UI in women (continued)

Author, Sample	Age	Definition UI	Smoking	Odds ratio (95%CI)
			Pack years current, .15+vs. never	1.2 (0.9; 1.6)
			Pack years current, <15 vs. never	1.3 (1; 1.7)
			Pack years Former, <15 vs. never	1.1 (0.9; 1.4)
			Pack years former, 15+ vs. never	**1.9 (1.3; 2.8)**
			Smoking Current vs. never	1.2 (1; 1.5)
			Smoking Former vs. never	1.2 (1; 1.5)
Hannestad, 2003[361] N = 27,936	≥20	Mixed UI :larger amounts at least once a week, 56 g/24 hours	Cigarettes/day current, 1-19 vs. never	**1.4 (1.1; 1.7)**
			Cigarettes/day current, 20+ vs. never	**2.4 (1.6; 3.6)**
			Cigarettes/day former, >20 vs. never	**3.3 (2.2; 4.9)**
			Cigarettes/day Smoking Former, 1-19 vs. never	1.3 (1; 1.6)
			Pack years current, <15 vs. never	1.1 (0.9; 1.5)
			Pack years current, 15+ vs. never	**1.9 (1.5; 2.4)**
			Pack years Former, <15 vs. never	1.3 (1; 1.6)
			Pack years former, 15+ vs. never	**2 (1.4; 2.8)**
			Smoking Current vs. never	**1.5 (1.2; 1.8)**
			Smoking Former vs. never	**1.5 (1.2; 1.8)**
Hannestad, 2003[361] N = 27,936	≥20	Stress UI: larger amounts at least once a week, 56 g/24 hours	Cigarettes/day current, 1-19 vs. never	1.1 (0.8; 1.4)
			Cigarettes/day current, 20+ vs. never	**1.8 (1.1; 2.9)**
			Cigarettes/day former, >20 vs. never	1.4 (0.7; 2.6)
			Cigarettes/day Former, 1-19 vs. never	1.1 (0.8; 1.4)
			Pack years current, <15 vs. never	1 (0.7; 1.3)
			Pack years current, 15+ vs. never	**1.4 (1.1; 1.9)**
			Pack years Former, <15 vs. never	1 (0.8; 1.4)
			Pack years former, 15+ vs. never	**1.7 (1.1; 2.6)**
			Smoking Current vs. never	1.1 (0.9; 1.5)
			Smoking Former vs. never	1.1 (0.8; 1.4)
		Total UI: larger amounts at least once a week, 56 g/24 hours	Cigarettes/day current, 20+ vs. never	**2.1 (1.5; 2.8)**
			Cigarettes/day current, 1-19 vs. never	**1.3 (1.1; 1.5)**
			Cigarettes/day former, >20 vs. never	**2.5 (1.8; 3.5)**
			Cigarettes/day Former, 1-19 vs. never	**1.2 (1.1; 1.5)**
			Pack years current, <15 vs. never	1.1 (0.9; 1.4)
			Pack years current, 15+ vs. never	**1.7 (1.4; 2)**
			Pack years Former, <15 vs. never	1.2 (1; 1.4)
			Pack years former, 15+ vs. never	**2 (1.6; 2.6)**
			Smoking Current vs. never	**1.4 (1.2; 1.6)**
			Smoking Former vs. never	**1.4 (1.2; 1.6)**
		Urge UI: larger amounts at least once a week, 56 g/24 hours	Cigarettes/day current, 1-19 vs. never	1.3 (0.1; 3.6)
			Cigarettes/day current, 20+ vs. never	1.3 (0.8; 2.1)
			Cigarettes/day former, >20 vs. never	2.1 (0.7; 6)
			Cigarettes/day Former, 1-19 vs. never	1 (0.6; 1.7)
			Pack years current, 15+ vs. never	1.1 (0.6; 2.1)

Table F16. Association between smoking and UI in women (continued)

Author, Sample	Age	Definition UI	Smoking	Odds ratio (95%CI)
			Pack years current, <15 vs. never	1.5 (0.8; 2.7)
			Pack years Former, <15 vs. never	0.8 (0.4; 1.5)
			Pack years former, 15+ vs. never	**2.8 (1.5; 5.2)**
			Smoking Current vs. never	1.2 (0.7; 1.9)
			Smoking Former vs. never	1.1 (0.7; 1.8)
Miller, 2003[134] N = 1,500	21-79	Even a small amount of urine in the previous month	Current smoker <20 per day vs. never	1.26 (0.51; 3.14)
			Current smoker ≥20 per day vs. never	**3.34 (1.6; 6.98)**
Sampselle, 2002[151] N = 3,302	42-52	Frequency score is multiplied by volume score	Current smoking vs. never	**1.38 (1.04; 1.82)**
Miller, 2003[134] N = 1,500	21-79	Even a small amount of urine in the previous month	Ex-smoker vs. never	1.37 (0.64; 2.9)

Table F17. Association between cognitive status, depression, dependency, and UI in women

Author, Sample	Age	Definition of UI	Risk Factors	Odds Ratio (95%CI)
Incident UI, Cognitive status				
Ostbye, 2004[28] N = 5,322	>65	UI in the last 12 months	Cognitive status 50 3MS < 78	1.34 (0.78; 2.29)
			Cognitive status 3MS < 50	2.77 (0.37; 20.62)
Huang, 2007[46] N = 6,361	>65	UI in the last 12 months	Decline in Mini-Mental State Examination (more than 1 SD decline)	1.01 (0.86; 1.18)
			Decline in Trails B (more than 1 SD decline)	0.93 (0.79; 1.11)
			Decline in Digit Symbol Substitution test (more than 1 SD decline)	0.88 (0.73; 1.07)
			Decline in walking speed	**1.31 (1.09; 1.56)**
			Decline in chair stand speed	**1.4 (1.19; 1.64)**
		Urine leakage occurring at least 1/week that interfered with activities	Decline in Mini-Mental State Examination (more than 1 SD decline)	**1.55 (1.1; 2.17)**
			Decline in Trails B (more than 1 SD decline)	1.23 (0.84; 1.8)
			Decline in Digit Symbol Substitution test (more than 1 SD decline)	1.53 (1; 2.31)
			Decline in walking speed	1.44 (0.98; 2.12)
			Decline in chair stand speed	1.21 (0.86; 1.69)
Incident UI, Depression				
Jackson, 2004[22] N = 1,584	70-79	UI at least weekly	Depressive symptoms CES-D ≥ 16	**2.7 (1.4; 5.3)**
Waetjen, 2007[49] N = 3,302	42-52	UI at least monthly	Depressive symptoms	1.25 (0.96; 1.61)
Prevalent UI, Cognitive				
Ostbye, 2004[28] N = 5,322	>65	UI in the last 12 months	Cognitive status 50 3MS < 78	0.89 (0.58; 1.35)
			Cognitive status 3MS < 50	1.64 (0.49; 5.46)
Landi, 2003Landi, 2003 #937} N = 3,194	79.5+-9.5	0 (complete control)-4 (inadequate control with multiple daily episodes)	Delirium	**1.66 (1.31; 2.11)**
			CPS score24 vs. 0-1	**2.01 (1.64; 2.45)**
			CPS score>5 vs. 0-1	**6.11 (4.67; 7.99)**
Prevalent UI, Dependency				
McGrother, 2006[6] N = 12,570	>40	Stress UI, monthly or more	ADL 4 vs. 1	1 (0.5; 1.8)
Nuotio, 2003[136] N = 227	>70	Stress UI, ever	ADL disability (1+)	0.8 (0.3; 2)
McGrother, 2006[6] N = 12,570	>40	Stress UI, monthly or more	ADL 2 vs. 1	0.8 (0.4; 1.3)
		Stress UI, monthly or more	ADL 3 vs. 1	1.1 (0.7; 1.7)
Van Oyen, 2002[157] N = 3,804	≥15	UI at least once a week	Physical limitations moderate	**2.31 (1.52; 3.52)**
			Physical limitations severe	**2.66 (1.48; 4.77)**
Fultz, 1999[357] N = 3,991	>70	Mild=0-6 days/month	Difficulties with ADLs	**1.87 (1.43; 2.45)**
		Moderate=7-20days/month	Difficulties with ADLs	**1.87 (1.11; 3.14)**
		Severe ≥21 days/month	Difficulties with ADLs	**3.66 (2.83; 4.73)**

Table F18. Risk factors for urinary incontinence in child-bearing women (pregnancy, post-partum, and up to 1 year post-delivery) (continued)

Author, Sample	Age	Definition of UI	Risk Factors	Odds Ratio (95%CI)
Maggi, 2001[158] N = 1,531	>65	UI at least once per week	ADL disability	**1.75 (1.22; 2.52)**
			Mobility disability	**1.81 (1.32; 2.49)**
Nygaard, 2003[79] N = 5,701	50-69	UI in the last 12 months	ADL	**1.44 (1.1; 1.88)**
			Functional status	**1.55 (1.35; 1.78)**
			Functional status	**1.9 (1.49; 2.41)**
Jackson, 2006[100] N = 1,017	55-75	Any leakage in the past year	Physical functioning score 51-75 vs. 76-100	1.3 (1; 1.8)
			Physical functioning score 0-50 vs. 76-100	**1.8 (1.2; 2.6)**
		Severe: Sandvik score of 6-8 over the past year	Physical functioning score 51-75 vs. 76-100	1.6 (1; 2.4)
			Physical functioning score 0-50 vs. 76-100	**2.3 (1.5; 3.8)**
Landi, 2003Landi, 2003 #937} N = 3,194	79.5±9.5	0 (complete control)-4 (inadequate control with multiple daily episodes)	24 vs. 0-1	**1.81 (1.3; 2.52)**
			>5 vs. 0-1	**5.99 (4.68; 7.66)**
Van Oyen, 2002[157] N = 3,804	≥15	UI at least once a week	Physical limitations Moderate vs. none	**4.15 (2.85; 6.04)**
			physical limitations Severe vs. none	**5.21 (1.16; 8.61)**
Prevalent UI, Depression				
Waetjen, 2007[49] N = 3,302	42-52	Mixed UI, at least monthly	Depressive symptoms	1.45 (1.04; 2.03)
Nuotio, 2003[136] N = 227	>70	Stress UI, ever	Depressed mood (2+ in GDS-5 vs. <2)	2.1 (0.9; 5.2)
Jackson, 2004[21] N = 1,584	70-79	Stress UI, within the past week	Depressive symptoms (CES-D >16)	2 (0.92; 4.34)
Nygaard, 2003[79] N = 5,701	**50-69**	Mild-moderate incontinence - incontinence on 15 or fewer days in the last month	Depression	1.41 (1.06; 1.87)
		Severe incontinence-incontinence on more than 15 days in the last month	Depression	**1.82 (1.26; 2.63)**
Melville, 2005[112] N = 3,596	30-90	UI at least monthly.	Current major depression	**2.5 (1.7; 3.7)**
		UI at least monthly	Current major depression	1.8 (1.1; 2.9)
Moghaddas, 2005[359] N = 6,642	50-64	Any leakage	Self-reported depression (yes)	**1.37 (1.21; 1.55)**
Waetjen, 2007[49] N = 3,302	42-52	UI at least monthly	Depressive symptoms	**1.28 (1.02; 1.61)**
		UI >weekly/daily	Depressive symptoms	1.33 (0.99; 1.81)
Buchsbaum, 2002[144] N = 149	39-91	"Current" UI	depression	**2.96 (1.21; 7.55)**
Landi, 2003Landi, 2003 #937} N = 3,194	79.5+-9.5	0 (complete control)-4 (inadequate control with multiple daily episodes)	Yes	1.05 (0.88; 1.25)
Jackson, 2004[21] N = 1,584	70-79	Urge UI, within the past week	Depressive symptoms (CES-D >16)	1.49 (0.98; 2.27)

Table F18. Risk factors for urinary incontinence in child-bearing women (pregnancy, post-partum, and up to 1 year post-delivery)

Author, Sample	Age	Risk Factors	Odds Ratio (95%CI)	
Burgio, 1996[362]	523 postpartum women 14-42 years	White women: previous UI included in model:		
		Previous UI:	15.8	6.7-37.3
		Education:	1.4	0.9-2.3
		Nocturia:	1.1	0.99-1.3
		White women: previous incontinence not included in mode:		
		Education:	1.7	1.1-2.6
		Number of births:	1.2	0.97-1.5
		Nocturia:	1.1	0.99-1.3
		Black women: previous incontinence not included in model:		
		Attended class:	4.0	1.4-12.1
		BMI, smoking during pregnancy, number of pregnancies, coughing a lot, urinary frequency, family member has UI, income level were not associated with UI		
Wilson, 1996[363]	1,505 women 3 months after delivery	All women:		
		Mode of delivery		
		Forceps	1.1	0.8-1.6
		Cesarean section	0.4	0.3-0.6
		Parity		
		2	1.3	1-1.8
		3	1.4	1;2
		4	1.1	0.6-2
		5+	2.2	1-4.9
		BMI	1.07	1.04-1.1
		Pelvic floor muscle exercises during pregnancy		
		None	1	
		Few/month	0.8	0.6-1.1
		Weekly	0.8	0.5-1.3
		Few/week	0.9	0.7-1.2
		Daily All women:	0.6	0.4-0.9
		All women with no previous UI:		
		Mode of delivery		
		Forceps	1.3	0.8-2.3
		Cesarean section	0.3	0.1-0.6
		Parity		
		2	1.5	1-2.4
		3	1	0.6-1.9
		4	1	0.4-2.9
		5+	0.9	0.1-8.2
		BMI	1.02	0.97-1.07
		Pelvic floor muscle exercises during pregnancy		
		None	1	

Table F18. Risk factors for urinary incontinence in child-bearing women (pregnancy, post-partum, and up to 1 year post-delivery) (continued)

Author, Sample	Age	Risk Factors	Odds Ratio (95%CI)	
		Few/month	0.8	0.4-1.6
		Weekly	0.9	0.4-2.3
		Few/week	1	0.6-1.6
		Daily	0.9	0.5-1.7
		All primiparae:		
		Mode of delivery		
		Forceps	1.1	0.7-1.7
		Cesarean section	0.4	0.2-0.7
		BMI	1.07	1.02-1.12
		Pelvic floor muscle exercises during pregnancy		
		None	1	
		Few/month	0.7	0.4-1.3
		Weekly	0.8	0.4-1.7
		Few/week	0.8	0.5-1.4
		Daily	0.6	0.3-1
		Primiparae with no previous UI:		
		Mode of delivery		
		Forceps	1	0.5-1.9
		Cesarean section	0.2	0-0.6
		BMI	1.07	1-1.14
		Pelvic floor muscle exercises during pregnancy		
		None	1	
		Few/month	1.4	0.5-3.5
		Weekly	1.2	0.4-3.9
		Few/week	1.1	0.5-2.3
		Daily	0.8	0.3-1.9
Højberg, 1999[39]	7,795 nulliparous and multiparous women	UI at least once/week		
		Age:		
		15-24 years: 1	1.5	1.0-2.4
		25-29years: Reference		
		30-34 years:	1.3	0.9-1.8
		> 35 years:	1.2	0.8-1.9
		Parity:		
		1; First delivery, C-section:	1.3	0.4-4.3
		1; First delivery, vaginally:	5.7	3.9-8.3
		2; Only C-sections: --		--
		3+; Only vaginal deliveries:	4.8	3.0-7.9
		3+; only C-section: --		--
		3; Only vaginal deliveries:	7.7	3.9-15.3
		Pre-pregnancy BMI		
		< 20:	1	0.7-1.3
		20-30: reference		--

Table F18. Risk factors for urinary incontinence in child-bearing women (pregnancy, post-partum, and up to 1 year post-delivery) (continued)

Author, Sample	Age	Risk Factors	Odds Ratio (95%CI)	
		30-35:	1.7	0.9-3.2
		> 35:	2.5	1.0-6.0
		Smoker:	1.4	1.0-1.8
		Previous miscarriages before 12th week:	1.1	0.8-1.5
		Previous miscarriage after 12th week:	1.6	0.9-2.9
		Previous lower abdominal or urological surgery:	1.2	0.8-1.8
		Association with SUI or MUI at 16 weeks gestation:		
		Length of second stage (min)		
		> 90:	0.7	0.2-2.3
		Episiotomy:	1.9	1.0-3.5
		Spontaneous perineal laceration > 3 cm:	1.3	0.5-3.2
		Vacuum extraction:	0.6	0.3-1.6
		Vaginal laceration:	1.2	0.6-2.2
		Third degree anal tear:	0.01	0-0
		Infant weight (g)		
		≥ 4000:	1.9	1.0-3.6
		Time since last delivery (years)		
		≤ 1 year:	1.8	1.0-3.6
		Oxytocin stimulation:	1	0.6-1.9
		Pudental block:	1.2	0.7-2.0
Farrell, 2001[364]	595 primiparae with vaginal and cesarean deliveries	UI at 6 months post-delivery:		
		Duration of passive second stage of labor	1.0	1.0-1.01
		Duration of epidural	1.0	0.9-1.0
		Forceps delivery	1.3	0.6-2.5
		Relative risk:		
		UI at 6 weeks:		
		Spontaneous vaginal delivery vs. cesarean delivery:	2.8	1.5-5.3
		Forceps vs. spontaneous vaginal	1.5	1.1-2.2
		Forceps vs. cesarean:		
			4.3	2.2-8.2
		Labored cesarean vs. elective cesarean	2.3	0.3-17.6
		Cesarean in second stage vs. elective cesarean	1.2	0.1-12.2
		Cesarean in labor vs. spontaneous vaginal	0.4	0.2-0.8
		UI at 6 months:		
		Spontaneous vaginal delivery vs. cesarean delivery:	2.1	1.1-3.7
		Forceps vs. spontaneous vaginal	1.5	1.0-2.3
		Forceps vs. cesarean:		
			3.1	1.7-5.9
		Labored cesarean vs. elective cesarean	2.5	0.3-18.5

Table F18. Risk factors for urinary incontinence in child-bearing women (pregnancy, post-partum, and up to 1 year post-delivery) (continued)

Author, Sample	Age	Risk Factors	Odds Ratio (95%CI)	
		Cesarean in second stage vs. elective cesarean	0.6	0.04-9.1
		Cesarean in labor vs. spontaneous vaginal	0.6	0.3-1.0
		Vacuum extraction showed similar risk as forceps at 6 months postpartum		
Pregazzi, 2002[150]	537 primiparae and multiparae women with vaginal deliveries	Labor onset conditions (spontaneous or induced with intravaginal dinoprostone)		
			1.736	1.060–2.843
		Asymptomatic women	0.492	0.273–0.885
		Women with stress incontinence		
Thompson, 2002[154]	1,295 primiparae and multiparae with vaginal and cesarean deliveries	Urinary incontinence at 8 weeks unassisted vaginal deliveries, women with cesarean sections	0.25	0.14–0.44
		Urinary incontinence at 16 weeks unassisted vaginal deliveries, women with cesarean sections	0.59	0.35–0.99
		Urinary incontinence at 24 weeks unassisted vaginal deliveries, women with cesarean sections	0.55	0.31–0.98

Burgio, 2003[122]	523 aged 14-42 primiparae and multiparae with vaginal and cesarean deliveries	Time (month)	1.02	0.984;	1.055
		Age (year)	1.007	0.957;	1.061
		Race (black)	0.699	0.328;	1.486
		Education(> college)	0.629	0.382;	1.034
		Frequency of urination	1.123	1.057;	1.194
		Smoking	2.934	1.366;	3.852
		Type of delivery (vaginal)	2.36	1.361;	4.088
		Body mass index	1.055	1.016;	1.094
		Incontinent during pregnancy	2.002	1.204;	3.327
		Length of breastfeeding	1.169	1.022;	1.339
		Forceps	1.87	1.085;	3.222
Hvidman, 2003[130]	376 20-59 years: primiparae and multiparae with vaginal and cesarean deliveries	Predictors of postpartum UI after last delivery:			
		UI before index pregnancy	4.7	2.4-9.0	
		UI during index pregnancy	7	3.7-13.3	
		Index delivery by cesarean section	0.2	0.06-0.9	
		Years since last index delivery	0.8	0.6-1.0	
		Postpartum UI ≥ 4 weeks:			
		UI during index pregnancy	11.1	5.7-21.8	
		Perineal suturing at index delivery	2.4	1.2-4.8	
		Vacuum extraction or forceps delivery	0.2	0.03-0.8	
		Years since index delivery	0.7	0.6-1.0	
		Postpartum UI ≥ 12 weeks			
		UI before index pregnancy	4	1.6-9.9	

Table F18. Risk factors for urinary incontinence in child-bearing women (pregnancy, post-partum, and up to 1 year post-delivery) (continued)

Author, Sample	Age	Risk Factors	Odds Ratio (95%CI)	
		Perineal suturing at index delivery	2.9	1.6-9.9
		Years since index delivery	0.6	0.4-0.9
		Depending on model: variables not associated were: age, childhood enuresis, BMI > 30, cystitis, abdominal and/or gynecologic surgery, number of deliveries (total and vaginal), information on index delivery (augmentation, mode of delivery, episiotomy, vacuum/forceps, bladder catheter, birth weigh, breast-feeding		
Eliasson, 2005[365]	665 nulliparous women	Inability to interrupt urine flow	2.1	1.5-3.1
		Perceived discomfort in lower abdomen	3.6	2.3-5.9
		Varicose veins/hemorrhoids	1.5	1.0-2.2
		Pre-pregnancy high impact activity	1.4	1.0-2.0
		Variables that were not associated were: pre-pregnancy leakage, partus normal, regular physical activity, chronic disease, age > 25 years, straining during micturition, and university studies		
Glazener, 2006[5]	3,405 nulliparous women with singleton births	Primiparae who are first incontinent after their index delivery compared with continent primiparae		
		Age of mother at index birth		
		<25	1	
		25–29	1.52	1.18–1.94
		30–34	1.46	1.10–1.94
		>35	2.21	1.47–3.33
		Delivery type		
		SVD	1	0.87–1.46
		Forceps/breech	1.12	0.81–1.63
		Vacuum	1.14	0.19–0.42
		Caesarean section	0.29	0.52–1.38
		Gestational age (weeks)		
		<37	1	
		>37	0.85	0.91–1.75
		Birth weight (quartiles) (kg)		
		<3	1	
		3.00–3.35	1.26	1.00–2.02
		3.36–3.69	1.42	0.90–1.96
		>3.70	1.33	0.67–1.30
		Head circumference (quartiles)		
		<35	1	
		335–344	0.93	0.54–1.09

Table F18. Risk factors for urinary incontinence in child-bearing women (pregnancy, post-partum, and up to 1 year post-delivery) (continued)

Author, Sample	Age	Risk Factors	Odds Ratio (95%CI)	
		345–354	0.77	0.52–1.12
		>355	0.76	0.75–1.38
		BMI before pregnancy (quartiles)		
		<20.7	1	
		20.7–22.3	1.02	0.70–1.30
		22.4–25	0.95	0.95–1.79
		>25	1.3	0.71–1.35
		primiparae who are first incontinent after their index delivery compared with continent primiparae		
		Age of mother at index birth		
		<25	1	
		25–29	1.46	1.15–1.86
		30–34	1.43	1.08–1.88
		>35	2.02	1.35–3.02
		Delivery type		
		SVD	1	
		Forceps/breech	1.18	0.92 –1.51
		Vacuum	1.16	0.83–1.63
		Caesarean section	0.28	0.19–0.41
		primiparae who are first incontinent during their index delivery compared with continent primiparae		
		Age of mother at index birth		
		<25	1	
		25–29	0.9	0.68–1.18
		30–34	0.9	0.66–1.24
		>35	1.47	0.92–2.35
		Delivery type		
		SVD	1	
		Forceps/breech	0.81	0.58–1.11
		Vacuum	1.05	0.70–1.59
		Caesarean section	0.39	0.27–0.59
		Gestational age (weeks)		
		<37	1	
		>37	0.73	0.40–1.34
		Birth weight (quartiles) (kg)		
		<3	1	
		3.00–3.35	1.42	0.96–2.10
		3.36–3.69	1.72	1.14–2.60

Table F18. Risk factors for urinary incontinence in child-bearing women (pregnancy, post-partum, and up to 1 year post-delivery) (continued)

Author, Sample	Age	Risk Factors	Odds Ratio (95%CI)	
		>3.70	1.82	1.16–2.86
		Head circumference (quartiles)		
		<335	1	
		335–344	0.88	0.60–1.30
		345–354	0.73	0.48–1.09
		>355	0.8	0.52–1.25
		BMI before pregnancy (quartiles)		
		<20.7	1	
		20.7–22.3	1.49	1.03–2.15
		22.4–25	1.35	0.93–1.96
		>25	1.6	1.09–2.35
		Delivery type		
		SVD	1	
		Forceps/breech	0.8	0.59–1.10
		Vacuum	1.06	0.72–1.57
		Caesarean section	0.39	0.27–0.58
		Birth weight (quartiles) (kg)	1	
		<3	1.33	0.95–1.85
		3.00–3.35	1.45	1.05–2.02
		3.36–3.69	1.56	1.12–2.19
		>3.70		
		BMI before pregnancy (quartiles)	1	
		<20.7	1.48	1.04–2.12
		20.7–22.3	1.38	0.96–1.99
		22.4–25	1.68	1.16–2.43
		>25	1.39	0.96–2.02
Burgio, 2007[366]	759; mean age of 28.1 335 sphincter tear 319 vaginal delivery without tear 105 Cesarean delivery	Antenatal UI	3.5	2.4–5.2
		No college education	2	1.4–2.8
		Higher pre delivery BMI	1.2	1.1–1.4
		Cesarean delivery	0.5	0.3–0.9
Casey, 2005[367]	3,387 nulliparous women with vaginal and Cesarean deliveries	Oxytocin augmentation	1.2	0.9-1.7
		Epidural analgesia	0.9	0.6-1.3
		Second stage > 2 hours	1.1	0.6-2.0
		Episiotomy	1.4	0.98-1.9
		3rd or 4th degree laceration	1.1	0.7-1.9
		Forceps delivery	1.5	0.8-2.6
		Cesarean delivery	0.5	0.3-0.8
		Birth weight > 4000 grams	1.0	0.5-1.9

Table F18. Risk factors for urinary incontinence in child-bearing women (pregnancy, post-partum, and up to 1 year post-delivery) (continued)

Author, Sample	Age	Risk Factors	Odds Ratio (95%CI)	
Schytt, 2004[30]	2,390 primiparae and multiparae with vaginal and Cesarean deliveries	Stress incontinence Primiparas		
		Age (years)		
		<25	0.9	0.6–1.2
		25–35	1	
		>35	1.3	0.8–2.2
		Education		
		Elementary school	1	
		High school	2.5	0.8–7.7
		College or university	2.9	0.9–8.7
		Civil status		
		married/cohabitant	1	
		single	1.6	1.1–2.5
		Native language		
		Swedish	1	
		Other than Swedish	1	0.6–1.7
		Multiparas		
		Age (years)		
		<25	1.1	0.7–1.7
		25–35	1	
		>35	1.2	1.0–1.6
		Education		
		Elementary school	1	
		High school	0.9	0.6–1.3
		College or university	1.1	0.8–1.7
		Civil status		
		married/cohabitant	1	
		single	1	0.6–1.7
		Native language		
		Swedish	1	
		Other than Swedish	1.4	1.1–1.8
		Stress incontinence Primiparas		
		Pregravida BMI		
		Underweight (<18.5)	0	
		Normal (18.5–24.9)	1	
		Overweight (25–29.9)	1.2	0.9–1.6
		Obesity (>30)	1.5	1.1–2.0
		Current pregnancy		
		Constipation*		
		Third trimester	1.3	1.0–1.7
		4–8weeks postpartum	1.5	1.1–2.0
		1 year after birth	1.2	0.9–1.8
		Urinary incontinence (overall)		

Table F18. Risk factors for urinary incontinence in child-bearing women (pregnancy, post-partum, and up to 1 year post-delivery) (continued)

Author, Sample	Age	Risk Factors	Odds Ratio (95%CI)	
		Third trimester	2.1	1.6–2.7
		4–8weeks postpartum	3.2	2.7–3.8
		Mode of delivery		
		Vaginal	1	
		Vacuum extraction or forceps	1.1	0.8–1.6
		Elective cesarean section	0	
		Emergency cesarean section	0.6	0.3–1.0
		Presentation (vaginal delivery)		
		Vertex	1	
		Occiput posterior	1.6	1.0–2.8
		Breech	0	
		Other	0	
		Infant birth weight (g)		
		<2500	0.9	0.4–2.1
		2500–3499	1	
		3500–4499	1.1	0.8–1.4
		>4500	1	0.4–2.3
		Infant head circumference (cm)		
		<33	1	
		34	1.2	0.8–1.9
		35	1.2	0.8–1.9
		36	1.5	1.0–2.3
		>37	1.1	0.6–1.8
		Spontaneous perineal rupture		
		No perineal rupture	1	
		First- and second degree	1.3	1.0–1.7
		Third- and fourth degree	1.2	0.7–2.2
		Episiotomy*	1.2	0.9–1.6
		Smoking*	0.7	0.5–0.9
		Prior to pregnancy		
		Early pregnancy	1	0.6–1.5
		2months after birth	1	0.6–1.6
		1 year after birth	0.8	0.6–1.2
		Multiparas		
		Number of children		
		1 child	1	
		2 children	0.9	0.7–1.1
		3–8 children	1	0.7–1.4

Table F18. Risk factors for urinary incontinence in child-bearing women (pregnancy, post-partum, and up to 1 year post-delivery) (continued)

Author, Sample	Age	Risk Factors	Odds Ratio (95%CI)	
		Previous mode of delivery*		
		Vaginal (at least once)	1	
		Cesarean section (exclusive)	0.9	0.6–1.2
		Pregravida BMI		
		Underweight (<18.5)	1.4	0.6–3.2
		Normal (18.5–24.9)	1	
		Overweight (25–29.9)	1.1	0.8–1.4
		Obesity >30)	1.3	1.0–1.6
		Current pregnancy		
		Constipation*		
		Third trimester	1.3	1.1–1.6
		4–8weeks postpartum	1.3	1.0–1.6
		1 year after birth	1.1	0.8–1.4
		Urinary incontinence (overall)		
		Third trimester	2.9	2.4–3.5
		4–8weeks postpartum	3.1	2.4–3.9
		Mode of delivery		
		Vaginal	1	
		Vacuum extraction or forceps	1.5	1.0–2.3
		Elective cesarean Section	0.5	0.3–0.9
		Emergency cesarean section	0.5	0.3–1.0
		Presentation (vaginal delivery)		
		Vertex	1	
		Occiput posterior	1.1	0.7–1.9
		Breech	0	
		Other	0	
		Infant birth weight (g)		
		<2500	1.8	1.0–3.2
		2500–3499	1	
		3500–4499	1.5	1.2–1.9
		>4500	1.3	0.8–2.0
		Infant head circumference (cm)		
		<33	1	
		34	1	0.7–1.6
		35	1.4	0.9–2.0
		36	1.3	0.9–1.9
		>37	1.1	0.7–1.6
		Spontaneous perineal rupture		
		No perineal rupture	1	
		First- and second degree	1.4	1.2–1.7

Table F18. Risk factors for urinary incontinence in child-bearing women (pregnancy, post-partum, and up to 1 year post-delivery) (continued)

Author, Sample	Age	Risk Factors	Odds Ratio (95%CI)	
		Third- and fourth degree	1.5	0.7–3.2
		Episiotomy*	0.9	0.6–1.5
		Smoking*		
		Prior to pregnancy	1.2	1.0–1.5
		Early pregnancy	1.3	0.9–1.7
		2months after birth	1.2	0.9–1.6
		1 year after birth	1.2	1.0–1.5
		All women		
		Age (years) >35	1.5	1.0–2.1
		Parity: Multiparas	1.4	1.1–1.8
		Pregravida BMI: Obesity	1.5	1.0–2.2
		Constipation		
		4–8weeks after childbirth	1.4	1.1–1.9
		Urinary incontinence (overall leakage of urine) 4–8weeks After childbirth	5.7	4.3–7.6
		Mode of delivery		
		Vaginal	1	
		Vacuum extraction or forceps	1.1	0.7–1.8
		Cesarean section	0.5	0.3–0.9
		Spontaneous perineal rupture		
		No perineal rupture	1	
		First-and second degree	1.2	1.0–1.6
		Third-and fourth degree	1	0.4–2.5
Chaliha, 1999[326]	549 primiparae with vaginal and cesarean deliveries	Urge		
		Augmentation	24.3	0.8, 728.7
		Epidural	0.1	0.0, 2.3
		Cesarean compared with spontaneous and instrumental vaginal deliveries	0.5	0.2, 1.1
		Perineal trauma	0.5	1.0, 2.8
		First stage	1	1.0, 1.0
		Second stage (active)	1	1.0, 1.0
		Second stage (passive)	1	1.0, 1.1
		Fetal weight	11.3	0.4, 352.8
		Fetal head circumference	2	0.7, 5.7
		Stress		
		Augmentation	0.9	0.5, 2.1
		Epidural	0.5	0.2, 1.3

Table F18. Risk factors for urinary incontinence in child-bearing women (pregnancy, post-partum, and up to 1 year post-delivery) (continued)

Author, Sample	Age	Risk Factors	Odds Ratio (95%CI)	
		Cesarean compared with spontaneous and instrumental vaginal deliveries	1	0.8, 1.2
		Perineal trauma	1.1	0.7, 1.7
		First stage	1	1.0, 1.0
		Second stage (active)	1	1.0, 1.0
		Second stage (passive)	1	1.0, 1.0
		Fetal weight	2.5	1.1, 6.1
		Fetal head circumference	0.8	0.7, 1.1

Table19. Association between hormonal status and prevalent UI in females

Author, Sample	Age	Definition of UI	Menstrual status	Odds ratio (95%CI)
Kuh, 1999[179] N = 1,333	48	Stress UI ≥2/hour during the day and at ≥2/night	Naturally postmenopausal (by 48 y)	0.54 (0.32; 0.91)
Sampselle, 2002[151] N = 3,302	42-52	Frequency score is multiplied by volume score	Perimenopausal vs. premenopausal	**1.27 (1.09; 1.49)**
		Frequency score is multiplied by volume score	Perimenopausal status	**1.35 (1.1; 1.65)**
Chen, 2003[123] N = 1,247	>20	Stress UI within the past 2 weeks	Menopause vs. premenopausal	0 .81 (0.4; 1.6)
Moghaddas, 2005[359] N = 6,642	50-64	UI: any leakage	Premenopausal	**1.44 (1.13; 1.82)**
			Premenopausal women with depression	**1.47 (1.1; 2.02)**
			Premenopausal	1.39 (0.97; 1.99)
Hvidman, 2003[356] N = 3,900	20-59	UI in the past week	Bleeding	0.8 (0.5; 1.4)
			Bleeding use of sanitary towels vs. none	0.8 (0.4; 1.4)
			Bleeding, amount Weak vs. none	0.5 (0.2; 1.4)
			Bleeding, amount Medium vs. none	0.9 (0.5; 1.4)
			Bleeding, amount Heavy vs. none	1.1 (0.8; 1.5)
			Days before expected end of menstrual cycle-15 days	0.6 (0.2; 2)
			Days before expected end of menstrual cycle-6-10 days	1 (0.4; 2.4)
			Days since day one in present menstrual cycle11-15 days	**2.1 (1.1; 4)**
			Days before expected end of menstrual cycle16-20 days	1.1 (0.5; 2.4)
			Days since day one in present menstrual cycle Days 15	0.8 (0.4; 1.4)
			Days since day one in present menstrual cycle Days 6-10	1 (0.6; 1.9)
			Days since day one in present menstrual cycle Days 11-15	1.3 (0.7; 2.4)
			Days since day one in present menstrual cycle Days 16-20	1.2 (0.6; 2.2)
			Days since day one in present menstrual cycle Days 21-25	1.1 (0.5; 2.1)
			Days since day one in present menstrual cycle Days 26-30	0.5 (0.2; 1.6)
			Days since day one in present menstrual cycle Days 31-35	1.2 (0.3; 4.9)
			Days since day one in present menstrual cycle Unknown	1.2 (0.7; 2.1)
			Decreased duration of bleeding	**2.2 (1.3; 3.6)**
			Increased duration of bleeding	1.4 (0.7; 2.9)
			Increased menstrual flow	1.2 (0.7; 2.1)
			Recent change in menstrual cycle and bleeding	1.5 (1; 2.3)
			Usual duration of menstrual cycle <21 days vs. 21-31 days	1.2 (0.2; 9.4)
			Usual duration of menstrual cycle >32 days vs. 21-31 days	1.2 (0.4; 3.4)
			Usual duration of menstrual cycle >35 days vs. 21-31 days	1.1 (0.3; 4.8)
			Variation of menstrual cycle duration <5 days vs. 6-13 days	1.1 (0.6; 1.9)
			Variation of menstrual cycle duration ≥5 days vs. 6-13 days	1 (0.5; 2)
			Variation of menstrual cycle duration ≥14 days vs. 6-13 days	0.8 (0.2; 3.4)
			Variation of menstrual cycle duration ≥30 days vs. 6-13 days	1.3 (0.2; 10.1)

Table19. Association between hormonal status and prevalent UI in females (continued)

Author, Sample	Age	Definition of UI	Menstrual status	Odds ratio (95%CI)
			Menstrual cycle and/or bleeding more irregular	1.2 (0.6; 2.3)
			Menstrual cycle duration 21-32 days and variation range <5 days	1.4 (0.9; 2.4)
			Menstrual cycle duration 21-32 days and variation range <5 days, no hormone use	1.3 (0.8; 2)
			Menstrual cycle regularity, Regular	1.2 (0.7; 1.9)
			Menstrual cycle regularity, Irregular	0.9 (0.5; 1.7)

Bold - significant association at 95% level

Table F20. Association between prevalent UI and hysterectomy

Author, Sample	Age	Definition of UI	Odds Ratio (95%CI)
Stress			
Chiarelli, 1999[173]	45-50	UI in the past year	**0.78 (0.69; 0.88)**
N = 41,724	70-75	UI in the past year	1.13 (0.97; 1.31)
Van der Vaart, 2002[155]	35-70	Not bothersome UI	1.18 (0.88; 1.59)
N = 1,626	35-70	Bothersome UI	1.18 (0.69; 1.86)
Parazzini, 2003[138]	>40	UI in the past month	1.4 (1; 1.9)
N = 2,205			
Jackson. 2004[21]	70-79	UI in the past week	1.47 (0.97; 2.23)
N = 1,584			
Fritel, 2005[110]	49-61	Daily	1.1 (0.9; 1.5)
N = 2,625			
Total UI			
Parazzini, 2003[138]	>40	UI in the past month	**1.6 (1.1; 2.1)**
N = 2,205			
Brown, 1996[194]	69-101	Daily	**1.4 (1.1; 1.6)**
N = 7,949			
Holtedahl, 1998[355]	50-74	1-2 = Slight, 3-4 = Moderate, 6-8 = Severe	1.07
N = 507		1-2 = Slight, 3-4 = Moderate, 6-8 = Severe	1.15
Bortolotti, 2000[165]	≥40	UI in the past year	1.5 (0.9; 2.6)
N = 2,767			
Schmidbauer, 2001[62]	≥20	UI in the past month	**1.35 (1.1; 1.65)**
N = 1,262			
Melville, 2005[112]	30-90	UI at least monthly	**1.3 (1.1; 1.6)**
N = 3,596		UI at least monthly. Severe: Sandvik severity index score of 6-8	**1.6 (1.2; 2)**
Moghaddas, 2005[359]	50-64	Any leakage	1.21 (1; 1.45)
N = 6,642		Any leakage	1.1 (0.79; 1.41)
Danforth, 2006[68]	25-54	Occasional UI: 1-3 times a month.	**1.2 (1.1; 1.3)**
N = 83,355		Frequent UI: At least weekly.	**1.4 (1.3; 1.5)**
		Severe: Wet underwear.	**1.6 (1.5; 1.7)**
Jackson, 2006[100]	55-75	Any leakage in the past year	1.2 (0.9; 1.5)
N = 1,017		Severe: Sandvik score of 6-8 over the past year	1.5 (1; 2.1)
Urge UI			
Kuh, 1999[179]	48	At least two hourly during the day and at least twice a night	1.3 (0.93; 2)
N = 1,333			
Ueda, 2000[172]	40-75	1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Very Often	1.611 (1.051; 2.469)
N = 968			
Van der Vaart, 2002[155]	35-70	Not bothersome	**1.93 (1.4; 2.63)**
N = 1,626		Bothersome	**2.63 (1.39; 4.41)**
Parazzini, 2003[138]	>40	UI in the past month	1.5 (1; 2.3)
N = 2,205			

Bold- significant association at 95% confidence level

Table F21. Association between prevalent UI and gynecological factors

Author, Sample	Age	Definition of UI	Strata of Risk Factors	Odds Ratio (95%CI)
Mixed UI				
Waetjen, 2007[49] N = 3,302	42-52	UI at least monthly	Fibroids	1.46 (0.99; 2.15)
Parazzini, 2003[138] N = 2,205	>40	UI in the past month	Hysterectomy	**1.6 (1.1; 2.1)**
Stress UI				
Chen, 2003[123] N = 1,247	>20	UI in the past 2 weeks	Previous gynecological surgery vs. none	2 (1.1; 3.7)
Huang, 2006[70] N = 345 Asian women	**40-69**	UI at least weekly in the pas 7 days	Hysterectomy in Asian women	2.79 (1.03; 7.54)
Van der Vaart, 2002[155] N = 1,626	35-70	UI not bothersome	Hysterectomy	1.18 (0.88; 1.59)
		UI bothersome	Hysterectomy	1.18 (0.69; 1.86)
Parazzini, 2003[138] N = 2,205	>40	UI in the past month	Hysterectomy	1.4 (1; 1.9)
Jackson, 2004[21] N = 1,584	70-79	UI in the past week	Hysterectomy	1.47 (0.97; 2.23)
Fritel, 2005[110] N = 2,625	49-61	Often or all of the time	Hysterectomy	1.1 (0.9; 1.5)
Total				
Brown, 1996[194] N = 7,949	69-101	Daily	Grip strength (kg per SD)	1 (0.9; 1.1)
			Quadriceps strength (kg per SD)	0.9 (0.8; 1.1)
Thom, 1997[193] N = 933	≥60	Within the past year	Hysterectomy <45 y vs. >45	1.41 (0.89; 2.23)
		Within the past year	Hysterectomy <45 y vs. >45	1.54 (0.87; 2.74)
Holtedahl, 1998[355] N = 507	50-74	1-2 = Slight, 3-4 = Moderate, 6-8 = Severe	Result of gynecological examination (abnormal vs. normal)	1.77
		1-2 = Slight, 3-4 = Moderate, 6-8 = Severe	Result of gynecological examination (abnormal vs. normal)	2.86
		1-2 = Slight, 3-4 = Moderate, 6-8 = Severe	Pelvic muscle contraction (poor vs. good)	4.5
		1-2 = Slight, 3-4 = Moderate, 6-8 = Severe	Pelvic muscle contraction (poor vs. good)	3.48
		1-2 = Slight, 3-4 = Moderate, 6-8 = Severe	Previous operation for uterovaginal prolapse (yes vs. no)	4.28
		1-2 = Slight, 3-4 = Moderate, 6-8 = Severe	Other previous operation on uterus (excluding hysterectomies) /adnexae/ovaries (yes vs. no)	1.86
		1-2 = Slight, 3-4 = Moderate, 6-8 = Severe	Previous operation for uterovaginal prolapse (yes vs. no)	5.3

Table F21. Association between prevalent UI and gynecological factors (continued)

Author, Sample	Age	Definition of UI	Strata of Risk Factors	Odds Ratio (95%CI)
		1-2 = Slight, 3-4 = Moderate, 6-8 = Severe	Other previous operation on uterus (excluding hysterectomies) /adnexae/ovaries (yes vs. no)	2.24
Bortolotti, 2000[165] N = 2,767	≥40	Within the past year	Perineal trauma	0.8 (0.4; 1.8)
Schmidbauer, 2001[62] N = 1,262	≥20	Within the past 4 weeks	Wertheim	1.26 (0.85; 1.85)
Van Oyen, 2002[157] N = 3,804	≥15	At least once a week, at least once a month, less than once a month	Uterine prolapse	**4.11 (2.15; 7.86)**
Sampselle, 2002[151] N = 3,302	42-52	Frequency score is multiplied by volume score	History of leiomyomata for all ethnic groups but black	1.13 (0.88; 1.45)
Hvidman, 2003[356] N = 3,900	20-59	Within the past seven days	Ever gynecologic operation	1.6 (1; 2.5)
Uustal-Fornel, 2004[208] N = 1,336	40 yr and 60 yr	Leakage weekly or more often	Feeling of pelvic heaviness vs. none	**3.8 (2.1; 7)**
Moghaddas, 2005[359] N = 6,642	50-64	Any leakage	Hysterectomy (yes)Women with depression	**1.33 (1.04; 1.7)**
Brown, 2006[95] N = 1,461	**>20**	Weekly urinary incontinence	Hysterectomy (yes/no)in diabetics	**2.29 (1.01; 5.2)**
Jackson, 2006[100] N = 1,017	55-75	Any leakage in the past year	Atrophic vaginitis	1.5 (1; 2.1)
			Any vaginal symptom (dryness, discharge, itching, dyspareunia) 1.6	**1.6 (1.2; 2.2)**
			Vaginal colonization w/E coli 1-3 growth	0.9 (0.7; 1.2)
			Vaginal colonization w/E coli 4+ growth	1.3 (0.8; 2)
		Severe: Sandvik score of 6-8 over the past year	Atrophic vaginitis	1.4 (0.9; 2.2)
			Any vaginal symptom (dryness, discharge, itching, dyspareunia) 1.6	1.6 (1; 2.7)
			Vaginal colonization w/E coli 1-3 growth	1 (0.6; 1.7)
			Vaginal colonization w/E coli 4+ growth	1.7 (1; 2.8)
Waetjen, 2007[49] N = 3,302	42-52	frequency: at least monthly	Fibroids	1.31 (1; 1.72)
Brown, 1996[194] N = 7,949	69-101	Daily	Hysterectomy vs. none	**1.4 (1.1; 1.6)**
Holtedahl, 1998[355] N = 507	50-74	1-2 = Slight, 3-4 = Moderate, 6-8 = Severe	Hysterectomy (yes vs. no)	1.07
		1-2 = Slight, 3-4 = Moderate, 6-8 = Severe	Hysterectomy (yes vs. no)	1.15
Bortolotti, 2000[165] N = 2,767	≥40	Within the past year	Hysterectomy	1.5 (0.9; 2.6)

Table F21. Association between prevalent UI and gynecological factors (continued)

Author, Sample	Age	Definition of UI	Strata of Risk Factors	Odds Ratio (95%CI)
Schmidbauer, 2001[62] N = 1,262	≥20	Within the past 4 weeks	hysterectomy	**1.35 (1.1; 1.65)**
Melville, 2005[112] N = 3,596	30-90	Frequency: at least monthly. Severe: Sandvik severity index score of 6-8	Hysterectomy	**1.3 (1.1; 1.6)**
		Frequency: at least monthly. Severe: Sandvik severity index score of 6-8	Hysterectomy	**1.6 (1.2; 2)**
Moghaddas, 2005[359] N = 6,642	50-64	Any leakage	Hysterectomy (yes)	1.21 (1; 1.45)
		Any leakage	Hysterectomy (yes)	1.1 (0.79; 1.41)
Danforth, 2006[68] N = 83,355	25-54	Occasional: 1-3 times a month.	Hysterectomy	**1.2 (1.1; 1.3)**
		Frequent: At least weekly.	Hysterectomy	**1.4 (1.3; 1.5)**
		Severe: Wet underwear.	Hysterectomy	**1.6 (1.5; 1.7)**
Jackson, 2006[100] N = 1,017	55-75	Any leakage in the past year	Hysterectomy	1.2 (0.9; 1.5)
		Severe: Sandvik score of 6-8 over the past year	Hysterectomy	1.5 (1; 2.1)
Chiarelli, 1999[173] N = 41,724	45-50	Rarely, sometimes, often experience leaking urine in the last year	Hysterectomy+prolapse vs. none or unknown	**1.85 (1.53; 2.23)**
			Hysterectomy+oophorectomy vs. none or unknown	1.05 (0.87; 1.27)
			Hysterectomy+prolapse+oophorectomy vs. none or unknown	**1.88 (1.34; 2.63)**
			Prolapse vs. none or unknown	**2.41 (1.92; 3.04)**
			Oophorectomy+prolapse vs. none or unknown	0.75 (0.15; 3.82)
			Oophorectomy	0.71 (0.39; 1.27)
	70-75	Rarely, sometimes, often experience leaking urine in the last year	Hysterectomy and oophorectomy vs. none or unknown	**1.18 (1.08; 1.38)**
			Hysterectomy+prolapse repair vs. none or unknown	**2.03 (1.67; 2.47)**
			Hysterectomy+prolapse repair+oophorectomy vs. none or unknown	**1.77 (1.44; 2.17)**
			Prolapse repair vs. none or unknown	**1.73 (1.46; 2.06)**
			Oophorectomy+prolapse repair vs. none or unknown	1.97 (0.82; 4.67)
			Oophorectomy vs. none or unknown	1.37 (0.81; 2.31)
Miller, 2003[134] N = 1,500	21-79	Even a small amount of urine in the previous month	No Hysterectomy vs. yes	**0.67 (0.45; 0.99)**
Chiarelli, 1999[173] N = 41,724	45-50	Rarely, sometimes, often experience leaking urine in the last year	Hysterectomy vs. none or unknown	**0.78 (0.69; 0.88)**
			Hysterectomy vs. none or unknown	1.13 (0.97; 1.31)
Urge				
Waetjen, 2007[49]	42-52	Frequency: at least monthly	Fibroids	**1.53 (1.08; 2.27)**

Table F21. Association between prevalent UI and gynecological factors (continued)

Author, Sample	Age	Definition of UI	Strata of Risk Factors	Odds Ratio (95%CI)
N = 3,302				
Kuh, 1999[179] N = 1,333	48	At least two hourly during the day and at least twice a night	Hysterectomy	1.3 (0.93; 2)
Ueda, 2000[172] N = 968	40-75	1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Very Often	Hysterectomy	1.611 (1.051; 2.469)
Van der Vaart, 2002[155] N = 1,626	35-70	Not bothersome	Hysterectomy	**1.93 (1.4; 2.63)**
		Bothersome	Hysterectomy	**2.63 (1.39; 4.41)**
Parazzini, 2003[138] N = 2,205	>40	Within the past month	Hysterectomy	1.5 (1; 2.3)

Table F22. Association between urinary symptoms and prevalent UI in women

Author, Year, Sample	Age	Definition UI	Urinary symptoms	Odds ratio (95%CI)
Chiarelli, 1999[173] N = 41,724	18-23	UI in the last year	Urine that burns and stings: Rarely vs. never	**2.94 (2.59; 3.33)**
			Urine that burns and stings: Sometimes vs. never	**4.19 (3.56; 4.93)**
			Urine that burns and stings: Often vs. never	**4.93 (3.64; 6.74)**
	45-50	UI in the last year	Urine that burns and stings: Rarely vs. never	**2.17 (1.96; 2.42)**
			Urine that burns and stings: Sometimes vs. never	**2.71 (2.35; 3.14)**
			Urine that burns and stings: Often vs. never	**4.29 (2.85; 6.45)**
	70-75	UI in the last year	Urine that burns and stings: Rarely vs. never	**2.45 (2.18; 2.76)**
			Urine that burns and stings: Sometimes vs. never	**2.99 (2.62; 3.41)**
			Urine that burns and stings: Often vs. never	**7.97 (5.71; 11.12)**
Kuh, 1999[179] N = 1,333	48	UI ≥2/hour during the day and ≥2/night	Enuresis	**2.9 (1.3; 6.9)**
Miller, 2003[134] N = 1,500	21-79	UI even a small amount in previous month	Urine that burns and stings: Rarely vs. never	0.68 (0.34; 1.37)
			Urine that burns and stings: Sometimes vs. never	0.78 (0.38; 1.62)
			Urine that burns and stings: Often vs. never	**4.06 (1.32; 12.48)**
			Urine that burns and stings: Rarely vs. never	1.3 (0.59; 2.89)
			Urine that burns and stings: Sometimes vs. never	**2.69 (1.5; 4.8)**
			Urine that burns and stings: Often vs. never	1.56 (0.79; 3.1)
			Urine that burns and stings: Unit increase in response category	1.3 (1.04; 1.62)
Van Oyen, 2002[157] N = 3,804	≥15	UI at least once a week	Urinary tract infections	**5.75 (3.35; 9.9)**
			Urinary tract infections	**4.39 (2.55; 7.51)**
Kok, 1992[202] N = 719	≥60	UI at least twice a week	Frequency	**3.52 (1.88; 6.59)**
			Nocturia	**4.03 (1.48; 10.98)**
Bortolotti, 2000[165] N = 2,767	≥40	UI in the past year	Enuresis	1.3 (0.7; 2.4)
Schmidbauer, 2001[62] N = 1,262	≥20	UI in the past 4 weeks	Lower urinary tract symptoms	1.15 (0.82; 1.62)
Hvidman, 2003[356] N = 3,900	20-59	UI in the past week	Enuresis	**2.8 (1.6; 5)**
Kocak, 2005[368] N = 1,012	≥18	UI once a week or less-	Nocturnal enuresis	**3 (1.6; 8)**
Kuh, 1999[179] N = 1.333	48	Urge UI: ≥2/hour during the day and ≥2/night	Enuresis	**2.7 (1.3; 5.6)**

Bold- significant association at 95% confidence level

Table F23. Association between urinary tract infection and prevalent UI in women

Author, Sample	Age	Definition of UI	Urinary tract infection	Odds ratio (95%CI)
Mixed UI				
Brown, 1999[353] N = 2,763	Mean: 67 (SD: 7)	UI in the past week	UTI in past year: 1 vs. 0	1.04 (0.73; 1.47)
			UTI in past year: 2+ vs. 0	**2.44 (1.51; 3.92)**
Parazzini, 2003[138] N = 2,205	>40	UI in the past month	Recurrent UTIs	**1.9 (1.5; 2.4)**
Kuh, 1999[179] N = 1,333	48	≥2/hourl during the day and ≥2/night	Urinary or kidney infections (15-43 yr)	1.6 (0.94; 2.6)
Stress UI				
Brown, 1999[353] N = 2,763	Mean: 67 (SD: 7)	UI in the past week	UTI in past year: 1 vs. 0	1.04 (0.66; 1.85)
			UTI in past year: 2+ vs. 0	1.51 (0.77; 2.97)
Kuh, 1999Kuh, 1999[179] N = 1,333	48	UI at least two hourly during the day and at least twice a night	urinary or kidney infections (15-43 yr)	1.1 (0.78; 1.5)
Nuotio, 2003[136] N = 227	>70	Ever UI	UTI (1+/year vs. <1/year)	0.9 (0.4; 2)
Parazzini, 2003[138] N = 2,205	>40	UI in the past month	Recurrent UTIs	1.3 (1; 1.8)
Huang, 2006[70] N = 345 Asian women	**40-69**	UI at least weekly	Frequent UTIs in White women	1.8 (1.05; -3.1)
Total UI				
Bortolotti, 2000[165] N = 2,767	≥40	UI in the past year	Recurrent UTI	**2.2 (1.4; 3.4)**
Buchsbaum, 2002[144] N = 149	39-91	"Current" UI	UTI	**3.37 (1.23; 11.06)**
Van Oyen, 2002[157] N = 3,804	≥15	UI at least once a week	UTIs	**6.83 (4.43; 10.6)**
Hvidman, 2003[356] N = 3,900	20-59	UI in the past week	Cystitis 1997	1.5 (0.8; 2.7)
Landi, 2003[131] N = 3,194	79.5+-9.5	0 (complete control)-4 (inadequate control with multiple daily episodes)	UTI	**3.66 (2.51; 5.33)**
Ozerdogan, 2004[29] N = 625	>20	Ever UI	Recurrent UTIs	**4.7 (4.7; 8.9)**
Oskay, 2005[111] N = 500	>50	<1/month (rare) - >1/day (serious). Severity: drops lost, underwear wet, dresses wet, leaks through legs	UTI after menopause	**1.84 (1.18; 2.89)**
Kocak, 2005[368] N = 1,012	≥18	Frequency: ≤1/week - always. Severity: small, moderate, large	Recurrent UTI	**2.3 (1.3; 3.9)**
Jackson, 2006[100] N = 1,017	55-75	Any leakage in the past year	Asymptomatic bacteriuria	1.3 (0.6; 2.6)
		Severe: Sandvik score of 6-8 over the past year	Asymptomatic bacteriuria	0.7 (0.3; 1.6)
		Any leakage in the past year	Lifetime UTI's 1-5	1.2 (1; 1.7)
			Lifetime UTI's 6+	**1.9 (1.4; 2.7)**

Table F23. Association between urinary tract infection and prevalent UI in women (continued)

Author, Sample	Age	Definition of UI	Urinary tract infection	Odds ratio (95%CI)
			UTI in past year	1.2 (0.8; 1.8)
		Severe: Sandvik score of 6-8 over the past year	Lifetime UTI's 1-5	1.6 (1; 2.5)
			Lifetime UTI's 6+	2 (1; 2.5)
			UTI in past year	1.4 (0.7; 2.6)
Brown, 1999[353]	Mean: 67 (SD:	UI in the past week	UTI in past year: 1 vs. 0	1.04 (0.68; 1.6)
N = 2,763	7)		UTI in past year: 2+ vs. 0	**1.98 (1.1; 3.57)**
Kuh, 1999[179]	48	UI at least 2/x hour during the day and ≥2/night	Urinary or kidney infections (15-43 yr)	1.2 (0.82; 1.7)
N = 1,333				
Ueda, 2000[172]	40-75	1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Very	Cystitis	**1.961 (1.459; 2.635)**
N = 968		Often		
Parazzini, 2003[138]	>40	UI in the past month	Recurrent UTIs	**2.3 (1.6; 3.1)**
N = 2,205				
Van Oyen, 2002[157]	≥15	UI at least once a week	UTI	**5.75 (3.35; 9.9)**
N = 3,804		UI at least once a month	UTI	**4.39 (2.55; 7.51)**

Bold- significant association at 95% confidence level

Table F24. Association between glucose metabolism and UI

Author, Sample	Age	Definition	Risk Factor	Odds ratio (95%CI)
Incidence				
Ostbye, 2004[28] N = 5,322	>65	In the last 12 months, have you lost any amount of urine beyond your control	Diabetes	1.08 (0.8; 1.46)
Lifford, 2005[109] N = 81,845	50-75	Frequency: weekly amount: severe - wet underwear. Very severe - wet out clothing/floor	Diabetes >10 years (Any UI)	**1.47 (1.15; 1.89)**
		Frequency: weekly amount: severe - wet underwear. Very severe - wet out clothing/floor	Diabetes >10 years (Severe UI)	**1.75 (1.32; 2.33)**
		Frequency: weekly amount: severe - wet underwear. Very severe - wet out clothing/floor	Diabetes >10 years (Very severe UI)	**2.62 (1.39; 4.96)**
Waetjen, 2007[49] N = 3,302	42-52	Frequency: at least monthly	Diabetes	**3.02 (1.12; 8.1)**
Prevalence				
Nuotio, 2003[136] N = 227	>70	Stress UI, ever	Fasting glucose serum level, mg/dl Fecal incontinence vs. continence	1 (0.8; 2.7)
Sampselle, 2002[151] N = 3,302	42-52	Stress UI, Frequency score is multiplied by volume score	Diabetes	1.55 (1.07; 2.25)
Fritel, 2005[110] N = 2,625	49-61	Stress UI, often or all of the time	Diabetes	1.8 (1; 3.2)
Waetjen, 2007[49] N = 3,302	42-52	Frequency: >weekly/daily	Diabetes	**3.1 (1.43; 6.74)**
Lifford, 2005[109] N = 81,845	50-75	Severe - wet underwear. Very severe - wet out clothing/floor	Diabetes (Severe UI)	**1.4 (1.3; 1.6)**
		Very severe - wet out clothing/floor	Diabetes (Very severe UI)	**1.8 (1.5; 2.1)**
Jackson, 2005[101] N = 1,017	55-75	Sandvik Index	Diabetes duration < 10 years	1.4 (0.8; 2.6)
		Sandvik Index	Diabetes duration >10 years	1.6 (0.7; 3.4)
		Sandvik Index , mild UI	Diabetes treatment ,diet	1.3 (0.5; 2.8)
		Sandvik Index	Diabetes treatment ,insulin	1.7 (0.6; 4.1)
		Sandvik Index	Diabetes treatment ,med	1.5 (0.8; 2.9)
		Sandvik Index	Diabetic peripheral neuropathy	1.7 (0.9; 3.2)
Jackson, 2006[100] N = 1,017	55-75	Any leakage in the past year	Diabetic peripheral neuropathy treatment vs. no diabetes	**1.9 (1.1; 3.3)**
		Severe: Sandvik score of 6-8 over the past year	Diabetic peripheral neuropathy treatment vs. no diabetes	1.2 (0.6; 1.8)
Jackson, 2005[101] N = 1,017	55-75	Sandvik Index	Diabetic retinopathy	1.9 (0.7; 4.8)
Jackson, 2006[100] N = 1,017	55-75	Any leakage in the past year	Diabetic retinopathy treatment vs. no diabetes	1.4 (0.6; 3.6)
		Severe: Sandvik score of 6-8 over the past year	Diabetic retinopathy treatment vs. no diabetes	1.4 (0.4; 5.3)

Table F24. Association between glucose metabolism and UI (continued)

Author, Sample	Age	Definition	Risk Factor	Odds ratio (95%CI)
		Any leakage in the past year	Diet-treated diabetes treatment vs. no diabetes	1.4 (0.9; 2.4)
		Severe: Sandvik score of 6-8 over the past year	Diet-treated diabetes treatment vs. no diabetes	1.5 (0.8; 3.1)
Schmidbauer, 2001[62] N = 1,262	≥20	Within the past 4 weeks	Fasting glucose serum level, mg/dl>123 vs. <110	1.22 (0.73; 2.03)
			Fasting glucose serum level, mg/dl110-123 vs. <110	**1.44 (1.04; 2)**
Jackson, 2005[101] N = 1,017	55-75	Sandvik Index	HbA1c<7.5%	1.4 (0.7; 2.6)
		Sandvik Index	HbA1c> 8.5%	1.2 (0.3; 3.6)
		Sandvik Index	HbA1c7.68.5%	1.2 (0.4; 3)
Jackson, 2006[100] N = 1,017	55-75	Any leakage in the past year	Insulin treated diabetes vs. no diabetes	1.4 (0.8; 2.6)
		Severe: Sandvik score of 6-8 over the past year	Insulin treated diabetes vs. no diabetes	0.5 (0.8; 2.7)
Brown, 2006[95] N = 1,461	>20	Weekly urinary incontinence	Microalbuminuria vs. no in diabetics	0.98 (0.36; 2.71)
			Microalbuminuria vs. no in impaired glucose tolerance	**7.45 (1.59; 34.98)**
			Neuropathic pain (yes/no)in diabetics	**2.37 (1.27; 4.42)**
Jackson, 2005[101] N = 1,017	55-75	Sandvik Index	No Diabetic peripheral neuropathy	1.4 (0.7; 2.7)
			No Diabetic retinopathy	1.1 (0.6; 2)
Jackson, 2006[100] N = 1,017	55-75	Any leakage in the past year	Pill-treated diabetes vs. no diabetes	0.8 (0.5; 1.3)
		Severe: Sandvik score of 6-8 over the past year	Pill-treated diabetes vs. no diabetes	1.6 (0.9; 2.7)
Danforth, 2006[68] N = 83,355	25-54	Frequent: At least weekly.	Type 2 Diabetes	**1.2 (1.1; 1.3)**
		Severe: Wet underwear.	Type 2 Diabetes	**1.3 (1.2; 1.4)**

Bold- significant association at 95% confidence level

Table F25. Association between neurological diseases and UI in women

Author, Sample	Age	Definition of UI	Risk Factors	Odds Ratio (95% CI)
Incident UI, Total UI				
Ostbye, 2004[28] N = 5,322	>65	UI in the last 12 months	Stroke	**1.58 (1.13; 2.22)**
Prevalent UI, Total UI				
Parazzini, 2003[138] N = 2,205	>40	UI in the past month	Neurological diseases	**3.7 (1.8; 7.3)**
Brown, 1996[194] N = 7,949	69-101	UI daily	Gait speed (m/sec per SD)	0.8 (0.6; 1)
		UI daily	Parkinson disease vs. none	0.3 (0.1; 1.6)
Fultz, 1999[357] N = 3,991	>70	UI at least monthly	Poor sensory status	**1.94 (1.6; 2.35)**
		Moderate =7-20days/month	Poor sensory status	1.22 (0.82; 1.82)
		Severe ≥21 days/month	Poor sensory status	**1.53 (1.2; 1.94)**
Bortolotti, 2000[165] N = 2,767	≥40	UI in the last 12 months	Neurological disease	1.8 (0.7; 4.3)
Maclennan, 2000[84] N = 3,010	15-97	UI in the last 12 months	Osteoporosis	1.8 (1; 3.2)
Maggi, 2001[158] N =1,531	>65	Rarely, 1 to 2 times per month, at least once per week, or every day	Parkinsonism	**2.27 (1.14; 4.54)**
Ozerdogan, 2004[29] N = 625	>20	Ever	Neurological disorders	**3.8 (1.7; 8.6)**
Rohr, 2005[107] N = 5,795	>45	UI in the past month	Paraplegia	**1.56 (1.14; 2.64)**
		UI in the past month	Parkinson	1.46 (0.75; 2.86)
Fultz, 1999[357] N = 3,991	>70	Severe ≥21 days/month	Stroke (ever)	**1.85 (1.44; 2.37)**
Finkelstein, 2002[145] N = 29,520	≥30	As diagnosed by a health professional	Back problems	**1.76 (1.33; 2.32)**
Landi, 2003[131] N = 3,194	79.5±9.5	0 (complete control)-4 (inadequate control with multiple daily episodes)	Hip Fracture	1.26 (0.99; 1.59)
		0 (complete control)-4 (inadequate control with multiple daily episodes)	Parkinson's disease	0.99 (0.68; 1.43)
Van Oyen, 2002[157] N = 3,804	≥15	UI at least once a week,	Sensorial limitation vs. no	**1.9 (1.36; 2.65)**
Prevalent UI, Urge UI				
Parazzini, 2003[138] N = 2,205	>40	UI in the past month	Neurological diseases	2.1 (0.7; 5.9)
Rohr, 2005[107] N = 5,795	>45	UI in the past month	Paraplegia	**1.8 (1.27; 2.53)**
		UI in the past month	Parkinson	1.66 (0.81; 3.39)
		UI in the past month	Stroke	**1.84 (1.2; 2.8)**

Table F25. Association between neurological diseases and UI in women(continued)

Author, Sample	Age	Definition of UI	Risk Factors	Odds Ratio (95% CI)
Prevalent UI, Stress UI				
Parazzini, 2003[138] N = 2,205	>40	UI in the past month	Neurological diseases	0.3 (0.04; 2.3)
Rohr, 2005[107] N = 5,795	>45	UI in the past month	Paraplegia	1.29 (0.93; 1.8)
		UI in the past month	Parkinson	1.89 (0.97; 3.71)
		UI in the past month	Stroke	**1.8 (1.19; 2.72)**

Bold- significant association at 95% confidence level

Table F26. Association between health status, comorbidities, and UI in women

Author, Sample	Age	Definition of UI	Health Condition	Odds Ratio (95%CI)
Comorbidity, Incident UI				
Ostbye, 2004[28] N = 5,322	>65	UI In the last 12 months	Arthritis	1.18 (0.94; 1.49)
			Kidney	**1.69 (1.22; 2.33)**
			Foot and ankle trouble	**1.36 (1.04; 1.78)**
Comorbidity, Prevalent UI				
Parazzini, 2003[138] N = 2,205	>40	UI in the past month	Chronic obstructive pulmonary disease	**1.9 (1.3; 2.6)**
Kuh, 1999[179] N =1,333	48	UI at least two hourly during the day and at least twice a night	GP consultations High vs. low	**1.8 (1.1; 2.9)**
		Stress UI at least two hourly during the day and at least twice a night	GP consultations High vs. low	1.4 (1; 1.9)
Nuotio, 2003[136] N = 227	>70	Stress UI, ever	Comorbidity (3 diseases) vs. <3	1.4 (0.7; 2.9)
Parazzini, 2003[138] N =2,205	>40	Stress UI, within the past month	Chronic obstructive pulmonary disease	1.4 (0.8; 2.2)
Jackson, 2004[21] N = 1,584	70-79	Stress UI, within the past week	Chronic obstructive pulmonary disease	**5.55 (1.33; 23.2)**
Rohr, 2005[107] N = 5,795	>45	Stress UI, within the past month	Chronic lung disease	**1.65 (1.35; 2.02)**
Van Oyen, 2002[157] N = 3,804	≥15	UI at least once a month	1 disease	1.85 (0.98; 3.49)
			≥2 diseases	**4.38 (2.5; 7.68)**
Brown, 1996[194] N = 7,949	69-101	UI daily	Chronic obstructive pulmonary disease vs. none	**1.4 (1.1; 1.9)**
Maclennan, 2000[84] N = 3,010	15-97	UI within the past year	Most/ every day vs. never/occasionally	**1.6 (1.1; 2.3)**
Maggi, 2001[158] N = 1,531	>65	UI at least once per week	COPD	**1.53 (1.11; 2.12)**
			Hip fracture	1.38 (1.02; 1.88)
			Night awakening	**1.48 (1.11; 1.97)**
Finkelstein, 2002[145] N = 29,520	≥30	UI diagnosed by a health professional	COPD	1.35 (0.88; 2.07)
Van Oyen, 2002[157] N = 3,804	≥15	UI at least once a week	1 disease	1.73 (0.97; 3.07)
			≥2 diseases	**5.93 (3.67; 9.57)**
Nygaard, 2003[79] N = 5,701	50-69	Mild-moderate: UI ≤15/days in the last month	Comorbidity index	**1.2 (1.02; 1.41)**
		Severe: UI>15 days in the last month	Comorbidity index	**1.47 (1.16; 1.87)**
Oskay, 2005[111] N = 500	>50	UI in the last month	Chronic illness	**1.95 (1.31; 2.91)**
Melville, 2005[112] N = 3,596	30-90	UI at least monthly	Medical comorbidity score	**1.34 (1.1; 1.6)**
	30-90	Severity index score of 6-8	Upper half of RxRisk score	**1.4 (1.1; 1.8)**

Table F26. Association between health status, comorbidities, and UI in women (continued)

Author, Sample	Age	Definition of UI	Health Condition	Odds Ratio (95%CI)
Ostbye, 2004[28] N = 5,322	>65	UI in the last 12 months	Arthritis	**1.32 (1.08; 1.61)**
			Kidney	**3.36 (2.69; 4.21)**
			Foot and ankle trouble	1.25 (0.89; 1.76)
Kocak, 2005[368] N = 1,012	≥18	UI once a week or less	Other chronic diseases	1.2 (0.6; 2)
Rohr, 2005[107] N = 5,795	>45	UI in the past month	Chronic lung disease	**1.66 (1.37; 2.01)**
Swanson, 2005[106] N = 606	45-81	UI in the past month	Cough	**2.9 (1.7; 5)**
			Headaches	1.5 (1; 2.3)
			Swollen ankles	**1.9 (1.2; 3.2)**
			Usually have a cough	**3.5 (1.8; 6.8)**
Kuh, 1999[179] N =1,333	48	Urge UI, ≥2/hourl during the day and at ≥2/night	GP consultations High vs. low	1.1 (0.81; 1.6)
Parazzini, 2003[138] N = 2,205	>40	Urge UI, within the past month	Chronic obstructive pulmonary disease	1.5 (0.9; 2.5)
Rohr, 2005[107] N = 5,795	>45	Urge UI, within the past month	Chronic lung disease	**1.73 (1.4; 2.15)**
Health status, Incident UI				
Jackson, 2004[21] N = 1,584	70-79	At least weekly	Health ABC Performance score	**1.6 (1.1; 2.3)**
(Waetjen, 2007[49] N = 3,302	42-52	UI: >weekly/daily	Health status Fair to poor vs. good to excellent	**2.99 (1.35; 6.62)**
		Urge UI, frequency: at least monthly	Health status Fair to poor vs. good to excellent	**0.42 (0.18; 0.99)**
Health status, Prevalent UI				
Brown, 1999[353] N = 2,763	Mean: 67 (SD: 7)	Mixed UI within the past week	Poor health	**1.43 (1.14; 1.79)**
		Stress UI, within the past week	Poor health	1.06 (0.78; 1.45)
Jackson, 2004[21] N = 1,584	70-79	Stress UI, within the past week	Poor health	1.6 (0.92; 2.78)
McGrother, 2006[6] N = 12,570	>40	Stress UI, monthly or more	Health status Good vs. excellent	1.3 (0.9; 1.8)
		Stress UI, monthly or more	Health status fair vs. excellent	1.2 (0.7; 1.9)
		Stress UI, monthly or more	Health status poor vs. excellent	2 (0.9; 4.2)
		Stress UI, monthly or more	Long-term illness	0.6 (0.3; 1)
Huang, 2006[70] N = 345	40-69	Stress UI, at least weekly incontinence (recall # of episodes in past week)	Poor/fair health in White women	**2.6 (1.43; 4.72)**
Brown, 1996[194] N = 7,949	69-101	Daily	Poor overall health vs. good overall health	**1.6 (1.3; 2.1)**

Table F26. Association between health status, comorbidities, and UI in women (continued)

Author, Sample	Age	Definition of UI	Health Condition	Odds Ratio (95%CI)
Muscatello, 2001[160] N = 262	>16	>1 symptom: nocturia, urgency, stress UI, urge UI	Good health vs. excellent	1.3 (0.6; 2.6)
		>1 symptom: nocturia, urgency, stress UI, urge UI	Faire or poor health vs. excellent	**2.9 (1.1; 7.4)**
Brown, 1999[353] N = 2,763	Mean: 67 (SD: 7)	Urge UI, within the past week	Poor health	0.93 (0.69; 1.24)
Kok, 1992[202] N = 719	≥60	At least twice a week	poor mobility	**4.74 (2.55; 8.83)**
Heart diseases, Prevalent UI				
Brown, 1996[194] N = 7,949	69-101	Daily	congestive heart failure vs. none	1.1 (0.8; 1.6)
Schmidbauer, 2001[62] N = 1,262	≥20	Within the past 4 weeks	SBP, 146+ vs. <=145	**1.25 (1.02; 1.54)**
	≥20	Within the past 4 weeks	DBP, 91+ vs. <=90	1.17 (0.92; 1.48)
Finkelstein, 2002[145] N = 29,520	≥30	As diagnosed by a health professional	Heart problems	0.87 (0.48; 1.61)
	≥30	As diagnosed by a health professional	Hypertension	0.75 (0.48; 1.18)
Chen, 2003[123] N = 1,247	>20	Stress UI, within the past 2 weeks	Hypertension	1.6 (0.7; 3.7)
Landi, 2003[131] N = 3,194	79.5+-9.5	0 (complete control)-4 (inadequate control with multiple daily episodes)	Atrial Fibrillation	0.95 (0.72; 1.24)
		0 (complete control)-4 (inadequate control with multiple daily episodes)	Heart Failure	0.98 (0.78; 1.24)
Kocak, 2005[368] N = 1,012	≥18	UI once a week or less	Hypertension	**2.9 (1.3; 6.3)**
Rohr, 2005[107] N = 5,795	>45	UI in the past month	Myocardial infarction	0.96 (0.64; 1.45)
		Stress UI, within the past month	Myocardial infarction	0.81 (0.51; 1.29)
		Urge UI, within the past month	Myocardial infarction	1.13 (0.72; 1.78)

Bold- significant association at 95% confidence level

Table F27. Association between gastrointestinal symptoms, surgery, and UI in females

Author, Sample	Age	Definition of UI	Risk Factors	OR(95%CI)
Prevalent UI, Constipation				
Chiarelli, 1999[173] N = 41,724	18-23	UI in the last year	Constipation, Rarely vs. never	**2.13 (1.87; 2.42)**
			Constipation, Sometimes vs. never	**2.86 (2.43; 3.36)**
			Constipation, Often vs. never	**2.66 (2.07; 3.4)**
			Constipation, Rarely vs. never	**2.46 (2.24; 2.71)**
			Constipation, Sometimes vs. never	**2.16 (1.94; 2.4)**
			Constipation, Often vs. never	**2.31 (1.96; 2.72)**
			Constipation, Rarely vs. never	**2.67 (2.38; 2.99)**
			Constipation, Sometimes vs. never	**2.05 (1.82; 2.31)**
			Constipation, Often vs. never	**2.21 (1.87; 2.61)**
Ueda, 2000[172] N = 968	40-75	UI Sometimes	Constipation, Yes vs. no	0.896 (0.642; 1.25)
Landi, 2003[131] N = 3,194	79.5+-9.5	UI weekly	Constipation, yes vs. no	1.19 (0.95; 1.48)
Oskay, 2005[111] N = 500	>50	UI weekly	Constipation, yes vs. no	**1.75 (1.17; 2.65)**
Jackson, 2006[100] N = 1,017	55-75	Any leakage in the past year	Constipation, yes vs. no	1 (0.8; 1.3)
		Severe: Sandvik score of 6-8 over the past year	Constipation, yes vs. no	**1.5 (1; 2.2)**
Prevalent UI, Gastrointestinal Symptoms				
Uusta-Fornel, 2004[208] N = 1,336	40 yr and 60 yr	UI weekly or more often	Digitation by defecation	1.8 (0.9; 3.6)
Chiarelli, 1999[173] N = 41,724	18-23	UI in the last year	Bowel problems Rarely vs. never	**1.97 (1.65; 2.35)**
			Bowel problems Sometimes vs. never	**1.5 (1.18; 1.89)**
			Bowel problems Often vs. never	**1.82 (1.33; 2.48)**
			Bowel problems, Rarely vs. never	**1.66 (1.45; 1.91)**
			Bowel problems, Sometimes vs. never	**1.69 (1.46; 1.96)**
			Bowel problems, Often vs. never	**1.78 (1.42; 2.23)**
			Bowel problems, Rarely vs. never	**1.48 (1.28; 1.72)**
			Bowel problems, Sometimes vs. never	**1.39 (1.2; 1.62)**
			Bowel problems, Often vs. never	**1.51 (1.22; 1.87)**
Uusta-Fornel, 2004[208] N = 1,336	40 yr and 60 yr	Leakage weekly or more often	Groin hernia vs. none	3.3 (0.7; 14.9)
Prevalent UI, Surgery				
Bortolotti, 2000[165] N = 2,767	≥40	UI in the past year	Abdominal surgery	1.2 (0.8; 1.7)
Hvidman, 2003[356] N = 3,900	20-59	UI in the past seven days	Ever abdominal or gynecologic operation	**1.7 (1.1; 2.8)**
Parazzini, 2003[138] N = 2,205	>40	UI in the past month	Abdominal surgery	1 (0.7; 1.5)
		Stress UI in the past month	Abdominal surgery	1.1 (0.8; 1.6)

Table F27. Association between gastrointestinal symptoms, surgery, and UI in females (continued)

Author, Sample	Age	Definition of UI	Risk Factors	OR(95%CI)
		Mixed UI in the past month	Abdominal surgery	1 (0.8; 1.3)
Uustal Fornel, 2004[208] N = 1,336	40 yr and 60 yr	Leakage weekly or more often	Varicose vein surgery vs. none	1.9 (1; 3.4)
Fritel, 2005[110] N = 2,625	49-61	Stress UI often or all of the time	Pelvic organ prolapse surgery	1.5 (0.8; 2.7)
Jackson, 2006[100] N = 1,017	55-75	Any leakage in the past year	Bladder or urinary surgery	1.2 (0.8; 1.9)
		Severe UI: Sandvik score of 6-8 over the past year	Bladder or urinary surgery	1.4 (0.8; 2.4)
Prevalent UI, UI surgery				
Schmidbauer, 2001[62] N = 1,262	≥20	UI in the past 4 weeks	UI surgery	**1.43 (1.17; 1.75)**
Fritel, 2005[110] N = 2,625	49-61	Stress UI often or all of the time	UI surgery	**1.1 (1.2; 3.7)**
			UI surgery	**1.3 (1.3; 4)**
			UI surgery	**2.3 (1.4; 4)**
Bortolotti, 2000[165] N = 2,767	≥40	UI in the past year	Urological surgery	1.9 (0.8; 4.6)
Prevalent UI, UI during pregnancy				
Foldspang, 1999[175] N = 4,710	20-59	Stress UI in the past year	UI during pregnancy:	**3.4 (2.4; 4.6)**
			UI following childbirth:	**4.6 (3.5; 6)**

Bold- significant association at 95% confidence level

Table F28 Association between pharmacological agents and UI in women

Author, Sample	Age	Definition of UI	Drug	OR(95%CI)
Incident UI				
Jackson, 2004[22]	70-79	UI at least weekly	Insulin	**3.5 (1.6; 7.9)**
N = 1,584		UI at least weekly	Oral medications for diabetes	1.8 (0.9; 3.7)
		UI at least weekly	Not on medication for diabetes	1 (0.5; 2)
Prevalent UI, Stress				
Nuotio, 2003[136]	>70	UI ever	Polypharmacy (>3 drugs vs. <3)	0.6 (0.3; 1.3)
N = 227		UI ever	Sleeping medication vs. none	1.1 (0.6; 2.3)
Rohr, 2005[107]	>45	UI in the past month	Diuretics	**1.22 (1.06; 1.42)**
N = 5,795				
Prevalent UI, Total				
Brown, 1996[194]	69-101	UI daily	Non-thiazide diuretics vs. none	1.2 (0.9; 1.6)
N = 7,949				
Finkelstein, 2002[145]	≥30	UI diagnosed by a health professional	Pain medication	0.94 (0.68; 1.31)
N = 29,520			Tranquilizers	**1.65 (1.06; 2.57)**
			Antidepressants	**1.759 (1.04; 2.94)**
			Hypnotics	**1.52 (1.07; 2.16)**
			Narcotics	1.37 (0.89; 2.13)
			Laxatives	**1.67 (1.18; 2.37)**
			Asthma medication	0.82 (0.51; 0.33)
			BP medication	1.14 (0.7; 1.87)
			Heart medication	0.99 (0.49; 2.02)
			Diuretics	1.44 (0.96; 2.17)
			Antibiotics	**1.64 (1.25; 2.16)**
Van Oyen, 2002[157]	≥15	UI at least once a week	Diuretics	**2.74 (1.63; 4.61)**
N = 3,804				
Moghaddas, 2005[359]	50-64	UI, any leakage	Antidepressants	1.32 (0.96; 1.81)
N = 6,642		UI, any leakage	Antidepressants In women with depression	1.37 (0.97; 1.93)
Rohr, 2005[107]	>45	UI in the past month	Diuretics	**1.25 (1.09; 1.44)**
N = 5,795				
Nygaard, 2003[79]	50-69	Mild-moderate incontinence - ≤15/days in the last month	Psychiatric medication	1.55 (1.16; 2.07)
N = 5,701		Severe incontinence- >15 days in the last month	Psychiatric medication	1.49 (1.01; 2.19)
Prevalent UI, Urge				
Jackson, 2004[21]	70-79	UI in the past week	Insulin	1.78 (0.86; 3.68)
N = 1,584			Oral medication	1.02 (0.51; 2.04)
			Not on medication	2.69 (1.37; 5.29)
Rohr, 2005[107]	>45	UI in the past month	Diuretics	1.28 (1.1; 1.5)
N = 5,795				

Bold- significant association at 95% confidence level

Table F29. Association between hormone use and UI in women

Author, Year, Sample	Age	Definition of UI	Hormone Use	Odds Ratio (95%CI)
Incident UI				
Brown, 1996[194] N = 7,949	69-101	UI daily	Oral estrogen vs. none	**1.9 (1.5; 2.4)**
Grodstein, 2004[16] N = 39,436	50-75	Occasional: 1-3 times a month.	Dose of oral conjugated estrogen 0.3mg vs. none	**1.31 (1.13; 1.52)**
			Dose of oral conjugated estrogen 0.625mg vs. none	**1.47 (1.29; 1.46)**
			Dose of oral conjugated estrogen1.25mg vs. none	**1.42 (1.25; 1.61)**
			Oral estrogen alone or with progestin<1 year vs. never	**1.46 (1.16; 1.84)**
			Oral estrogen alone or with progestin11.9 years vs. never	**1.71 (1.4; 2.08)**
			Oral estrogen alone or with progestin24.9 years vs. never	**1.35 (1.22; 1.5)**
			Oral estrogen alone or with progestin59.9 years vs. never	**1.41 (1.29; 1.54)**
			Oral estrogen alone or with progestin>10 years vs. never	**1.56 (1.44; 1.69)**
			Transdermal estrogen alone or with progestin<1 year vs. never	1.76 (0.79; 3.91)
			Transdermal estrogen alone or with progestin11.9 years vs. never	**2.02 (1.01; 4.05)**
			Transdermal estrogen alone or with progestin24.9 years vs. never	**1.99 (1.51; 2.62)**
			Transdermal estrogen alone or with progestin59.9 years vs. never	**1.35 (1.08; 1.7)**
			Transdermal estrogen alone or with progestin>10 years vs. never	**1.56 (1.2; 2.03)**
			Duration of past use<2 years vs. never	**1.17 (1.06; 1.28)**
			Duration of past use25 years vs. never	**1.19 (1.07; 1.33)**
			Duration of past use69 years vs. never	1.1 (0.97; 1.25)
			Duration of past use>10 years vs. never	1.16 (0.98; 1.36)
			Time since last use<2 years vs. never	**1.39 (1.22; 1.58)**
			Time since last use25 years vs. never	**1.24 (1.09; 1.4)**
			Time since last use69 years vs. never	**1.18 (1.05; 1.34)**
			Time since last use >10 years vs. never	1.02 (0.91; 1.14)
			Oral estrogen alone vs. never	**1.45 (1.33; 1.57)**
			Transdermal estrogen alone vs. never	**1.55 (1.29; 1.87)**
			Oral estrogen and progestin vs. never	**1.47 (1.36; 1.59)**
			Transdermal estrogen and progestin vs. never	**1.6 (1.27; 2.02)**
			Past hormone use vs. never	**1.14 (1.06; 1.23)**
Jackson, 2004[22] N = 1,584	70-79	UI at least weekly	Current estrogen use vs. none	**1.7 (1.1; 2.6)**
Miller, 2003[134] N = 1,500	21-79	even a small amount of urine in the previous month	Ever used HRT	**1.66 (1.11; 2.47)**
Jackson, 2004[21] N = 1,584	70-79	Stress UI in the past week	Current estrogen use	**1.98 (1.26; 3.11)**
Thom, 1997[193] N = 933	≥60	UI within the past year	ever used estrogen replacement therapy vs. never	**1.92 (1.33; 2.76)**
		UI within the past year	ever used estrogen replacement therapy vs. never	**1.78 (1.13; 2.8)**

Table F29. Association between hormone use and UI in women (continued)

Author, Year, Sample	Age	Definition of UI	Hormone Use	Odds Ratio (95%CI)
Van Oyen, 2002[157] N = 3,804	≥15	UI at least once a week, at least once a month, less than once a month	postmenopausal hormones	**1.67 (1.1; 2.55)**
Hvidman, 2003[356] N = 3,900	20-59	UI within the past seven days	Present hormone use vs. none	1.3 (0.7; 2.1)
			Present hormone use indication, contraception vs. none	1.4 (0.7; 2.5)
			Present hormone use indication, menstrual disorder vs. none	**2.9 (1.3; 6.5)**
			Present hormone use indication, Menopause vs. none	0.7 (0.1; 5.6)
			Present hormone use indication, Not specified vs. none	1 (0.2; 4.2)
			Hormone use 1997 vs. none	1 (0.6; 1.7)
			Hormone use 1997 indication, contraception vs. none	1.1 (0.6; 2)
			Hormone use 1997 indication, menstrual disorder vs. none	**2.5 (1.1; 5.6)**
			Hormone use 1997 indication, menopause vs. none	0.7 (0.1; 5.6)
			Hormone use 1997 indication, not specified vs. none	0.7 (0.2; 2.8)
			Hormone use ever vs. never	0.9 (0.5; 1.5)
			Hormone use ever Indication, contraception vs. never	1 (0.6; 1.7)
			Hormone use ever indication, menstrual disorder vs. never	**2 (1.2; 3.5)**
			Hormone use ever indication, menopause vs. never	0.6 (0.1; 4.7)
			Hormone use ever indication, urinary incontinence vs. never	6.1 (0.6; 61.8)
			Hormone use ever indication, not specified vs. never	1.1 (0.5; 2.4)
Teleman, 2004[360] N = 2,682	50-59	At least occasionally	HRT use	**1.5 (1.2; 1.8)**
Moghaddas, 2005[359] N = 6,642	50-64	Any leakage	Oral contraceptives, ever	1.15 (1; 1.31)
			Peri- or postmenopausal women with current systemic hormone therapy use in the hormonal status	1.11 (0.98; 1.27)
			Oral contraceptives, ever; Women with depression	1.18 (0.98; 1.42)
			Peri- or postmenopausal women with current Women with depression Systemic hormone therapy use in the hormonal status	1 (0.84; 1.18)
			Oral contraceptives, ever	1.12 (0.92; 1.36)
			Peri- or postmenopausal women with current systemic hormone therapy use in the hormonal status	**1.29 (1.1; 1.56)**
Danforth, 2006[68] N = 83,355	25-54	Occasional: 1-3/month.	Oral contraceptive use Former vs. never	**1.2 (1.1; 1.3)**
		Occasional: 1-3/month.	Oral contraceptive use Current vs. never	1 (1; 1.1)
		Frequent: At least weekly.	Oral contraceptive use Former vs. never	**1.2 (1.15; 1.3)**
		Frequent: At least weekly.	Oral contraceptive use Current vs. never	**1.1 (1.1; 1.2)**
		Severe: Wet underwear.	Oral contraceptive use Former vs. never	**1.2 (1.1; 1.3)**
		Severe: Wet underwear.	Oral contraceptive use Current vs. never	1 (0.9; 1.1)
Jackson, 2006[100] N = 1,017	55-75	Any leakage in the past year	Oral estrogen use in past month	1.2 (0.9; 1.5)
		Any leakage in the past year	Estrogen cream past month	**2.8 (1.5; 2.4)**
		Severe: Sandvik score of 6-8 over the past year	Oral estrogen use in past month	**1.6 (1.1; 2.3)**
		Severe: Sandvik score of 6-	Estrogen cream past month	0.9 (0.4; 2.1)

Table F29. Association between hormone use and UI in women (continued)

Author, Year, Sample	Age	Definition of UI	Hormone Use	Odds Ratio (95%CI)
		8 over the past year		
Brown, 1996[194] N = 7,949	69-101	Daily	Oral estrogen vs. none	**1.9 (1.5; 2.4)**
Jackson, 2004[21] N = 1,584	70-79	Urge UI: within the past week	Current estrogen use	**1.68 (1.07; 2.63)**
Huang, 2006[70] N = 345 Asian women	**40-69**	Urge UI: at least weekly incontinence to recall the number of episodes in the past 7 days	Oral estrogen use	**1.82 (1.12; 2.93)**

Table F30. Prevalence of UI among males with risk factors

Author Sample	Risk factor	UI	%
Diokno, 1990[314] N = 651	Arthritis	UI	50.40
		Urge	43.20
		Stress	45.50
	Cardiovascular problems	UI	6.90
		Urge	2.30
		Stress	10.00
	Stroke	UI	10.10
		Urge	7.70
		Stress	9.10
	Mobility Problems	UI	14.70
		Urge	11.30
		Stress	0.00
	Hearing and vision problems	UI	38.60
		Urge	34.90
		Stress	27.30
	Any vision problems	UI	28.80
		Urge	15.60
		Stress	20.00
	Diabetes	UI	20.30
		Urge	20.00
		Stress	36.40
	Pulmonary problems	UI	15.70
		Urge	26.70
		Stress	9.10
	Bowel problems	UI	11.20
		Urge	11.10
		Stress	9.10
	Genital surgery	UI	44.00
		Urge	26.70
		Stress	45.50
	UTI	UI	13.40
		Urge	9.60
		Stress	27.30
Smoger, 2000[169] N = 809	Diuretics	UI	35.60
	Antispasmodic agents	UI	60.00
	Prostate active agents	UI	38.10
	Bladder surgery	UI	58.30
	Prostate surgery	UI	46.60
Van Kampen, 1997[369] N = 216	Transurethral resection of prostate	UI	19
	1 year after transurethral resection	UI	1.50
Van Kampen, 1997[369] N = 298	Transvesical prostatectomy for benign prostatic hyperplasia	UI	15.00
	1 years after transvesical prostatectomy for benign prostatic hyperplasia	UI	1.00

Table F31. Prevalence and incidence of UI in males with prostate cancer

Author Sample	Patient Population	UI	N	%
Lee, 1996[370]	Prostate cancer with no history of prior transurethral resection of the prostate	UI	626	0.20
Talcott, 1998[184]	Localized prostate cancer	UI	279	2.00
Adolfsson, 1998[252]	Prostate cancer	UI	342	30.00
	Men not reporting any treatment for prostate cancer 22 months after diagnosis	UI	139	30.00
Joly, 1998[316]	Localized prostate cancer	UI	71	9.00
Smoger, 2000[169]	Prostate cancer	UI	809	43.50
Augustin, 2002[371]	Prostate cancer	UI	368	6
Liu, 2005[372]	Prostate cancer	UI	1,192	2.9
	Prostate cancer with prior transurethral resection of the prostate		1,192	7.8
Jacobsen 2007[47]	Prostate cancer	pad weight gain > 8 gm/24h ours	148	4.1
			29	0
			28	7.4
	Localized prostate cancer	UI	172	4
			67	3.5
Johnson, 2004[23]	non-Hispanic Whites with prostate cancer	Occasional leakage	1,475	8.8
	non-Hispanic Whites with prostate cancer	Frequent leakage	1,475	2.1
	African-American with prostate cancer	Occasional leakage	321	9.5
	African-American with prostate cancer	Frequent leakage	321	2
	Hispanic with prostate cancer	Occasional leakage	279	11.2
	Hispanic with prostate cancer	Frequent leakage	279	6.5
Lee, 1996[370]	Prostate cancer with history of prior transurethral resection of the prostate	UI	132	2.00
Sandhu, 2000[373]	Prostate cancer patients with a prior history of a transurethral resection of the prostate	incident stress UI with 1 pad daily or occasional leakage	120	8.00

Table F32. Prevalence or incidence of UI after treatments for prostate cancer

Author	Treatment	UI	N	%
Radical prostatectomy				
Talcott, 1998[184]	3 months after prostatectomy for localized prostate cancer	Pad use	125	58.00
	1 year after prostatectomy for localized prostate cancer		125	35.00
Adolfsson, 1998[252]	22 months after radical prostatectomy	UI	22	65.00
Van Kampen, 1997[369]	Radical prostatectomy for localized prostate cancer	UI	175	66.00
	1 year after radical prostatectomy for localized prostate cancer		175	2.00
Goluboff, 1998[313]	3.3 years after radical retropubic prostatectomy	regular use of pads	480	8.2
	6 months after radical retropubic prostatectomy		480	8.00
Gray, 1999[374]	2.7 years after Perineal radical prostatectomy	Wears >2 pads/day	23	22.00
		Must wear pads at all times	23	26.00
		Leak with minimal effort	23	13.00
		Pads are completely soaked	6	17.00
	2.7 years after retropubic radical prostatectomy	Wears .2 pads/day	49	22.00
		Must wear pads at all times	49	35.00
		Leak with minimal effort	49	18.00
		Pads are completely soaked	24	17.00
	2.7 years after radical prostatectomy	UI	209	43.00
Catalona, 1999[375]	18 months after retropubic prostatectomy	UI	1,325	8.00
Augustin, 2002[371]	12 months after radical retropubic prostatectomy	protection against urinary incontinence	368	27.2
		one pad per day	368	14.7
		two or more pads per day	368	12.5
		surgical treatment for incontinence	368	1.4
Sebesta, 2002[152]	younger than 65 years of age 18 months after radical prostatectomy	UI	674	56.3
		Several episodes per week	674	10.8
		<1/day	674	19.4
		1/day	674	16.8
		>1/day	674	9.2
		Pad use 0–1/day	674	12.9
		Pad use 1–2/day	674	8.9
		Pad use 2–3/day	674	3.7
		Pad use 3–4/day	674	2.5
		Pad use >4/day	674	2.7
		Sudden urge/no time	674	17.4
		Physical exertion	674	50.8
		Urge incontinence only (no stress	674	5.2
		While in bed/running to bathroom	674	7.6
		Dry in AM/Leak only in PM	674	13.4
Hu, 2003[32]	Radical prostatectomy, 1991	UI	12,079	20
	Radical prostatectomy, 1992		12,079	25
	Radical prostatectomy, 1993		12,079	19
	Radical prostatectomy, 1994		12,079	11

Table F32. Prevalence or incidence of UI after treatments for prostate cancer (continued)

Author	Treatment	UI	N	%
	Radical prostatectomy, 1995		12,079	4
	Age 65–69,Radical prostatectomy, 1991		12,079	23
	Age 65–69,Radical prostatectomy, 1992		12,079	24
	Age 65–69,Radical prostatectomy, 1993		12,079	20
	Age 65–69,Radical prostatectomy, 1994		12,079	10
	Age 65–69,Radical prostatectomy, 1995		12,079	4
	Age 70–74,Radical prostatectomy, 1991		12,079	19
	Age 70–74,Radical prostatectomy, 1992		12,079	25
	Age 70–74,Radical prostatectomy, 1993		12,079	18
	Age 70–74,Radical prostatectomy, 1994		12,079	11
	Age 70–74,Radical prostatectomy, 1995		12,079	4
	Age >75,Radical prostatectomy, 1991		12,079	19
	Age >75,Radical prostatectomy, 1992		12,079	26
	Age >75,Radical prostatectomy, 1993		12,079	19
	Age >75,Radical prostatectomy, 1994		12,079	11
	Age >75,Radical prostatectomy, 1995		12,079	8
Maffezzini, 2003[132]	29 months after radical retropubic prostatectomy for clinically intracapsular prostate cancer	stress UI requiring 1-3 pads/day	295	8.8
	29 months after radical retropubic prostatectomy for clinically intracapsular prostate cancer	UI, >4 pads/day	295	2.3
Hisasue, 2004[376]	12 months after radical retropubic prostatectomy	stress UI	300	4.3
Jacobsen	3 months after Radical prostatectomy	pad weight gain of more than 8 gm during a 24-hour period	148	42
	12 months after Radical prostatectomy	pad weight gain of more than 8 gm during a 24-hour period	148	12.8
	3 months after open retropubic prostatectomy	UI	172	42
	12 months after open retropubic prostatectomy	UI	172	12.8
Johnson, 2004[23]	12 Months after radical prostatectomy for non-Hispanic whites with prostate cancer	Occasional leakage	1,475	50.2
	12 Months after radical prostatectomy for non-Hispanic whites with prostate cancer	Frequent leakage	1,475	15.6
	12 Months after radical prostatectomy for African-American with prostate cancer	Occasional leakage	321	51.4
	12 Months after radical prostatectomy for African-American with prostate cancer	Frequent leakage	321	9
	12 Months after radical prostatectomy for Hispanic with prostate cancer	Occasional leakage	279	46.9
	12 Months after radical prostatectomy for Hispanic with prostate cancer	Frequent leakage	279	14.9
	60 Months after radical prostatectomy for non-Hispanic whites with prostate cancer	Occasional leakage	1,475	53.7
	60 Months after radical prostatectomy for non-Hispanic whites with prostate cancer	Frequent leakage	1,475	14.3
	60 Months after radical prostatectomy for African-American with prostate cancer	Occasional leakage	321	39.7

Table F32. Prevalence or incidence of UI after treatments for prostate cancer (continued)

Author	Treatment	UI	N	%
	60 Months after radical prostatectomy for African-American with prostate cancer	Frequent leakage	321	10.4
	60 Months after radical prostatectomy for Hispanic with prostate cancer	Occasional leakage	279	47.4
	60 Months after radical prostatectomy for Hispanic with prostate cancer	Frequent leakage	279	18.7
Laparoscopic radical prostatectomy				
Olson, 2001[377]	1 month after laparoscopic radical prostatectomy for clinically localized prostate cancer	Incident UI	101	90.10
	3 months after laparoscopic radical prostatectomy for clinically localized prostate cancer		77	71.40
	6 months after laparoscopic radical prostatectomy for clinically localized prostate cancer		61	42.60
	12 months after laparoscopic radical prostatectomy for clinically localized prostate cancer		37	43.2
	1 months after laparoscopic radical prostatectomy for clinically localized prostate cancer	Daily pad use, >1/day	78	22.8
	3 months after laparoscopic radical prostatectomy for clinically localized prostate cancer		61	20.8
Jacobsen, 2007[47]	3 months after Laparoscopic prostatectomy (first half procedures)	pad weight gain > 8 gm/24-hour	29	70.4
	12 months after Laparoscopic prostatectomy (first half procedures)		29	20.72
	3 months after Laparoscopic prostatectomy (last half procedures)		28	60
	12 months after Laparoscopic prostatectomy (last half procedures)		28	14.3
	3 months after laparoscopic prostatectomy (second half)	UI	67	60
	3 months after laparoscopic prostatectomy (first half)		67	70.4
	12 months after laparoscopic prostatectomy (second half)		67	19.2
	12 months after laparoscopic prostatectomy (first half)		67	16
Radiation for prostate cancer				
Lee, 1996[370]	More than 3 months after prostate cancer treated with definitive external-beam radiation therapy	Incident late grade 2 or higher urinary incontinence	758	0.50
	5 years after definitive external-beam radiation therapy for prostate cancer	actuarial urinary incontinence rate	758	1.30
Talcott, 1998[184]	3 months after radiotherapy for localized prostate cancer	Pad use	135	5.00
	1 year after radiotherapy for localized prostate cancer		135	5.00
Adolfsson, 1998[252]	22 months after External radiation	UI	37	33.00
Joly, 1998[316]	4-8 years after external beam irradiation and brachytherapy	UI	65	40.00
	4-8 years after external beam irradiation and brachytherapy	invaliding UI	65	9.00
	4-8 years after external beam irradiation and brachytherapy	diagnosed UI (charts)	65	11.00

Table F32. Prevalence or incidence of UI after treatments for prostate cancer (continued)

Author	Treatment	UI	N	%
Sandhu, 2000[373]	5 years after radiation with acute >/= Grade 2 GU symptoms	incident stress incontinence requiring 1 pad daily for protection or experienced occasional leakage	110	18.00
	5 years after radiation with Grade 1 or no acute urinary symptoms		110	7.00
Liu, 2005[372]	54 months after external beam radiotherapy	Incident Grade 1 incontinence	1,192	4.9
		Incident Grade 2 incontinence	1,192	0.6
		Incident Grade 3 incontinence	1,192	0.6
Sandhu, 2000[373]	5 years after high-dose 3-dimensional conformal radiotherapy in patients with a prior history of a transurethral resection of the prostate	incident stress incontinence requiring 1 pad daily for protection or experienced occasional leakage	110	9.00
Adolfsson, 1998[252]	22 months after endocrine treatment	UI	109	24.00
	22 months after endocrine treatment subsequent to external or radical prostatectomy		35	20.00
Fowler, 1996[378]	3-5 years after high energy external beam radiation therapy	Dripping or leaking urine	621	29

Table F33. Prevalence and severity of post-prostatectomy UI

Author	Country	Method	UI Definition	Surgical Procedure(s)	Response Rate	Number	Followup (Months)	UI Prevalence (%)
Ramon, 1993[379]	France	Clinical evaluation	Stress UI	RRP	6 Months: 100% 12 Months: 82%	6 Months: 484 12 Months: 398	6, 12	6 Months: 10% 12 Months: 5%
Lowe, 1996[380]	USA	Patient interviews and questionnaires	Any loss of urinary control requiring protection	RRP	91%	188	1, 3, 6, 12	1 Month: 83% 3 Months: 49% 6 Months: 26.5% 12 Months: 16% >12 Months: 11.7%
Weldon, 1997[381]	USA	Prospective clinical evaluation	Daily pad use	RPP	Not reported	220	18	5%
Bishoff, 1998[382]	USA	Mailed survey	Any UI Pad use	RRP and RPP	80% RRP 78% RPP	784 RRP 123 RPP	≥12	Immediate post-op 79% RPP 85% RRP Pad use: 39% RPP 56% RRP
Goluboff, 1998[313]	USA	Mailed survey	Any UI Daily or pad use Continuous UI	RRP	78.2%	480	Mean: 39 Range: 1 - 8.8 years	8.2% 7.4% daily 0.8% continuous 43.6% UUI
Catalona, 1999[375]	USA	Self-reported questionnaire.	Requiring protection to keep outer garments dry.	RRP	70.9%	1,325	Minimum of 18	8%
Gray, 1999[374]	USA	Mailed survey	Pad use Incontinence more than once per week	RRP RPP	80%	RRP: 96 RPP: 71	Median: 32 Range: 4 - 65	RPP: <1 year: 50% 1-2 years: 26% >2 years: 28% RRP: <1 year: 27% 1-2 years: 26% >2 years: 18%
Horie, 1999[383]	Japan	Self reported at clinic visits	Pad use	RRP	97%	104	1, 3, 6, 12	22%
Benoit, 2000[384]	USA	Review of Medicare records	Daily urinary leakage and pad use	RRP	100%	25,651	12	7.9%

Table F33. Prevalence and severity of post-prostatectomy UI (continued)

Author	Country	Method	UI Definition	Surgical Procedure(s)	Response Rate	Number	Followup (Months)	UI Prevalence (%)
Poon, 2000[385]	USA	Self-reported telephone interviews	Pad use	RRP	85%	165	12	3-5%
Olsson, 2001[377]	France	Self-reported questionnaires	Pad use	LRP	1 Month: 44.3% 3 Months: 33.8% 6 Months: 26.8% 12 Months: 16.2%	228	12	22%
Sebesta, 2002[152]	USA (multiple states)	Mailed survey	Urine leakage in past week	RRP	78%	674	Within 18 months of surgery	56.3% 10.8% several times/day 19.4% <once/day 16.8% once/day 9.2% >once/day
Hu, 2003[32]	USA	Data was taken from random sample of standard Medicare files.	Not reported. Taken from Medicare data, definition of incontinence was not listed.	RRP	Not reported	12,079	36	20% in 1991 4% in 1995
Maffezini, 2003[132]	Italy	Consecutive series. Data came from review of charts and records from patients.	UI: Use of 4 or more pads/day SUI: Usually wore protection but less than 4 pads/day	RRP	98.3%	300	29	11.1% 8.6% SUI 2.3%
Moinzadeh[386], 2003	USA	Self-administered questionnaire and/or third party telephone interview	Pad use	RRP	100%	200	3, 6, 12, 15	Baseline: 36.5% 3 Months: 18% 6 Months: 9% 12 Months: 1.5% 15 Months: 0.5%
Salomon, 2003[387]	USA and France	Self-administered questionnaire	Pad use	RRP	100%	146	12	29.5%
Talcott, 2003[142]	USA	Self-administered questionnaire	Frequency and magnitude of urine loss	RRP	85.2% at 3 month followup 76.6% for 24 months	613	Baseline, 3 months, 1 and 2 years	4.9% Baseline 34.9% 3 months 23.9% 1 year 23.4% 2 years
Deliveliotis, 2004[15]	Greece	Self-administered questionnaire	Daily urine leakage	105 RRP 98 TURP	73.9% RRP 64.9% TURP 54.1% controls	203	2 years	RRP: 9% TURP: 2.8%
Deliveoliotis, 2002[388]	Greece	Self-administered questionnaire	Pad use	RRP	100%	149	3, 6, 9, 12	3 Months: 39.6% 6 Months: 26.8% 9 Months: 13.4% 12 Months: 5 %

Table F33. Prevalence and severity of post-prostatectomy UI (continued)

Author	Country	Method	UI Definition	Surgical Procedure(s)	Response Rate	Number	Followup (Months)	UI Prevalence (%)
Johnson, 2004[23]	USA	Self-administered questionnaire	Self reported level of urinary control: total, occasional leakage, frequent leakage or no control, and unknown or missing.	RRP	62.3%	3,533	Baseline, 6, 12, 24, and 60 months after prostate cancer diagnosis	Baseline: 10.9% Whites (2.1% frequent) 11.5% Blacks (2%) 17.7% Hispanics (6.5% frequent) 6 months: 74.7% Whites (22.6% frequent) 67.6% Blacks (23.4% frequent) 67.5% Hispanics (26.7% frequent) 12 months: 65.8% Whites (15.6% frequent) 60.4% Blacks (9% frequent) 61.8% Hispanic (14.9% frequent) 24 months: 60.0% Whites (9.8% frequent) 56.2% Blacks (11.1% frequent) 64.3% Hispanics (11.3% frequent) 60 months: 68% Whites (14.3% frequent) 50.1% Blacks (10.4% frequent) 66.1% Hispanics (18.7% frequent)
Moore, 2007[389]	Canada	Clinical evaluation	More than 8 grams of urine loss on 24 hour pad test	RRP Lap RRP	93%	RRP: 198 Lap RRP: 48	3 and 12	Baseline: 4% 3 Months: 43% 12 Months: 15%

Table F33. Prevalence and severity of post-prostatectomy UI (continued)

Author	Country	Method	UI Definition	Surgical Procedure(s)	Response Rate	Number	Followup (Months)	UI Prevalence (%)
Smither, 2007[48]	USA	Prospective cohort with clinic evaluation. Chart reviews.	≤1 gram of urine loss on a 1 hour pad test	RRP	100%	203	2, 6, 18, 30, 42, and 54 weeks post-procedure	Minimal (≤1 gm): 3% 2 weeks 37% 6 weeks 66% 18 weeks 85% 30 weeks 87% 42 weeks 91% 54 weeks Mild (1.1-1.9 gms): 23% 2 weeks 23% 6 weeks 22% 18 weeks 9% 30 weeks 8% 42 weeks 5% 54 weeks Moderate (10.0-49.9 gms): 50% 2 weeks 26% 6 weeks 8% 18 weeks 4% 30 weeks 3% 42 weeks 3% 54 weeks Severe (≥50 gms) 24% 2 weeks 14% 6 weeks 4% 18 weeks 2% 30 weeks 2% 42 weeks 1% 54 weeks
Eastham, 1996[390]	USA	Clinical evaluation and self-reported questionnaires	Leaking urine onto ≥1/pads daily, patients who were wet with normal activity	RRP RRP (With new anastomic technique, 1990)	95%	RRP: 191 RRP (Post 1990 w/new technique) : 390	1 Year and 2 year	RRP: 1 year: 14% 2 years: 9% RRP w/anastomic method): 1 year: 8% 2 years: 5%
Begg, 2002[391]	USA	Diagnostic tests	Leakage or absence of urinary control >2 times/day	RRP	100%	11,522	>1 year	65-69 years: 7% 70-74 years: 7% 75+ years: 9%
Stanford, 2000[392]	USA	Mailed, self-reported questionnaires or	Leakage of urine	RRP	62.3%	3,533	12 months and 24 months	Baseline Age: <60: Occasional leakage: 6.8% Frequent leakage: 1.4%

Table F33. Prevalence and severity of post-prostatectomy UI (continued)

Author	Country	Method	UI Definition	Surgical Procedure(s)	Response Rate	Number	Followup (Months)	UI Prevalence (%)
		telephone and in-person interviews						No control: 0.9% 60-64: Occasional leakage: 9.8% Frequent leakage: 1.8% No control: 0% 65-74: Occasional leakage: 11.3% Frequent leakage: 3.7% No control: 1.3% 75-79: Occasional leakage: 9.6% Frequent leakage: 4.0% No control: 0% 12 Months: Age <60: Occasional leakage: 48.5% Frequent leakage: 7.0% No control: 2.5% 60-64: Occasional leakage: 53.4% Frequent leakage: 11.5% No control: 4.0% 65-74: Occasional leakage: 47.6% Frequent leakage: 16.2% No control: 2.4% 75-79: Occasional leakage: 28.2% Frequent leakage: 23.4% No control: 13% 24 Months: Age <60: Occasional leakage: 46.4% Frequent leakage: 5.2% No control: 0.7% 60-64: Occasional leakage: 55.8% Frequent leakage: 6.6% No control: 3.6% 65-74: Occasional leakage: 50.4% Frequent leakage: 10.6%

Table F33. Prevalence and severity of post-prostatectomy UI (continued)

Author	Country	Method	UI Definition	Surgical Procedure(s)	Response Rate	Number	Followup (Months)	UI Prevalence (%)
								No control: 0.9% 75-79: Occasional leakage: 11.1% Frequent leakage: 27.0% No control: 13.8%
Emberton, 1996[393]	UK	Mailed, self-reported questionnaires	Leakage of urine	RRP	82.4%	4,226	3 Months	3 Months: "I leak a tiny amount:" 44.4 "Sufficient to cause a problem:" 6.1% "Sufficient to need pads:" 4.4%
Fowler, 1995[394]	USA	Self-reported mailed questionnaires and telephone interviews	Dripping or leaking urine over the past month	RRP	92%	1,072	2-4 years after surgery	"None now:" 15.9% "Dripping now, no pad use:" 21.5% "Wear pads or clamp:" 20.7%
Kundu, 2004[395]	USA	Self-reported questionnaires	Use of pads or other protection	RRP	78.7%	2,737	Minimum of 18 months	Younger than 50: 5% 50-59: 4% 60-69: 7% 70+: 14%
Harris, 2003[396]	USA	Surgeon evaluation	Pad usage	RPP	100%	508	1, 2, 4, 6, and 12 months	1 month: 62% 2 months: 47% 4 months: 26% 6 months: 15% 12 months: 4%
Varkarakis, 2004[397]	Austria	In person interviews	Pad usage	RRP	84.9%	526	1, 6, and 12 months	3 months: 25.2% 6 months: 18.3% 12 months: 6.5%
Lepor, 2004[398]	USA	Self-reported, mailed questionnaires	Pad usage	RRP	94.2%	500	3, 6, 12, and 24 months	3 months: 29.1% 6 months: 12.8% 12 months: 7.9% 24 months: 1.5%

Table F33. Prevalence and severity of post-prostatectomy UI (continued)

Author	Country	Method	UI Definition	Surgical Procedure(s)	Response Rate	Number	Followup (Months)	UI Prevalence (%)
Penson, 2005[399]	USA	Self-reported questionnaires or telephone interviews	Leakage of urine	RRP	62.3%	3,533	6, 12, 24, and 60 months	6 months: Occasional leakage: 52% Frequent leakage: 19% No control: 6% 12 months: Occasional leakage: 49% Frequent leakage: 13% No control: 3% 24 months: Occasional leakage: 50% Frequent leakage: 9% No control: 2% 60 months: Occasional leakage: 51% Frequent leakage: 11% No control: 3%
Sacco, 2006[400]	Italy	Telephone or in-person interviews	Pad usage	RRP	86%	985	3, 6, 12, and 24 months	3 months: 31.8% 6 months: 22% 12 months: 13.1% 24 months: 6.8%
Saranchuk, 2005[401]	USA	Clinical database	Pad usage	RRP	100%	647	12 and 24 months	12 months: 13% 24 months: 7%
Van Randenborgh, 2004[402]	Germany	Self-administered questionnaires	Pad usage	RRP	100%	1,013	Up to 12 months	With Urethral Stump: <4 weeks: 67% 1-3 months: 51% 3-6 months: 22% 6-12 months: 0% w/o Urethral Stump: <4 weeks: 85% 1-3 months: 56% 3-6 months: 35% 6-12 months: 95%
Mettlin, 1997[403]	USA	Hospital cancer registries	Pad usage	RRP	85.3%	2,922	Up to 5 years	Occasional, no pads required: 24.6% Daily, <2 pads required: 11.7% Daily, >2 pads required: 4.8% Total incontinence: 2.9%

TURP: Transurethral retropubic prostatectomy; RRP= radical retropubic prostatectomy; RPP = radical perineal prostatectomy; Lap RRP = laproscopic retropubic prostatectomy; UI=urinary incontinence; SUI=stress urinary incontinence

Table F34. Association between race and FI

Author Sample	Fecal Incontinence	Race , Population Groups	Odds Ratio (95%CI)
Women			
Macarthur, 2005[404] N = 4,046 1,793 primiparae 3,813 included in the model	Fecal incontinence	Asian vs. Non-Asian, 6 years postpartum	**3.42 (2.36; 4.94)***
	Persistent fecal incontinence	Asian vs. Non-Asian, 6 years postpartum among primiparae at index delivery	**13.46 (5.88; 30.81)***
	Persistent fecal incontinence	Asian vs. Non-Asian, 6 years postpartum	**6.00 (3.66; 9.86)***
MacArthur, 2001[405] N = 7,879	Fecal incontinence	Asian vs. Non-Asian, 3 months postpartum	**3.21 (2.04; 5.05)***
Richter, 2005[406] N = 180	Anal incontinence	Non Whites vs. Whites with morbid obesity before laparoscopic weight loss surgery	0.58 (0.28; 1.16)
Nursing homes			
Nelson1998, [306] N = 18,224	Fecal incontinence	Non-Caucasian vs. Caucasian, 1,992	**1.00 (1.00; 1.00)**
	Fecal incontinence	Non-Caucasian vs. Caucasian, 1,993	**1.30 (1.00; 1.70)**
Nelson2005, [407] N = 8,170	Combined urinary and fecal	Non Whites vs. Whites	**2.00 (1.20; 3.40)***
	Fecal incontinence	Non Whites vs. Whites	**2.10 (1.30; 3.40***

Bold- multivariate odds ratios
*- Significant incontinence odds ratio 95% CI

Table F35. Prevalence of FI in community dwelling adults by diet, body mass index, and the presence of diabetes

Author	Population subgroup	Symptoms	Prevalence, %
Alcohol			
Melville, 2005[338] N = 3,444	Moderate alcohol, women	Fecal incontinence	0.84
BMI in women			
Richter, 2005[406] N = 180	BMI>40, undergoing laparoscopic weight loss surgery	Anal incontinence	32.00
Ng, 2002[408] N = 320	Body mass index >20	Anal incontinence	12.81
Richter, 2005[406] N = 180	BMI>40, undergoing laparoscopic weight loss surgery	Flatus	14.44
	BMI>40, undergoing laparoscopic weight loss surgery	Flatus and liquid feces	7.79
	BMI>40, undergoing laparoscopic weight loss surgery	Liquid feces	6.68
	BMI>40, undergoing laparoscopic weight loss surgery	Solid or liquid feces	2.79
Diabetes			
Meschia, 2002[409] N = 881	Women	Anal incontinence	0.91
Melville, 2005[338] N = 3,444	Women	Fecal incontinence	1.13
Jackson, 1997[303] N = 14	Women	Fecal incontinence	21.4
Bytzer, 2001[351] N = 423	Men and women	Solid feces	2.60
		Solid or liquid feces	12.80

Table F36. Association between severity of FI and BMI

Author Sample	Definition of Incontinence	Risk Factors in Population Groups	Relative Risk (95%CI))
Guise, 2007[410] N = 8,774	Persistent Incontinence of stool	BMI before the birth ≥30 vs. <30	**1.70 (1.37; 2.11)***
Hojberg, 2000[215] N = 7,557	Isolated flatus incontinence at least once a week	Pre-pregnancy BMI < 20 vs. 20-30	**0.90 (0.70; 1.20)**
	Isolated flatus incontinence at least once a week	Pre-pregnancy BMI >35 vs. 30-35	**0.90 (0.30; 2.90)**
Bliss, 2004[308] N = 1,352	Soils underwear or floor	Overweight men and women older than 75 years	1.40 (1.00; 2.00)

Bold = multivariate odds ratios
* Significant difference

Table F37. Association between physical activity and FI

Author Sample	Fecal Incontinence	Physical Activity in Population Groups	Odds Ratio (95%CI
Ostbye, 2004[28] N = 8,949	Prevalence of fecal incontinence	Frequent exercise in women	**0.75 (0.53; 1.05)**
	Incidence of fecal incontinence	Frequent exercise in women	**0.9 (0.69; 1.16))**
	Prevalence of fecal incontinence	Frequent exercise in men	**0.67 (0.4; 1.14)**
	Incidence of fecal incontinence	Frequent exercise in men	**1.05 (0.7; 1.57)**
Bradley, 2005[64] N = 297	Fecal urgency	Exercise ≥ weekly vs.< weekly	**0.3 (0.2; 0.8)***

Bold = multivariate odds ratios
* Significant difference

Table F38. Prevalence of FI in patients with cancer

Author	Age	Definition of Fecal Incontinence	Risk Factor	Prevalence, %
Kienle, 2007[411] N = 100	65	Anal incontinence, Grade 1	Deep or standard anterior resection for rectal cancer	2
		Anal incontinence, Grade 2	Deep or standard anterior resection for rectal cancer	2
Welsh, 2003[412] N = 124	76	Anal incontinence	Survivors of anterior resection of the rectum	53
Tanum, 1991[413] N = 106	35-91	Anal incontinence	Chemotherapy and radiation therapy for carcinoma of the anal canal	1.9
Norderval, 2004[414] N = 205		Anal incontinence	Proctocolectomy	1.15
			Proctocolectomy with J-pouch anastomosis	25
			Proctocolectomy with W-pouch anastomosis	7
Kienle, 2006[411] N = 100	65	Pad use, always	Deep or standard anterior resection for rectal cancer	42
		Pad use, daytime	Deep or standard anterior resection for rectal cancer	6
		Pad use, nighttime	Deep or standard anterior resection for rectal cancer	4
		Pad use, occasionally	Deep or standard anterior resection for rectal cancer	8

Table. F39. Prevalence of FI in community dwelling adults after stroke

Author Sample	Gender	Condition	Prevalence, %
Combined urinary and fecal incontinence			
Brittain, 2006[348] N = 1,483	Women and Men	Stroke survivors	4.3
Fecal Incontinence			
Brittain, 2006[348] N = 1,483	Women and Men	Stroke survivors	7.4
Otegbayo, 2006[239] N = 54	Women	Acute stroke	3.4
	Men	Acute stroke	8.0
Harari, 2003[415] N = 846	Women	6 months after stroke	5.3
	Women and Men	1 year after stroke	10.9
	Women and Men	3 months after stroke, <65 years old	1.7
	Women and Men	3 months after stroke	10.8
	Women and Men	3 years after stroke	15.0
	Women and Men	3 months after stroke, 65–79 year old	5.0
	Women and Men	3 months after stroke , >80 years old	4.1
	Women and Men	7 to 10 days after stroke	29.7
	Women and Men	Nonwhite 3 months after stroke	2.2
	Women and Men	White 3 months after stroke	8.4
Nakayama, 1997[416] N = 935	Women and Men	6 months after stroke	5.0
	Women and Men	acute stroke	34.0
	Women and Men	At Discharge after stroke	12.0
Otegbayo, 2006[239] N = 54	Women and Men	Ischemic acute stroke	9.7
	Women and Men	Left acute stroke	3.6
	Women and Men	Right acute stroke	7.7
	Women and Men	Acute stroke	5.6
Brittain, 2006, [348] N = 1,483	Women and Men	Stroke survivors	0.8
	Women and Men	Furnishing or bedding in stroke survivors	27.0
	Women and Men	Stroke survivors	7.0
	Women and Men	Soiling underwear in stroke survivors	66.0
Major fecal incontinence			
Brittain, 2006, [348] N = 1,483	Women and Men	Stroke survivors	5.0
Partial fecal incontinence			
Nakayama, 1997[416] N = 935	Women and Men	6months after stroke	4.0
	Women and Men	Acute stroke	6.0
	Women and Men	At discharge after stroke	6.0

Table F40. Prevalence of fecal incontinence in patients with neurological disease

Author	Neurological Disease	Fecal Incontinence	Prevalence, %
Sakakibara, 2001[282] N = 323 men and 183 women	Parkinson's disease in men	Fecal incontinence	10
	Parkinson's disease in women	Fecal incontinence	5
Menter, 1997[266] N = 227	Spinal cord injury	Fecal incontinence	6.3
	Tetraplegia	Fecal incontinence	13.8
	Paraplegia	Fecal incontinence	3.7
	Incomplete injuries (ASIA Impairment D)	Fecal incontinence	2.1
Hinds, 1990[213] N = 280	Multiple sclerosis	Fecal incontinence	51.0
Ho, 2005[417] N = 434	Multiple sclerosis	Fecal incontinence	20.7
Hinds, 1990[213] N = 280	Multiple sclerosis	Fecal incontinence, >1/week	25.0
Ho, 2005[417] N = 434	Multiple sclerosis	Major soiling of underclothes	7.6
		Minimal soiling of underclothes	11.3
		Passive soiling, always	2.5
		Passive soiling, never	6.7
		Passive soiling, sometimes	11.3
		Soiling weekly	4.8
		Soiling daily	2.3
		Soiling less often	9.2
		Soiling monthly	3.2
		Soiling of furniture	0.7
		Soiling of outer clothes	0.9
		Wear pad	7.1
		Active soiling, always	1.4
		Active soiling, never	4.4
		Active soiling, sometimes	15.0
Hinds, 1990[213] N = 280	Multiple sclerosis	Bowel dysfunction (constipation and/or fecal incontinence)	68.0
	Multiple sclerosis	Constipation	43.0
Ho, 2005[417] N = 434	Multiple sclerosis	Consistency of soiling: mainly formed	5.1
		Consistency of soiling: mainly watery	9.0

Table F41. Association between FI and pressure ulcers in residents of nursing homes

Author Sample	Definition of Incontinence	Relative Risk (95%CI)
Nelson, 2005[407] N = 8,170	Combined urinary and anal incontinence	**1.00 (1.00; 1.00)**
Nelson, 1998[306] N = 18,224	Fecal incontinence in 1992	**2.60 (2.20; 3.00)**
	Fecal incontinence 1993	**2.30 (2.00; 2.60)**

Bold = multivariate odds ratios

Table F42. Association between FI and gastrointestinal conditions in residents of nursing homes

Author Sample	Risk Factors	Odds Ratio 95%CI
Combined UI and FI		
Nelson, 2005[407] N = 8,170	Constipation	**1.00 (1.00; 1.00)**
	Diarrhea	**1.00 (1.00; 1.00)**
	Fecal impaction	**1.00 (1.00; 1.00)**
FI		
Nelson, 2005[407] N = 8,170	Constipation	**1.00 (1.00; 1.00)**
	Diarrhea	**1.00 (1.00; 1.00)**
	Fecal impaction	**1.00 (1.00; 1.00)**
Nelson, 1998[306] N = 18,224	Constipation, 1992	**1.40 (1.30; 1.60)***
	Diarrhea, 1992	**3.30 (2.70; 4.20)***
	Fecal impaction, 1992	**1.50 (1.10; 2.10)***
	Constipation, 1993	**1.30 (1.20; 1.40)***
	Diarrhea, 1993	**2.40 (1.90; 3.10)***
	Fecal impaction, 1993	**2.10 (1.30; 3.30)***

Bold = multivariate odds ratios
* Significant difference

Table F43. Association between type and severity of FI and gastrointestinal conditions

Author Sample	Age	Risk Factors in Population Groups	Fecal Incontinence	Odds Ratio 95%CI
Bliss, 2004[308] N = 1,352	Mean age of 75+-6	Bowel resection	Severity, fecal incontinence ≥1 times/day	3.2 (1.5; 6.6)*
		Defecation urgency always	Severity, soils underwear or floor	11.9 (4.9; 28.8)*
		Defecation urgency most of the time	Severity, soils underwear or floor	5 (3; 8.6)*
		Defecation urgency some of the time	Severity, soils underwear or floor	2.8 (2; 4.1)*
		Loose or liquid stool consistency	Severity, having fecal incontinence ≥1 times/day	2.4 (1.3; 4.3)*
		Loose or liquid stool consistency	Severity, soils underwear or floor	3 (1.5; 5.8)*
		Urgency always	Severity, having fecal incontinence ≥1 times/day	11.4 (5.1; 25.5)*
		Urgency most of the time	Severity, fecal incontinence ≥1 times/day	4.7 (2.8; 7.6)*
		Urgency some of the time	Severity, fecal incontinence ≥1 times/day	3 (2.1; 4.3)*
		Hemorrhoids	Severity, fecal incontinence ≥1 times/day	1.6 (1.1; 2.3)*
		Hemorrhoids	Severity, soils underwear or floor	1.5 (1.1; 2.2)*
		Defecation urgency some of the time	Type, liquid feces	2.1 (1.4; 3.2)*
		Defecation urgency always	Type, solid feces	20.3 (2.9; 11.3)*
		Defecation urgency most of the time	Type, solid feces	4.3 (0.9; 17.4)
		Loose or liquid stool consistency	Type, liquid feces	2.8 (1.3; 6.1)*
		Had surgery for hemorrhoids	Type, liquid feces	2.5 (1.4; 4.3)*
Johanson, 1997[418] N = 388	31-103	Frequent diarrhea	Type, liquid feces	**2.5 (1.5; 4.2)***
		Straining	Type, solid feces	**0.7 (0.3; 0.9)**
		Straining	Type, liquid feces	**0.7 (0.5; 0.9)**
		Watery stool	Type, liquid feces	**2.5 (1.5; 4)***
Uustal Fornell, 2004[208] N = 885	>40	Hemorrhoid operation in women	Flatus	1.60 (0.50; 4.80)
			Type, liquid feces	2.60 (1.00; 6.10)
			Type, solid feces	1.50 (0.00; 9.30)

Bold = multivariate odds ratios
* Significant difference

Table F44. Prevalence of FI after gastro-intestinal surgery

Author	Gastro-Intestinal Surgery	Definition of FI	Prevalence of FI
Reissman, 1996[419] N = 14 >60 years N = 126 <60 years	Double stapled ileoanal reservoir ulcerative colitis or familial adenomatous polyposis	Fecal incontinence during the day	7%
	Double stapled ileoanal reservoir ulcerative colitis or familial adenomatous polyposis	Fecal incontinence during the day	5%
Lohmuller, 1990[420] N = 734	Inflammatory bowel disease after ileal pouch-anal anastomosis and Pouchitis	Frequent fecal incontinence	11%
	Inflammatory bowel disease after ileal pouch-anal anastomosis	Frequent fecal incontinence	8%
	Inflammatory bowel disease after ileal pouch-anal anastomosis and Pouchitis	Occasional fecal incontinence	43%
	Inflammatory bowel disease after ileal pouch-anal anastomosis	Occasional fecal incontinence	35%
Gonzalez-Argente, 2001[421] N = 32	Surgery for rectal prolapse in women	Fecal incontinence	97%

Table F45. Association between FI and surgical procedures

Author Sample	Age	Risk Factors in Population Groups	Odds Ratio (95% CI)
Anal incontinence			
Chen, 2003[284] N = 1,253 100% female	≥20	Gynecological surgery	**1.8 (1.1; 2.9)***
Ng, 2002[408] N = 320 100% female		Prior pelvic surgery	**1.64 (0.79; 3.42)**
Fecal incontinence			
Bharucha, 2006[422] N = 2,800 100% female	≥20	Anorectal surgery	**1.2 (0.7; 2.1)**
Kalantar, 2002[339] N = 642 55% female	> 18	Perianal surgery	**4.62 (2.05; 10.4)***
Severity of incontinence			
Bliss, 2004[308] N = 1,352 60% female	mean age of 75+-6	Soils underwear or floor after bowel resection	2.2 (1.1; 4.5)*
Hojberg, 2000[215] N = 1726	≥15	Isolated flatus incontinence ≥1/week after previous lower abdominal or urological surgery	**1.5 (1.1; 2.1)***
Flatus incontinence			
Uustal Fornell, 2004[208] N = 885 100% female	>40	Groin hernia needing surgery	1.50 (0.40; 5.40)
		Hiatus hernia	1.10 (0.30; 3.60)
		Varicose veins needing surgery	1.00 (0.60; 1.50)
Liquid feces			
Uustal Fornell, 2004[208] N = 885 100% female	>40	Groin hernia needing surgery	3.00 (1.10; 8.30)*
		Hiatus hernia	4.30 (1.60; 11.30)*
		Varicose veins needing surgery	1.00 (0.60; 1.70)
Solid feces			
Johanson, 1997[418] N = 338 76% female	31-103	Rectal surgery	**0.4 (0.2; 0.9)**
Uustal Fornell, 2004[208] N = 885 100% female	>40	Groin hernia needing surgery	4.00 (0.00; 16.30)
		Hiatus hernia	5.90 (1.80; 19.80)*
		Varicose veins needing surgery	1.90 (0.80; 4.10)

Bold = multivariate odds ratios
* Significant difference

Table F46. Association between fecal incontinence and drug administration

Author Sample	Age	Drug	Odds Ratio (95%CI)
Combined urinary and fecal incontinence			
Endo, 2002[304] N = 605		Cathartic/laxative use	1.902 (1.078; 3.355)*
		Diuretic use	2.226 (1.264; 3.921)*
Fecal incontinence			
Quander[232] N = 6,099	>65	Antacids	**1.4 (0.90; 2.00)**
		Anticonvulsant	**1.90 (1.90; 3.20)***
		Antidepressants	**1.90 (1.20; 3.00)***
		Anti Parkinson	**4.30 (2.50; 5.30)***
		Antipsychotic	**3.90 (2.50; 6.20)***
		Beta blocker	**0.8 (0.60; 1.10)**
		Benzodiazepine	**0.8 (0.50; 1.50)**
		Calcium channel blocker	**0.7 (0.60; 0.90)**
		Diuretic	**1.1 (0.90; 1.40)**
		Estrogen	**0.7 (0.40; 1.40)**
		Fiber	**1.6 (0.90; 2.90)**
		Hypnotics	**3.10 (1.80; 4.80)***
		Iron	**0.8 (0.20; 2.50)**
		Narcotics	**1.70 (1.20; 2.50)***
Bliss, 2004[308] N = 1,352	mean age of 75+-6	Fecal incontinence ≥1 times/day after daily administration of stool softener for constipation	2.1 (1.1; 3.7)*
Richter, 2005[406] N = 180	16-55	Anal incontinence: Diuretics in morbid obese before laparoscopic weight loss surgery	0.78 (0.39; 1.58)
Hormone therapy in women			
Richter, 2005[406] N = 180	16-55	Anal incontinence: hormone replacement therapy in morbid obese before laparoscopic weight loss surgery	0.87 (0.40; 1.92)
Bharucha, 2006[422] N = 2,800	≥20	Fecal incontinence: hormone therapy - current	**1 (0.8; 1.6)**
		Fecal incontinence: contraceptive use	**1.3 (0.98; 1.8)**

Bold = multivariate odds ratios
* Significant difference

Table F47. Prevalence of FI in men with prostate diseases

Author Sample	Risk Factor	Definition of Fecal Incontinence	Prevalence, %
Korman, 2004[288] N = 201	Perineal prostatectomy	Fecal incontinence	5.4
	Retropubic prostatectomy	Fecal incontinence	6.4
O'Connell, 2007[423] N = 212	Prostate surgery more than a year ago	Fecal incontinence >1/day	3.4
	Prostate surgery more than a year ago	Fecal incontinence >1/week	3.9
	Prostate surgery more than a year ago	Fecal incontinence 1/day	8.2
	Prostate surgery more than a year ago	Loosing control of stools as a big problem	1.1
Adolfsson, 1998[252] N = 661	Prostate cancer	Solid or liquid feces	8.0
	Prostate cancer	Urgency	22.0
	Prostate cancer	Constipation	20.0

Table F48. Association between FI and abortion in women

Author Sample	Definition of Fecal Incontinence	Abortion	Odds Ratio (95%CI)
Hojberg, 2000[215]	Severity, isolated flatus incontinence ≥1/week	Previous abortions <12 weeks of gestation	**1 (0.8; 1.3)**
	Severity, isolated flatus incontinence ≥1/week	Previous abortions >12 weeks of gestation	**0.7 (0.3; 1.6)**

Bold = multivariate odds ratios

Table F49. Association between FI and menopause

Author Sample	Age	Definition of Fecal Incontinence	Odds Ratio (95%CI)
Ng, 2002[408] N = 320		Anal incontinence	**0.91(0.52; 1.60)**
Chen, 2003[284] N = 1,253	≥20	Anal incontinence	**0.6 (0.3; 1.1)**
Abramov, 2005[424] N = 542	26-86	Fecal incontinence	**2.1 (1.15; 3.8)***
		Flatus incontinence	**2.11 (1.43; 3.13)***

Bold = multivariate odds ratios
* Significant difference

Table F50. Association between FI and UI in residents of nursing homes

Author	Year of Observation	Age	Odds Ratio (95%CI)
Nelson, 1998[306]	1992	84	**12.60 (11.50; 13.70)***
N = 18,224	1993	84	**11.30 (10.30; 12.40)***

Bold = multivariate odds ratios
* Significant difference

Table F51. Prevalence of FI in patients with prolapse and in women with UI

Author Sample	Risk Factor	Prevalence, %
Anal incontinence		
Weber,1998[425] N = 143	Vaginal prolapse	16.10
	Vaginal prolapse - Stage 0	8.70
	Vaginal prolapse - Stage 1	39.10
	Vaginal prolapse - Stage 2	30.40
	Vaginal prolapse - Stage 3	21.80
Rose, 2002[223] N = 150	Rectal prolapse in men and women	30.70
Fecal incontinence		
Soligo, 2006[426] N = 786	Urogynecologic symptoms	20.00
Meschia, 2002[409] N = 881	Genital prolapse >2 grade	8.17
Ng,2002[408] N = 320	Genuine stress incontinence	3.75
	Mixed urinary incontinence	2.8
	Overactive bladder	6.25
	Prior pelvic surgery for prolapse	6.88
Meschia, 2002[409] N = 881	Prolapse repair	2.16
Leroi, 1999[427] N = 409	Stress urinary incontinence	28.00
Meschia, 2002[409] N = 881	Urinary incontinence and/or genital prolapse	20.00
Ng,2002[408] N = 320	Urinary symptoms	15.90
	Uterovaginal prolapse	12.19
Parmentier, 2004[428] N = 291	Pelvic organ prolapse	26.10
Combined urinary and fecal incontinence		
Soligo, 2003[429]2 N = 504	Urogynecologic symptoms	20.24
Meschia, 2002[409] N = 881	Urinary incontinence and/or genital prolapse	13.90
Jelovsek, 2005[430] N = 152	Urinary incontinence or pelvic organ prolapse	22.00
Fecal incontinence		
Melville,2005[338] N = 3,444	Urinary incontinence	4.82
Jelovsek, 2005[430] N = 302	Urinary incontinence or pelvic organ prolapse	19.00
Jackson, 1997[303]	Anterior colporrhaphy (n=27)	22.22
	Posterior colporrhaphy (n=22)	22.73
	Prolapse >1st degree (n=139)	24.46
	Prolapse >2nd degree (n=71)	26.76
	Prolapse >3rd degree (n=46)	26.09
	Prolapse repair (n=46)	26.67
	Urinary incontinence or pelvic organ prolapse (n=247)	17.00
Flatus incontinence		
Leroi, 1999[427] N = 409	Stress urinary incontinence	18.30
Ng,2002[408] N = 320	Urinary symptoms	12.30
Liquid feces incontinence		
Leroi, 1999[427] N = 409	Stress urinary incontinence	9.50
Passive fecal incontinence		

Table F51. Prevalence of FI in patients with prolapse and in women with UI (continued)

Author Sample	Risk Factor	Prevalence, %
Soligo, 2003[429] N = 504	Urogynecologic symptoms	8.73
Soiling		
Jelovsek, 2005[430] N = 302	Urinary incontinence or pelvic organ prolapse	12.00
Solid and liquid feces		
Ng,2002 [408] N = 320	Urinary symptoms	3.60
Leroi, 1999[427] N = 409	Stress urinary incontinence	3.60
Solid feces		
Leroi, 1999[427] N = 409	Stress urinary incontinence	1.00
Jelovsek, 2005[430] N = 302	Urinary incontinence or pelvic organ prolapse	7.00
Solid or liquid feces		
Khullar, 1998[276] N = 465	Mild stress urinary incontinence	14.81
	Moderate stress urinary incontinence	24.19
	Severe stress urinary incontinence	11.70
Urge fecal incontinence		
Soligo, 2003[429] N = 504	Urogynecologic symptoms	9.33
Soligo, 2006[426] N = 786	Urogynecologic symptoms	11.20

Table F52. Association between FI and prolapse in women

Author Sample	Age	Risk Factor	Odds Ratio (95%CI)
Anal incontinence			
Meschia, 2002[409] N = 881	58.6	Douglas >grade 2	**1.50 (0.60; 3.50)**
		Perineum >grade 2	**1.40 (0.70; 2.80)**
		Prolapse of Bladder >2 grade	0.90 (0.60; 1.20)
		Prolapse of Cervix/cuff >2 grade	0.80 (0.50; 1.30)
		Prolapse of Douglas >2 grade	2.20 (1.10; 4.40)*
		Prolapse of Perineum >2 grade	1.80 (1.00; 3.30)
		Prolapse of Rectum >2 grade	2.00 (1.20; 3.10)
		Prolapse of Urethra >2 grade	0.90 (0.60; 1.40)
		Rectum >grade 2	**1.90 (1.10; 3.30)***
Ng, 2002[408] N = 320		Utero vaginal prolapse	**5.02 (2.19; 11.54)***
Chen, 2003[284] N = 1,253	≥20	Utero vaginal prolapse	**3.2 (1.1; 8.9)***
Flatus incontinence			
Uustal Fornell, 2004[208] N = 885	>40	Bulge	2.80 (1.20; 6.40)
		Digitation by defecation	2.10 (1.30; 3.60)*
		Pelvic heaviness	2.30 (1.50; 3.60)*
Liquid incontinence			
Uustal Fornell, 2004[208] N = 885	>40	Bulge	1.40 (0.50; 3.50)
		Digitation by defecation	1.80 (1.10; 3.00)*
		Pelvic heaviness	4.20 (2.70; 6.40)
Solid incontinence			
Uustal Fornell, 2004[208] N = 885	>40	Bulge	1.80 (0.00; 7.20)
		Digitation by defecation	1.40 (0.60; 3.70)
		Pelvic heaviness	3.30 (1.60; 7.00)

Bold = multivariate odds ratios
* Significant difference

Table F53. Association between severity of FI and UI

Author Sample	Fecal Incontinence	Urinary Symptoms	Odds Ratio (95%CI)
Kjolhede, 2005[431] N = 508	Urgency (n = 508)	Burch colposuspension for urinary incontinence vs. healthy controls 14 years after surgery	**1.18 (0.60; 2.30)**
	Severity, flatus, weekly or more often (n = 495)	Burch colposuspension	**1.98 (1.17; 3.37)***
	Severity, liquid, weekly or more often (n = 495)	Burch colposuspension	**3.67 (1.43; 9.42)***
	Severity, solid, weekly or more often (n = 495)	Burch colposuspension	**2.96 (0.42; 20.9)**
	Severity, soils underclothes (soiling from the bowel) (n = 495)	Burch colposuspension	**2.02 (0.93; 4.42)**
	Soiling underclothes	Burch colposuspension for urinary incontinence vs. healthy controls 14 years after surgery	**1.44 (0.75; 2.77)**
	Wear pad during a day	Burch colposuspension for urinary incontinence vs. healthy controls 14 years after surgery	**3.22 (1.30; 7.95)***
	Adverse affect on general well-being	Burch colposuspension for urinary incontinence vs. healthy controls 14 years after surgery	**2.15 (1.30; 3.56)***
	Adverse effect on social activities/social life	Burch colposuspension for urinary incontinence vs. healthy controls 14 years after surgery	**1.39 (0.73; 2.65)**
	Avoiding activities because of incontinence	Burch colposuspension for urinary incontinence vs. healthy controls 14 years after surgery	**2.02 (0.88; 4.64)**
Nichols, 2005[432] N = 190	Bothersome anal incontinence	Stage II pelvic organ prolapse and/or urinary incontinence vs. stage 0 or I pelvic organ prolapse and no urinary incontinence	5.40 (2.80; 10.60)*
		Stage II pelvic organ prolapse and/or urinary incontinence vs. stage 0 or I pelvic organ prolapse and no urinary incontinence	**4.90 (2.10; 11.80)***
Bliss, 2004[308] N = 1,352	Severity, having fecal incontinence≥1 time/day	Urinary incontinence in men and women	2.5 (1.8; 3.4)*
Kjolhed, 2005[431] N = 508	Frequent soiling underclothes	Burch colposuspension for urinary incontinence vs. healthy controls 14 years after surgery	**2.02 (0.93; 4.42)**

Bold = multivariate odds ratios
* Significant difference

Table F54. Prevalence of FI related to pregnancy and birth

Author Sample	Risk Factors	Prevalence, %
Anal incontinence		
Groutz, 1999[433] N = 300	No posterolateral episiotomy	2.30
	1 year after delivery	4.67
	3 months after delivery	7.00
Bugg, 2005[434] N = 275	10 months postpartum	9.10
Sze, 2005[435]	Complete 3rd-degree perineal laceration, n = 65	16.92
	Complete 3rd-degree tear as a nullipara, n = 234	14.53
	Complete 3rd-degree tear as a nullipara and > 2 deliveries, n = 40	30.00
	Complete 3rd-degree tear as a nullipara and 1 delivery, n = 67	16.42
	Complete 3rd-degree tear as a nullipara and no vaginal delivery, n = 65	16.92
Sze, 2005[436]	4th-degree sphincter tear as a nullipara, n = 148	30.20
	4th-degree sphincter tear as a nullipara, n = 50	40.00
	1- Delivery after 4th-degree sphincter tear as a nullipara, n = 60	23.33
	2- Delivery after 4th-degree sphincter tear as a nullipara, n = 36	27.78
	Sphincter tears and ≥ 2 additional vaginal deliveries, n = 37	27.03
Hojberg, 2000[215] N = 1,726	Pregnant women with one previous delivery	8.60
Parmentier, 2004[428] N = 291	Forceps delivery	5.16
Meschia, 2002[409] N = 881	Forceps delivery	2.38
	Episiotomy	12.94
	Infant weighing >3800g	8.85
	Vacuum	0.57
Ng,2002[408] N = 320	Vaginal delivery history	13.44
Any fecal incontinence		
Chiarelli, 2003[286]	Multiparous, n = 270	8.50
	Primiparous, n = 298	5.40
Bothersome fecal incontinence		
Nygaard,1997[437]	30 years postpartum after Cesarean, n = 33	15.20
	30 years postpartum after Episiotomy, n = 89	25.80
	30 years postpartum with anal disruption, n = 29	27.60
Combined urinary and fecal incontinence		
Bugg, 2005[434] N = 275	10 months postpartum	5.50
Groutz, 1999[433] N = 300	2 year after delivery	1.67
Fecal incontinence		
Jackson, 1997[303]	Episiotomy, n = 218	12.84
	Forceps, n = 192	6.25
Melville,2005[338] N = 3,444	Nonoperative vaginal delivery	2.90
	Nulliparous	1.05
	Cesarean sections only	0.29
McKinnie, 2005[438] N = 1,004	Pregnant women	12.75
Goldberg,2003[285] N = 733	Previous multiple pregnancy	10.00
Walsh, 1996[439] N = 81	3rd-degree tear primary repair	7.00
Fecal urgency		
Mazouni, 2005[228] N = 159	12 months after instrumental delivery	8.20

Table F54. Prevalence of FI related to pregnancy and birth (continued)

Author Sample	Risk Factors	Prevalence, %
Flatus incontinence		
Chiarelli, 2003[286] N = 568	12 months after instrumental delivery and/or a high birth weight infant	24.40
Groutz, 1999[433] N = 300	3 months after delivery	6.30
Nygaard,1997[437]	30 years postpartum after Cesarean, n = 33	15.20
	30 years postpartum after Cesarean, n = 33	57.60
	30 years postpartum after Episiotomy, n = 89	30.30
	30 years postpartum after Episiotomy, n = 89	69.70
	30 years postpartum with anal disruption, n = 29	58.60
	30 years postpartum with anal disruption, n = 29	75.90
Chiarelli, 2003[286] N = 270	Multiparous	24.80
Hojberg, 2000[215] N = 1,726	Pregnant women with 1 previous delivery	4.20
Goldberg,2003[285] N = 733	Previous multiple pregnancy	25.20
Chiarelli, 2003[286] N = 298	Primiparous	24.10
Walsh, 1996[439] N = 81	3rd-degree tear primary repair	12.00
Mazouni, 2006[228] N = 159	13 months after instrumental delivery	7.50
Liquid feces incontinence		
Chiarelli, 2003[286] N = 568	12 months after instrumental delivery and/or a high birth weight infant	4.90
Hojberg, 2000[215] N = 1,726	Pregnant women with 1 previous delivery	2.30
Chiarelli, 2003[286]	Multiparous, n = 270	5.90
	Primiparous, n = 298	4.00
Soiling		
Chiarelli, 2003[286] N = 270	Multiparous	14.80
Goldberg,2003[285] N = 733	Previous multiple pregnancy	10.00
Chiarelli, 2003[286] N = 298	Primiparous	7.40
Solid feces incontinence		
Bugg, 2005[434] N = 275	10 months postpartum	3.00
Chiarelli, 2003[286] N = 568	12 months after instrumental delivery and/or a high birth weight infant	2.60
Groutz, 1999[433] N = 300	3 months after delivery	0.70
Hojberg, 2000[215] N = 1,726	Pregnant women with 1 previous delivery	0.60
Chiarelli, 2003[286]	Multiparous, n = 270	3.00
	Primiparous, n = 298	2.30
Urgency		
Chiarelli, 2003[286]	Multiparous, n = 270	18.90
	Primiparous, n = 298	11.00
	12 months after instrumental delivery and/or a high birth weight infant, n = 568	14.80
Urgency and incontinence		
Sangalli, 2000[234] N = 129	13 years obstetrical anal sphincter tear	22.48

Table F55. Incidence and severity of FI related to pregnancy and birth

Author Sample	Risk Factors	Fecal Incontinence	Prevalence %
Norderval, 2004[414] N = 150	25 months after primary repair of obstetric sphincter tears	Incidence of anal incontinence, total	45.30
		Incidence of Flatus	24.00
		Incidence of Flatus <1/week	7.30
		Incidence of Flatus >1/week	12.00
		Incidence of Flatus Daily	4.70
		Incidence of Incontinence to liquid stool	13.30
		Incidence of Incontinence to liquid stool <1/week	12.70
		Incidence of Incontinence to liquid stool >1/week	0.70
		Incidence of Incontinence of solid feces	8.00
		Incidence of Incontinence of solid feces <1/week	4.70
		Incidence of Incontinence of solid feces Daily	0.70
Impact on life			
Sze, 2005[436]	1- Delivery after 4th-degree sphincter tear as a nullipara	Little effect on daily activities, n = 60	3.33
	2- Delivery after 4th-degree sphincter tear as a nullipara	Little effect on daily activities, n =36	5.56
	4th-degree sphincter tear as a nullipara	Little effect on daily activities, n =50	8.00
	1- Delivery after 4th-degree sphincter tear as a nullipara	No effect on daily activities, n =60	20.00
	2- Delivery after 4th-degree sphincter tear as a nullipara	No effect on daily activities, n =36	11.11
	4th-degree sphincter tear as a nullipara	No effect on daily activities, n =50	32.00
Macarthur,2005[404] N = 4,214	3 months and 6 years postpartum	Persistent fecal incontinence	3.60
Sze, 2005[435] 15970289	Complete 3rd-degree perineal laceration	Severe anal incontinence, n =65	3.08
	Complete 3rd-degree tear as a nullipara	Severe anal incontinence, n =234	2.14
	Complete 3rd-degree tear as a nullipara and > 2 deliveries	Severe anal incontinence, n =40	5.00
	Complete 3rd-degree tear as a nullipara and 1 delivery	Severe anal incontinence, n =67	1.49
	Complete 3rd-degree tear as a nullipara and no vaginal delivery	Severe anal incontinence, n =65	3.08
	Sphincter tears and ≥ 2 additional vaginal deliveries	Severe fecal incontinence, n =37	5.41
Sze, 2005[436]	1- Delivery after 4th-degree sphincter tear as a nullipara	Severe effect on daily activities, n =60	0.00
	2- Delivery after 4th-degree sphincter tear as a nullipara	Severe effect on daily activities, n =36	11.11
	4th-degree sphincter tear as a nullipara	Severe effect on daily activities, n =50	0.00
	1- Delivery after 4th-degree sphincter tear as a nullipara	Severe incontinence, n =60	0.00
	2- Delivery after 4th-degree sphincter tear as a nullipara	Severe incontinence, n =36	11.11
	4th-degree sphincter tear as a nullipara	Severe incontinence, n = 50	0.00
Soiling			
Chiarelli, 2003[286] N = 568	12 months after instrumental delivery and/or a high birth weight infant	Soiling of the underwear	10.90
Solid feces			
Chiarelli, 2003[286] N = 568	12 months after instrumental delivery and/or a high birth weight infant	Solid and liquid feces	6.90

Table F55. Incidence and severity of FI related to pregnancy and birth (continued)

Author Sample	Risk Factors	Fecal Incontinence	Prevalence %
Sangalli, 2000[234] N = 129	13 years obstetrical anal sphincter tear	Solid or liquid feces	6.98
Eason, 2002[283] N = 949	3 months post partum	Solid or liquid feces, once daily	0.20
		Solid or liquid feces, <once weekly	2.30
		Solid or liquid feces, >once daily	0.10
		Solid or liquid feces, 1–6 times weekly	0.40
Sangalli, 2000[234] N = 129	13 years obstetrical anal sphincter tear	Solid or liquid feces, flatus	11.63
Norderval, 2004[414]2 N = 150	25 months after primary repair of obstetric sphincter tears	Incontinence solid feces >1/week	2.70
Bowel control			
Fenner,2003 [287]	6 months after delivery	N = 831	21.70
	4-degree lacerations	Worse bowel control, n = 165	30.80
	3rd-degree lacerations	Worse bowel control, n= 666	3.60

Table F56. Association between fetal characteristics and FI

Author Sample	Fetal Risk Factors	Fecal Incontinence	Odds Ratio (95%CI)
Chaliha, 1999[326] N = 549	Fetal head circumference	Fecal urgency, 3 months postpartum	1 (0.7; 1.4)
		Flatus incontinence, 3 months postpartum	0.9 (0.6; 1.2)
Frudinger, 2002[440] N = 134	Fetal head circumference	Anal incontinence	**1.11 (0.74; 1.67)**
Chaliha, 1999[326] N = 549	Fetal weight	Fecal urgency, 3 months postpartum	1 (0.6; 6.8)
		Flatus incontinence, 3 months postpartum	2.9 (0.8'; 10.2)
Eason, 2002[283] N = 252	Fetal weight, <4,000g	Anal incontinence, 3 months postpartum	**1 (1; 1)**
Casey, 2005[367] N = 3,887	Fetal weight, >4,000g	Anal incontinence, within 7 months of delivery, at or before their 6month contraceptive follow up after delivery	**2.4 (1.3; 4.4)***
Frudinger[440] N = 134	Fetal weight, (kg)	Anal incontinence	**1.31 (0.34; 4.99)**
Guise, 2007[410] N = 8,774	Fetal weight, ≥4,000g	Solid feces incontinence	**0.92 (0.73; 1.15)**
Abramov, 2005[424] N = 274	At least 1 Fetal weight, >4,000g	Fecal incontinence	**1.19 (0.56; 2.53)**
		Flatus incontinence	**1.02 (0.63; 1.63)**
Faltin, 2001[328] N = 1,228	Fetal weight ≤4,000g	Fecal urgency	**1 (1; 1)**
	Fetal weight >4,000g	Fecal urgency	**1.5 (0.7; 3.1)**
Mazouni, 2005[228] N = 159	Fetal weight (g)	Fecal incontinence,18 months instrumental delivery	**1.00 (1.00; 1.00)**
Casey, 2005[367] N = 3,887	Fetal weight t, ≤4,000g	Fecal incontinence, within 7months of delivery, at or before their 6-month contraceptive follow up after delivery	**1 (1; 1)**
van Brummen, 2006[441] N = 487	Fetal weight, 3,107g	Fecal incontinence, 1 year after delivery	0.99 (0.99; 1.01)
	Fetal weight, 3,445g	Fecal incontinence, 1 year after delivery	1.00 (1.00; 1.00)
Guise, 2007[410] N = 8,774	Heaviest fetal weight, ≥4,000g	Solid feces incontinence	**0.85 (0.69; 1.04)**
Eason, 2002[283] N = 252	Fetal weight, ≥4,000g	Anal incontinence, 3 months postpartum	**1.2 (0.9; 1.6)**
Hojberg, 2000[215]	Fetal weight, >4,000g	Flatus incontinence at least once a week, at 16 weeks of gestation in the index-pregnancy	**2.4 (1.1; 5.1)***
Faltin, 2006[442] N = 540	Fetal weight, >4,000g vs. <3,000g	>2 symptoms at least once a week or 3 symptoms (flatus, liquid or solid Incontinence, pad use pad; lifestyle alteration), 18 years after rupture of anal sphincter tear during childbirth	1.21 (0.47; 3.14)
Faltin, 2001[328] N = 1,228	Fetal weight, >4,000g vs. <4,000g	Anal incontinence	**0.7 (0.4; 1.4)**

Table F56. Association between fetal characteristics and FI (continued)

Author Sample	Fetal Risk Factors	Fecal Incontinence	Odds Ratio (95%CI)
Faltin, 2006[442] N = 540	Fetal weight, 3,000-3,499g	>2 symptoms at least once a week or 3 symptoms (flatus, liquid or solid Incontinence, pad use pad; lifestyle alteration), 18 years after rupture of anal sphincter tear during childbirth	0.74 (0.39; 1.4)
	Fetal weight, 3,500-3,999g	>2 symptoms at least once a week or 3 symptoms (flatus, liquid or solid Incontinence, pad use pad; lifestyle alteration), 18 years after rupture of anal sphincter tear during childbirth	0.86 (0.44; 1.68)

Bold = multivariate odds ratios
* Significant difference

Table F57. Association between FI and mode of delivery

Author Sample	Risk Factor	Definition of Fecal Incontinence	Time From Exposure to Fecal Incontinence	Odds Ratio (95%CI)
Chaliha, 1999[326] N = 549	Augmentation	Fecal incontinence urgency	3 months postpartum	0.6 (0.2; 1.6)
	Augmentation	Flatus	3 months postpartum	0.8 (0.2; 2.8)
	Epidural analgesia	Flatus	3 months postpartum	0.9 (0.7; 1.3)
Casey, 2005[367] N = 3,887	Epidural analgesia	Anal incontinence	Within 7 months of delivery, at or before their 6-month contraceptive follow up after delivery	**1.2 (0.7; 1.9)**
Chaliha, 1999[326] N = 549	Epidural analgesia	Fecal incontinence urgency	3 months postpartum	0.4 (0.1; 1.4)
Faltin, 2006[442] N = 540	Episiotomy vs. no episiotomy	Severity, at least 2 symptoms at least once a week or 3 symptoms (symptoms: incontinence to flatus, liquid or solid stool; need to wear a pad; lifestyle alteration)	18 years after rupture of anal sphincter tear during childbirth	1.04 (0.93; 1.15)
Casey, 2005[367] N = 3,887	Episiotomy	Anal incontinence	Within 7 months of delivery, at or before their 6-month contraceptive follow up after delivery	**1 (0.4; 2.3)**
De Leeuw, 2001[307] N = 250	Mediolateral episiotomy, primiparity	Fecal incontinence	After anal sphincter damage during delivery	**0.17 (0.05; 0.61)***
Eason, 2002[283] N = 252	Episiotomy without extension into anal sphincter perineal injury	Anal incontinence	3 months postpartum	**1.3 (0.9; 1.8)**
Chiarelli, 2003[286] N = 568	Instrumental delivery	Fecal incontinence	At twelve months postpartum	0.83 (0.31; 2.2)
	Marked abdominal striae	Fecal incontinence	At twelve months postpartum	2.34 (0.91; 6.02)
Casey, 2005[367] N = 3,887	Oxytocin augmentation	Anal incontinence	Within 7 months of delivery, at or before their 6-month contraceptive follow up after delivery	**0.7 (0.3; 1.6)**
	Cesarean delivery	Anal incontinence		**0.6 (0.2; 2)**
Eason, 2002[283] N = 252	Cesarean delivery	Anal incontinence	3 months postpartum	**0.8 (0.6; 1.2)**
Guise, 2007[410] N = 8,774	Cesarean in this delivery	Solid feces		**0.94 (0.77; 1.15)**
	Cesarean in this delivery, cesarean labored without push			**0.81 (0.53; 1.25)**
	Cesarean in this delivery, Cesarean never labored			**1 (1; 1)**
	Cesarean labored and pushed			**0.92 (0.56; 1.52)**

Table F57. Association between FI and mode of delivery (continued)

Author Sample	Risk Factor	Definition of Fecal Incontinence	Time From Exposure to Fecal Incontinence	Odds Ratio (95%CI)
	Ever had cesarean			**0.92 (0.76; 1.11)**
	Pushing time ≥1 hour in this delivery	Severity, incontinence of stool		**1.22 (1.02; 1.47)***
Chaliha, 1999[326] N = 549	Cesarean compared with spontaneous and instrumental vaginal deliveries	Fecal incontinence urgency	3 months postpartum	0.8 (0.6; 1.2)
		Flatus	3 months postpartum	1.1 (0.6; 2.2)
Melville, 2005[338] N = 6,888	Cesarean deliveries only	Fecal incontinence		**0.87 (0.42; 1.8)**
MacArthur, 2001[405] N = 7,879	Breech delivery	Fecal incontinence	3 months postpartum	**1.49 (0.42; 5.24)**
Frudinger, 2002[440] N = 134	Caesarean delivery	Anal incontinence		**0.31 (0.06; 1.62)**
MacArthur, 2001[405] N = 7,879	Caesarean Section	Fecal incontinence	3 months postpartum	**0.58 (0.35; 0.97)***
		Frequent Fecal incontinence	3 months postpartum	**0.36 (0.14; 0.98)***
Macarthur, 2005[404] N = 4,046	Caesarean Section	persistent Fecal incontinence	6 years postpartum among primiparae at index delivery	**0.56 (0.23; 1.37)**
		Persistent Fecal incontinence	6 years postpartum	**1.07 (0.64; 1.81)**
Faltin, 2006[442] N = 240	Cesarean delivery	Severity, at least 2 symptoms at least once a week or 3 symptoms (symptoms: incontinence to flatus, liquid or solid stool; need to wear a pad; lifestyle alteration)	18 years after rupture of anal sphincter tear during childbirth	0.61 (0.16; 2.38)
Lal, 2001[443] N = 184	Cesarean delivery vs. spontaneous vaginal delivery	Anal incontinence	10 months postpartum	0.61 (0.25; 1.53)
	Cesarean delivery with labor vs. vaginal delivery			1.66 (0.83; 3.32)
	Cesarean delivery without labor vs. vaginal delivery			1.62 (0.81; 3.23)
Abramov, 2005[424] N = 346	Cesarean only delivery	Fecal incontinence		**0.39 (0.13; 1.04)**
		Flatus		**0.92 (0.52; 1.56)**
Uustal Fornell, 2004[208] N = 885	Cesarean section only	Anal incontinence		1.00 (1.00; 1.00)
Bharucha, 2006[422] N = 2,800	Cesarean section only, no surgery	Fecal incontinence		**0.7 (0.3; 1.5)**
Richter, 2005[406] N = 180	Number of cesarean deliveries	Anal incontinence	Morbid obesity before laparoscopic weight loss surgery	0.84 (0.55; 1.29)

Table F57. Association between FI and mode of delivery (continued)

Author Sample	Risk Factor	Definition of Fecal Incontinence	Time From Exposure to Fecal Incontinence	Odds Ratio (95%CI)
Macarthur, 2005[404] N = 4,046	Only caesarean section(s)	Fecal incontinence	6 years postpartum	**1.04 (0.72; 1.50)**
Abramov, 2005[424] N = 274	At least 1 episiotomy	Fecal incontinence		**1.03 (0.45; 2.32)**
		Flatus		**1.22 (0.7; 2.11)**
Eason, 2002[283] N = 252	Episiotomy	Anal incontinence	3 months postpartum	**1.1 (0.8; 1.4)**
Mazouni, 2005[228] N = 159	Episiotomy	Fecal incontinence	16 months instrumental delivery	1.00 (1.00; 1.00)
Hojberg, 2000[215]	Episiotomy	Severity, isolated flatus incontinence at least once a week	At 16 weeks of gestation in the index-pregnancy	**1.9 (0.8' 4.2)**
Signorello, 2000[444] N = 626	Episiotomy v 2nd/3rd/4th degree tear	Fecal incontinence	3 months postpartum	3.20 (1.30; 7.90)*
			6 months postpartum	2.90 (0.70; 11.20)
		Flatus	3 months postpartum	2.10 (1.30; 3.40)*
			6 months postpartum	2.10 (1.20; 3.70)*
	Episiotomy v intact/1st degree tear	Fecal incontinence	3 months postpartum	5.50 (1.80; 16.20)*
			6 months postpartum	3.70 (0.90; 15.60)
		Flatus	3 months postpartum	1.70 (1.00; 2.80)
			6 months postpartum	2.30 (1.20; 4.30)*
De Leeuw, 2001[307] N = 250	Mediolateral episiotomy, multiparity	Fecal incontinence	after anal sphincter damage during delivery	**1.25 (0.27; 5.83)**
Casey, 2005[367] N = 3,887	Forceps delivery	Anal incontinence	Within 7 months of delivery, at or before their 6-month contraceptive follow up after delivery	**1.2 (0.5; 2.9)**
Eason, 2002[283] N = 252	Forceps delivery	Anal incontinence	3 months postpartum	**1.4 (1; 2.1)**
Guise, 2007[410] N = 8,774	Forceps use, ever	severity, incontinence of stool		**1.29 (0.98; 1.7)**
Abramov, 2005[424] N = 274	At least 1 forceps delivery	Fecal incontinence		**0.98 (0.4; 2.41)**
		Flatus		**0.76 (0.33; 1.21)**
Frudinger, 2002[440] N = 134	Forceps delivery	Anal incontinence		**1.36 (0.35; 5.29)**
Sultan, 1993[445] N = 90	Forceps delivery	Fecal incontinence		1.81 (0.12; 27.72)
MacArthur, 2001[405] N = 7,879	Forceps delivery	Fecal incontinence	3 months postpartum	**1.94 (1.30; 2.89)***
Sultan, 1993[445] N = 90	Forceps delivery	Urgency		7.23 (0.85; 61.35)
	Forceps delivery	Fecal incontinence and urgency		19.56 (1.12; 340.25)*
MacArthur, 2001[405] N = 7,879	Forceps delivery	Frequent fecal incontinence	3 months postpartum	**1.94 (1.07; 3.54)***

Table F57. Association between FI and mode of delivery (continued)

Author Sample	Risk Factor	Definition of Fecal Incontinence	Time From Exposure to Fecal Incontinence	Odds Ratio (95%CI)
Macarthur, 2005[404] N = 4,046	Forceps deliver; n = 1,793	Persistent fecal incontinence	6 years postpartum among primiparae at index delivery.	**2.50 (1.37; 4.59)***
	Forceps delivery; n =3,813	Persistent Fecal incontinence	6 years postpartum	**2.06 (1.40; 3.04)***
Meyer, 2000[446] N = 107	Forceps delivery vs. spontaneous delivery	Fecal incontinence	10 month after delivery	0.80 (0.75; 1.05)
Schraffordt Koops, 2003[447] N = 479	Forceps delivery vs. Spontaneous delivery	Fecal incontinence	incident 3-4 years after delivery	1.25 (0.69; 2.27)
	Forceps delivery vs. Spontaneous delivery	Fecal incontinence	3-4 years after delivery	0.80 (0.44; 1.44)
	Forceps delivery vs. Spontaneous delivery	Fecal incontinence Grade 2	3-4 years after delivery	0.67 (0.22; 2.01)
	Forceps delivery vs. Spontaneous delivery	Fecal incontinence Grade 3	3-4 years after delivery	1.23 (0.46; 3.30)
	Forceps delivery vs. Spontaneous delivery	Fecal incontinence Grade 4	3-4 years after delivery	1.68 (0.74; 3.81)
Guise, 2007[410] N = 8,774	Forceps use, this delivery	Severity, incontinence of stool		**1.66 (1.1; 2.5)***
Macarthur, 2005[404] N = 4,046	≥1 forceps deliveries	Fecal incontinence	6 years postpartum	**1.48 (1.18; 1.87)***
Hojberg, 2000[215]	Outlet forceps	Severity, isolated flatus incontinence at least once a week	At 16 weeks of gestation in the index-pregnancy	**3.5 (0.4; 30.2)**
Bharucha, 2006[422] N = 2,800	Vaginal delivery with forceps or stitches, no surgery	Fecal incontinence		**1.2 (0.9; 1.6)**
Mahony, 2007[448] N = 500	Instrumental delivery	Fecal incontinence		**3.10 (1.20; 7.90)***
Liebling, 2004[25] N = 393	Instrumental delivery vs. Cesarean	Pain on opening bowels	6 weeks postpartum	**1.34 (0.74; 2.42)**
		Constipation	6 weeks postpartum	**0.85 (0.48; 1.49)**
		Increased passage of flatus	6 weeks postpartum	**1.44 (0.87; 2.39)**
		Hemorrhoids	6 weeks postpartum	**1.34 (0.80; 2.26)**
		Loss of control of bowels	6 weeks postpartum	**1.25 (0.28; 5.63)**
		Pain on opening bowels	1 year postpartum	**1.53 (0.44; 5.36)**
		Constipation	1 year postpartum	**2.55 (1.02; 6.37)***
		Increased passage of flatus	1 year postpartum	**1.66 (0.88; 3.12)**
		Hemorrhoids	1 year postpartum	**1.70 (0.92; 3.14)**
		Loss of control of bowels	1 year postpartum	**1.74 (0.34; 8.87)**
Faltin, 2001[328] N = 1,228	Operative delivery	Anal incontinence		**1.6 (0.9; 2.7)**
	Operative delivery	Fecal incontinence urgency		**1 (0.5; 2.2)**

Table F57. Association between FI and mode of delivery (continued)

Author Sample	Risk Factor	Definition of Fecal Incontinence	Time From Exposure to Fecal Incontinence	Odds Ratio (95%CI)
Nichols, 2005[432] N = 190	Operative delivery vs. vaginal delivery in stage II pelvic organ prolapse and/or urinary incontinence	Bothersome anal incontinence		**4.50 (1.20; 17.10)***
Nichols, 2004[449] N = 100	Operative vaginal delivery	Anal incontinence		**3.75 (1.60; 8.70)***
Nichols, 2005[432] N = 190	Operative vaginal delivery pelvic floor disorders vs. not operative delivery	Bothersome anal incontinence		3.60 (1.60; 8.80)*
Faltin, 2006[442] N = 540	Overactive vaginal delivery	Severity, at least 2 symptoms at least once a week or 3 symptoms (symptoms: incontinence to flatus, liquid or solid stool; need to wear a pad; lifestyle alteration)	18 years after rupture of anal sphincter tear during childbirth	1.83 (1.11; 3.02)*
Hojberg, 2000[215]	Oxytocin stimulation vs. stimulation	Severity, isolated flatus incontinence at least once a week	At 16 weeks of gestation in the index-pregnancy	**0.7 (0.4; 1.5)**
Eason, 2002[283] N = 252	% of days perineal massage performed <33	Anal Incontinence	3 months postpartum	**1 (1; 1)**
	% of days perineal massage performed ≥ 67			**0.8 (0.6; 1.1)**
	% of days perineal massage performed; 33-66			**1 (0.8; 1.3)**
Abramov, 2005[424] N = 274	At least 1 prolonged second stage of labor (>2 hrs)	Fecal incontinence		**1.12 (0.49; 2.54)**
		Flatus		**1.04 (0.58; 1.78)**
Mazouni, 2005[228] N = 159	Length of labor 1	Fecal incontinence	15 months instrumental delivery	1.00 (1.00; 1.00)
Hojberg, 2000[215]	Length of second stage ≤90 minutes	Severity, isolated flatus incontinence at least once a week	At 16 weeks of gestation in the index-pregnancy	**1 (1; 1)**
				0.5 (0.1; 2.4)
Eason, 2002[283] N = 252	Length of second stage of labor, ≥1.5 hour(vaginal delivery only)	Anal incontinence	3 months postpartum	**0.9 (0.7; 1.2)**
	Length of second stage of labor, 0.5-0.9 hour(vaginal delivery only)			**0.8 (0.6; 1.2)**
	Length of second stage of labor, 1-1.4 hour(vaginal delivery only)			**0.8 (0.6; 1.2)**

Table F57. Association between FI and mode of delivery (continued)

Author Sample	Risk Factor	Definition of Fecal Incontinence	Time From Exposure to Fecal Incontinence	Odds Ratio (95%CI)
Guise, 2007[410] N = 8,774	Pushing time ever ≥1 hour	Severity, incontinence of stool		**1.07 (0.91; 1.26)**
Frudinger, 2002[440] N = 134	Second stage (hours)	Fecal incontinence		**0.89 (0.57; 1.39)**
Casey, 2005[367] N = 3,887	Second stage >2 hours vs. ≤2 hours	Fecal incontinence	Within 7 months of delivery, at or before their 6-month contraceptive follow up after delivery	**0.4 (0.2; 1.1)**
Uustal Fornell, 2004[208] N = 885	Delivery by vacuum extractor	Flatus		1.40 (0.50; 4.50)
		Liquid		2.00 (0.70; 6.00)
		Solid		1.20 (0.00; 7.50)
Schraffordt Koops, 2003[447] N = 479	Vacuum extraction vs. Spontaneous delivery	Fecal incontinence Grade 4	3-4 years after delivery	0.71 (0.29; 1.74)
Eason, 2002[283] N = 252	Vacuum delivery	Anal incontinence	3 months postpartum	**1.3 (0.9; 1.8)**
Guise, 2007[410] N = 8,774	Vacuum only, ever	Severity, incontinence of stool		**1.12 (0.88; 1.42)**
MacArthur, 2001[405] N = 7,879	Vacuum delivery	Fecal incontinence	3 months postpartum	**1.26 (0.77; 2.07)**
		Frequent fecal incontinence	3 months postpartum	**1.29 (0.62; 2.71)**
Macarthur, 2005[404] N = 4,046	Vacuum delivery; n = 1,793	Persistent Fecal incontinence	6 years postpartum among primiparae at index delivery.	**0.41 (0.10; 1.75)**
	Vacuum delivery; n =3,813	persistent Fecal incontinence	6 years postpartum	**0.47 (0.15; 1.53)**
Hojberg, 2000[215]	Vacuum extraction	Severity, isolated flatus incontinence at least once a week	At 16 weeks of gestation in the index-pregnancy	**1.5 (0.6; 3.9)**
Schraffordt Koops, 2003[447] N = 479	Vacuum extraction vs. Spontaneous delivery	Fecal incontinence	Incident 3-4 years after delivery	0.85 (0.48; 1.51)
		Fecal incontinence	3-4 years after delivery	1.18 (0.66; 2.09)
		Fecal incontinence Grade 2	3-4 years after delivery	0.97 (0.39; 2.41)
		Fecal incontinence Grade 3	3-4 years after delivery	0.97 (0.37; 2.52)
Guise, 2007[410] N = 8,774	Vacuum only, this delivery	Severity, incontinence of stool		**1.12 (0.82; 1.53)**
Peschers, 2003[450] N = 100	Vacuum vs. spontaneous vaginal delivery	Anal incontinence	6-24 weeks postpartum	0.83 (0.36; 1.93)
		Fecal incontinence urgency	6-24 weeks postpartum	1 (0.236; 4.241)
		Flatus incontinence >1/week	6-24 weeks postpartum	1.741 (0.393; 7.713)
		Incontinence for liquid stood >1/week	6-24 weeks postpartum	7.442 (0.374; 147.925)
		Incontinence for solid stool >1/week	6-24 weeks postpartum	3.061 (0.122; 76.949)
		Flatus	6-24 weeks postpartum	1 (0.375; 2.664)

Table F57. Association between FI and mode of delivery (continued)

Author Sample	Risk Factor	Definition of Fecal Incontinence	Time From Exposure to Fecal Incontinence	Odds Ratio (95%CI)
		Liquid	6-24 weeks postpartum	1 (0.236; 4.241)
		Solid	6-24 weeks postpartum	3.128 (0.314; 31.142)
		Fecal incontinence soiling	6-24 weeks postpartum	0.683 (0.201; 2.315)
Faltin, 2006[442] N = 540	Non operative vaginal delivery	Severity, at least 2 symptoms at least once a week or 3 symptoms (symptoms: incontinence to flatus, liquid or solid stool; need to wear a pad; lifestyle alteration)	18 years after rupture of anal sphincter tear during childbirth	1 (1; 1)
De Leeuw, 2001[307] N = 250	Subsequent vaginal delivery	Fecal incontinence	After anal sphincter damage during delivery	**2.32 (0.85; 6.33)**
Boreham, 2005[331] N = 457	Vaginal parity (per delivery)	Anal incontinence		1.16 (1; 1.35)
Borello-France, 2006[451] N = 472	Vaginal control	Fecal incontinence	6 weeks postpartum	**1.1 (0.49; 2.5)**
		Fecal incontinence	6 months postpartum	**1.01 (0.38; 2.71)**
		Fecal incontinence urgency	6 weeks postpartum	**0.67 (0.39; 1.13)**
		Fecal incontinence urgency	6 months postpartum	**0.53 (0.29; 0.93)**
		Flatus	6 weeks postpartum	**1.3 (0.67; 2.6)**
		Flatus	6 months postpartum	**0.48 (0.24; 0.96)**
Ng, 2002[408] N = 320	Vaginal delivery	Anal incontinence		**1.09 (0.34; 1.25)**
Chen, 2003[284] N = 1,253	Vaginal delivery	Anal incontinence		**1.1 (0.8; 1.5)**
Uustal Fornell, 2004[208] N = 885	Vaginal delivery	Flatus		1.10 (0.40; 3.00)
		Flatus		1.50 (0.80; 2.70)
		Liquid		0.80 (0.30; 2.10)
		Liquid		1.00 (0.50; 1.80)
		Solid		1.00 (0.30; 2.70)
Bharucha, 2006[422] N = 2,800	Vaginal delivery without forceps or stitches, no surgery	Fecal incontinence		**0.8 (0.5; 1.1)**
MacLennan, 2000[84] N = 3,010	Vaginal vs. Caesarean delivery	Fecal incontinence		**1.50 (0.50; 4.90)**
		Flatus		**1.80 (0.80; 3.80)**
Melville, 2005[338] N = 6,888	H/O operative vaginal delivery	Fecal incontinence		**1.52 (1.09; 2.12)***
	Mixed/unknown delivery types	Fecal incontinence		**1.44 (0.82; 2.54)**

Bold = multivariate odds ratios
* Significant difference

Evidence Tables — Clinical Interventions to Reduce Risk of Incidence and Progression of Urinary Incontinence in Adults

Table F58. Effects of implementation of evidence based guidelines on urinary incontinence in residents of nursing homes

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Ryden, 2000[452] Quasi-experimental RCT to examine the effect of scientifically based protocols implemented by advanced practice gerontological nurses for incontinence in nursing home residents Duration: 6 months	Consecutive cohorts of newly admitted residents in 3 licensed proprietary nursing homes certified for Medicare, located in the suburban area comparable by occupancy rates, staff-to-resident ratios, staff turnover, resident acuity, and percentage of residents whose medical care was monitored by external nurse practitioners employed by physician group practices or managed care groups with 201-262 beds. Loss of followup: 86 treatment residents (2.4% withdrew, 18.0% were discharged, and 27.5% died) and 111 comparison group residents (2.0% withdrew, 9.2% were discharged, and 16.3% died).	1. Implementation of evidence-based protocol by advanced practice gerontological nurses: in-service staff education and direct resident care. 2. Usual care by nursing home staff.	Urinary incontinence recorded by nursing home staff in Incontinence monitoring schedule: observations every 2 hours, 24 hours a day for 3 days; percentage of wetness 5; average number of times wet per day for the 3-day period.	No intention to treat. Open label. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. No justification for sample size.
Schnelle, 1995[453] Multicenter non controlled intervention to examine computerized total quality management model for implementation of incontinence system in nursing homes. Duration: 6 months.	9 nursing homes, members of state long-term care association location within 1.5 hours driving distance from one another, agree to train staff. Exclusion criteria: not representative staffing rates and resident mix compared to nursing homes in the area.	Gradual implementation of computerized quality management model based on the federal guidelines for medical assessment and individualized prompted voiding protocols of incontinence.	% of wet residents collected using random hour wet check procedure by independent research assistants with nursing home experience	No intention to treat. Not randomized. Implementation of quality management model with before-after comparisons. No justification for sample size.

Table F59. Comparative effectiveness of implementation of evidence-based guidelines on urinary incontinence in residents of nursing homes

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Ryden, 2000[452] N = 319 71% female	Implementation of evidence-based protocol by advanced practice gerontological nurses: in-service staff education and direct resident care.	Usual care by nursing home staff	% of times wet recorded by nurse	35	40	21.0	26.0	0.8 (0.5; 1.2)		
			% of residents with Improvement in incontinence recorded by nurse	78	66	47.0	43.0	1.1 (0.9; 1.4)		
			Incontinence prevalence reported by a nurse	106	108	63.9	70.6	0.9 (0.8; 1.1)		
Schnelle, 1995[453] N = 85	After gradual implementation of computerized quality management model for medical assessment and individualized prompted voiding protocols of incontinence	Before gradual implementation of computerized quality management model for medical assessment and individualized prompted voiding protocols of incontinence	% of wet residents	14	26	17.0	31.0	0.5 (0.3; 1.0)	7 (5; 77)	140 (216; 13)A

Table F60. Effects of conservative management programs on urinary incontinence in females, residents of nursing homes

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Hu, 1990[454] RCT to examine the effects of behavioral training therapy on incontinent elderly in nursing homes. Duration: 3 months, followup: 22 weeks.	133 incontinent elderly females in seven nursing homes, ages 65 or over, incontinent during the daytime, and able to recognize their own name. Exclusion criteria: not reported. Loss of followup: 7%.	1. Behavioral therapy program for 3 months implemented by project-trained NRAs. With hourly wet checks, prompted and assisted toileting, positive reinforcement, bladder training to hold urine until the next hourly check. 2. Usual care.	Reported by nurses participants' wet episodes and patient requests for toileting.	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data did not confirm adequacy of randomization. Sample size justified
Hu, 1989[455] RCT to examine the effects of behavior therapy program for urinary incontinence on women residents of nursing homes. Duration: 3 months.	143 women with confirmed stress incontinence in seven nursing homes with ability to recognize her own name. Exclusion criteria: hospitalization, insufficient number of wet episodes per day (an average 0.18). Loss of followup: 6.9%	1. 13-week behavior therapy program for urinary incontinence which included hourly checking and prompting of individuals to toilet, praising for successful toileting, and social reinforcement (additional personal service). Assisted toileting between scheduled voiding. The program was implemented 14 hours/day, 7 days/week for 3 months. 2. Control group received usual incontinence-related care.	The change in urinary stress incontinence measured by the RN as wet checks/total checks/day (14 times/day).	No intention to treat. Open label. Randomization schedule not reported. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.
Ouslander, 2001[456] RCT to examine the effects of oral estrogen/progestin on incontinence in female nursing home residents. Duration 6 months	32 incontinent female residents (average age 88) from 5 nursing homes. Incontinence was diagnosed by nursing home staff and research staff using checks for wetness as involuntary loss of urine at least daily. Exclusion criteria: Medicare reimbursement (indicating a potential short stay and/or medical instability), terminal illness, cognitive impairment; history of breast or cervical cancer; wet <1/day on research staff checks; enteral feeding ; poor cooperation with screening procedures ; severe physical immobility, requiring a lift or 3-person transfer. Loss of follow up: 34%	1.Oral estrogen (0.625mg) combined with progesterone (2.5mg) and regular toileting assistance (prompted voiding) by trained research aides during 3-day data-collection periods 2. Placebo and regular toileting assistance (prompted voiding) by trained research aides during 3-day data-collection periods	The frequency of urinary incontinence as wetness rate = the percentage of checks at which research staff found residents to be wet during three 8-hour days of prompted voiding. The appropriate toileting rate was calculated by dividing the number of continent voids by the total number of voids.	No Intention to treat. Open label. Central randomization with table of random numbers. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F60. Effects of conservative management programs on urinary incontinence in females, residents of nursing homes 9continued0

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
			Cough tests for stress incontinence as positive (simultaneous leakage with cough), negative with estimated bladder volumes of at least 100ml (determined by voided volume plus residual bladder volume by ultrasound), negative, or unable to perform (some subjects would not cough on command).	

Table F61. Comparative effectiveness of conservative management programs on urinary incontinence in females, residents of nursing homes (events)

Author	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Hu, 1990[454] N = 143	Behavioral therapy program for 3 months implemented by the project-trained NRAs.	Usual care	% improvement in urinary incontinence reported by nursing home staff	19	6	26.0	8.0	**3.1 (1.3; 7.4)**	6 (2; 38)	180 (26; 509)E
			75-99% improvement in urinary incontinence reported by nursing home staff	4	3	5.0	4.0	1.3 (0.3; 5.7)		
Ouslander, 2001[456] N = 32	Oral estrogen (0.625 mg) combined with progesterone (2.5 mg) and regular toileting assistance (prompted voiding) by trained research aides during 3-day data-collection periods	Placebo and regular toileting assistance (prompted voiding) by trained research aides during 3-day data-collection periods	Positive cough test	0	3	0	17.6	0.16 (0.01; 2.88)		

Bold- significant differences in outcomes at 95%confidence level**;** Number needed to treat to have avoided or excessive outcome inn1 patient =1/(rate of the outcome in the control –rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control –rate of the outcome in the active group) ; A- avoided; E- excessive events

Table F62. Comparative effectiveness of conservative management programs on urinary incontinence in 143 females, residents of nursing homes

Author	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
Hu, 1989[455]	Behavioral therapy program for 3 months implemented by the project-trained registered nurses	Usual care	Urinary wet episodes/day reported by nursing home staff	1.7 ± 1.8	1.9 ± 1.3	-0.2 (-0.5; 0.2)	-9.0 (-26.3; 8.3)
	13-week behavior therapy program for urinary incontinence	Usual incontinence-related care	Number of incontinence episodes/day	2.2 ± 1.3	2.1 ± 1.1	0.1 (-0.2; 0.5)	6.0 (-9.9; 21.9)
Ouslander, 2001[456] N = 32	Oral estrogen (0.625 mg) combined with progesterone (2.5 mg) and regular toileting assistance (prompted voiding) by trained research aides during 3-day data-collection periods	Placebo and regular toileting assistance (prompted voiding) by trained research aides during 3-day data-collection periods	Appropriate toileting rate,% of continent voids by the total number of voids	37 ± 31	31 ± 29	0.20 (-0.50; 0.90)	0.20 (0.36; -0.50)

Table F63. Effects of conservative management programs on urinary incontinence in residents of nursing homes

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Schnelle, 1989[457] RCT to examine the effects of prompted voiding treatment of urinary incontinence in nursing home patients. Duration: 5-10 days.	126 incontinent patients from proprietary nursing homes (bed size 90-150), not affiliated with universities with correct discriminatory responses to instructions to point to shown subjects (pencil or glass). Exclusion criteria: continence, transfer to hospital during run-in period. Loss of followup: 60% during the run-in period, 2.4% after randomization.	1. Prompted voiding treatment: check for incontinence, asking for needed toileting assistance, prompted voiding, and socially reinforced for appropriate toileting. 2 .Usual care.	Urinary incontinence measured by nurse as wet checks/total checks and daily percent of appropriate toileting equal number of times the patient voided in any toilet receptacle/total number of appropriate and incontinent voiding.	No intention to treat. Open label. Randomization and allocation concealment unclear. Baseline data not reported. Sample size not justified.
Ouslander, 2005[458] Crossover RCT to examine the effects of functional incidental training on incontinence in nursing homes. Duration: 8 weeks.	107 patients in nursing homes, (resided in the facility at least 30 days and not initially admitted for short-term care; able to state their name, or in the presence of aphasia, capable of reliably pointing to two objects; required assistance by two or fewer people for transfer from bed to chair; with life expectancy of at least 6 months; not receiving active physical therapy; and ages 60 and older. Exclusion criteria: continence, severe behavioral changes, terminally ill. Loss of followup: 60%.	1. Functional incidental training: prompted voiding combined with individualized, functionally oriented endurance and strength-training exercises offered 4 times/day, 5 days/week. 2. Usual care.	Urinary and fecal incontinence measured as wet checks/total checks of the participants every 2 hours. Appropriate toileting rate: number of voids or bowel movements that were continent divided by the total number of voids or bowel movements.	No intention to treat. Open label. Computer-generated random numbers. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.
Schnelle, 2002[459] RCT to examine the effects of integrated incontinence care and exercise on urinary incontinence in nursing home residents. Duration: 8 months.	256 incontinent residents in 4 nursing homes. Exclusion criteria: post-acute skilled care units, terminally ill. Loss of followup: 26%.	1. Integrated incontinence care and exercise every 2 hours 5 days a week including fluid prompting, prompted toileting, and regular wet checks, arm raise and arm curl exercises. 2. Usual care.	Fecal and urinary incontinence frequency as % of hourly wet checks and the appropriate toileting ratio calculated by dividing the number of times a resident used a toilet or toilet substitute by the total number of voids.	No intention to treat. Single blind. Computerized randomization. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F63. Effects of conservative management programs on urinary incontinence in residents of nursing homes (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Jirovec, 2001[460] RCT to examine the effects of individualized scheduled toileting program on incontinent, memory-impaired elders being cared for at home. Duration: 6 months.	118 caregivers for incontinent, memory-impaired elders. Exclusion criteria: fecal continence. Loss of followup: 16.9% during implementation and 37% during 6 months period.	1. Individualized scheduled toileting procedure of every 2 hours and fluid intake ~six 8-oz glasses /day provided by trained caregivers. 2. Usual care.	Incontinence calculated as the percentage of time the patient was incontinent by dividing the incontinent episodes by the total number of voiding episodes, both continent and incontinent.	No Intention to treat, Open label. Randomization using the table of random numbers. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size not justified.
Colling, 1992[461] Quasi-experimental RCT to examine the effects of individualized form of habit training for urinary incontinence among elderly nursing homes residents. Duration: 12-week intervention and 12 week followup.	113 elderly subjects, 65 years and older with >3 episodes of clinical and urodynamic urinary incontinence/week for the last 12 weeks, cognitively and/or physically impaired, residents of 4 non-profit urban nursing homes with bed size 120-342. Exclusion criteria: toilet with assistance of more than1 staff member, fecal impaction, rectal or pelvic mass, prostate diseases, severe prolapse, atrophic vaginitis, neurological diseases, post-residual volume >200ml. Loss of followup: 21%	1. Individualized form of habit training for urinary incontinence administered by trained staff: toileting within 30 minutes prior to the mean time of voids within 1 hour block of time. Verbal encouragement to nursing staff to comply with the program. 2. Usual care.	Episodes of urinary incontinence/day measured by nursing staff. Wet checks were done hourly for one 24-hour period at 3-week intervals. Continuous electronic monitoring of voids for precise voiding schedule for each subject.	No intention to treat. Open label. Randomization at unit level. Allocation concealment unclear. Baseline data differed by the proportion of males and length of stay. Sample size justified.

Table F64. Comparative effectiveness of conservative management programs on urinary incontinence in residents of nursing homes (severity measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Colling, 1992[461] N = 113 66% female	Individualized form of habit training for urinary incontinence administered by trained staff: toileting within 30 minutes prior to the mean time of voids within 1 hour block of time. Verbal encouragement to nursing staff to comply with the program.	Usual care	Incontinent volume of urine loss, ml	500.0 ± 450.0	600.0 ± 400.0	-0.2 (-0.6; 0.1)	0.0 (-0.1; 0.0)
Schnelle, 2002[459] N = 190 84% female	Integrated incontinence care and exercise every 2 hours 5 days a week including fluid prompting, prompted toileting, and regular wet checks, arm raise and arm curl exercises	Usual care	Urinary incontinence frequency, % of wet checks	23.0 ± 21.0	35.0 ± 21.0	**-0.6 (-0.9; -0.3)**	-1.6 (-2.5; -0.8)
Schnelle, 1989[457] N = 126 75% female	Prompted voiding treatment: check for incontinence, asking for needed toileting assistance, prompted voiding, and socially reinforced for appropriate toileting	Usual care	Percent appropriate toileting	59.4 ± 26.7	16.8 ± 22.0	**1.7 (1.3; 2.2)**	10.4 (7.9; 12.8)
			Percent wet checks/total checks, %	17.8 ± 13.0	34.5 ± 16.8	**-1.1 (-1.5; -0.7)**	-3.2 (-4.3; -2.1)
Colling, 1992[461] N = 113 66% female	Individualized form of habit training for urinary incontinence administered by trained staff: toileting within 30 minutes prior to the mean time of voids within 1 hour block of time. Verbal encouragement to nursing staff to comply with the program.	Usual care	Urinary incontinence episodes/day (wet checks)	3.9 ± 1.0	4.8 ± 1.0	**-0.9 (-1.3; -0.5)**	-18.8 (-26.9; -10.6)
Ouslander, 2005[458] N = 107 10% female	Functional Incidental training: prompted voiding combined with individualized, functionally oriented endurance and strength-training exercises offered 4 times/day, 5 days/week	Usual care	Change after the treatments in wet checks/total checks,%			-17 (-83.9; 49.9)	
			Wet checks/total checks, %	25.0 ± 50.0	50.0 ± 28.0	**-0.6 (-1.0; -0.2)**	-1.2 (-2.0; -0.5)

Table F64. Comparative effectiveness of conservative management programs on urinary incontinence in residents of nursing homes (severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Jirovec, 2001[460] N = 118 30 % female	Individualized scheduled toileting procedure of every 2 hours and fluid intake ~six 8-oz glasses/day provided by trained caregivers.	Usual Care	% of urinary incontinent episodes/total voids	37.0 ± 28.0	49.0 ± 36.0	-0.4 (-0.7; 0.0)	-0.8 (-1.5; 0.0)

Bold- significant differences in outcomes at 95%confidence level

Table F65. Effects of conservative management programs on urinary incontinence in patients admitted for rehabilitation following acute unilateral hemispheric stroke

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Wikander, 1998[462] RCT to examine the effects of rehabilitation governed by functional independence measure on urinary incontinence in patients with acute hemispheric stroke Duration: Length of stay in the ward (~90 days)	34 incontinent stroke patients admitted for rehabilitation following acute unilateral hemispheric stroke. Exclusion criteria: not reported. Lost of followup: none	1. Specially designed education for ward staff based on the Functional Independence Measure Scale and for patients to manage incontinence independently. 2. Conventional method inhibiting abnormal muscle tone by handling and guiding the stroke patient in specific ways to relearn normal movements, which makes the patient dependent on ward staff for a longer period of time.	Urinary incontinence and the need for assistance because of urinary incontinence assessed by the staff with FIM-G (7-point scale, 7 - independent - 1- totally dependent	Intention to treat not stated but all patients were included in the analysis. Open label. Allocation concealment not adequate, patients were randomly allocated to one of two different wards depending on the availability of beds on the day of admission. Baseline data confirmed adequacy of randomization. No justification for sample size.

Table F66. Comparative effectiveness of conservative management programs on urinary incontinence in patients admitted for rehabilitation following acute unilateral hemispheric stroke

Author Sample	Outcome	Active Treatment	Control Treatment	Number of Case After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Wikander, 1998[462] N = 34 56% female	Number cured at discharge	Specially designed rehabilitation program to increase patient independent management of UI	Conventional rehabilitation program (patient dependent on ward staff for a longer period of time).	20	3	95.2	23.1	**4.1 (1.5; 11.2)**	1 (0; 8)	722 (121; 2,350)E
	Number discharged to a nursing home due to incontinence			2	8	9.5	61.5	**0.2 (0.0; 0.6)**	2 (2; 4)	520 (234; 592)A

Bold- significant differences in outcomes at 95%confidence level**;** Number needed to treat to have avoided or excessive outcome inn1 patient =1/(rate of the outcome in the control –rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control –rate of the outcome in the active group) ; A- avoided; E- excessive events

Clinical Interventions on Urinary Incontinence in Adults in the Community

Table F67. Effects of implementation of evidence based guidelines on urinary incontinence in adults

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Chadha, 2000[463] RCT to examine the effects of national guidelines and local protocols in improving hospital care for women with UI. Duration: 12 months	449 women with urinary incontinence from gynecology units in four district general hospitals across Scotland. Exclusion criteria: not reported. Loss of followup: 7.6%	National evidence based guidelines adapted locally to protocols, which were disseminated at specific local educational meetings and implemented by placing a copy of the appropriate protocol in women's hospital case notes prior to consultation.	Self reported perception of urinary incontinence based on questions routinely asked by clinicians.	No intention to treat. Randomization stratified by hospital size and location. 2 x 2 balanced incomplete block controlled before and after study. Baseline data confirmed adequacy of randomization. Sample size justified for process of care outcomes.

Table F68. Comparative effectiveness of evidence based guidelines on urinary incontinence in adults, self reported severity and impact of urinary incontinence

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Chadha, 2000[463] N = 449 100% female	National evidence based guidelines adapted locally to protocols, which were disseminated at specific local educational meetings and implemented by placing a copy of the appropriate protocol in women's hospital case notes prior to consultation.	Pre-guidelines levels	Self -reported perception of urinary incontinence, scores	15.5 ± 20.3	13.9 ± 20.7	0.1 (-0.1; 0.2)	0.6 (-0.4; 1.5)

Table F69. Effects of conservative management programs on urinary incontinence in community-dwelling adults

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Williams, 2005[464] RCT to examine the effects of continence service provided by specially trained nurses delivering evidence-based interventions using predetermined care pathways in adults. Duration: 6 months	3,746 men and women ages 40 years and over living in private households reporting incontinence several times per month or more, or several times a year and reported significant impact of symptoms on quality of life. Exclusion criteria: pregnancy, urinary fistula, pelvic malignancy, treatment for urinary symptoms. Loss of followup: 37% refused followup at 3 months, 22% refused followup at 6 months.	1. Continence service that included advice on diet and fluids; bladder training; pelvic floor awareness and lifestyle advice. 2. Existing primary care including GP and continence advisory services in the area.	Self-reported in validated questionnaire improvement or cure in one or more symptoms of total incontinence, urgency, frequency and nocturia.	Intention to treat. Open label. Randomization by household, at a ratio of 4:1 in favor of the continence nurse practitioner. Allocation concealment and randomization adequate. Sample size justified.
Borrie, 2002[465] RCT to examine the effects of combined lifestyle and behavioral interventions led by nurses in the management of urinary incontinence. Duration: 6 months	421 subjects 26 years of age or older with self reported urinary incontinence at least once per week, resided in the community, and communicated in English. Exclusion criteria: pregnancy, residency of long-term care institutions, dementia. Loss of followup: 10.1%	1. Lifestyle modification sessions every 4 weeks led by trained "nurse continence advisers" with a physician with expertise in continence management. 2. Usual care	Self reported urinary incontinent events (measured using bladder diaries) and pad use (measured using the questionnaire) per 24 hours	Intention to treat. Open label. Computer generated randomization with random permuted blocks, block size of 4. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. No justification for sample size.
Dowd, 2000[466] RCT to examine the effects of cognitive strategies combined with educational programs in urinary incontinence. Duration: 6 weeks	40 subjects >40 years of age, independent in self-care, with history of incontinence and/or frequency for at least 6 months, able to read and write English, and having hearing adequate for listening to an audiotape. Exclusion criteria: presence of urinary tract infections or severe neurological disorders. Loss of followup: not reported	1. Education about bladder health, recorded incontinence and frequency episodes in a voiding diary, and listening to the audiotape daily. 2. Education about bladder health and recorded incontinence and frequency episodes in the voiding diary	Comfort measured with the Urinary Incontinence and Frequency Comfort Questionnaire (UIFCQ) - 23 positive and negative items ranging from strongly agree to strongly disagree scored from 1 to 6 - higher comfort. The number of incontinent episodes and frequency of toileting recorded in a voiding diary with scores 8-96 incontinent episodes and 50-125 frequency episodes per week.	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F69. Effects of conservative management programs on urinary incontinence in community-dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Moore, 2003[467] RCT to examine the effects of nurse continence advisors and urogynaecologists in conservative management of urinary incontinence. Duration: 12 weeks	145 consecutive patients with stress and/or urge incontinence with idiopathic detrusor instability, sensory urgency, and mild or moderate leakage (urine loss in 1-hour pad test 2-9.9ml/hour or 10-50ml/hour). Exclusion criteria: previous pelvic radiotherapy, proven recurrent bacterial cystitis, prolapse beyond the introitus, uterine enlargement or incomplete bladder emptying (postvoid residual >100ml). Loss of followup: 22%	1. 2 nurse continence advisors/patient and consulting urogynecologist for 25-35 minutes/week provided bladder training, gradual increase in fluid intake, individual deferment techniques, pelvic floor muscle exercise and examination, transvaginal electrostimulation. 2. Outpatient regimen with 15-20 minute consultation with referral to physiotherapist and bladder training.	1-hour pad test, frequency volume charts, a 20-point incontinence score, and two quality of life tests (Incontinence Impact Questionnaire and Urogenital Distress Inventory). Objective cure as dry on 1-hour pad test. Subjective cure as >50% benefit on pad test but the patient felt cured and ready for discharge	Intention to treat. Open label. Computer-generated randomization stratified with respect to mild and moderate leakage with permuted blocks of 20. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
McFall, 2000[468,469] RCT to examine the effects of community-based intervention on self-management of urinary incontinence in elderly women Duration: 3 months	145 women ages 65 or older with self reported urinary incontinence ≥ 3 months, residing in Oklahoma. Exclusion criteria: Severe prolapse of uterus, hematuria, diverticulum, fistula, unresolved urinary tract infection, two or more urinary tract infections within 3 months, urinary obstruction, overflow incontinence, a postvoid residual volume of urine (PVR) >100ml, and blood glucose >300 mg/dl on two or more visits in a 3 month period, functional disability, severe hearing or vision problems, low literacy, and cognitive impairment. Loss of followup: 8.3%	1. Community-based intervention with 5 biweekly sessions of education and skill-building, for bladder training, managing the urge to urinate, and performing pelvic muscle exercises. Group support by registered nurses; occupational therapist, and public health educator. 2. Usual care	Self reported episodes of incontinence and frequency of voluntary micturition (voiding) per week.	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. No justification for sample size.

Table F70. Comparative effectiveness of conservative management programs on urinary incontinence in adults (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Active Cases	Number of Control Cases	% Active	% Control	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Williams, 2005[464] N = 3,746 60% female	Continence service that included advice on diet and fluids; bladder training; pelvic floor awareness and lifestyle advice	Existing primary care including GP and continence advisory services in the area	% of mild urinary incontinence or no problem with urine leakage	2,337	552	79.0	70.0	**1.1 (1.1; 1.2)**	11 (8; 19)	90 (52; 129)E
			% satisfied with current urinary symptoms for rest of life	1,893	418	64.0	53.0	**1.2 (1.1; 1.3)**	9 (6; 15)	110 (66; 156)E
			% cured	828	150	28.0	19.0	**1.5 (1.3; 1.7)**	11 (7; 20)	90 (49; 136)E
			Frequency (≥once hourly)	710	260	24.0	33.0	**0.7 (0.6; 0.8)**	11 (9; 17)	90 (117; 60)A
			Improvement	1,834	410	62.0	52.0	**1.2 (1.1; 1.3)**	10 (7; 18)	100 (56; 146)E
			Leakage (several times/month)	1,804	512	61.0	65.0	0.9 (0.9; 1.0)		
			Nocturia (≥3 times/night)	562	189	19.0	24.0	**0.8 (0.7; 0.9)**	20 (13; 49)	50 (20; 76)A
			Urgency: very strong or overwhelming	917	331	31.0	42.0	**0.7 (0.7; 0.8)**	9 (7; 13)	110 (78; 139)A

Bold- significant differences in outcomes at 95%confidence level**;** Number needed to treat to have avoided or excessive outcome inn1 patient =1/(rate of the outcome in the control –rate of the outcome in the active group); Number of attributable events= 1000*(rate of the outcome in the control –rate of the outcome in the active group) ; A- avoided; E- excessive events

Table F71. Comparative effectiveness of combined conservative management programs on urinary incontinence in females (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Active Cases	Number of Control Cases	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)
Moore, 2003[467] N = 145	2 nurse continence advisors/patient and consulting urogynecologist for 25-35 minutes/week provided bladder training, gradual increase in fluid intake, individual deferment techniques, pelvic floor muscle exercise and examination, transvaginal electro stimuli.	Out patient regimen with 15-20 minute consultation with referral to physiotherapist and bladder training.	Objective cure as dry on 1-hour pad test	37	27	50.0	38.0	1.3 (0.9; 1.9)	
McFall, 2000[468] N = 145	Community-based intervention: bladder training, managing the urge to urinate, and performing pelvic muscle exercises.	Usual care	Self reported urinary continence (100% improvement)	25	15	35.0	20.0	1.7 (1.0; 2.9)	
			Self reported Improvement in urinary incontinence of 50% or greater	44	28	61.0	38.0	**1.6 (1.1; 2.2)**	4 (2; 20)E

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in1 patient =1/(rate of the outcome in the control –rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control –rate of the outcome in the active group); A- avoided; E- excessive events

Table F72. Comparative effectiveness of combined conservative management programs on urinary incontinence in females, self reported severity and impact on life

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
Moore, 2003[467] N = 145	2 nurse continence advisors/patient and consulting urogynecologist for 25-35 minutes/week provided bladder training, gradual increase in fluid intake, individual deferment techniques, pelvic floor muscle exercise and examination, and trans vaginal electro-stimulation	Out patient regimen with 15-20 minutes consultation with referral to physiotherapist and bladder training.	Incontinence score	4.0 ± 1.8	3.0 ± 2.0	**0.5 (0.2; 0.9)**	17.4 (6.4; 28.4)
			Voids/day	6.0 ± 0.7	6.0 ± 0.7	0.0 (-0.3; 0.3)	0.0 (-5.4; 5.4)
			Voids/night	1.0 ± 0.0	1.0 ± 0.0		
			Pads/day	1.0 ± 0.0	1.0 ± 0.7		
			Quality of life urogenital distress inventory	18.0 ± 6.2	15.5 ± 5.0	**0.4 (0.1; 0.8)**	2.9 (0.7; 5.0)
			Short urogenital distress inventory 16	8.0 ± 1.5	6.0 ± 2.5	**1.0 (0.6; 1.3)**	16.2 (10.5; 22.0)
			Quality of life incontinence impact questionnaire	36.0 ± 9.3	37.5 ± 3.7	-0.2 (-0.5; 0.1)	-0.6 (-1.4; 0.3)
			Short incontinence impact questionnaire 7	11.0 ± 1.3	10.0 ± 2.3	**0.5 (0.2; 0.9)**	5.3 (2.0; 8.6)
			Leaks/week	3.0 ± 4.7	2.5 ± 3.0	0.1 (-0.2; 0.5)	5.1 (-8.0; 18.1)
			Pad test (ml)	2.0 ± 4.2	2.0 ± 4.0	0.0 (-0.3; 0.3)	0.0 (-16.3; 16.3)
McFall, 2000[468] N = 145	Community-based intervention: bladder training, managing the urge to urinate, and performing pelvic muscle exercises	Usual care	Self reported number of urinary incontinent episodes/week	3.6 ± 7.2	5.9 ± 8.5	-0.3 (-0.6; 0.0)	-5.1 (-10.6; 0.5)
			Nocturnal micturition	9.9 ± 9.3	9.6 ± 5.9	0.0 (-0.3; 0.4)	0.4 (-3.0; 3.8)

Bold- significant differences in outcomes at 95%confidence level

Table F73. Comparative effectiveness of conservative management programs on urinary incontinence in adults, self reported severity and quality of life

Author Sample	Active Treatment	Control Treatment	Outcomes	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Borrie, 2002[465] N = 446 73% female	Lifestyle modification sessions every 4 weeks led by trained "nurse continence advisers"	Usual care	Change in pad use for urinary incontinence events from baseline	-0.9 ± 4.4	-0.1 ± 3.7	-0.2 (-0.4; 0.0)	195.8 (4.3; 387.3)
			Change in urinary incontinence events from baseline	-1.2 ± 3.0	-0.2 ± 3.0	**-0.3 (-0.5; -0.1)**	168.9 (72.7; 265.1)

Bold- significant differences in outcomes at 95%confidence level

Table F74. Comparative effectiveness of educational intervention on urinary incontinence in adults (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Active Cases	Number of Control Cases	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Dowd, 2000[466] N = 40 74% female	Education about bladder health, recorded incontinence and frequency episodes in a voiding diary, and listening to the audiotape daily	Education about bladder health and recorded incontinence and frequency episodes in the voiding diary	Improvement in the number of incontinent episodes and frequency of toileting	18.9	9.88	90.0	52.0	**1.7 (1.1; 2.7)**	3 (1; 20)	380 (51; 880)E
			Improvement in Urinary Incontinence and Frequency Comfort Questionnaire	18.9	12.7	90.0	67.0	1.3 (0.9; 1.8)		

Bold- significant differences in outcomes at 95% confidence level**;** Number needed to treat to have avoided or excessive outcome in1 patient =1/(rate of the outcome in the control –rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control –rate of the outcome in the active group); A - avoided; E - excessive events

Table F75. Effects of dietary and other lifestyle interventions on risk and progression of urinary incontinence in adults

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Subak, 2005[470] RCT to examine the effect of weight loss on urinary incontinence in overweight and obese women. Duration: 3 months	48 women 18 to 80 years old with body mass index between 25 and 45 kg/m2, urinary incontinence for at least 3 months and at least 4 incontinent episodes/week, the stable dose of other incontinence therapy . Exclusion criteria: pregnancy, urinary tract infection, significant medical condition, pelvic cancer, neurological condition possibly associated with incontinence, interstitial cystitis or potential inability to complete the study. Lost of followup: 4 women; 1 withdrew from the study, 1 dropped due to medical condition, 2 had missing primary outcome data.	Weight reduction intervention: 3-month standard low calorie liquid diet (800kcals/day or less), increased physical activity to 60 minutes/day, training by a nutritionist, exercise physiologist or behavioral therapist 1. Immediate intervention group 2. Delayed for 3 month intervention	A 7-day voiding diary to report frequency of voids and incontinent episodes classified by clinical type (urge, stress, other). Urodynamic outcomes.	Intention to treat. Single blind (investigators assessing outcomes and statistical analysts). Randomization was stratified by type of incontinence, with randomly permuted blocks of 4. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Dowd, 1996[471] RCT to examine the effects of hydration on the number of urinary incontinence episodes. Duration: 5 weeks	58 women 50 years old and older with incontinence more than 6 months, independent in self-care, English speakers with >20 scores on Mini-Mental State. Exclusion criteria: not provided. Lost of followup: Not reported, 32 women maintained diaries and included in the analysis.	1. Increase fluid intake by 500cc 2. Maintain fluid intake at baseline level 3. Decrease by 300cc	Self reported episodes of urinary incontinence per week	No intention to treat. Open label. Allocation concealment unclear. Baseline data not provided but some differences at baseline reported. No justification of the sample size.
Swithinbank,2005[472] Cross-over RCT to examine the effect of caffeine restriction and fluid manipulation in the treatment of patients with urodynamic stress incontinence. Duration: 4 weeks	69 women with urodynamically proven stress incontinence naive to surgery. Exclusion criteria: Urinary tract infection, hepatic, cardiac or renal disease and diabetes mellitus, use of antidepressants, anticholinergics or diuretics. Lost of followup: 9 women.	1. Increased decaffeinated fluids to 3 liters daily (20 cups) or decreased decaffeinated fluids to 750ml (5 cups) daily 2. Caffeine restriction and increased fluid intake to 2, 2,673ml /day 3. Caffeine restriction and decreased fluid intake to 872ml/day	Detailed urinary diaries that included information concerning episodes of urgency and leakage. A 24-hour pad test.	No intention to treat. Open label. Allocation concealment unclear. Baseline data not provided. Sample size justified.
Tomlinson, 1999[473] Quasi-experimental RCT to examine the effect of behavioral management for continence on involuntary urine loss in older, rural women living at home. Duration: 4 weeks	94 women living in own home with self reported urinary incontinence at least 2/week. Exclusion criteria: Urinary tract infection, bladder cancer, retention of urine, need for a caregiver. Loss of followup: 41 women completed the reported self-monitoring phase.	1. Nurse managed behavioral management for continence: caffeine intake 1-2 cups/day, fluid intake 1,800-2,400ml/day before 6:00 P.M., voiding schedule every 4 hours, bowel management. 2. Recommendation on behavioral changes without special training or monitoring.	Self reported number of episodes and severity of urine incontinence. Pad test to measure grams of lost urine.	No intention to treat. Open label. The article reported outcomes before/after active treatment (one phase of RCT) excluding 44% of randomized women. Baseline data provided for active group only. No justification for sample size.

Table F75. Effects of dietary and other lifestyle interventions on risk and progression of urinary incontinence in adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Manonai, 2006[474] Cross-over RCT to examine the effect of a soy-rich diet on urogenital symptoms in peri- and postmenopausal women. Duration: Two 12-week diet periods and two 4-week washout periods.	42 healthy perimenopausal and postmenopausal women between 45-70 years old reported at least one type of urinary incontinence. Exclusion criteria: Presence or history of sex hormone dependent malignancies, liver or renal disorders, and pathology of urogenital tract. Loss of followup: 5 women withdrew from the study because of their inability to comply with this study and 1 was lost to pelvic examination followup.	1. Self-selected diet with low-fat and low cholesterol foods and soy protein 25g in various forms of soy foods containing more than 50mg/day of isoflavones 2. Self-selected diet with low fat and low cholesterol foods	Self reported presence of stress and urge urinary incontinence, urgency and frequency of urination (defined by the International Continence Society) scores of symptoms from none (0), mild (1), moderate (2), and severe (3).	No intention to treat. Single blind (physician and cytopathologist). Allocation concealment unclear. Baseline data provided with no analysis for incontinence rate. Sample size not justified.
Brown, 2006[475] Placebo controlled multi center RCT to examine the effects of intensive lifestyle intervention or metformin on prevalence of urinary incontinence among overweight pre-diabetic women. Duration: 2.9 years	2,191 women in the Diabetes Prevention Program RCT older than 25 years, body mass index ≥24kg/m^2, a fasting plasma glucose level 95-125mg/dl, and a 2-hour post-challenge glucose level 140-199mg/dl. Exclusion criteria: Taking medications that could affect glucose tolerance or serious medical illness. Loss of followup: 234 (11%) women with missing urinary incontinence data were excluded from the analysis.	1. Intensive lifestyle therapy to lose and maintain at least 7% of initial body weight through a low fat diet and to engage in moderate intensity physical activity for at least 150 minutes/week. 2. Metformin 850mg twice daily 3. Placebo twice daily.	Self reported incontinence symptoms by frequency and type using a validated questionnaire	Intention to treat. Double-blind. Randomization was stratified by clinical center. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified for the primary outcome-diabetes prevention.
Bryant , 2002[476] RCT to examine the effects of caffeine restriction on urinary incontinence symptoms Duration: 4 weeks	95 consecutive adult patients with urinary symptoms with routine intake of caffeine >100mg every 24 hours. Exclusion criteria: Cognitive impairment, pregnancy, urinary tract infection. Lost of followup: 21%, 14 subjects failed to return for followup, 4 had anxiety or family problems, 2 were treated, 1 had intercurrent illness.	1. Education to reduce caffeine intake to <100mg/day plus bladder training. 2. Bladder training: increasing intervals between voiding; increasing fluid intake to 2 L/day; urinary deferment techniques; ceasing “just in case” voiding	Self reported frequency, urgency and leakage episodes.	No intention to treat. Open label. Allocation concealment unclear. Baseline data confirmed the adequacy of randomization. Sample size not justified.

Table F76. Effects of weight reduction on improvement in urinary continence in females

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Subak, 2005[470] N = 48	Weight reduction intervention	Delayed weight reduction intervention	Stress incontinent episodes/week, % improved	22	0	92.0	0.1	**45.0 (2.9; 701.9)**	1 (1; 530)	919 (2; 701)E
			Urge incontinent episodes/week, % improved	17	3	70.0	11.0	**5.7 (1.9; 16.8)**	2 (1; 10)	590 (100; 1,742)E
			Total incontinent episodes/week, % improved	14	4	60.0	15.0	**3.5 (1.3; 9.1)**	2 (1; 19)	450 (52; 1,216)E

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control –rate of the outcome in the active group); A - avoided; E - excessive events

Table F77. Effect of dietary intervention on urinary incontinence in females (severity measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
Manonai, 2006[474] N = 42	Self-selected diet with low fat and low-cholesterol foods and soy protein 25g in various forms of soy foods containing more than 50mg/day of isoflavones.	Self-selected diet with low fat and low cholesterol foods	% of women reporting urge incontinence and mean scores after treatments	0.2 0.5	0.3 ± 0.5	-0.1 (-0.6; 0.3)	-49.5 (-234.4; 135.5)
			% of women reporting stress incontinence and mean scores after treatments	0.7 ± 0.7	0.7 ± 0.7	0.0 (-0.5; 0.5)	0.0 (-64.2; 64.2)
			% of women reporting urgency and mean scores after treatments	0.6 ± 0.7	0.6 ± 0.7	0.0 (-0.5; 0.5)	0.0 (-72.2; 72.2)
			% of women reporting frequency and mean scores after treatments	0.6 ± 0.8	0.6 ± 0.7	0.0 (-0.5; 0.5)	0.0 (-75.7; 75.7)
Dowd, 1996[471] N = 58	Decrease daily fluid intake by 300cc	Increase daily fluid intake by 500cc	Weekly episodes of urinary incontinence	0.1	0.6		
Swithinbank, 2005[472] N = 48	Caffeine restriction and decreased fluid intake to 872ml/day	Caffeine restriction and increased fluid intake to 2,673 ml/day	Voiding frequency	6.3 ± 0.4	8.3 ± 1.3	**-2.1 (-2.6; -1.5)**	-25.1 (-31.7; -18.4)
		Caffeine restriction and increased fluid intake to, 2,673 ml/day	Number of daily wetting episodes	0.5 ± 0.8	0.7 ± 1.2	-0.2 (-0.6; 0.2)	-28.8 (-92.4; 34.7)
	Increased decaffeinated fluids to 3 liters daily (20 cups) or decreased caffeinated fluids to 750ml/day (5 cups)	Baseline caffeine intake	Voiding frequency	7.0 ± 1.0	7.2 ± 0.6	-0.3 (-0.7; 0.2)	-3.5 (-9.7; 2.7)
		Baseline caffeine intake	Number of daily wetting episodes	0.8 ± 0.6	1.6 ± 0.6	**-1.4 (-1.9; -0.9)**	-86.9 (-117.9; -55.9)
	Caffeine restriction and decreased fluid intake to 872ml/day	Caffeine restriction and increased fluid intake to 2,673ml/day	24 hour pad weight increase (gm)	6.9 ± 3.5	7.9 ± 5.9	-0.2 (-0.7; 0.2)	-2.6 (-8.2; 3.0)

Table F77. Effect of dietary intervention on urinary incontinence in females (severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
	Increased decaffeinated fluids to 3 liters daily (20 cups) or decreased caffeinated fluids to 750ml/day (5 cups)	Baseline caffeine intake	24 hour pad weight increase, gm	7.1 ± 2.5	7.6 ± 5.4	-0.1 (-0.6; 0.3)	-1.6 (-7.4; 4.3)

Bold- significant differences in outcomes at 95%confidence level

Table F78. Effects of diet and weight management on urinary incontinence in females (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Manonai, 2006[474] N = 42	Self-selected diet with low fat and low cholesterol foods and soy protein 25g in various forms of soy foods containing more than 50mg/day of isoflavones	Self selected diet with low fat and low cholesterol foods	% of women reporting frequency and mean scores after treatment	18	16	50.0	44.4	1.1 (0.7; 1.8)		
			% of women reporting stress incontinence and mean scores after treatment	18	0	51.1	0.1	**37.0 (2.3; 591.5)**	2 (2; 761)	510 (1; 591)E
			% of women reporting urge incontinence and mean scores after treatment	6	8	16.7	22.2	0.8 (0.3; 1.9)		
			% of women reporting urgency and mean scores after treatment	21	18	58.3	50.0	1.2 (0.8; 1.8)		
Brown, 2006[475] N = 1,957	Intensive lifestyle therapy to lose and maintain at least 7% of initial body weight through a low fat diet and to engage in moderate-intensity physical activity for at least 150 minutes each week	Placebo twice daily	Prevalence of urge incontinence after treatment	156	169	23.7	25.6	0.9 (0.8; 1.1)		
			Prevalence of stress incontinence after treatment	206	242	31.3	36.7	0.9 (0.7; 1.0)		

Table F78. Effects of diet and weight management on urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
	Metformin 850mg twice daily	Placebo twice daily	Prevalence of stress incontinence after treatment	252	242	39.7	36.7	1.1 (0.9; 1.2)		
			Prevalence of urge incontinence after treatment	182	169	28.7	25.6	1.1 (0.9; 1.3)		

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in1 patient =1/(rate of the outcome in the control –rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control –rate of the outcome in the active group); A - avoided; E - excessive events

Table F79. Effects of dietary and other lifestyle modifications on perceived urinary incontinence in males and females from the community (severity measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95%CI)
Bryant, 2002[476] N = 95 95% female	Education to reduce caffeine intake to <100mg/day plus bladder training	Bladder training	Number of voids/24 hours	6.8 ± 2.0	7.9 ± 2.6	**-0.5 (-0.9; -0.1)**	-6.0 (-11.2; -0.8)
			Occasions of urgency/24 hours	1.6 ± 1.9	3.2 ± 2.8	**-0.7 (-1.1; -0.3)**	-20.9 (-33.9; -8.0)
			Occasions of leakage/24 hours	1.2 ± 1.9	1.4 ± 1.7	-0.1 (-0.5; 0.3)	-7.9 (-36.7; 20.8)

Bold- significant differences in outcomes at 95% confidence level

Table F80. Effects of behavioral interventions on female urinary incontinence related to pregnancy and birth

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Chiarelli, 2002[477] RCT to examine the effectiveness of physiotherapist delivered intervention to prevent urinary incontinence among women three months after giving birth. Duration: 3 months	720 women 48 hours after forceps or ventouse deliveries or their babies with a birth weight of 4,000g or more. Lost of followup: 6%	1. Training in pelvic floor exercises and incorporated strategies to improve adherence. 2. Usual postpartum care	Self reported in bladder diary and during phone survey "occasionally," "often," or "always" incontinence symptoms: -leaked even small amounts of urine when coughing, sneezing, laughing, or lifting -gone to the toilet urgently for fear of leak -leaked even small amounts before using the toilet -leaked even small amounts on way to the toilet or immediately as needed	Intention to treat. Single blind (physiotherapist). Allocation concealment adequate. Results adjusted to baseline differences. Sample size justified.
Reilly, 2003[478] RCT to examine the effects of supervised pelvic floor exercises antenatally on incidence of postpartum stress incontinence in at-risk primigravidae women. Duration: 5 months	268 primigravidae women in antenatal clinic at ~20 weeks of gestation with bladder neck mobility, on standardized valsalva, of 5mm or more linear movement. Exclusion criteria: Urge incontinence. Loss of followup: 101 due to unwilling to travel to the hospital dislike of perineometry and ultrasound.	1. Supervised by physiotherapist pelvic floor exercises 1/month before delivery: 3 repetitions of 8 contractions each held for 6 seconds to 2 minutes, rest repeated 2/day. At 34 weeks of gestation the number of contractions per repetition was increased to 12. 2. Verbal advice on pelvic floor exercises from their midwives antenatally	Self reported postpartum stress incontinence. Volume of leakage using one-hour International Continence Society pad test. Pelvic floor muscle strength by perineometry	Intention to treat. Single blind (observers to assess outcomes) Simple randomization with pseudo-random numbers generated by computer. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F80. Effects of behavioral interventions on female urinary incontinence related to pregnancy and birth (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Sampselle,1998[479] RCT to examine the effect of pelvic muscle exercise on postpartum symptoms of stress urinary incontinence in primigravidas during pregnancy and postpartum. Duration: 12 months	72 primigravidas at 20 weeks of gestation, 18 years or older with negative history of genitourinary pathology, permanent residents in the area, able to read and understand English. Loss of followup: 8 not willing to participate, 6 moved from the area, 5 conceived the second child during 12 months after the first birth, 7 provided incomplete incontinence information.	1. Standardized instruction in pelvic muscle exercise 2. Routine care with no systematic pelvic muscle exercise instruction	Self reported stress urinary incontinence scores by severity from 0 - no leakage to 3 - soaking. Pelvic muscle strength measured with a new speculum—maximum voluntary contraction force of pelvic muscle	Intention to treat. Single blind (observers to assess outcomes). Simple randomization generated by computer. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Chiarelli, 2004[480] followup to Chiarelli, 2002[477] RCT to examine the effects of physiotherapist-delivered promotion of pelvic floor exercise frequency on continence status for women at 12 months postpartum Duration: 12 months	720 women 48 hours after forceps or ventouse deliveries or their babies with a birth weight of 4,000g or more. Loss of followup: 13.2% in intervention and 14.3% in the control groups.	1. Training in pelvic floor exercises and incorporated strategies to improve adherence. 2. Usual postpartum care	Self reported in bladder diary and during phone survey “occasionally,” “often,” or “always” incontinence symptoms: -leaked even small amounts of urine when coughing, sneezing, laughing, or lifting -gone to the toilet urgently for fear of leak -leaked even small amounts before using the toilet -leaked even small amounts on way to the toilet or immediately as needed.	Intention to treat. Single blind (physiotherapist). Allocation concealment adequate. Results adjusted to baseline differences. Sample size justified.
Meyer, 2001[481] RCT to examine the effect of pelvic floor education after vaginal delivery on pelvic floor characteristics in nulliparous women. Duration: 10 months	107 white nulliparous women Exclusion criteria: Pregnancy complications (twin gestation, diabetes, or preterm labor, hemorrhage from low-lying placenta), women with beginning labor, history of urinary infections. Loss of followup- not reported.	1. 12 sessions of pelvic floor exercises with 20 minutes of biofeedback and 15 minutes of electrostimulation with an electrode placed in the lower third of the vagina. 2. No training	Self reported urinary incontinence using questionnaire, perineosonography, urethral pressure profiles, and intravaginal and intra-anal pressure recordings during pelvic floor contraction.	Intention to treat not stated. Open label. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F80. Effects of behavioral interventions on female urinary incontinence related to pregnancy and birth (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Labrecque, 2000[482] RCT to examine the effects of perineal massage performed during pregnancy on perineal symptoms after delivery. Duration of followup: 3 months	Pregnant women with (n = 493) and without (n = 1,034) a previous vaginal birth. Exclusion criteria: High risk of cesarean delivery, including previous cesarean delivery for cephalopelvic disproportion; multiple gestation; placenta previa; severe fetal growth restriction; breech presentation; preeclampsia; nonparticipating physicians; outbreak of genital herpes during the current pregnancy, inability to speak French or English, inability to understand the instructions, and already doing the massage. Loss of followup: 0.3%	1. Self administered perineal massage daily from the 34th or 35th week of pregnancy until delivery introducing 1 or 2 fingers 3 to 4cm deep into the vagina and applying and maintaining pressure. 2. Usual obstetric care.	Self reported urinary and incontinence as ever lost urine involuntarily (accidentally), when coughing, sneezing, laughing, or running. Response choices: never, less than once per week, 1 to 6 times a week, once a day, and more than once a day.	Intention to treat. Single-blind. Central randomization balanced in blocks of 4 or 6 stratified by history of previous vaginal birth, specialty of the attending physician and hospital. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Glazener, 2001[483] RCT to examine the effect of nurse assessment with reinforcement of pelvic floor muscle training exercises and bladder training among women with persistent postnatal incontinence. Duration: 12 months	747 women with urinary incontinence (defined as any involuntary loss of urine) 3 months postnatally, living within a 50km radius and who delivered in these units during a 12 month recruitment period. Exclusion criteria: mothers of stillborn or died neonates. Loss of followup: 25% in active and 35% in the control group.	1. Assessment by nurses of urinary incontinence with conservative advice on pelvic floor exercises (of 8-10 sessions each day of fast and slow contractions with the aim of 80-100 contractions daily) at five, seven, and nine months after delivery supplemented with bladder training if appropriate at seven and nine months. 2. The control group did not receive any visits from research nurses but received peripartum preparation, which sometimes included pelvic floor exercises, and could seek medical advice	Self reported persistence of any urinary incontinence; severe incontinence - at least once a week; type of incontinence, stress - during cough, laugh, sneeze, run, jump, or play sport; urge - feel an urgent desire to pass water and are unable to reach the toilet in time; mixed—combination of stress and urge.	Intention to treat. Single blind. Computer generated randomization stratified by parity (4 versus fewer), method of delivery (caesarean versus other), and frequency of incontinence (at least once a week versus less). Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F80. Effects of behavioral interventions on female urinary incontinence related to pregnancy and birth (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Glazener, 2005[484] Glazener, 2001[483] RCT to examine the effect of nurse assessment with reinforcement of pelvic floor muscle training exercises and bladder training among women with persistent postnatal incontinence	747 women with urinary incontinence (defined as any involuntary loss of urine) 3 months postnatally, living within a 50km radius and who delivered in these units during a 12 month recruitment period. Exclusion criteria: Mothers of stillborn or died neonates. Loss of followup: 29% in active and 31% in the control group.	1. Assessment by nurses of urinary incontinence with conservative advice on pelvic floor exercises (of 8-10 sessions each day of fast and slow contractions with the aim of 80-100 contractions daily) at five, seven, and nine months after delivery supplemented with bladder training if appropriate at seven and nine months. 2. The control group did not receive any visits from research nurses but received peripartum preparation, which sometimes included pelvic floor exercises, and could seek medical advice	Self-reported 6 years after intervention persistence of any urinary incontinence; severe incontinence - at least once a week; type of incontinence—stress during cough, laugh, sneeze, run, jump, or play sport; urge—feel an urgent desire to pass water and are unable to reach the toilet in time; mixed—combination of stress and urge.	Intention to treat. Single blind. Computer generated randomization stratified by parity (4 versus fewer), method of delivery (caesarean versus other), and frequency of incontinence (at least once a week versus less). Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Adherence to the intervention was the same in active and control group 6 years at followup. Sample size justified.
Sleep,1987[485] RCT to examine the effects of pelvic floor exercise on urinary incontinence in postnatal care. Duration: 3 months postpartum.	1,800 women 24 hours after vaginal delivery. Exclusion criteria: Mothers of stillborn or ill babies. Loss of followup: 10.6%	1. Standard care: initial instruction on pelvic floor exercise and advice to repeat as often as possible. 2. Intensive exercise care: initial instruction on pelvic floor exercise, extra session of exercise daily, visits and phone calls by community midwives, reminders, feedback to self measure squeeze pressure, and voiding diary.	Self reported urinary incontinence and frequency of wet episodes/day	Intention to treat. Open label. Randomization schedule not reported. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.
Mørkved , 2003[486] RCT to examine the effects of intensive pelvic floor muscle training during pregnancy on prevention of UI. Duration of intervention: 12	301 healthy nulliparous women ≥18 years, with a single live fetus at routine ultrasound scan. Exclusion criteria: pregnancy complications, high risk for preterm labor, pain during pelvic floor muscle contractions, ongoing urinary tract infection, diseases that could interfere with participation, residency too far from	1. Training in intensive pelvic floor muscle and general exercises with physiotherapist for 60 minutes/week. Exercise at home twice a day in a preferred position for 12 weeks (between weeks 20 and 36 of pregnancy). Near maximal contractions of 6–8 seconds for 3-4 fast	Self-reported symptoms of urinary incontinence: involuntary leakage >1/week during the last month. Pelvic floor muscle strength (vaginal squeeze pressure [cm/H2O]) measured by a vaginal balloon connected to a pressure transducer	Intention to treat. Single-blind. Randomization in blocks of 32 maximum. Allocation concealment not adequate. Baseline data confirmed the

Table F80. Effects of behavioral interventions on female urinary incontinence related to pregnancy and birth (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
weeks. Duration of follow up: 36 weeks of pregnancy and 3 months after childbirth	Trondheim to attend weekly training. Loss of follow up:4%	contractions and 6 second resting. 2. Control group: customary information given by midwife or general practitioner		adequacy of randomization. Sample size justified.

Table F81. Effects of conservative management on female urinary incontinence related to pregnancy and birth (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)
Glazener, 2001[483] N = 747	Assessment by nurses of urinary incontinence with conservative advice on pelvic floor exercises supplemented with bladder training.	Usual peripartum preparation	Any pad use	41	55	14.9	22.4	0.8 (0.5; 1.1)
			Any incontinence at 12 months postpartum in women with baseline stress incontinence	91	87	24.5	23.1	1.1 (0.8; 1.4)
			Severe incontinence (at least once a week) at 12 months postpartum	55	78	14.8	20.7	0.7 (0.5; 1.0)
			Severe incontinence in women with high initial severity (>1/week)	43	65	11.6	17.3	0.7 (0.5; 1.0)
			Severe incontinence in women with stress incontinence initially	29	37	7.8	9.8	0.8 (0.5; 1.3)
			Urinary incontinence (any)	167	169	59.9	69.0	1.0 (0.9; 1.2)
			Urinary incontinence (severe)	55	78	19.7	31.8	0.7 (0.5; 1.0)

Table F81. Effects of conservative management on female urinary incontinence related to pregnancy and birth (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)
Glazener, 2005[484] N = 747	Assessment by nurses of urinary incontinence with conservative advice on pelvic floor exercises supplemented with bladder training	Usual peripartum preparation	Self reported presence of any urinary incontinence 6 years after randomization	201	201	76.0	79.0	1.0 (0.9; 1.2)
			Urinary incontinence at 6 years after index delivery in women we severe (>1 week) initial incontinence	122	102	80.0	80.0	1.2 (1.0; 1.5)
			Urinary incontinence at 6 years after index delivery in women with initial stress incontinence	111	97	75.0	77.0	1.2 (0.9; 1.5)
			Urinary incontinence at 6 years after index delivery in women with severe initial incontinence (>1/week)	122	102	80.0	80.0	1.2 (1.0; 1.5)
			Using pads	72	59	28.0	24.0	1.2 (0.9; 1.7)

Table F82. Effects of conservative management on female urinary incontinence related to pregnancy and birth (self reported severity and impact on life)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Glazener, 2001[483] N = 747 100% female	Assessment by nurses of urinary incontinence with conservative advice on pelvic floor exercises supplemented with bladder training	Usual peripartum preparation	Mean No of pad changes	0.2 ± 0.0	0.3 ± 0.1	**-2.9 (-3.1; -2.7)**	-864.1 (-925.0; -803.2)
			Mean overall rating of severity (0=no problem at all to 10=can't think of anything worse)	2.8 ± 0.2	3.6 ± 0.3	**-3.1 (-3.3; -2.9)**	-87.1 (-93.0; -81.1)

Bold- significant differences in outcomes at 95% confidence level

Table F83. Effects of behavioral interventions on female urinary incontinence related to pregnancy and births (events)

Author Sample	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Labrecque, 2000[482] N = 1,034	Self administered perineal massage daily from the 34th or 35th week of pregnancy until delivery introducing 1 or 2 fingers 3 to 4cm deep into the vagina and applying and maintaining pressure	Usual obstetric care	Urinary continence in women with no previous vaginal birth	381	367	73.5	71.3	1.0 (1.0; 1.1)		
			Urinary continence in women with previous vaginal birth	163	151	66.3	61.1	1.1 (0.9; 1.2)		
Labrecque, 2000[482] N = 493	Self administered perineal massage daily from the 34th or 35th week of pregnancy until delivery introducing 1 or 2 fingers 3 to 4cm deep into the vagina and applying and maintaining pressure	Usual obstetric care	Urinary incontinence >1/day in women with previous vaginal birth	9	8	3.7	3.2	1.1 (0.4; 2.9)		

Table F83. Effects of behavioral interventions on female urinary incontinence related to pregnancy and births (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Labrecque, 2000[482] N = 1,034	Self administered perineal massage daily from the 34th or 35th week of pregnancy until delivery introducing 1 or 2 fingers 3 to 4cm deep into the vagina and applying and maintaining pressure	Usual obstetric care	Urinary incontinence >1/day in women with no previous vaginal birth	13	12	2.5	2.4	1.1 (0.5; 2.3)		
Meyer, 2001[481] N = 107	12 sessions of pelvic floor exercises with 20 minutes of biofeedback and 15 minutes of electro stimulation	Usual care	% recovering normal pelvic floor contraction	21	18	41.0	33.0	1.3 (0.8; 2.1)		
Chiarelli, 2002[477] N = 720	Training in pelvic floor exercises and incorporated strategies to improve adherence	Usual postpartum care	Prevalence of self reported urinary incontinence	115	134	31.0	38.4	0.8 (0.7; 1.0)		
			% of self reported severe mixed incontinence	37	59	10.1	16.8	**0.6 (0.4; 0.9)**	15 (10; 46)	67 (22; 100)A
Reilly, 2002[478] N = 268	Supervised by physiotherapist pelvic floor exercises 1 month before delivery	Verbal advice on pelvic floor exercises	Self-reported postpartum stress incontinence	23	36	19.2	32.7	**0.6 (0.4; 0.9)**	7 (5; 40)	135 (25; 205)A
			Positive pad test (+ v >1g)	7	8	9.5	10.8	0.8 (0.3; 2.1)		

Table F83. Effects of behavioral interventions on female urinary incontinence related to pregnancy and births (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Sampselle, 1998[479] N = 72	Standardized instruction in pelvic muscle exercise	Routine care with no systematic pelvic muscle exercise instruction	Odds ratio of improved maximum voluntary contraction force of pelvic muscle 1 year after vaginal birth					1.0 (1.0; 1.0)		
		Routine care with no systematic pelvic muscle exercise instruction	Odds ratio of stress incontinence symptoms 1 year after vaginal and cesarean birth					1.0 (1.0; 1.0)		
			Odds ratio of stress incontinence symptoms 1 year after vaginal birth					1.0 (1.0; 1.0)		
Chiarelli, 2004[480] N = 720	Training in pelvic floor exercises and incorporated strategies to improve adherence	Usual postpartum care	Self-reported incontinence	101	100	34.4	36.4	0.9 (0.8; 1.2)		
Sleep, 1987[485] N = 1,800	Intensive exercise care: initial instruction on pelvic floor exercise, extra session of exercise daily,	Standard care: initial instruction on pelvic floor exercise and advice to repeat as	Cured (no recorded urinary incontinence)	21	22	2.3	2.4	1.0 (0.5; 1.7)		
			Self reported urinary incontinence > 3times/day	9	9	1.0	1.0	1.0 (0.4; 2.5)		

Table F83. Effects of behavioral interventions on female urinary incontinence related to pregnancy and births (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
	visits and phone calls by community midwives, reminders, feedback to self measure squeeze pressure, and voiding diary	often as possible	Self reported urinary incontinence: sometimes wearing of pads	29	33	3.2	3.7	0.9 (0.5; 1.4)		
Mørkved, 2003[486] N = 301	Intensive pelvic floor muscle training and general exercises	Customary information given by midwife or general practitioner	Self-reported urinary incontinence at 36 wk of pregnancy	48	74	32.43	48.37	**0.67 (0.50;0.89)**	6 (4; 19)	4 (1.9; 159)A
	Intensive pelvic floor muscle training and general exercises	Customary information given by midwife or general practitioner	Self-reported urinary incontinence at 3 months after delivery	29	49	19.59	32.03	**0.61 (0.41; 0 .91)**	8 (5; 36)	124 (28; 189)A
	Intensive pelvic floor muscle training and general exercises	Customary information given by midwife or general practitioner	Self-reported urinary incontinence at 36 wk of pregnancy in Continent before pregnancy	29	52	19.59	33.99	**0.58 (0.39; 0.85)**	7 (5; 20)	144 (49; 208)A

Table F83. Effects of behavioral interventions on female urinary incontinence related to pregnancy and births (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
	Intensive pelvic floor muscle training and general exercises	Customary information given by midwife or general practitioner	Self-reported urinary incontinence at 36 wk of pregnancy in Continent before and at 20 wk	13	30	8.78	19.61	**0.45 (0.24; 0.82)**	9 (7; 29)	108 (34; 148)A
	Intensive pelvic floor muscle training and general exercises	Customary information given by midwife or general practitioner	Self-reported urinary incontinence at 3 months after delivery in Continent before pregnancy	14	28	9.46	18.30	**0.52 (0.28; 0.94)**	11 (8; 95)	88 (11; 131)A
	Intensive pelvic floor muscle training and general exercises	Customary information given by midwife or general practitioner	Self-reported urinary incontinence at 3 months after delivery in Continent before and at 20 wk	9	13	6.08	8.50	0.72 (0.32; 1.62)		

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control –rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control –rate of the outcome in the active group); A - avoided; E- excessive events

Table F84. Effects of behavioral intervention on urinary incontinence related to pregnancy and birth (urodynamic outcomes)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)
Reilly, 2002[478] N = 268	Supervised by physiotherapist pelvic floor exercises once per month before delivery	Verbal advice on pelvic floor exercises	Change in bladder neck mobility, mm	-0.2 ± 0.4	-0.1 ± 0.5	-0.2 (-0.4; 0.1)
			Perineometry (cm/H2O)	11.5 ± 7.9	10.5 ± 5.5	0.1 (-0.1; 0.4)
Meyer, 2001[481] N = 107	12 sessions of pelvic floor exercises with 20 minutes of biofeedback and 15 minutes of electro stimulation	Usual care	Bladder neck position, standing (mm)	27.0 ± 4.0	27.0 ± 5.0	0.0 (-0.4; 0.4)
			Bladder neck mobility, supine (mm)	14.0 ± 5.0	15.0 ± 6.0	-0.2 (-0.6; 0.2)
			Functional urethral length (mm)	30.0 ± 6.0	31.0 ± 7.0	-0.2 (-0.5; 0.2)
			Area of continence at stress (mm2)	616.0 ± 299.0	588.0 ±328.0	0.1 (-0.3; 0.5)
			Maximal urethral closure pressure at stress (cm/H2O)	83.0 ± 23.0	89.0 ± 30.0	-0.2 (-0.6; 0.2)
			Pressure transmission ratio values (%) in the central third of the functional urethral length	81.0 ± 23.0	77.0 ± 27.0	0.2 (-0.2; 0.5)
			Intravaginal pressures (cm/H2O)	33.0 ± 22.0	41.0 ± 27.0	-0.3 (-0.7; 0.1)
			Intra-anal pressures (cm/H2O)	36.0 ± 20.0	43.0 ± 24.0	-0.3 (-0.7; 0.1)

Table F85. Effects of behavioral interventions on risk and progression of incontinence in community dwelling females

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Diokno, 2004[487] Duplicate: Sampselle, 2005[488] RCT to examine the effects of behavioral modification program on incidence of urinary incontinence in older women. Duration: 1 year.	359 postmenopausal, continent women (0-5 days of incontinent episodes in the previous year) 55 years and older. At baseline 2 groups reported identical 39% absolute continence and zero UI days. 61% of participants reported 1 to 5 UI episodes in year. Exclusion criteria: neurologic diseases, mini-mental scores <24, positive paper towel cough test, grade 4 uterine prolapse. Loss of followup: 9% in the control and 14% in active groups did not return communication, relocated or experienced changes in personal health or the health of a family member.	1. 2 hour classroom presentation on behavioral modification program: pelvic floor muscle training, bladder training, and individualized test of knowledge, adherence, and skills to reinforce the technique as needed. 2. Usual care	Self reported in the standardized Medical Epidemiologic and Social Aspects of Aging (MESA) questionnaire absolute continence: urinary incontinence episodes no more than 5 days in the last 12 months. Voiding frequency and intervoid interval reported in 3-day voiding diary. Displacement and pressure digital scores from test for pelvic floor muscle strength.	Intention to treat not stated. Single blind (nurse examiner). Randomizations in blocks of 16 women to provide balanced recruitment between groups. Allocation concealment adequate. Results adjusted to baseline differences. Sample size not justified.
Dumoulin, 2004[489] RCT to compare the effectiveness of multimodal supervised physiotherapy programs among women with persistent postnatal stress urinary incontinence. Duration: 2 months	64 premenopausal women younger than 45 years presenting symptoms of stress urinary incontinence at least once per week 3 months or more after their last delivery. Exclusion criteria: Current pregnancy, urinary incontinence before pregnancy, previous surgery for stress incontinence, moderate to severe urogenital prolapse, involuntary detrusor contraction on cystometry neurologic or psychiatric disease, or a major medical condition, taking medication that could interfere with their evaluation or treatment, inability to understand French or English instructions. Loss of followup: 2, plus 2 did not attend the final examination and were excluded from the analysis.	1. Pelvic floor rehabilitation: 15 minute electrical stimulation of the pelvic floor muscle; then 25 minute pelvic floor muscle exercise program with biofeedback, which included strengthening and motor relearning exercises and a home exercise 5 days/week. 2. Pelvic floor rehabilitation plus abdominal training: in addition to PFE 30 minutes of deep abdominal muscle training consisting of isolation, reeducation, and functional retraining of the transversus abdominis 3. Relaxation massage for the back and extremities by physiotherapist. They were asked not to exercise their pelvic floor muscles at home.	1. 20 minute pad test with standardized bladder volume. 2. Perceived symptoms and burden of incontinence using a Visual Analog Scale Urogenital Distress Inventory (19-items); Incontinence Impact Questionnaire (26 items) focusing on daily living, social interaction, sex life, and self-perception. 3. Pelvic floor maximum strength and rapidity of contraction using static pelvic floor muscle dynamometer	Intention to treat not stated. Single blind. Stratified randomization by the results from pad test using a balanced block randomization schedule generated from a table of random numbers. Allocation concealment adequate Baseline data confirmed adequacy of randomization. Sample size justified.

Table F85. Effects of behavioral interventions on risk and progression of incontinence in community dwelling females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Goode, 2003[490] RCT to examine whether pelvic floor electrical stimulation increases efficacy of behavioral training for community-dwelling women with stress incontinence Duration: 8 weeks	200 ambulatory, nondemented, community-dwelling women ages 40 to 78 years with urinary incontinence (at least 2 stress incontinence episodes per week on the 2-week baseline bladder diary) confirmed during urodynamic testing. Exclusion criteria: Continual leakage, postvoid residual urine volume >150ml, severe uterine prolapse, congestive heart failure, hemoglobin A_{1C} ≥9, or impaired mental status (Mini-Mental State Examination score <24). Loss of followup: 18.2% in the behavioral group, 11.9% in the pelvic floor electrical stimulation group, and 37.3% in the self-help booklet.	1. Behavioral training (biofeedback-assisted pelvic floor muscle training, home exercises, bladder control strategies, and self-monitoring with bladder diaries). Anorectal biofeedback (~20 minutes) with 3-balloon probe to measure sphincter pressure and rectal pressure. Pelvic floor muscle exercises:15 repetitions of 2- to 4-second contractions with equal periods of relaxation/day. Bladder diary to use "stress strategies" for prevention of urine leakage 2. Behavioral training plus pelvic floor electrical stimulation 15 minutes/day 3. Control: self-administered behavioral training administered with a self-help booklet with suggestions for isolating the pelvic floor muscles, progressive home exercise, self monitoring, and bladder control strategies.	Self reported % reduction in the number of incontinent episodes documented in bladder diaries. Leakage in stress test and bladder capacity during urodynamic examination.	Intention to treat. Open label. Computer-generated stratified by types and severity of incontinence and race randomization with block size of 6. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F85. Effects of behavioral interventions on risk and progression of incontinence in community dwelling females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Wyman, 1998[491] RCT to examine the efficacy of bladder training, pelvic muscle exercise with biofeedback-assisted instruction, and combination therapy, on urinary incontinence in women. Duration: 12-week intervention program, 3 month followup	204 community-dwelling women age 45 years and older diagnosed with genuine stress incontinence, (urine loss at least once per week), with urodynamic evidence of genuine stress incontinence, and mentally intact (Mini-Mental State Examination Score >23). Exclusion criteria: Reversible causes of urinary incontinence, uncontrolled metabolic conditions, residual urine volume after voiding >100ml, urinary tract infection, genitourinary fistula or indwelling catheterization, and inability to correctly perform a pelvic muscle contraction on digital examination. Loss of followup: 6% withdrew either immediately after randomization or during the intervention visits, 8% failed to keep their followup appointment or to mail in completed instruments at the 3-month followup.	Structured 12-week program of patient education, self-monitoring of voiding behavior with daily treatment logs, compliance assessment, and positive reinforcement administered by trained registered nurses. 1. Bladder training with schedule voiding interval from 30-60 minutes (baseline diary) to increase by 30 minutes each week. 2. The pelvic muscle exercise with 5 fast (3 second) contractions and 10 sustained (10 second) contractions with 10-second relaxation periods between contractions twice a day. Sustained contractions were increased by 10 contractions/week so that by the third week a total of 10 fast and 40 sustained contractions were performed daily (total = 50 contractions). Visual and verbal biofeedback to observe pelvic and abdominal muscle pressure during fast, sustained, and preventive contractions recorded with vaginal balloon device and displayed on a strip-chart recorder. 3. Combination therapy of bladder training and pelvic muscle exercise.	Self-reported in a standardized diary the number of weekly incontinent episodes. Patient perception of improvement and treatment satisfaction. Pad weight test.	No intention to treat. Open label. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F85. Effects of behavioral interventions on risk and progression of incontinence in community dwelling females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Theofrastous, 2002[492] RCT to examine the efficacy of bladder training and pelvic muscle exercise with biofeedback-assisted instruction on urinary incontinence in women. Duration: 12-week intervention program, 3 month followup	137 community-dwelling women age 45 years and older diagnosed with genuine stress incontinence, (urine loss at least once per week), with urodynamic evidence of genuine stress incontinence, and mentally intact (Mini-Mental State Examination Score >23). Exclusion criteria: Reversible causes of urinary incontinence, uncontrolled metabolic conditions, residual urine volume after voiding >100ml, urinary tract infection, genitourinary fistula or indwelling catheterization, and inability to correctly perform a pelvic muscle contraction on digital examination. Loss of followup: 6% withdrew either immediately after randomization or during the intervention visits, 8% failed to keep their followup appointment or to mail in completed instruments at the 3- month followup.	1. Pelvic floor muscle training: 4 office biofeedback sessions and home exercise with two sets of 5 quick and 10 sustained contractions with 10-second rest periods increased to 5 quick and 20 sustained contractions 2/day for a total of 50 contractions per day. Reinforcement with home audiocassette tapes, 4 weekly 30-minute biofeedback sessions, and regular contact with the research nurses. 2. Bladder training: initial voiding interval of 30 or 60 minutes increased each week depending on the subject's tolerance of the schedule to 22.5 hours.	Self reported urinary incontinence episodes/week using diaries and vaginal pressure measurements by using balloon manometry.	No intention to treat. Open label. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F85. Effects of behavioral interventions on risk and progression of incontinence in community dwelling females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Alewijnse,2003[493] RCT to examine the effectiveness of pelvic muscle floor exercise therapy supplemented with a health education program urinary incontinence among women. Duration: 14-22 weeks of intervention and 1 year followup.	129 community-dwelling women over 17 years old with urinary incontinence, able ability to complete questionnaires in Dutch language. Exclusion criteria: Continence, neurological conditions, venereal disease, viral infections, using medication that may impact incontinence, pregnancy or 3 months after delivery, after surgical treatment for incontinence, and women with physical impairments. Severe prolapse, vaginal atrophy, and urinary tract infection were not exclusion criteria. Loss of followup: 20% for different reasons, one died.	1. Bladder training with voiding frequency of ~7 voidings/day and pelvic floor muscle exercise: 10 slow twitch contractions (10-30 seconds) and 10 fast twitch contractions (2-3 seconds), 5 times/day, each contraction being followed by relaxation; correct toileting and drinking behavior (1,500-2,000ml/day); techniques to prevent leakage. Combination of PFME with Health education therapy. 2. Reminder intervention: information and reminders of PFME therapy and adherence behavior 3. Reminder and self-help guide with individualized information on coping with urinary incontinence, tips to increase adherence behavior, and relapse prevention strategies to support the self-management process. 4. Reminder, self-help guide and counseling intervention: addition of counseling by physiotherapists, structural oral feedback, and reinforcement to promote adherence behavior.	Self reported weekly frequency of wet episodes and change in frequency of wet episode.	Intention to treat. Open label. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.
Aukee, 2004[494] RCT to examine the effectiveness of pelvic floor training with home biofeedback device among women with tress urinary incontinence Duration: 12 weeks intervention, 1 year followup.	35 women 21-70 years old with urodynamically confirmed stress incontinent (maximal urethral closure pressure >20cm/H2O and cough leak point pressure >90cm/H2O). Exclusion criteria: Previous incontinence operations, genital prolapse, inability to understand instructions for home training, pregnancy, severe diseases such as malignancies in the abdominal region, multiple sclerosis and diabetes mellitus requiring insulin. Loss of followup: 1 woman at 1 year.	1. Home program with given verbal and written instructions for home practice and advise to practice for 20 minutes/day, 5 times/week. 2. Pelvic floor training by physiotherapist 5 times/12 weeks: 3-5 second contractions with 10 second intervals in supine and standing position with home biofeedback using a personal EMG-assisted biofeedback device.	Review of hospital records to identify gynecologic surgery during 1 year of followup. Pelvic floor muscle activity while supine (*m*V).	Intention to treat. Open label. Randomization was performed by a random numbers table, in blocks of four. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F85. Effects of behavioral interventions on risk and progression of incontinence in community dwelling females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Bergman, 1987[495] RCT to examine the effects of bladder training on urinary incontinence in women after surgery for stress urinary incontinence. Duration of followup: 3 months	89 women with a clinically and urodynamically proved diagnosis of genuine stress urinary incontinence after surgery for incontinence (40 revised Pereyra procedure and 49 Burch retropubic urethropexy). Exclusion criteria: Not reported. Loss of followup: None	1. "Bladder training" scheduled clamping and unclamping of the suprapubic Bonnano catheter throughout postoperative period. 2. "Nonbladder training" continuous bladder drainage with suprapubic Bonnano catheter throughout postoperative period.	Length of postoperative bladder catheterization	No intention to treat. Open label. Randomization using a randomization list. Allocation concealment unclear. Baseline data not reported. Sample size not justified.
Wang, 2004[496] RCT to examine the efficacy of pelvic floor muscle training, biofeedback-assisted PFMT , and electrical stimulation in the management of overactive bladder. Duration: 12 weeks.	120 women age 16-75 years, symptoms of overactive bladder for more than 6 months, frequency of voiding eight times or more per day, and urge incontinence one time or more per day. Exclusion criteria: pregnancy, deafness, neurologic disorders, diabetes mellitus, pacemaker or intrauterine device use, genital prolapse greater than Stage II of the International Continence Society grading system, residual urine >100ml, and urinary tract infection. Loss of followup: 14.2%	1. Pelvic floor muscle training with submaximal to maximal PFM contractions for 6 seconds 5 times and 10 fast contractions per session at least 3 times/day. 2. Biofeedback-assisted pelvic floor muscle training with an intravaginal electromyogram probe to contract or relax PFMs following the visual EMG signals. 3. Electrical stimulation in the management of overactive bladder with intravaginal electrode at the physiotherapy unit.	Self-reported urge urinary incontinence. The strength of the PFMs using palpation by way of the vagina according to the “PERFECT” scheme to assess the power (P), endurance (E), number of repetitions (R), and number of fast (1-second) contractions (F). The power is graded from 0-5, according to the Oxford grading system. PFM strength - vaginal pressure using a balloon probe connected to a pressure transducer.	No intention to treat. Single blind. Central computer-generated randomization in blocks of 6. Allocation concealment adequate. Baseline data did not confirm adequacy of randomization. Sample size justified.
Bo, 2005[497] Followup RCT to examine the effects of intensive exercise on stress urinary incontinence. Duration of followup: 6 months and 15 years	52 women with urodynamic stress urinary incontinence participated in the original RCT. Exclusion criteria: Response rate 90.4% Loss of followup: 9.6%	1. Intensive pelvic floor exercise with 8-12 maximum contractions for 6-8 seconds 3 series/day under the supervision of physical therapist for 6 months. 2. Home exercise groups	Self reported urinary incontinence and severity of lower urinary tract symptoms by the severity index and the International Consultation of Incontinence Questionnaire Urinary Incontinence Short Form	Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F85. Effects of behavioral interventions on risk and progression of incontinence in community dwelling females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Elser, 1999[498] RCT to examine the effects of pelvic floor muscle training, bladder training, or both, on urodynamic parameters in women with urinary incontinence. Duration: 12 weeks	204 women 45 years or older, ambulatory, mentally intact with urodynamic genuine stress incontinence or detrusor instability, with or without stress incontinence, experiencing 1–100 episodes of incontinence per week as recorded on the qualifying 7-day urinary diary, capable of performing a pelvic floor muscle contraction as assessed by digital exam. Exclusion criteria: Reversible cause of incontinence, uncontrolled metabolic conditions (e.g., diabetes mellitus), postvoid residual of >100ml, persistent urinary tract infection, urinary tract fistula, or indwelling catheterization. Loss of followup: 11.3%	Patient education, self-monitoring with treatment logs, compliance assessment, and positive reinforcement techniques administered by trained research nurses. 1. Pelvic floor muscle training with10 fast (3 second) contractions and 40 sustained (10 second) contractions with 10 second rest periods between contractions performed daily (total 50 contractions) in two or more exercise sets. Visual and verbal biofeedback via a strip-chart recorder of vaginal and abdominal pressures measured by vaginal balloons. 2. Bladder training. 3. Pelvic floor muscle training combined with bladder training.	Multi-channel urodynamics outcomes: first sensation to void, maximum cystometric capacity, the difference between MCC and FSV (MCC − FSV), functional urethral length, maximum urethral closure pressure, urethral closure pressure, maximum Kegel urethral closure pressure, Kegel urethral closure pressure, pressure transmission ratio, maximum pressure transmission ratio, and straining urethral axis.	No intention to treat Open label. Stratified by severity of urinary incontinence, urodynamic diagnosis, and treatment site randomization. Allocation concealment not reported. Baseline data did not confirm adequacy of randomization. Sample size justified.

Table F85. Effects of behavioral interventions on risk and progression of incontinence in community dwelling females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Tibaek, 2005[499] RCT to examine the effect of pelvic floor muscle training in women with urinary incontinence after ischemic stroke. Duration: 12 weeks	26 women 40 and 85 years old with acute ischemic stroke verified by CAT scan lasting >24 hours; stroke symptoms in at least 1 month; normal cognitive function (mini-mental state examination >25); urinary incontinence related to stroke; independent walking abilities indoors >100 meters with/without aids; independence in toilet visits. Exclusion criteria: Urinary tract infection; symptom of vaginal prolapse; chronic respiratory diseases; psychiatric diseases; other neurological diseases; does not speak Danish. Loss of followup: 8%	1. Intensive pelvic floor muscle training 1-2 times/day by specialized physiotherapist: group information on incontinence and instruction in self-palpation of PFM, motivation and instruction in home exercises with close to maximum contraction (6 second contraction/6 second rest) and endurance PFM exercise with 30% of maximum contraction as long as possible (maximum 30 second contraction/30 second rest). Group treatment: isolate PFM contraction (6 second contraction/6 second rest); strength exercises (3 second contraction/3 second rest, and 6 second contraction/6 second rest); endurance exercises (maximum 30 second contractions/30 second rest). 2. Usual care	Self reported in voiding diary time and frequency of voiding, the number of incontinence episodes, and the number of used pads.	No Intention to treat. Single blind. Randomization with a table of random numbers. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Subak, 2002[500] RCT to examine the effects of low-intensity behavioral therapy program on urinary incontinence in older women Duration of followup: 6 weeks	Women 55 years and older with self reported urinary incontinence, members of health maintenance organization, living independently in the community and functionally capable of independent toileting. Exclusion criteria: Uncontrolled diabetes mellitus, urinary tract infection, history of urinary obstruction, overflow, functional incontinence, urinary tract anomalies. Loss of followup: 19.1%	1. 6 weekly 20-minute group instructional sessions on bladder training by nurse educators and followed individualized voiding schedules. 2. Usual care	The number of incontinent episodes per week recorded in a 7-day urinary diary.	No Intention to treat. Single blind. Computer based randomization. Allocation concealment unclear. Baseline confirmed adequacy of randomization. Sample size justified.

Table F85. Effects of behavioral interventions on risk and progression of incontinence in community dwelling females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Goode, 2002[501] Placebo-controlled RCT to examine the effect of biofeedback-assisted behavioral training on urinary incontinence in older women. Duration: 8 weeks	105 ambulatory, non demented, community-dwelling women 55 and older with self-reported urge incontinence at least twice per week for >3 months with urodynamic evidence of bladder dysfunction. Exclusion criteria: Continual leakage, postvoid residual urine volume greater than 200ml, uterine prolapse past the introitus, narrow-angle glaucoma, unstable angina pectoralis, congestive heart failure, history of malignant arrhythmias, or impaired mental status. Loss of followup: 46.7%	1. Four sessions (over 8 weeks) of biofeedback-assisted behavioral training by nurse practitioners. 2. Placebo control condition, usual care	Self reported urinary incontinence and urodynamic outcomes.	No Intention to treat. Single blind. Randomization and allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size not justified.
Lagro-Janssen, 1992[502] RCT to examine the effects of pelvic floor exercises on stress incontinence and bladder training on urge incontinence. Duration: 3 months	110 women with self-reported urinary incontinence confirmed with urodynamic as stress or urge. Exclusion criteria: Not reported. Loss of followup: 3.6%	1. Pelvic floor exercises alone (stress) or bladder training (urge) or its combination (mixed) 2. Usual care	Self reported urinary incontinence	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Fantl, 1991[503] RCT to examine the effects of bladder training on urinary incontinence in older women. Duration: 6 weeks.	131 noninstitutionalized women 55 years and older with clinical and urodynamic urinary incontinence >1 leakage/week; mentally intact (Mini-Mental State Examination score >23), capable of independent toileting. Exclusion criteria: Uncontrolled diabetes, urinary tract infection, urinary obstruction, reversible cause of incontinence, permanent catheterization. Loss of followup:6.1%	1. Bladder training using 6 weekly visits included patient education; voiding schedule to have micturition from every 30-60 minutes to every 2.5-3 hours; and positive reinforcement. 2. Usual care	Self reported number of urinary incontinence episodes/week and urodynamic outcomes using standard urinary diary.	No intention to treat. Open label Randomization stratified by urodynamic incontinence. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F85. Effects of behavioral interventions on risk and progression of incontinence in community dwelling females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Dougherty, 2002[504] RCT to examine the effects of behavioral management for continence on urinary incontinence in older rural women in their homes. Duration: 6 months and followup 2 years.	218 women 55 years and older, who lived in a private residence in rural area; with involuntary urine loss >2/week of 1g/24 hours or more; without urinary tract infection. Exclusion criteria: Bladder cancer or kidney disease, indwelling urinary catheter, residual urine >100cc, needed caregiver. Loss of followup:18%	1. Behavioral management for continence: -Self-monitoring and bladder training to reduce caffeinated beverages to <2 cups/glasses, 1,500 <daily fluid intake <4000cc, no fluid consumption after 6 p.m., daytime voiding interval <4 hours, and treatment of constipation. -Pelvic muscle exercise with biofeedback: 15 repetitions per day increased by 15 repetitions every 3 weeks to 45 contractions/day) three times a week for 12 weeks. 2. Control group	Severity of urine loss was evaluated by pad test. Self reported episodes of urine loss, micturition frequency, voiding interval.	Intention to treat. Open label minimization. Randomization with minimization to balance by severity, age, bacteriuria ethnicity, and caregiver. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size not justified.
Burgio, 2002[505] RCT to examine the effects of biofeedback as a part of complex behavioral training program for urge incontinence in community-dwelling older women. Duration: 8 weeks	222 ambulatory, nondemented, community-dwelling women ages 55 to 92 years with urge incontinence or mixed incontinence >2 times/week for at least 3 months, and with urodynamic evidence of bladder dysfunction (detrusor instability during filling or provocation or maximal cystometric capacity of ≤400ml). Exclusion criteria: Continual leakage, postvoid residual urine volume >150ml, severe uterine prolapse past the vaginal introitus, decompensated congestive heart failure, or impaired mental status (Mini-Mental State Examination score <24). Loss of followup: 5.7%	1. Biofeedback-assisted behavioral training implemented by nurse practitioners. Abdominal pressure and sphincter responses were measured with 3-baloon probe inserted in rectum. Pelvic floor muscle exercise with 10 second contractions/10 second relaxation for 45 minutes/day. 2. 4 visits of behavioral training without biofeedback (verbal feedback based on vaginal palpation). Pelvic floor muscle exercise with 10 second contractions/10 second relaxation for 45 minutes/day. 3. Self-administered behavioral treatment using a self-help booklet to advise pelvic floor exercise and bladder control.	Self reported number of incontinence episodes documented in bladder diaries	Intention-to-treat. Open label. Randomization stratified by race, type, and severity of incontinence. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F85. Effects of behavioral interventions on risk and progression of incontinence in community dwelling females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Wyman, 1997[506] RCT to examine the effects of bladder training on quality of life in older women with urinary incontinence. Duration: 6 weeks.	131 women 55 years and older, ambulatory, mentally intact, independent residents in the community with urodynamic stress urinary incontinence >1 episode/week. Exclusion criteria: Metabolic decompensation, urinary tract infection, outlet obstruction, fistula, reversible cause of urinary incontinence, permanent indwelling catheter. Loss of followup: 6%	1. Bladder training: patient education, progressive scheduled voiding regimen, positive reinforcement. 2. Usual care	Self reported quality of life measures (Incontinence Impact Questionnaire (IIQ) with 26 items and 4 point scale from 0 - not at all to 3 - greatly.	No Intention to treat, Open label. Randomization stratified by type of incontinence. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size not justified.
Yoon, 2003[507] RCT to examine the effectiveness of bladder training versus pelvic muscle exercises in the treatment of urinary incontinence in women. Duration: 8 weeks	50 parous women 35–55 years old a with urine loss of 1.0g or more on a 30 minute pad test and 14 voids or more during a period of 48 hours before the preliminary evaluation. Exclusion criteria: Urinary tract infection tested by urinalysis and urine culture, previous experience of surgery for urinary incontinence, HRT and other medication for urinary incontinence. Loss of followup: 8%	1. Bladder training with increased interval between voluntary voids. 2 Pelvic muscle exercise (30 contractions for 15 to 20 minutes/day) with immediate and simultaneous visual feedback of pelvic muscles during a 20 minute weekly biofeedback session with electromyography. 3. Usual care	Self reported voids and incontinence scores (5-Likert scale) and urodynamic outcomes	No intention to treat. Single blind. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified
Janssen, 2001[508] RCT to examine the effects of individual and group physiotherapy for urinary incontinence in women. Duration: 3 months, followup 12 months.	530 women of all ages (mean 47.8 years) with stress, urge, or mixed incontinence. Exclusion criteria: Neurological cause of incontinence, a tumor or infection in the pelvis, severe vaginal prolapse. Loss of followup: 22%	1. Individual pelvic floor exercises 5 times/day and bladder training with delay voiding, training with 11 30-minute sessions. 2. Group pelvic floor exercises 5 times/day and bladder training with delay voiding, training with 9 2-our sessions.	Objective changes in the severity of urinary incontinence, frequency of urine loss, and frequency of nocturnal urine loss.	Intention to treat. Single blind. Stratified by type, severity and duration of incontinence frequency sampling randomization. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F85. Effects of behavioral interventions on risk and progression of incontinence in community dwelling females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Nygaard, 1996[509] RCT to examine the effects of pelvic floor muscle exercises in combination with specially designed audiotape on stress, urge, and mixed urinary incontinence in women. Duration: 3 months	71 women non pregnant women >21 years old with urinary incontinence. Exclusion criteria: Genital prolapse past the vaginal introitus, parturition within the preceding 6 months, and deafness. Loss of followup: 23%.	1. Pelvic floor muscle exercises with 2 5-minute daily sessions, beginning with contractions for 4-8 seconds in combination with specially designed audiotape with 270 minutes of music and verbal instructions of technique tips, reminders, and exercise cues. 2. Pelvic floor muscle exercises with 2 5-minute daily sessions, beginning with contractions for 4-8 seconds.	Self reported number of incontinent episodes, documented with a 3-day voiding diary	Intention to treat. Single blind. Randomization with random numbers table, in blocks of 4. Allocation concealment not reported. Baseline data not reported. Outcomes reported by type of incontinence, randomization ignored. Sample size justified.
McClurg, 2006[510] RCT to examine the effects of pelvic floor training and advice , electromyography biofeedback, and neuromuscular electrical stimulation on urinary incontinence in patients with multiple sclerosis. Duration of treatment: 9 weeks. Duration of follow up: 24 weeks	30 women >18 years with multiple sclerosis stabilized for the previous 3 months. Expanded Disability Status Scale score <7.5 with at least one of the following: any involuntary leakage of urine, voiding frequency >8/24 hours, nocturia, and/ or reported voiding dysfunction such as hesitancy, straining, poor stream, and incomplete emptying demonstrated by uro-flowmetry. Exclusion criteria: MS relapse necessitating hospitalization 3 months prior to or during the study, symptomatic prolapse, presence of urinary tract infection, current or recent diagnosis of a serious medical condition (other than MS), severe cognitive impairment, contraindications to neuromuscular electrical stimulation. Loss of follow up: 6.7%	1. Pelvic Floor Training and Advice: education with booklet about normal bladder control, lifestyle interventions (weight reduction, relieving constipation, cessation of smoking, caffeine reduction, fluid management, clothing, reducing emotional stress), bladder training, pelvic floor exercise with individualized contractions/relaxation duration based on assessment of power endurance. 2. Pelvic Floor Training and Advice and EMG Biofeedback . 3. Pelvic Floor Training and Advice with EMG Biofeedback and neuromuscular electrical stimulation. Stimulation at clinic (weekly) initially for 5 min 30 minutes .using pulse rate 40Hz, pulse width 250msec,with 5sec on and10 sec off or 10 Hz, 450msec, 10sec on and 3sec off, at maximum-tolerated intensity	3-day voiding diary; 24 hr pad-test; Uroflowmetry; Pelvic Floor Muscle Assessment; Incontinence Impact Questionnaire (IIQ); Urogenital Distress Inventory (UDI); King's Health Questionnaire (KHQ), and the Multiple Sclerosis Quality of Life-54 Instrument (MSQoL-54).	Intention to treat. Open label. Computer generated randomization list. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size not justified

Table F86. Effects of behavioral interventions on risk and progression of stress urinary incontinence in females

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Laycock, 2001[511] RCT to examine the effects of vaginal cones, pressure biofeedback, and pelvic floor exercises on stress urinary incontinence in females. Duration: 3 months.	101 women 20-64 years old with symptoms of stress urinary incontinence. Exclusion criteria: Moderate or severe urge urinary incontinence, moderate or severe genital prolapse, pregnancy or plans to become pregnant, use of medications that can affect the lower urinary tract, HRT for <3 months, neurological diseases. Loss of followup: 32.7%	1. Pelvic floor exercise with maximum contraction for 1 second and rest for 4 seconds, 10 minutes/day combined with home pressure biofeedback using intra-vaginal perineometer. 2. Vaginal cones for 10 minutes/day with individually adjusted size and increasing weight. 3. Pelvic floor exercise for 10 minutes/day.	Pad use/day, wet episodes/day, Pelvic floor muscles contractility	No intention to treat. Open label. Permuted block randomization in ratio 2:2:1. Allocation concealment not reported. Baseline data not reported. Sample size not justified.
Bo, 2000[512] RCT to examine the effects of pelvic floor muscle exercise on female genuine stress incontinence. Duration: 6 months.	59 women with clinically and urodynamically proven genuine stress incontinence .4grams of leakage measured by the pad test. Exclusion criteria: Urinary incontinence other than GSI, involuntary detrusor contractions exceeding 10cm/H2O on cystometry, residual urine .50ml, maximal uroflow, 15ml/second, previous surgery for GSI, neurological or psychiatric disease, ongoing urinary tract infections, other diseases that could interfere with participation, use of concomitant treatments during the trial, and inability to understand instructions given in Norwegian. Loss of followup: 6.7%.	1. Pelvic floor muscle exercise with 8-12 maximum contractions in 3 series/day and 45 minutes/week group sessions. 2. Untreated control group	Self reported urinary incontinence using 7 point satisfaction scale. Norwegian version of the Quality of Life Scale (QoLS-N) and the Bristol Female Lower Urinary Tract Symptoms (B-FLUTS) questionnaire.	No Intention to treat. Open label. Computer generated randomization stratified by degree of leakage. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified

Table F86. Effects of behavioral interventions on risk and progression of stress urinary incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Bo,1999[513] RCT to examine the effects of pelvic floor exercises, electrical stimulation, vaginal cones, and no treatment on females genuine stress incontinence. Duration: 6 months	107 women with clinically and urodynamically proved genuine stress incontinence >4g of leakage measured by pad test with standardized bladder volume. Exclusion criteria: urinary incontinence other than genuine stress incontinence, involuntary detrusor contractions >10cm/H2O on cystometry, abnormal bladder function (residual urine >50ml and maximal uroflow <15ml/second), previous surgery for genuine stress incontinence, neurological or psychiatric disease, ongoing urinary tract infections, other diseases that could interfere with participation, use of concomitant treatments during the trial, and inability to understand instructions given in Norwegian. Loss of followup: 12.3%	1. Pelvic floor exercise with 8-12 contractions 3 times/day and in groups with skilled physical therapists 1/week. 2. The electrical stimulation using vaginal intermittent stimulation with the MS 106 Twin at 50Hz 30 minutes/day. 3. The vaginal cones of 20, 40, and 70g for 20 minutes/day. 4. The untreated control group offered the use of a continence guard.	Muscle strength measured by vaginal squeeze pressure 1/month. Pad test with standardized bladder volume. 24 hour pad test. Self reported symptoms of severity. Leakage index. Patients indicated on a 5 point scale (5 always, 4 often, 3 sometimes, 2 seldom, 1 never) the frequency of urinary leakage during sneezing, coughing, laughing, walking, walking downhill, running, jumping, and lifting. The mean was calculated as an index of leakage frequency before and after treatment. Objective cure as <2g leakage on the pad test with standardized bladder volume. Subjective cure as (number of women stating that the condition was “unproblematic” after the treatment).	Intention to treat. Single blind. Computer generated random numbers stratified by baseline leakage. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F86. Effects of behavioral interventions on risk and progression of stress urinary incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Cammu,1998[514] RCT to examine the effects of pelvic floor exercises and vaginal weight cones in the treatment on female genuine stress incontinence. Duration: 12 weeks	60 ambulatory and fit white women with urodynamic urinary stress incontinence, and vaginal capacity permitting the use of a vaginal probe-EMG biofeedback-or cones post-partum period, and had neither a genital prolapse nor any other associated pathology that warranted surgery. Furthermore, these women had no detrusor instability, no outflow obstruction, and no intrinsic urethral sphincter deficiency. Loss of followup: Not reported	1. Weekly session of pelvic floor exercises vaginal probe-EMG biofeedback using perineometer 2. Vaginal weight cones (20, 32, 45, 57, and 70g) for 15 minutes, twice daily.	Self reported urinary incontinence using visual analog scale. Pad test	Intention to treat. Open label. Computerized randomization with random numbers tables. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified
Miller, 1998[515] RCT to examine the effects of intentionally contracting the pelvic floor muscles before and during a cough on mild and moderate female stress urinary incontinence. Duration: 1 week	27 women with self reported stress urinary incontinence and demonstrable urine loss during a deep cough with leakage occurring at least weekly and up to 5 times/day. Exclusion criteria: History of systemic neuromuscular disease, previous bladder surgery, active urinary tract infection, leakage that was delayed after coughing and categorized as detrusor instability, leakage that saturated a paper towel and/or pooled on the floor when coughing in the standing posture, inability to demonstrate any voluntary contraction of the pelvic floor muscles despite detailed instruction during the pelvic exam, and significant coexistent pelvic organ prolapse below the hymenal ring. Loss of followup: Not reported	1. Immediate intervention group taught intentionally contracting the pelvic floor muscles before and during a cough (Knack) 2. Wait-listed control group	Self report 6-day urination diary, digital test for pelvic muscle strength and self reported symptoms (possible score range: 0-21).	Intention to treat not stated. Single-blind randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.

Table F86. Effects of behavioral interventions on risk and progression of stress urinary incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Aksac, 2003[516] RCT to examine the effects of pelvic floor muscle exercises or biofeedback on female urinary stress incontinence. Duration: 2 months	50 postmenopausal women with female urinary stress incontinence taking HRT. Exclusion criteria: Not reported. Loss of followup: Not reported.	1. Pelvic floor muscle exercise (contractions for 10 seconds and relaxation for 20 seconds, 10 times/session, 3 sessions/day) via digital palpation at home 2. Pelvic floor muscle exercise (contractions for 10 seconds and relaxation for 20 seconds) via biofeedback (vaginal probe in EMG pressure mode) 3 times/ week. 3. Usual care, hormone replacement therapy	Pad test, perineometry outcomes, digital palpation based Pelvic floor muscle strength, incontinence frequency: 1=urine loss 1/day, 2=urine loss >1/week, 3=urine loss <1/week, 4=urine loss 1/month). Visual analog scale based social activity index: 0=cannot undertake any social activity, 10=does not have any problem.	Intention to treat not stated. Randomization with choosing closed letters (patients had to pick up closed letters). Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Burns, 1993[517] RCT to examine the effects of biofeedback and pelvic muscle exercise treatment on stress incontinence in older community-dwelling women. Duration: 6 months	135 community-dwelling women older than 55 years with sphincteric incompetence, >3 urine losses/week, urodynamic incontinence, >23 scores in Mini-Mental State exam. Exclusion criteria: glycosuira, pyuria, residual urine >50cc, Peak urine flow <15cc/second Loss of followup: 7%	1. Biofeedback using vaginal EMG probe, contraction for 10 seconds and relaxations for 10 seconds 10 times in each weekly session. 2. Pelvic muscle exercise with 4 sets of 20 increasing by 10/set until maximum 200 sets/day. 3. Usual care.	Self reported urinary incontinent episodes, improvement in incontinence. Urodynamic outcomes.	No Intention to treat. Single-blind. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified
Sherman, 1997[518] RCT to examine the effects of pelvic muscle exercises with urethral biofeedback on exercise-induced urinary incontinence in females soldiers. Duration: 8 weeks.	39 female active duty soldiers with exercise-induced urinary incontinence (stress or mixed). Exclusion criteria: not reported. Loss of followup: not reported.	1. Pelvic muscle exercises with contractions for 10 seconds and relaxation for 10 seconds 5 times/session, 20 minutes twice/day with urethral biofeedback using vaginal EMG probe. 2. Pelvic muscle exercises with contractions for 10 seconds and relaxation for 10 seconds 5 times/session 20 minutes twice/day alone.	Self reported urinary incontinence symptoms. Urodynamic outcomes.	Intention to treat not stated. Open label. Randomization stratified by diagnosis of physical stress incontinence or mixed urge/stress incontinence. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified

Table F86. Effects of behavioral interventions on risk and progression of stress urinary incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Burns,1990[519] RCT to examine the effects of pelvic floor exercises or biofeedback on female stress urinary incontinence. Duration: 8 weeks	128 women with stress or mixed urinary incontinence >3/week with Mini-Mental scores >23. Exclusion criteria: urinary tract infection. Loss of followup: not reported.	1. Kegel pelvic floor exercises 4 times/day. 2. Biofeedback with vaginal EMG probe and visual control. 3. Usual care.	Self reported urinary symptoms. Electromyographic outcomes	No Intention to treat not stated. Single blind. Randomization with permuted blocks of 10. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Wells, 1991[520] RCT to examine the effects of pelvic muscle exercise or pharmacologic treatment of stress urinary incontinence in community-living elderly women. Duration: 6 months	157 community-living women, ages 55 to 90 years. Exclusion criteria: nursing home residency Loss of followup: 34% in active and 15% in control group.	1. Pelvic muscle exercises with contractions for 10 seconds and relaxation for 10 seconds, 90-160 times/day. 2. Phenylpropanolamine hydrochloride in a dose of 50mg /day, increasing to 50mg 2 times/ day.	Subjective improvement, self recorded frequency of wetting.	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified
Aukee, 2002[521] RCT to examine the effects of electromyography-assisted biofeedback training and pelvic floor muscle training on female stress urinary incontinence. Duration: 12 weeks.	30 women with urodynamically tested stress incontinence ages 31 to 69 years without previous incontinence operations and an abdominal leak point pressure >90. Exclusion criteria: Genital protrusion beyond the vaginal hymen, an inability to understand instructions for home training, pregnancy, and any severe disease such as malignancy in the abdominal region, multiple sclerosis, and insulin-dependent diabetes. Loss of followup: 6.7%	1. Pelvic floor muscle exercise after verbal and written instructions for home practice of 20 minutes/day 5 times/week and individual EMG-assisted biofeedback device with vaginal probe and verbal control. 2. Pelvic floor muscle exercise after verbal and written instructions for home practice of 20 minutes/day 5 times/week.	24 hour pad test, leakage index of 13 types of physical exertions that trigger urinary leakage in women with stress incontinence.	Intention-to-treat. Open label. Randomization with random numbers table with permuted blocks of four. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F86. Effects of behavioral interventions on risk and progression of stress urinary incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Berghmans, 1996[522] RCT to examine the effects of biofeedback and pelvic floor muscle exercise on female genuine stress incontinence. Duration: 12 weeks.	40 women 18-70 years with mild or moderate stress incontinence (grade 1). Exclusion criteria: Use of medicine to counteract functional disabilities of the lower urinary tract, pronounced lesions of the pudendus nerve during clinical neurophysiological examination, positive sediment of urine culture, non-compliance in the diagnostic phase, neurogenic bladder function disability caused by surgery of urological and or gynecological nature, period of 6 weeks after a delivery, other forms of treatment to cure stress incontinence, stress incontinence grade 3 or 4, psychological disorders, irritable vagina, pacemaker, hip prosthesis, pathology such as spina bifida, spinal cord lesion. Loss of followup: none	1. Pelvic floor muscle exercise 12 treatment sessions, 3 times/week with contractions 3 -30 seconds 10-30 times beginning with 4 sets of 10 (5 quick and *5* sustained) and increased by 10 per set until 30 times/set. Biofeedback with EMG vaginal probe and visual control. 2. Pelvic floor muscle exercise 12 treatment sessions, 3 times/week with contractions 3-30 seconds 10-30 times beginning with 4 sets of 10 (5 quick and *5* sustained) and increased by 10 per set until 30 times/set.	Involuntary urine loss, measured with 48 hours pad test. Self completed urinary symptoms questionnaire as 10-point scale and maximum of 50 points for more serious problem: 1. At what level of bladder pressure involuntary loss of urine starts 2. Degree of wet caused by involuntary loss of urine 3. Frequency of involuntary loss of urine 4. Level of limitation of social activities because of incontinence *5.* Emotional state related to involuntary loss of urine	Intention to treat Single blind. Computer generated randomization stratified by seriousness of incontinence (grade 1 and 2) and by referral (general practitioner or urologist) with permuted blocks of 4. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Liebergall-Wischnitzer ,2005[523] RCT to examine the effects of circular muscle exercises on female urinary stress incontinence. Duration: 12 weeks.	59 women, mainly hospital employees with stress or mixed urinary incontinence with urine loss >1gin pad test. Exclusion criteria: Pregnancy, severe cardiac or respiratory diseases, pelvic surgery within 6 months, grade 3 and 4 cystocele, previous pelvic radiation, active mucosal lesion in vagina or perineum. Loss of followup: 13.3%	1. Paula method of circular muscle training 15-45 minutes/day with training sessions of 45 minutes/week. 2. Pelvic floor muscle exercise 15 minutes with 30 minute lesson session/week.	Self reported incontinence, quality of life (I-QOL), 1-hour pad test, and pelvic floor muscle strength (assessed by perineometer and digital examination).	No intention to treat. Single blind. Computer generated randomization with block of 4 stratified by age. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F86. Effects of behavioral interventions on risk and progression of stress urinary incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Sung, 2000[524] RCT to examine the effects of pelvic floor muscle exercises on female genuine stress incontinence. Duration: 6 weeks	90 married women with urinary incontinence. Exclusion criteria: not reported. Loss of followup: not reported.	1. Functional electrical stimulation-biofeedback for 20 minutes/session with frequency 35Hz-50Hz and contractions of 32 seconds, 2 sessions/week 2. Intensive pelvic floor muscle exercises 3. Control usual care	Jackson's Bristol female urinary symptom questionnaire with scores from 1 (not a problem) to 5 - very serious problem). Objective changes of pelvic muscle contraction force measured by perineometer.	Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.
Lagro-Janssen , 1991[525] RCT to examine the effects of pelvic floor exercise on urinary incontinence in women. Duration: 3 months	66 women ages 20-65 years with genuine stress incontinence. Exclusion criteria: Previously undergone an operation for incontinence; if they suffered from underlying neurological causes for incontinence, from diabetes mellitus or from urinary tract infection; or if there was a temporary cause for their incontinence (for example, pregnancy or bed rest). Loss of followup: none.	1. Instructions in pelvic floor exercises 5- 10 sessions of 10 pelvic muscle contractions for 6 seconds each day. 2. No therapy	Self reported urinary incontinence and impact of incontinence on life.	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Kim, 2001[526] RCT to examine the effects of continence efficacy intervention program on stress urinary incontinence in Japanese women. Duration: 3 months.	48 women 20-75 years old with stress or mixed urinary incontinence. Exclusion criteria: Drug or surgery treatment for incontinence. Loss of followup: 15.2%	1. Continence efficacy intervention program: common pelvic floor muscle education, audiovisual tape, calendar, counseling, schedule guideline, assessing self-care methods. 2. Conventional care.	Self reported urinary continence and improvement in symptoms of urinary incontinence graded from 0 to 100.	No Intention to treat. Open label. Randomization by the order of coming to the clinic. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F86. Effects of behavioral interventions on risk and progression of stress urinary incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Arvonen, 2001[527] RCT to examine the effects of pelvic floor muscle training with and without vaginal balls on females stress urinary incontinence. Duration: 4 months	37 women ages 25-65 with stress urinary incontinence, understanding of spoken Swedish. Exclusion criteria: Pregnancy, cysto/rectocele, prolapse, urinary tract infection, altered vaginal tissue, and medication affecting the functioning of the urinary tract or kidneys. Loss of followup: 7%	1. Pelvic floor muscle training program with contractions/relaxations for 5 seconds 10 times twice a day. 2. Pelvic floor muscle training program with contractions/relaxations for 20/20 seconds 10 times twice a day using weighted vaginal balls 50-100g.	Pad-test with a standardized bladder volume. The strength of the pelvic floor musculature assessed by vaginal palpation graded from 0=no contraction to 5=very strong pressure with a strong lift for 6±7 seconds.	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Borello-France, 2006[528] RCT to examine the effects of exercise position during pelvic-floor muscle exercises on females stress urinary incontinence. Duration:12-weeks	44 women 38 to 70 years old, ambulatory, with symptoms of stress urinary incontinence >1/week. Exclusion criteria: Pregnancy, symptoms of urgency or urge urinary incontinence, prior treatments for stress urinary incontinence (collagen injection, medications affecting bladder tone, pessary, or surgery), practicing pelvic-floor muscle exercises, pacemaker, use of intrauterine device, medical history of pelvic cancer, severe endometriosis, neurologic or metabolic disorders likely to impair bladder or sphincter function. Loss of followup: 18%	1. Pelvic floor muscle exercises with EMG biofeedback in the supine position only using maximum 30-60 repetitions of 3-12 second contractions twice daily. 2. Pelvic floor muscle exercises with EMG biofeedback in both supine and upright positions,1 set (3- and 12-second contractions) in each position with maximum 20 repetitions (2 sets of 10) of the 3-12 second contractions twice daily.	1-week bladder diary, 1 hour pad test, urodynamic outcomes, quality-of-life (Incontinence Impact Questionnaire ranges from 0-400 with poorer perceived quality of life).	Intention-to-treat. Open label. Block randomization schedule with a random-number table. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F86. Effects of behavioral interventions on risk and progression of stress urinary incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Mørkved, 2002[529] RCT to examine the effects of individual pelvic floor muscle training with and without biofeedback in women with urodynamic stress incontinence. Duration of treatment and followup: 6 months	103 women with symptoms of stress incontinence and >2g leakage measured by a pad test with standardized bladder volume. Exclusion criteria: involuntary detrusor contractions on cystometry, abnormal bladder function (residual urine >50ml), previous surgery for stress incontinence, neurologic or psychiatric disease, urinary tract infection, other diseases that could interfere with participation, pregnancy, use of concomitant treatments during the trial period, and inability to understand instructions in Norwegian. Loss of follow up: 8.7%	1. Pelvic floor muscle training with 3 sets of 10 contractions 3 times/day, individually supervised by a physical therapist. At home, 3 sets of 10 high intensity (close to maximum) contractions per day with a biofeedback apparatus 2. Pelvic floor muscle training with 3 sets of 10 contractions 3 times/day, individually supervised by a physical therapist. At home, 3 sets of 10 high intensity (close to maximum) contractions per day without biofeedback	Pad test with standardized bladder volume with 300ml of saline. Women wore pre-weighed pads and jumped with legs in subsequent adduction and abduction (jumping jacks/star jumps: 20 repetitions) and coughed three times. Objective cure ≤2g of leakage. Self-report of severity using 5-point scale (unproblematic, minor problem, moderate problem, problematic, very problematic). Subjective cure - reporting the leakage to be unproblematic after treatment. The leakage index in 5-point scale (1-never, 5-always) containing 13 types of physical activities known to trigger urinary leakage. The social activity index with nine social settings and 10cm visual analogue scale (0 - impossible to participate, 10 - no problem to participate).	Intention to treat. Single blind. Centralized but no computerized randomization stratified by results of a pad test with standardized bladder volume (20g or less and more than 20g of leakage). Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F87. Effects of behavioral interventions on urinary continence in females (events) (tables sorted by rate of urinary continence after active treatment, from highest to lowest)

Author Sample	Active Treatment	Control Treatment	Definition of Cure	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Aksac, 2003[516] N = 50	Pelvic floor muscle exercise (contractions for 10 seconds and relaxation for 20 seconds) via biofeedback (vaginal probe in EMG pressure mode) 3 times/week	Usual care	Cure from stress urinary incontinence in pad test	16	0	80.0	0	**17.3 (1.1; 261.7)**		799 (0; 261)E
	Pelvic floor muscle exercise (contractions for 10 sec and relaxation for 20 sec, 10 times/session, 3 sessions/day) via digital palpation at home		Cure from stress urinary incontinence in pad test	15	0	75.0	0	**16.2 (1.1; 246.5)**		749 (0; 246)E
Bo, 2005[497] N = 47	Intensive pelvic floor exercise with 8-12 maximum contractions for 6-8 seconds 3 series/day under the supervision of physical therapist for 6 months	Home exercise groups	Self reported cure from incontinence 6 months followup	13	4	60.0	17.0	**4.0 (1.5; 10.5)**	2 (1; 11)	430 (91; 1,620)E

Table F87. Effects of behavioral interventions on urinary continence in females (events) (tables sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Cure	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Borello-France, 2006[528] N = 44	Pelvic floor muscle exercises with EMG biofeedback in the supine position only using maximum 30-60 repetitions of 3-12 second contractions twice daily.	Pelvic floor muscle exercises with EMG biofeedback in both supine and upright positions, 1 set (3- and 12-second contractions) in each position with maximum 20 repetitions (2 sets of 10) of the 3-12 second contractions twice daily.	Urinary continence (objective cure in urodynamic exam)	13	13	59.1	59.1	1.0 (0.6; 1.6)		
Mørkved, 2002[529] N = 103 100% female Followup: 6 months	Pelvic floor muscle training with 3 sets of 10 contractions 3 times/day, individually supervised by a physical therapist. At home, 3 sets of 10 high intensity (close to maximum) contractions per day with a biofeedback apparatus	Pelvic floor muscle training with 3 sets of 10 contractions 3 times/day, individually supervised by a physical therapist. At home, 3 sets of 10 high intensity (close to maximum) contractions per day without biofeedback	Objective Cure (<2g of Leakage on the Pad Test)	28	21	52.83	42.00	1.26 (0.83; 1.90)		
			Urinary incontinence unproblematic	19	14	35.85	28.00	1.28 (0.72; 2.27)		

Table F87. Effects of behavioral interventions on urinary continence in females (events) (tables sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Cure	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Bo, 1999[513] N = 122	Pelvic floor exercise with 8-12 contractions 3 times/day and in groups with skilled physical therapists 1/week.	Untreated control group offered the use of a continence guard	Subjective cure as (number of women stating that the condition was "unproblematic" after the treatment)	14	1	48.3	3.1	**15.4 (2.2; 110.3)**	2 (0; 27)	452 (36; 3,415)E
Goode, 2003[490] N = 200	Behavioral training (biofeedback-assisted pelvic floor muscle training, home exercises, bladder control strategies, and self-monitoring with bladder diaries) and Pelvic floor electrical stimulation	Self-administered behavioral training administered with a self-help booklet	% of women with no leakage in post treatment urodynamic testing	32	25	47.2	37.5	1.3 (0.9; 1.9)		
Wang, 2004[496] N = 120	Electrical stimulation in the management of overactive bladder with intravaginal electrode at the physiotherapy unit	Pelvic floor muscle training	Cured urge incontinence	17	12	40.0	30.3	1.3 (0.7; 2.5)		

Table F87. Effects of behavioral interventions on urinary continence in females (events) (tables sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Cure	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Cammu, 1998[514] N = 30	Weekly session of pelvic floor exercises vaginal probe-EMG biofeedback using perineometer.	Vaginal weight cones (20, 32, 45, 57, and 70g) for 15 minutes twice daily	Negative stress test	12	12	40.0	40.0	1.0 (0.5; 1.9)		
Wang, 2004[496] N = 120	Biofeedback-assisted pelvic floor muscle training with an intravaginal electromyogram probe to contract or relax PFMs following the visual EMG signals.	Pelvic floor muscle training	Cured urge incontinence	15	12	38.2	30.3	1.3 (0.7; 2.4)		
Bo, 1999[513] N = 122	Pelvic floor exercise with 8-12 contractions 3 times/day and in groups with skilled physical therapists 1/week.	Untreated control group offered the use of a continence guard	Objective cure as <2g leakage on the pad test with standardized bladder volume	11	2	37.9	6.3	**6.1 (1.5; 25.1)**	3 (1; 34)	317 (29; 1,507)E

Table F87. Effects of behavioral interventions on urinary continence in females (events) (tables sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Cure	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Kim, 2001[526] N = 33	Continence Efficacy Intervention Program: common pelvic floor muscle education, audiovisual tape, calendar, counseling, schedule guideline, assessing self–care methods.	Conventional care	Self reported cure	6	2	37.5	11.8	3.2 (0.7; 13.6)		
Diokno, 2004[487] N = 359	Behavioral modification program: pelvic floor muscle training, bladder training	Usual care	% of absolute continent	61	55	37.0	28.0	**1.3 (1.0; 1.8)**		
Elser, 1999[498] N = 204	Pelvic floor muscle training with visual and verbal biofeedback	Bladder training	Cured from incontinence (self reported and urodynamic)	25	17	36.8	25.0	1.5 (0.9; 2.5)		
Alewijnse, 2003[493] N = 129	Pelvic floor muscle exercise with reminder and self-help guide	Bladder training and pelvic floor muscle exercise	% cured (100% dry) 1 year after intervention	17	21	32.7	41.2	0.8 (0.5; 1.3)		

Table F87. Effects of behavioral interventions on urinary continence in females (events) (tables sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Cure	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Bo, 2005[497] N = 47	Intensive pelvic floor exercise with 8-12 maximum contractions for 6-8 seconds 3 series/day under the supervision of physical therapist for 6 months	Home exercise groups	Self reported continence 15 years followup	6	4	28.6	15.4	1.9 (0.6; 5.7)		
Goode, 2003[490] N = 200	Behavioral training (biofeedback-assisted pelvic floor muscle training, home exercises, bladder control strategies, and self-monitoring with bladder diaries)	Self-administered behavioral training administered with a self-help booklet	% of women with no leakage in post treatment urodynamic testing	18	25	27.6	37.5	0.7 (0.4; 1.2)		
Wells, 1991[520] N = 157	Pelvic muscle exercises with contractions for 10 seconds and relaxation for 10 seconds 90-160 times/day	Phenylpropa-nolamine hydrochloride in a dose of 50mg/day, increasing to 50mg 2 times/day	Cure from stress urinary incontinence (dry)	22	11	27.0	14.0	1.9 (1.0; 3.6)		
Wyman, 1998[491] N = 204	Combination of bladder training and pelvic muscle exercise	Bladder training	% cured at 3 months followup	16	10	27.0	16.0	1.6 (0.8; 3.3)		

Table F87. Effects of behavioral interventions on urinary continence in females (events) (tables sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Cure	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Arvonen, 2001[527] N = 37	Pelvic floor muscle training program with contractions/ relaxations for 5 seconds 10 times 2 times/day	Pelvic floor muscle training program with contractions/ relaxations for 20/20 seconds 10 times 2 times/day using weighted vaginal balls 50-100g	No Leakage (g)	5	9	26.3	50.0	0.5 (0.2; 1.3)		
Berghmans, 1996[522] N = 40	Pelvic floor muscle exercise with biofeedback with EMG vaginal probe and visual control.	Pelvic floor muscle exercise	Cure from stress urinary incontinence	5	3	25.0	15.0	1.7 (0.5; 6.1)		
Burns, 1993[517] N = 135	Biofeedback using vaginal EMG probe, contraction for 10 seconds and relaxations for 10 seconds 10 times in each weekly session	Usual care.	Cure from stress urinary incontinence	9	1	23.0	3.0	**8.8 (1.2; 66.0)**	5 (1;201)	200 (5; 1,951)E

Table F87. Effects of behavioral interventions on urinary continence in females (events) (tables sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Cure	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Janssen, 2001[508] N = 530	Individual pelvic floor exercises 5 times/day and bladder training with delay voiding, training with 11 30 minute sessions.	Group pelvic floor exercises 5 times/day and bladder training with delay voiding, training with 9 2 hour sessions	% cured (urinary continent) at 9 months	28	57	22.0	14.0	**1.6 (1.0; 2.4)**	13 (143; 5)	80 (7; 191)E
Lagro-Janssen, 1991[525] N = 66	Instructions in pelvic floor exercises 5-10 sessions of 10 pelvic muscle contractions for 6 seconds each day.	No therapy	Urinary continence	7	1	21.2	3.0	7.0 (0.9; 53.8)		
Wyman, 1998[491] N = 204	Pelvic muscle exercise with biofeedback-assisted instruction	Bladder training	% cured at 3 months followup	13	10	20.0	16.0	1.3 (0.6; 2.7)		
Janssen, 2001[508] N = 530	Individual pelvic floor exercises 5 times/day and bladder training with delay voiding, training with 11 30 minute sessions.	Group pelvic floor exercises 5 times/day and bladder training with delay voiding, training with 9 2 hour sessions	% cured (urinary continent) at 3 months	25	53	20.0	13.0	1.5 (1.0; 2.3)		

Table F87. Effects of behavioral interventions on urinary continence in females (events) (tables sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Cure	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Burgio, 2002[505] N = 222	4 visits of behavioral training without biofeedback (verbal feedback based on vaginal palpation). Pelvic floor muscle exercise with 10 second contractions and 10 second relation for 45 minutes/day	Self-administered behavioral treatment using a self-help booklet to advice pelvic floor exercise and bladder control	% cured	15	11	20.0	15.0	1.4 (0.7; 2.8)		
	Biofeedback-assisted behavioral training implemented by nurse practitioners	Self-administered behavioral treatment using a self-help booklet to advice pelvic floor exercise and bladder control	% cured	15	11	20.0	15.0	1.4 (0.7; 2.8)		
Lagro-Janssen, 1992[502] N = 106	Pelvic floor exercises alone (stress) or bladder training (urge) or its combination (mixed)	Usual care	Self reported urinary continence cured	10	1	18.5	1.8	**10.4 (1.4; 78.3)**	6 (1; 150)	167 (7; 1,380)E

Table F87. Effects of behavioral interventions on urinary continence in females (events) (tables sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Cure	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Goode, 2003[490] N = 200	Behavioral training (biofeedback-assisted pelvic floor muscle training, home exercises, bladder control strategies, and self-monitoring with bladder diaries)	Self-administered behavioral training administered with a self-help booklet	% of patients with 100% reduction in weekly incontinence episodes cured	11	10	17.0	15.0	1.1 (0.5; 2.5)		
Burns, 1993[517] N = 135	Pelvic muscle exercise with 4 sets of 20 increasing by 10/set until maximum 200 sets/day	Usual care	Cure from stress urinary incontinence	7	1	16.0	3.0	6.3 (0.8; 49.3)		
Goode, 2003[490] N = 200	Behavioral training (biofeedback-assisted pelvic floor muscle training, home exercises, bladder control strategies, and self-monitoring with bladder diaries) and pelvic floor electrical stimulation	Self-administered behavioral training administered with a self-help booklet	% of patients with 100% reduction in weekly incontinence episodes cured	10	10	15.0	15.0	1.0 (0.4; 2.2)		
Elser, 1999[498] N = 204	Pelvic floor muscle training combined with bladder training	Bladder training	Cured from incontinence (self reported and urodynamic)	10	17	14.7	25.0	0.6 (0.3; 1.2)		

Table F87. Effects of behavioral interventions on urinary continence in females (events) (tables sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Cure	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Bo, 1999[513] N = 122	The vaginal cones of 20, 40, and 70g for 20 minutes/day.	Untreated control group offered the use of a continence guard	Objective cure as <2g leakage on the pad test with standardized bladder volume	4	2	13.8	6.3	2.2 (0.4; 11.2)		
Fantl, 1991[503] N = 131	Bladder training using 6 weekly visits included patient education; voiding schedule to have micturition from every 30-60minutes to every 2.5-3 hours; and positive reinforcement.	Usual care	Self reported urinary continence (cured)	8	2	12.0	3.0	4.1 (0.9; 18.4)		
Bo, 1999[513] N = 122	The electrical stimulation using vaginal intermittent stimulation with the MS 106 Twin at 50Hz 30 minutes/day.	Untreated control group offered the use of a continence guard	Subjective cure as (number of women stating that the condition was “unproblematic” after the treatment)	3	1	9.4	3.1	3.0 (0.3; 27.3)		

Table F87. Effects of behavioral interventions on urinary continence in females (events) (tables sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Cure	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Arvonen, 2001[527] N = 37	Pelvic floor muscle training program with contractions/ relaxations for 5 seconds 10 times 2 times/day	Pelvic floor muscle training program with contractions/ relaxations for 20/20 seconds 10 times 2 times/day using weighted vaginal balls 50-100g	Cured from stress urinary incontinence	0	4	0.0	22.2	0.1 (0.0; 1.8)		

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control –rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control –rate of the outcome in the active group); A - avoided; E - excessive events

Table F88. Effects of behavioral interventions on improvement of urinary continence in females (events) (tables sorted by rate of improvement in urinary continence after active treatments, from highest to lowest)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Wells, 1991[520] N = 157	Pelvic muscle exercises with contractions for 10 seconds and relaxation for 10 seconds 90-160 times/day	Phenylpropa-nolamine hydro-chloride in a dose of 50mg/day, increasing to 50mg 2 times/day	Negative simple lying stress test	77	70	94.1	93.8	1.0 (0.9; 1.1)		
Janssen, 2001[508] N = 530	Individual pelvic floor exercises 5 times/day and bladder training with delay voiding, training with 11 30 minute sessions.	Group pelvic floor exercises 5 times/day and bladder training with delay voiding, training with 9 2 hour sessions	% improved for urinary incontinence at 3 months	118	347	94.0	86.0	**1.1 (1.0; 1.2)**	13 (7; 44)	80 (23; 136)E
Goode, 2003[490] N = 200	Behavioral train-ing (biofeedback-assisted pelvic floor muscle training, home exercises, blad-der control strategies, and self-monitoring with bladder diaries) and pelvic floor electrical stimulation	Self-administered behavioral training administered with a self-help booklet	% of patients with >50% reduction in weekly incontinence episodes	58	38	86.0	57.0	**1.5 (1.2; 1.9)**	3 (2; 8)	290 (122; 524)E

Table F88. Effects of behavioral interventions on improvement of urinary continence in females (events) (tables sorted by rate of improvement in urinary continence after active treatments, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Janssen, 2001[508] N = 530	Individual pelvic floor exercises 5 times/day and bladder training with delay voiding, training with 11 30 minute sessions.	Group pelvic floor exercises 5 times/day and bladder training with delay voiding, training with 9 2 hour sessions	% improved for urinary incontinence at 9 months	107	315	85.0	78.0	**1.1 (1.0; 1.2)**	14 (7; 279)	70 (4; 150)E
Lagro-Janssen, 1991[525] N = 66	Instructions in pelvic floor exercises 5-10 sessions of 10 pelvic muscle contractions for 6 seconds each day.	No therapy	Improvement in urinary incontinence	28	0	85.0	0	**57.0 (3.6; 896.4)**	1 (1; 381)	849 (3; 895)E
Goode, 2002[501] N = 70	Four sessions (over 8 weeks) of biofeedback-assisted behavioral training by nurse practitioners.	Usual care	Self reported improvement in urinary incontinence	27	19	82.3	51.5	**1.6 (1.1; 2.3)**	3 (2; 16)	308 (62; 652)E
Goode, 2003[490] N = 200	Behavioral training (biofeedback-assisted pelvic floor muscle training, home exercises, bladder control strategies, and self-monitoring with bladder diaries)	Self administered behavioral training administered with a self-help booklet	% of patients with >50% reduction in weekly incontinence episodes	53	38	80.0	57.0	**1.4 (1.1; 1.8)**	4 (2; 16)	230 (64; 457)E

Table F88. Effects of behavioral interventions on improvement of urinary continence in females (events) (tables sorted by rate of improvement in urinary continence after active treatments, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Lagro-Janssen, 1991[525] N = 66	Instructions in pelvic floor exercises 5-10 sessions of 10 pelvic muscle contractions for 6 seconds each day.	No therapy	Improvement in restrictions of activities	25	2	75.0	6.0	**12.5 (3.2; 48.6)**	1 (0;8)	690 (133; 2,854)E
Fantl, 1991[503] N = 131	Bladder training using 6 weekly visits included patient education; voiding schedule to have micturition from every 30-60minutes to every 2.5-3 hours; and positive reinforcement.	Usual care	Self reported more than 50% reduction in urinary incontinence episodes	49	16	75.0	24.0	**3.1 (2.0; 4.9)**	2 (1; 4)	510 (237; 929)E
Lagro-Janssen, 1992[502] N = 106	Pelvic floor exercises alone (stress) or bladder training (urge) or its combination (mixed)	Usual care	Self reported improvement in urinary incontinence	40	2	74.0	3.0	**20.7 (5.3; 81.6)**	1 (0; 8)	710 (128; 2,419)E
Berghmans, 1996[522] N = 40	Pelvic floor muscle exercise with biofeedback with EMG vaginal probe and visual control.	Pelvic floor muscle exercise	Improvement in stress urinary incontinence	14	14	70.0	70.0	1.0 (0.7; 1.5)		

Table F88. Effects of behavioral interventions on improvement of urinary continence in females (events) (tables sorted by rate of improvement in urinary continence after active treatments, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Lagro-Janssen1991[525] N = 66	Instructions in pelvic floor exercises 5-10 sessions of 10 pelvic muscle contractions for 6 seconds each day.	No therapy	Improvement in psychological impact of urinary incontinence	23	0	70.0	0.1	**47.0 (3.0; 743.0)**	1 (1;507)	699 (2; 742)E
Burns, 1990[519] N = 128	Biofeedback with vaginal EMG probe and visual control	Usual care.	Self reported reduction in urine loss	24	0	61.0	0.1	**49.0 (3.1; 779.1)**	2 (1; 480)	609 (2; 778)E
Burns, 1993[517] N = 135	Biofeedback using vaginal EMG probe, contraction for 10 seconds and relaxations for 10 seconds 10 times in each weekly session	Usual care	Improvement in stress urinary incontinence	24	2	61.0	6.0	**11.7 (3.0; 46.2)**	2 (0; 8)	550 (118; 2,712)E
Goode, 2003[490] N = 200	Behavioral training (biofeedback-assisted pelvic floor muscle training, home exercises, bladder control strategies, and self-monitoring with bladder diaries) and pelvic floor electrical stimulation	Self-administered behavioral training administered with a self-help booklet	% of patients with >75% reduction in weekly incontinence episodes	40	30	60.0	45.0	**1.3 (1.0; 1.9)**	7 (3; 53)	150 (19; 385)E

Table F88. Effects of behavioral interventions on improvement of urinary continence in females (events) (tables sorted by rate of improvement in urinary continence after active treatments, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Burgio, 2002[505] N = 222	4 visits of behavioral training without biofeedback (verbal feedback based on vaginal palpation). Pelvic floor muscle exercise with 10 second contractions and 10 second relation for 45 minutes/day.	Self-administered behavioral treatment using a self-help booklet to advice pelvic floor exercise and bladder control	Urinary incontinence does not restrict daily activities	43	31	58.1	41.3	**1.4 (1.0; 2.0)**	6 (3; 274)	168 (4; 396)E
Arvonen, 2001[527] N = 37	Pelvic floor muscle training program with contractions/ relaxations for 5 seconds 10 times 2 times/day	Pelvic floor muscle training program with contractions/ relaxations for 20/20 seconds 10 times 2 times/day using weighted vaginal balls 50-100g	Improvement in stress urinary incontinence	11	7	57.9	38.9	1.5 (0.7; 3.0)		
Goode, 2003[490] N = 200	Behavioral training (biofeedback-assisted pelvic floor muscle training, home exercises, bladder control strategies, and self-monitoring with bladder diaries)	Self-administered behavioral training administered with a self-help booklet	% of patients with >75% reduction in weekly incontinence episodes	38	30	57.0	45.0	1.3 (0.9; 1.8)		

Table F88. Effects of behavioral interventions on improvement of urinary continence in females (events) (tables sorted by rate of improvement in urinary continence after active treatments, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Diokno, 2004[487] N = 359	Behavioral modification program: pelvic floor muscle training, bladder training	Usual care	% of improved incontinence	92	80	56.0	41.0	**1.4 (1.1; 1.7)**	7 (3; 24)	150 (42; 286)E
Burns, 1993[517] N = 135	Pelvic muscle exercise with 4 sets of 20 increasing by 10/sets until maximum 200 sets/day	Usual care	Improvement in stress urinary incontinence	23	2	54.0	6.0	**10.4 (2.6; 41.4)**	2 (0; 10)	480 (98; 2,424)E
Burns, 1990[519] N = 128	Kegel pelvic floor exercises 4 times/day	Usual care	Self reported reduction in urine loss	21	0	54.0	0.1	**45.2 (2.8; 721.0)**	2 (1; 545)	539 (2; 720)E
Subak, 2002[500] N = 152	6 weekly 20 minute group instructional sessions on bladder training by nurse educators and followed individualized voiding schedules	Usual care	Self reported reduction in mean number of incontinent episodes, %	39	11	50.0	15.0	**3.4 (1.9; 6.1)**	3 (1; 7)	350 (134; 772)E
Burgio, 2002[505] N = 222	Biofeedback-assisted behavioral training implemented by nurse practitioners	Self administered behavioral treatment using a self-help booklet to advise pelvic floor exercise and bladder control	Urinary incontinence does not restrict daily activities	36	31	49.3	41.3	1.2 (0.8; 1.7)		

Table F88. Effects of behavioral interventions on improvement of urinary continence in females (events) (tables sorted by rate of improvement in urinary continence after active treatments, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
	4 visits of behavioral training without biofeedback (verbal feedback based on vaginal palpation). Pelvic floor muscle exercise with 10 second contractions and 10 second relation for 45 minutes/day.	Self administered behavioral treatment using a self-help booklet to advise pelvic floor exercise and bladder control	Self reported improvement in urinary incontinence as "much better"	36	20	48.6	26.7	**1.8 (1.2; 2.8)**	5 (2; 22)	220 (46; 490)E
	Biofeedback-assisted behavioral training implemented by nurse practitioners	Self administered behavioral treatment using a self-help booklet to advise pelvic floor exercise and bladder control	Self reported improvement in urinary incontinence as "much better"	33	20	45.2	26.7	**1.7 (1.1; 2.7)**	5 (2; 48)	185 (21; 444)E
Bo, 1999[513] N = 122	Pelvic floor exercise with 8-12 contractions 3 times/day and in groups with skilled physical therapists 1/week.	Untreated control group offered the use of a continence guard	Urinary continence and almost continent	12	1	41.4	3.1	**13.2 (1.8; 95.6)**	3 (0;3 8)	383 (26; 2,957)E

Table F88. Effects of behavioral interventions on improvement of urinary continence in females (events) (tables sorted by rate of improvement in urinary continence after active treatments, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Aksac, 2003[516] N = 50	Pelvic floor muscle exercise (contractions for 10 seconds and relaxation for 20 seconds, 10 times/session, 3 sessions/day) via digital palpation at home	Usual care	Improvement in stress urinary incontinence in pad test	5	2	25.0	20.0	1.3 (0.3; 5.3)		
Wyman, 1998[491] N = 204	Combination of bladder training and pelvic muscle exercise	Bladder training	% of reported 75-99% reduction in incontinence	13	9	22.0	15.0	1.5 (0.7; 3.2)		
	Pelvic muscle exercise with biofeedback-assisted instruction	Bladder training	% of reported 75-99% reduction in incontinence	14	9	22.0	15.0	1.5 (0.7; 3.3)		
Wells, 1991[520] N = 157	Pelvic muscle exercises with contractions for 10 seconds and relaxation for 10 seconds 90-160 times/day	Phenylpropanolamine hydrochloride in a dose of 50mg/day, increasing to 50mg 2 times/day	Improvement in stress urinary incontinence	17	29	21.0	39.0	**0.5 (0.3; 0.9)**	6 (4; 24)	180 (42; 264)A
Aksac, 2003[516] N = 50	Pelvic floor muscle exercise (contractions for 10 seconds and relaxation for 20 seconds) via biofeedback (vaginal probe in EMG pressure mode) 3 times/week	Usual care	Improvement in stress urinary incontinence in pad test	4	2	20.0	20.0	1.0 (0.2; 4.6)		

Table F88. Effects of behavioral interventions on improvement of urinary continence in females (events) (tables sorted by rate of improvement in urinary continence after active treatments, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Bo, 1999[513] N = 122	Electrical stimulation using vaginal intermittent stimulation with the MS 106 Twin at 50Hz 30 minutes/day.	Untreated control group offered the use of a continence guard	Urinary continence and almost continent	3	1	9.4	3.1	3.0 (0.3; 27.3)		

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F89. Effects of bladder training and pelvic muscle floor exercises on progression of urinary incontinence in females (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
McFall, 2000[469] N = 145	Community-based intervention :bladder training, managing the urge to urinate, and performing pelvic muscle exercises	Usual care	Self reported bothersomeness of urinary incontinence	42	62	58.9	85.2	**0.7 (0.6; 0.9)**	4 (3; 8)	263 (124; 381)A
Fantl, 1991[503] N = 131	Bladder training using 6 weekly visits included patient education; voiding schedule to have micturition from every 30-60 minutes to every 2.5-3 hours; and positive reinforcement.	Usual care	Self reported increase in episodes of urinary incontinence	5	28	8.0	43.0	**0.2 (0.1; 0.4)**	3 (3; 4)	350 (241; 398)A
McFall, 2000[469] N = 145	Community-based intervention: bladder training, managing the urge to urinate, and performing pelvic muscle exercises	Usual care	Use absorbent pads for urinary incontinence	39	56	54.0	77.0	**0.7 (0.6; 0.9)**	4 (3; 14)	230 (74; 345)A

Table F89. Effects of bladder training and pelvic muscle floor exercises on progression of urinary incontinence in females (events) (CONTINUED)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Arvonen, 2001[527] N = 37	Pelvic floor muscle training program with contractions/relaxations for 5 seconds 10 times 2 times/day	Pelvic floor muscle training program with contractions/relaxations for 20/20 seconds 10 times 2 times/day using weighted vaginal balls 50-100g	Leakage >50g	1	1	5.3	5.6	0.9 (0.1; 14.0)		
Bo, 2000[512] N = 59	Pelvic floor muscle exercise with 8-12 maximum contractions in 3 series/day and 45 min/week group sessions	Untreated control group	Problem with interference with physical activity	13	24	43.5	79.3	**0.6 (0.4; 0.9)**	3 (2; 10)	358 (102; 507)A
			Problems because of avoiding places and situations	8	10	28.0	34.4	0.8 (0.4; 1.8)		
			Problems with interference with social life	1	12	3.7	40.7	**0.1 (0.0; 0.6)**	3 (2; 6)	370 (154; 402)A
Lagro-Janssen, 1992[502] N = 106	Pelvic floor exercises alone (stress) or bladder training (urge) or its combination (mixed)	Usual care	Self reported deterioration in urinary incontinence	1	2	2.0	3.0	0.5 (0.0; 5.6)		

Table F89. Effects of bladder training and pelvic muscle floor exercises on progression of urinary incontinence in females (events) (CONTINUED)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Bo, 2005[497] N = 47	Intensive pelvic floor exercise with 8-12 maximum contractions for 6-8 seconds 3 series/day under the supervision of physical therapist for 6 months	Home exercise groups	Self reported severe and very severe urinary incontinence 15 years followup	1	7	4.8	26.9	0.2 (0.0; 1.3)		
Lagro-Janssen, 1992[502] N = 106	Pelvic floor exercises alone (stress) or bladder training (urge) or its combination (mixed)	Usual care	Self reported severe urinary incontinence	4	23	7.4	41.1	**0.2 (0.1; 0.5)**	3 (3; 5)	337 (211; 383)A
Bo, 2005[497] N = 47	Intensive pelvic floor exercise with 8-12 maximum contractions for 6-8 seconds 3 series/day under the supervision of physical therapist for 6 months	Home exercise groups	Self reported urge incontinence 15 years followup	3	10	14.3	38.5	0.4 (0.1; 1.2)		
			Stress urinary incontinence last month (n) 15 years followup	19	21	90.5	80.8	1.1 (0.9; 1.4)		
Bo, 2000[512] N = 59	Pelvic floor muscle exercise with 8-12 maximum contractions in 3 series/day and 45 minutes/week group sessions	Untreated control group	Urinary incontinence with intercourse	3	13	10.5	41.7	**0.2 (0.1; 0.8)**	3 (3; 10)	312 (104; 385)A

Table F89. Effects of bladder training and pelvic muscle floor exercises on progression of urinary incontinence in females (events) (CONTINUED)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Bo, 2005[497] N = 47	Intensive pelvic floor exercise with 8-12 maximum contractions for 6-8 seconds 3 series/day under the supervision of physical therapist for 6 months	Home exercise groups	Always pad use 15 years followup	3	7	14.3	26.9	0.5 (0.2; 1.8)		
Aukee, 2004[494] N = 35	Pelvic floor training by physiotherapist 5 times/12 weeks with home biofeedback	Home program with given verbal and written instructions for home practice	Gynecologic surgery at 1 year of followup.	9	5	47.4	31.3	1.5 (0.6; 3.6)		
McClurg, 2006[510] N = 30 100% female 24 months	Pelvic Floor Training and Advice and EMG Biofeedback	Pelvic Floor Training and Advice	Self reported urinary incontinence	5	8	50.00	80.00	0.63 (0.31; 1.25)		
Mørkved, 2002[529] N = 103 6 months	Pelvic floor muscle training with 3 sets of 10 contractions 3 times/day, individually supervised by a	Pelvic floor muscle training with 3 sets of 10 contractions 3 times/day,	UI is Minor problem	17	18	32.08	36.00	0.89 (0.52; 1.53)		
			UI is Moderate problem	8	5	15.09	10.00	1.51 (0.53; 4.31)		
			UI is Problematic	3	6	5.66	12.00	0.47(0.1; 1.79		

Table F89. Effects of bladder training and pelvic muscle floor exercises on progression of urinary incontinence in females (events) (CONTINUED)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
	physical therapist. At home, 3 sets of 10 high intensity (close to maximum) contractions per day with a biofeedback apparatus	individually supervised by a physical therapist. At home, 3 sets of 10 high intensity (close to maximum) contractions per day without biofeedback	UI is very problematic	1	3	1.89	6.00	0.31 (0.03; 2.92)		

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F90. Behavioral interventions on risk and progression of stress urinary incontinence in males with prostate diseases

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Wille,2003[530] RCT to examine the effects of pelvic muscle exercises, electrical stimulation and biofeedback on urinary incontinence after radical retropubic prostatectomy. Duration: 3 months Duration of followup: 12 months	139 patients who underwent radical retropubic prostatectomy Exclusion criteria: Patient unwillingness to make 2 visits 3 and 12 months Postoperatively. Loss of followup: 7.9%	1. Instructions about postoperative pelvic muscle exercises. 2. Instructions about postoperative, electrical stimulation (ES) for 15 minutes twice daily with frequency 27Hz, biphasic pulse shape with 1-second bursts, a 5-second pulse width and 2-second pulse trains. Intensity was controlled by each patient from 10% to 100%. 3. Instructions about postoperative, electrical stimulation (ES) for 15 minutes twice daily and biofeedback (BFB) 15 minutes twice daily with stimulation time of 5 seconds, and contracting and relaxing time of 5 and 15 seconds. Treatment was started immediately after catheter removal and performed for 3 months.	Self reported urinary incontinence with symptom inventory. 20-minute pad test Subjective continence - no or 1 pad used daily. Objective continence-urine loss of less than 1gm.	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Yokoyama, 2004[531] RCT to examine the effects extracorporeal magnetic innervation and functional electrical stimulation on urinary incontinence after retropubic radical prostatectomy. Duration: 1-2 months Duration of followup: 6 months	36 patients with urinary incontinence after retropubic radical prostatectomy. Exclusion criteria: <100g pad weight after the 24-hour pad test 1 day after removing the catheter, use of anticholinergic drugs. Loss of followup: none	1. Extracorporeal magnetic innervation (ExMI) using neocontrol system was used with 20 minute treatment sessions, 2/week for 2 months. The frequency of the pulse field was 10Hz for 10 minutes, followed by a second treatment at 50Hz for 10 minutes. 2. Functional electrical stimulation (FES) using anal electrode and pulses of 20Hz square waves at a 300μs pulse duration were used for 15 minutes twice daily for 1 month. 3. Control group: pelvic floor muscle exercises.	Self reported bladder diaries, 24-hour pad weight testing	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F90. Behavioral interventions on risk and progression of stress urinary incontinence in males with prostate diseases (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Filocamo,2005[532] RCT to examine the effects of early pelvic floor muscle training on urinary incontinence after radical retropubic prostatectomy. Duration of followup: 12 months	300 consecutive patients who had undergone standard radical retropubic prostatectomy for clinical stage T1 or T2 prostate cancer. Exclusion criteria: Prior bladder or prostate surgery, prior urinary or fecal incontinence, neurogenic dysfunction of the lower urinary tract, and a preoperative history of overactive bladder. Loss of followup: 1%	1. Early pelvic floor rehabilitation program after removal of the catheter with verbal explanations, palpation, and visualization of Kegel exercises: 3 sets of 10 contractions for 5 seconds and 10 seconds of muscular relaxation under digital anal control. 2. No formal training in pelvic floor rehabilitation after catheter removal.	Self reported urinary incontinence using International Continence Society (ICS)-male questionnaire. 1 hour and 24 hour pad test	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Moore, 1999[533] RCT to examine the effects of intensive pelvic muscle exercises and electrical stimulation on urinary incontinence after radical prostatectomy. Duration: 12 weeks. Duration of followup: 8 months	63 patients >4 weeks after radical prostatectomy, with urinary incontinence (>2g of urine loss on pad test), within 12 hours drive of study center, not seeking other treatments, able to speak and read English and comply with the study protocol. Exclusion criteria: Demand pacemaker, previous pelvic floor stimulation, active rectal lesions or infections, known detrusor instability. Loss of followup: 7.9%	1. Intensive pelvic muscle exercises conducted by a physiotherapist for 30 minutes 2/week: maximal contractions for 5 seconds, slow release and 10 seconds of muscular relaxation. 2. Intensive pelvic muscle exercises conducted by a physiotherapist for 30 minutes 2/week: maximal contractions for 5 seconds, slow release and 10 seconds of muscular relaxation; plus electrical stimulation : 50Hz, biphasic pulse shape with 1 second bursts, 1 second width, and 1 second pulse trains. 3. Standard treatment with verbal and written instructions about postoperative pelvic muscle exercises from urologist and from the nurses at the pre-admission clinic.	Urine symptom inventory. Continence: a loss of <2g of urine. Socially acceptable continence: loss of <10g of urine. 24-hour pad test	No intention to treat. Open label. Computer generated randomization with random numbers list. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Mathewson-Chapman, 1997[534] RCT to examine the effects of pelvic muscle exercises with biofeedback on urinary incontinence after radical prostatectomy for localized prostate cancer. Duration: 12 weeks	53 patients after radical prostatectomy for localized prostate cancer. Exclusion criteria: not reported Loss of followup: none	1. Education booklet and instruction for pelvic muscle exercises with biofeedback: maximal contractions for 10 seconds, slow release, and 10 seconds of muscular relaxation, 3 times/week. 2. Standard care with no pelvic muscle exercises. All patients were recommended to limit coffee, tea, chocolate, alcohol, and over counter medication for bladder control.	Self reported in three-day bladder diaries length of time urine loss was experienced; 2) episodes and frequency of urine loss; and 3) ounces of urine lost and number of pads used.	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F90. Behavioral interventions on risk and progression of stress urinary incontinence in males with prostate diseases (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Floratos, 2002[535] RCT to examine the effects of electromyographic biofeedback with verbal instructions as learning tools of pelvic muscle exercises on urinary incontinence after radical prostatectomy. Duration: 12 weeks. Duration of followup: 6 months	42 consecutive patients with urinary incontinence after radical retropubic prostatectomy for localized prostate cancer, able to participate in a learning program, in good general condition and willingness to participate in the study. Exclusion criteria: Significant perioperative complications (ureteric or rectal injury, urine leakage from anastomosis, thrombo-embolism), history of preoperative incontinence and pelvic or lower urinary tract operations, psychiatric history. Loss of followup: 2.4%	1. Electromyographic biofeedback as learning tools for pelvic muscle exercises immediately after catheter removal: submaximal contractions 3-5 seconds, relaxation for 6-10 seconds, 80-100 times/day and 15 sessions of 2-channel electromyographic biofeedback (three times weekly, 30 minutes each). 2. Verbal feedback as learning tools for pelvic muscle exercises immediately after catheter removal: submaximal contractions 3-5 seconds, relaxation for 6-10 seconds, 80-100 times/day.	Self reported in 3-day bladder diaries. Continence: a loss of <1g of urine. 1 hour pad test	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Van Kampen, 2000[536] RCT to examine the effects of pelvic floor re-education for patients with urinary incontinence after radical prostatectomy. Duration of followup: 1 year	102 consecutive incontinent patients who had had radical retropubic prostatectomy for clinically localized prostate cancer, incontinent on day 15 after surgery after removal of the catheter, and who could comply with the ambulatory treatment schedule. Exclusion criteria: Continence Loss of followup: 3.9%	1. Pelvic floor re-education program with active pelvic floor muscle exercises and biofeedback for as long as they were incontinent.. 2. .Placebo electrotherapy (a false interferential current) via four skin electrodes, two placed on the abdomen and two on the adductor muscles of the thighs	Self reported urinary incontinence with a visual analogue scale (0=completely dry, 10=completely incontinent). 1 hour and 24 hour pad tests.	Intention-to-treat. Single blind. Computer generated randomization with random permuted blocks. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Bales,2000[537] RCT to examine the effects of preoperative biofeedback training on urinary continence in men undergoing radical prostatectomy. Duration: 2-4 weeks. Duration of followup: 6 months	100 men with Stages T1c-T2c prostate cancer who were to undergo radical retropubic prostatectomy. Exclusion criteria: Preoperative radiotherapy or neoadjuvant hormonal blockade, transurethral resection of the prostate, pre-existing neurologic disease. Loss of followup: 3%	1. Graded pelvic muscle exercise training with biofeedback 2-4 weeks before surgery 4 times/day until surgery and to resume exercises when the urethral catheter was removed following surgery. Surface electrodes were used to assess muscle strength and contractions of 5-10 seconds, and 10-15 repetitions were performed. 2. Control group: Pelvic muscle exercises without biofeedback.	Self reported urinary continence: one pad or less/day, either because of minimal urine leakage or for security if no leakage was present,	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.

Table F90. Behavioral interventions on risk and progression of stress urinary incontinence in males with prostate diseases (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Porru, 2001[538] RCT to examine the effects of pelvic floor muscle exercises on urinary incontinence in patients after transurethral prostatectomy. Duration: 4 weeks	63 consecutive patients with bladder outflow obstruction and diagnosis of symptomatic benign prostatic hyperplasia after transurethral prostatectomy. Exclusion criteria: Age over 80 years old, history of urethral or pelvic surgery, neurogenic bladder, or prostatic carcinoma. Loss of followup: Not reported	1. Verbal instruction, feedback on contractions of pelvic floor muscles, and verbal reinforcement of appropriate responses to teach selective contractions of anal sphincter muscles and relaxation of abdominal muscles for 45 times/day, divided into 3 sessions of 15 exercises each. 2 Standard care without instruction on pelvic floor muscle exercises.	Self reported urinary incontinence using The American Urological Association Symptom Score	Intention to treat not stated. Single blind. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.
Franke, 2000[539] RCT to examine the effects of biofeedback and pelvic floor exercises 6 weeks after radical prostatectomy on urinary incontinence. Duration: 6 months	30 patients who underwent radical retropubic prostatectomy. Exclusion criteria: Previous transurethral prostatic resection, neurological condition affecting the urinary tract, residual urine greater than 50ml. or a urinary tract infection. Loss of followup: Not reported	1. Pelvic floor muscle exercises at home of 20 contractions 3 times/day, with 45 minute perineal patch, electromyography biofeedback behavioral therapy session and timed voiding schedule to decrease urgency and urge incontinence. 2. Standard care without instruction on pelvic floor muscle exercises.	Self reported urinary incontinence and voiding diary and 48-hour pad test	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Parekh,2003[540] RCT to examine the effects of physical therapy and pelvic floor exercises before and after radical prostatectomy on urinary incontinence. Duration: 3 months Duration of followup: 6 months	38 consecutive patients scheduled to undergo radical prostatectomy. Exclusion criteria: Prior bowel or bladder incontinence. Loss of followup: Not reported	1. Physical therapy for a pelvic floor exercise program with 2 treatment sessions before surgery and every 3 weeks for 3 months after the catheter removal. A home exercise program was followed for 6 months or longer by patients requiring further physical therapy guidance. 2. Standard care without instruction on pelvic floor muscle exercises.	Self reported urinary incontinence and number of pads used daily. Continence - 0 or 1 precautionary pad	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.

Table F90. Behavioral interventions on risk and progression of stress urinary incontinence in males with prostate diseases (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Dorey, 2004[541] RCT to examine the effects of pelvic floor muscle exercises and manometric biofeedback for post-micturition dribble in men with erectile dysfunction. Duration of followup: 3 months	55 men with erectile dysfunction. Exclusion criteria: Urological congenital abnormalities, neurological deficits, and previous urological surgery. Loss of followup: 9.1%	1. Pelvic floor muscle exercises including a strong post-void "squeeze out" pelvic floor muscle contraction, biofeedback, and suggestions for lifestyle changes. 2. Advice on lifestyle changes	24 hours, pad test, anal manometric outcomes.	No intention to treat. Single blind. Random number system of odd or even tickets not adequate. Allocation concealment not adequate. Sample size not justified.
Burgio, 2006[542] RCT to examine the effects of preoperative biofeedback assisted behavioral training on urinary incontinence after radical prostatectomy. Duration of follow up: 6 months	125 continent men 53 to 68 years old who elected radical prostatectomy for prostate cancer. Exclusion criteria: >2 episodes of urinary incontinence in the previous 6 months, documented incontinence in the bladder diary, prior prostatectomy, impaired mental status (score less than 20 on the Mini-Mental State Examination), <1 week before scheduled surgery. Loss of follow up: 18.4%	1. Single preoperative session of biofeedback assisted behavioral training plus daily home exercise daily until the surgery and after catheter removal: 45 pelvic floor muscle exercises in various positions, divided into 3 sessions of 15 exercises to contract sphincter muscles (2 -10-second contraction, 2-10 seconds of relaxation with immediate visual feedback of rectal pressure and external anal sphincter contractions using 3 small balloons). 2. Usual care control condition, consisting of simple postoperative instructions to interrupt the urinary stream.	Self reported incontinence duration from bladder diaries, incontinence severity (the proportion with severe/continual leakage), Incontinence Impact Questionnaire, psychological distress (Hopkins Symptom Checklist) pad use, and health related quality of life (Medical Outcomes Study Short Form Health Survey). Self reported continence -3 consecutive 1-day diaries with no leakage or a 7-day diary with no leakage.	Intention to treat. Single blind. Randomization with computer generated random numbers and block size of 4 stratified by age (<65 vs. ≥65 years) and tumor differentiation (Gleason score ≤5 vs. > 5). Allocation concealment not adequate. Baseline data confirmed the adequacy of randomization. Sample size justified.

Table F91. Effects of behavioral interventions on urinary continence in males (events) (table sorted by rate of continence in the active group, from highest to lowest)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Filocamo, 2005[532] N = 300	Early pelvic floor rehabilitation program after removal of the catheter with verbal explanations, palpation, and visualization of Kegel exercises: 3 sets of 10 contractions for 5 seconds and 10 seconds of muscular relaxation under digital anal control.	No formal training in pelvic floor rehabilitation after catheter removal	Self reported urinary continence	148	132	98.7	88.0	**1.1 (1.1; 1.2)**	9 (6; 21)	107 (47; 170)E
Mathewson-Chapman, 1997[534] N = 53	Education booklet and instruction for pelvic muscle exercises with biofeedback: maximal contractions for 10 seconds, slow release and 10 seconds of muscular relaxation, 3 times/week.	Standard care with no pelvic muscle exercises. All patients were recommended to limit coffee, tea, chocolate, alcohol, and over counter medication for bladder control.	Self reported urinary continence	26	24	96.3	100.0	1.0 (0.9; 1.1)		

Table F91. Effects of behavioral interventions on urinary continence in males (events) (table sorted by rate of continence in the active group, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Van Kampen, 2000[536] N = 102	Pelvic floor re-education program with active pelvic floor muscle exercises and biofeedback for as long as they were incontinent.	Placebo electrotherapy (a false interferential current) via four skin electrodes, two placed on the abdomen and two on the adductor muscles of the thighs.	Self reported urinary continence	48	42	95.0	81.0	**1.2 (1.0; 1.4)**	7 (3; 340)	140 (3; 286)E
Yokoyama, 2004[531] N = 36	Extracorporeal magnetic innervation (ExMI) using neocontrol system was used with 20 minute treatment sessions, 2/week for 2 months. The frequency of the pulse field was 10Hz for 10 minutes, followed by a second treatment at 50Hz for 10 minutes.	Pelvic floor muscle exercises	Urinary continence pad free	11	10	91.7	83.3	1.1 (0.8; 1.5)		

Table F91. Effects of behavioral interventions on urinary continence in males (events) (table sorted by rate of continence in the active group, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Filocamo, 2005[532] N = 300	Early pelvic floor rehabilitation program after removal of the catheter with verbal explanations, palpation, and visualization of Kegel exercises: 3 sets of 10 contractions for 5 seconds and 10 seconds of muscular relaxation under digital anal control.	No formal training in pelvic floor rehabilitation after catheter removal.	International Continence Society (ICS)-male questionnaire: completely dry	134	101	89.3	67.3	**1.3 (1.2; 1.5)**	5 (3; 9)	220 (115; 338)E
Wille, 2003[530] N = 139	Instructions about postoperative pelvic muscle exercises	Instructions about postoperative, electrical stimulation (ES) for 15 minutes twice daily and biofeedback (BFB) 15 minutes twice daily with stimulation time of 5 seconds, and contracting and relaxing time of 5 and 15 seconds	Self reported urinary continence	41	41	88.0	88.6	1.0 (0.8; 1.1)		

Table F91. Effects of behavioral interventions on urinary continence in males (events) (table sorted by rate of continence in the active group, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Bales, 2000[537] N = 100	Graded pelvic muscle exercise training with biofeedback 2 to 4 weeks before surgery 4 times/day until surgery and to resume exercises when the urethral catheter was removed following surgery.	Pelvic muscle exercises without biofeedback	Self reported urinary continence	44	48	88.0	96.0	0.9 (0.8; 1.0)		
Van Kampen, 2000[536] N = 102	Pelvic floor re-education program with active pelvic floor muscle exercises and biofeedback for as long as they were incontinent.	Placebo electrotherapy (a false interferential current) via four skin electrodes, two placed on the abdomen and two on the adductor muscles of the thighs.	Self reported urinary continence in visual analogue scale 0-1 (0 = completely dry, 10 = completely incontinent).	44	36	88.0	70.0	**1.3 (1.0; 1.6)**	6 (3; 44)	180 (23; 396)E
Franke, 2000[539] N = 30	Pelvic floor muscle exercises at home of 20 contractions 3 times/day with 45 minute perineal patch, electromyography biofeedback behavioral therapy session and timed voiding schedule to decrease urgency and urge incontinence.	Standard care without instruction on pelvic floor muscle exercises.	Self reported pad free condition	13	13	86.0	88.0	1.0 (0.8; 1.3)		

Table F91. Effects of behavioral interventions on urinary continence in males (events) (table sorted by rate of continence in the active group, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Parekh, 2003[540] N = 38	Physical therapy for a pelvic floor exercise program with and 2 treatment sessions before surgery and every 3 weeks for 3 months after catheter removal. A home exercise program.	Standard care without instruction on pelvic floor muscle exercises.	Self reported urinary continence diary)	16	14	85.0	75.0	1.1 (0.8; 1.6)		
			Self reported urinary continence (<1 pad/day)	16	15	84.2	78.9	1.1 (0.8; 1.4)		
Wille, 2003[530] N = 139	Instructions about postoperative and electrical stimulation (ES) for 15 minutes twice daily with frequency 27Hz, biphasic pulse shape with 1 second bursts, a 5 second pulse width and 2 second pulse trains.	Instructions about postoperative, electrical stimulation (ES) for 15 minutes twice daily and biofeedback (BFB) 15 minutes twice daily with stimulation time of 5 seconds, and contracting and relaxing time of 5 and 15 seconds.	Self reported Urinary continence	37	41	81.0	88.6	0.9 (0.8; 1.1)		
	Instructions about postoperative pelvic muscle exercises		Urinary continence in pad test	36	42	76.7	90.5	0.8 (0.7; 1.0)		

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F92. Effects of behavioral interventions on progression of urinary incontinence in males (events)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Moore, 1999[533] N = 63	Intensive pelvic muscle exercises conducted by a physiotherapist for 30 minutes 2/week plus electrical stimulation: 50Hz, biphasic pulse shape with 1 second bursts, 1 second width, and 1 second pulse trains.	Standard treatment with verbal and written instructions about postoperative pelvic muscle exercises from urologist and from the nurses at the pre-admission clinic	Self reported urinary incontinence that affected life	6	3	31.6	14.3	2.2 (0.6; 7.6)		
	Intensive pelvic muscle exercises conducted by a physiotherapist for 30 minutes 2/week: maximum contractions for 5 seconds, slow release and 10 seconds of muscular relaxation	Standard treatment with verbal and written instructions about postoperative pelvic muscle exercises from urologist and from the nurses at the pre-admission clinic	Self reported urinary incontinence that affected life	3	3	16.7	14.3	1.2 (0.3; 5.1)		

Table F92. Effects of behavioral interventions on progression of urinary incontinence in males (events) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Porru, 2001[538] N = 58	Verbal instruction, feedback on contractions of pelvic floor muscles, and verbal reinforcement of appropriate responses to teach selective contractions of anal sphincter muscles and relaxation of abdominal muscles, 45 times/day	Standard care without instruction on pelvic floor muscle exercises	Self reported urinary incontinence	4	12	13.3	42.9	**0.3 (0.1; 0.9)**	3 (3; 16)	295 (53; 380)A
Parekh, 2003[540] N = 38	Physical therapy for a pelvic floor exercise program with and 2 treatment sessions before surgery and every 3 weeks for 3 months after catheter removal. A home exercise program.	Standard care without instruction on pelvic floor muscle exercises	Use of >3 pads/day for urinary incontinence	2	3	10.5	15.8	0.7 (0.1; 3.5)		

Table F92. Effects of behavioral interventions on progression of urinary incontinence in males (events) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Wille, 2003[530] N = 139	Instructions about postoperative and electrical stimulation (ES) for 15 minutes twice daily with frequency 27Hz, biphasic pulse shape with 1 second bursts, a 5-second pulse width, and 2 second pulse trains.	Instructions about postoperative, electrical stimulation (ES) for 15 minutes twice daily and biofeedback (BFB) 15 minutes twice daily with stimulation time of 5 seconds; contracting and relaxing time of 5 and 15 seconds.	Urinary continence in pad test	38	42	82.0	90.5	0.9 (0.8; 1.1)		
Dorey, 2004[541] N = 55	Pelvic floor muscle exercises including a strong post-void "squeeze out" pelvic floor muscle contraction, biofeedback, and suggestions for lifestyle changes.	Advice on lifestyle changes	Less amount of post-micturition dribble	2	1	7.1	3.7	1.9 (0.2; 20.1)		
			Less often post-micturition dribble	2	2	7.1	7.4	1.0 (0.1; 6.4)		
			No post-micturition dribble	14	1	50.0	3.7	**13.5 (1.9; 95.7)**	2 (0; 30)	463 (33; 3,508)E
Filocamo, 2005[532] N = 300	Early pelvic floor rehabilitation program after removal of the catheter with	No formal training in pelvic floor rehabilitation after catheter removal	International Continence Society (ICS)-male questionnaire: 2 pads /day	1	11	0.7	7.3	**0.1 (0.0; 0.7)**	15 (14; 45)	67 (22; 72)A

Table F92. Effects of behavioral interventions on progression of urinary incontinence in males (events) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
	verbal explanations, palpation, and visualization of Kegel exercises: 3 sets of 10 contractions for 5 seconds and 10 seconds of muscular relaxation under digital anal control.		ICS-male questionnaire: 3 pads /day or more	8	8	5.3	5.3	1.0 (0.4; 2.6)		
			ICS male questionnaire: occasional leakage	14	29	9.3	19.3	**0.5 (0.3; 0.9)**	10 (7; 42)	100 (142; 24)
			Self reported urinary incontinence	2	18	1.3	12.0	**0.1 (0.0; 0.5)**	9 (9; 16)	107 (117; 64)
			Severe stress urinary incontinence that required implantation of artificial sphincter	2	3	1.3	2.0	0.7 (0.1; 3.9)		
Burgio; 2006[542] N = 125 6 months	Single preoperative session of biofeedback assisted behavioral training plus daily home exercise.	Usual care control condition, consisting of simple postoperative instructions to interrupt the urinary stream	Urine loss when coughing	11	24	17.46	38.71	**0.45 (0.24; 0.84)**	5 (3; 16)	212 (62; 293)A
			Urine loss when sneezing	13	23	20.63	37.10	**0.56 (0.31; 1.00)**	6 (4; 709)	165 (1; 256)A
			Urine loss when Getting up from lying position	7	15	11.11	24.19	0.46 (0.20; 1.05)		
			Urine loss when lifting	23	26	36.51	41.94	0.87 (0.56; 1.35)		
			Urine loss when walking	10	17	15.87	27.42	0.58 (0.29; 1.16)		
			Urge to urinate on way to toilet	13	19	20.63	30.65	0.67 (0.37; 1.24)		

Table F92. Effects of behavioral interventions on progression of urinary incontinence in males (events) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
			Wearing pads	16	24	25.40	38.71	0.66 (0.39; 1.11)		
			Resume usual activities	28	33	44.44	53.23	0.84 (0.58; 1.20)		
			Severe and continual leakage	4	12	5.90	19.80	**0.33 (0.11; 0.96)**	7 (6; 133)	139 (8; 176)A

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control –rate of the outcome in the active group); A - avoided; E - excessive events

Table F93. Behavioral clinical interventions on urinary incontinence in adults

Study	Participants	Clinical Interventions	Outcome	Quality Issues
O'Brien, 1991[309] RCT to examine the effects of pelvic floor exercises and bladder retraining supervised by non-specialist nurse on urinary incontinence in adults with regular urinary incontinence. Duration: 3 months	561 adults ages 35 years and older with regular urinary incontinence (two or more leaks in any one month). Exclusion criteria: Urinary tract infection. Loss of followup: not reported	1. Four sessions of pelvic floor exercises and bladder retraining supervised by non-specialist nurse. 2. Usual care	Self reported urinary incontinence and changes in incontinence.	No Intention to treat. Single blind. Computer based randomization. Allocation concealment unclear. Baseline data not reported. Sample size justified.
McDowell, 1999[543] Cross-over RCT to examine the effects of behavioral therapies of urinary incontinence in homebound older adults. Duration: 8 weeks.	105 adults 60 years and older, homebound (Health Care Financing Administration, cognitively intact (Folstein Mini-Mental State Examination score >24), with urinary incontinence (>2 urinary accidents/week for at least 3 months), who understand and speak English. Exclusion criteria: Folstein MMSE scores <24, severe pelvic prolapse, terminal illness, post-void residual >100ml unable to toilet independently, no caregiver willing and able to assist with toileting, <2 urinary accidents per week, unable to provide satisfactory self-report bladder diary data after three attempts. Loss of followup: 19%	1. Biofeedback-assisted pelvic floor muscle training by NPs skilled in behavioral therapies for urinary incontinence. Behavioral therapy: 8 weekly sessions at homes with biofeedback-assisted pelvic floor muscle exercises, urge and stress strategies, and bladder retraining. Biofeedback with surface electromyography for immediate visual and/or auditory feedback of pelvic floor and abdominal muscle activity. PFM exercises 3/day, 10-15 exercises at each session to contract and relax muscles for 10 seconds. 2. Usual care with attention control (visits by the NP every 1-2 weeks to provide social interaction).	Self reported episodes of urinary incontinence/day and changes in severity of urinary incontinence (mild: <5 accidents/week; moderate: 5-10 accidents/week; severe: >10 accidents/week).	No intention to treat. Single blind. Computer-generated stratified by cognitive ability, toileting skills, and severity of urinary incontinence randomization with permuted blocks. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F93. Behavioral clinical interventions on urinary incontinence in adults (continued)

Study	Participants	Clinical Interventions	Outcome	Quality Issues
Engberg, 2002[544, part of McDowell, 1999{McDowell, 1999 #10200}] Cross-over RCT to examine the effects of prompted voiding in cognitively impaired homebound older adults. Duration: 8 weeks	19 adults 60 years and older with urinary incontinence >2 episodes/week for >3 months who met Center for Medicare and Medicaid Services criteria for being homebound, residents in 2 large Medicare-approved home health agencies in a large metropolitan area who understand and speak English. Exclusion criteria: Terminal illness; postvoid residual volume >100ml; caregiver was unable or unwilling to provide toileting assistance, complete bladder diaries, or implement the PV protocol. Loss of followup: 19%	1. Prompted voiding by caregivers to approach subjects hourly for perceived wet/dry status vs. objective wet checks, feedback and praising for correct response, toilet by request, positive feedback for appropriate toileting. 2. Usual care with attention control (visits by the NP every 1-2 weeks to provide social interaction).	Incontinent episodes reported by subjects' caregivers in 2-week bladder diary.	Intention to treat. Single blind. Computer-generated stratified by cognitive ability, toileting skills, and severity of urinary incontinence randomization. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size not justified but power reported.
Paterson, 1997[545] RCT to examine the effects of pelvic floor exercises and urethral milking as treatments for post-micturition dribble in males. Duration: 12 weeks.	49 men 36-83 years old who had not undergone surgery on the bladder, urethra, or prostate gland but with history of post-micturition dribble. Exclusion criteria: not reported. Loss of followup: 12.2%	1. Pelvic muscle exercise with 1 second contractions (~5) to increase length and strengths of contractions as much as possible. 2. Urethral milking after appropriate education. 3. Counseling including drinking pattern, aperient use, toileting habits, dietary advice, and relaxation therapy.	Objectively measure pad weight gain.	No intention to treat. Single blind. Randomization with random numbers table and balanced block design. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F94. Effects of behavioral interventions on urinary incontinence in adults (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
O'Brien, 1991[309] N = 561 76% female	Four sessions of pelvic floor exercises and bladder retraining supervised by non-specialist nurse	Usual care	Self reported improved urinary incontinence	182	7	48.1	3.8	**12.6 (6.0; 26.2)**	2 (1; 5)	443 (193; 965)E
			Self reported cured urinary incontinence	32	1	8.5	0.5	**15.5 (2.1; 112.5)**	13 (2; 161)	79 (6; 609)E

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A- avoided; E- excessive events

Table F95. Effects of behavioral interventions on perceived urinary incontinence in females (severity and quality of life measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
Dougherty, 2002[504] N = 218	Behavioral management for continence: self-monitoring, bladder training, pelvic muscle exercise	Usual care	Urine loss per 24 hours (g) at 6 months	38.2 ± 109.9	37.2 ± 73.4	0.0 (-0.3; 0.3)	0.0 (-0.8; 0.8)
			Incontinence episodes/day at 6 months	1.0 ± 1.9	1.8 ± 1.9	**-0.4 (-0.7; -0.1)**	-23.4 (-39.9; -6.9)
			Nocturnal voluntary at 6 months	0.5 ± 0.8	0.9 ± 0.8	**-0.5 (-0.8; -0.2)**	-55.6 (-88.8; -22.3)
			Voiding interval (hours) at 6 months	2.5 ± 0.7	2.4 ± 0.6	0.2 (-0.1; 0.4)	6.4 (-5.9; 18.6)
			Self-rating of urine loss 6 months	5.9 ± 0.9	4.7 ± 1.2	**1.2 (0.9; 1.5)**	26.1 (19.2; 33.0)
			Nocturnal voluntary micturition per night at 2 years	0.9 ± 1.0	1.3 ± 0.9	**-0.4 (-0.7; -0.1)**	-32.2 (-55.1; -9.4)
			Voiding interval (hours) at 2 years	2.3 ± 0.6	2.1 ± 0.6	0.3 (0.0; 0.6)	15.9 (1.8; 30.0)
			Incontinence episodes/day at 2 years	1.0 ± 1.2	2.3 ± 3.2	**-0.5 (-0.8; -0.3)**	-23.9 (-36.9; -10.9)
			Self rating of urine loss at 2 years	5.7 ± 1.3	4.9. ± 1.4	**0.6 (0.3; 0.9)**	11.3 (5.2; 17.4)
Bo, 1999[513] N = 122	Pelvic floor exercise with 8-12 contractions 3 times/day and in groups with skilled physical therapists 1/week.	Untreated control group offered the use of a continence guard	Change from baseline in episodes of leakage/day (average from 3 days)	-1.2 ± 2.0	0.3 ± 2.3	**-0.7 (-1.2; -0.2)**	-228.8 (-401.3; -56.2)
	Electrical stimulation using vaginal intermittent stimulation with the MS 106 Twin at 50Hz 30 minutes/day.			-0.7 ± 4.6	0.3 ± 2.3	-0.3 (-0.8; 0.2)	-91.7 (-255.8; 72.4)
			Change from baseline in leakage index	-0.2 ± 0.5	0.1 ± 0.6	**-0.6 (-1.1; -0.1)**	
			Change from baseline in social activity index	0.6 ± 1.0	-0.2 ± 1.7	**0.6 (0.1; 1.1)**	-281.4 (-31.5; -531.4)
Liebergall-Wischnitzer, 2005[523] N = 63	Pelvic floor muscle exercise 15 minutes with 30 minute lesson	Paula method of circular muscle training 15-45	Change from baseline in quality of life-avoidance, limiting behaviors scores (8 items)	9.5 ± 27.4	9.8 ± 17.3	0.0 (-0.5; 0.5)	-0.1 (-5.2; 4.9)

Table F95. Effects of behavioral interventions on perceived urinary incontinence in females (severity and quality of life measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
	session/week	minutes/day with training sessions of 45 minutes/week	Change from baseline in quality of life-avoidance, social embarrassment scores (5 items)	9.3 ± 13.0	14.0 ± 23.0	-0.3 (-0.7; 0.2)	-1.8 (-5.3; 1.8)
Tibaek, 2005[499] N = 26	Intensive pelvic floor muscle training 1-2 times/day by specialized physiotherapist	Usual care	Voiding frequency totally/24 hours	7.0 ± 1.3	9.0 ± 2.7	**-1.0 (-1.8; -0.2)**	-10.8 (-19.9; -1.7)
			Voiding frequency, nighttime/24 hours	2.0 ± 0.0	2.0 ± 0.7		
			Number of used pads/24 hours	1.0 ± 0.0	1.0 ± 1.3		
			Number of incontinence episodes/24 hours	0.0 ± 0.0	0.0 ± 0.7		
Subak, 2002[500] N = 152	6 weekly 20-minute group instructional sessions on bladder training by nurse educators and followed individualized voiding schedules	Usual care	Diurnal incontinent episodes per week	4.2 ± 5.5	9.6 ± 16.0	**-0.5 (-0.8; -0.1)**	-4.7 (-8.1; -1.4)
			Nocturnal incontinent episodes per week	1.1 ± 2.0	1.4 ± 2.5	-0.1 (-0.5; 0.2)	-9.5 (-32.2; 13.3)
			Total incontinent episodes per week	5.2 ± 6.8	11.0 ± 17.4	**-0.4 (-0.8; -0.1)**	-4.0 (-6.9; -1.1)
			Nocturnal micturition per week	9.5 ± 5.2	6.7 ± 4.1	**0.6 (0.3; 0.9)**	8.9 (4.1; 13.8)
Burgio, 2002[505] N = 222	Biofeedback-assisted behavioral training implemented by nurse practitioners	Self administered behavioral treatment using a self-help booklet to advice pelvic floor exercise and bladder control	Self reported urinary incontinence episodes/week	6.1 ± 10.3	6.7 ± 11.4	-0.1 (-0.4; 0.3)	-0.8 (-5.6; 4.0)
			% reduction in self reported urinary incontinence	63.1 ± 42.7	58.6 ± 38.8	0.1 (-0.2; 0.4)	0.2 (-0.4; 0.7)
	4 visits of behavioral training without biofeedback (verbal feedback based on vaginal palpation). pelvic floor muscle exercise with 10 second contractions and 10 second relation for 45 minutes/day		Self reported urinary incontinence episodes/week	17.3 ± 16.3	15.4 ± 14.2	0.1 (-0.2; 0.4)	0.8 (-1.3; 2.9)
			% reduction in self reported urinary incontinence	69.4 ± 32.7	58.6 ± 38.8	0.3 (0.0; 0.6)	0.5 (0.0; 1.1)

Table F95. Effects of behavioral interventions on perceived urinary incontinence in females (severity and quality of life measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
Wyman, 1997[506] N = 131	Bladder training: patient education, progressive scheduled voiding regimen, positive reinforcement	Usual care	Self reported quality of life measures (Incontinence Impact Questionnaire (IIQ)	32.0 ± 41.0	60.0 ± 65.0	**-0.5 (-0.9; -0.2)**	-0.9 (-1.4; -0.3)
Lagro-Janssen, 1991[525] N = 66	Instructions in pelvic floor exercises 5-10 sessions of 10 pelvic muscle contractions for 6 seconds each day.	No therapy	Mean leakage episodes/week	4.8 ± 1.3	25.3 ± 3.6	**-7.6 (-8.9; -6.2)**	-29.8 (-35.4; -24.3)
Theofrastous, 2002[492] N = 137	Pelvic floor muscle training: 4 office biofeedback sessions and home exercise	Bladder training	Self reported urinary incontinent episodes per week	9.4 ± 14.0	10.0 ± 12.0	0.0 (-0.4; 0.3)	-0.5 (-3.8; 2.9)
Fantl, 1991[503] N = 131	Bladder training using 6 weekly visits included patient education; voiding schedule to have micturition from every 30-60 minutes to every 2.5-3 hours; and positive reinforcement.	Usual care	Diurnal micturition/week	52.0 ± 14.0	57.0 ± 27.0	-0.2 (-0.6; 0.1)	-0.4 (-1.0; 0.2)
			Nocturnal micturition/week	5.0 ± 5.0	8.0 ± 6.0	**-0.5 (-0.9; -0.2)**	-6.8 (-11.1; -2.4)
Diokno, 2004[487] N = 359	Behavioral modification program: pelvic floor muscle training, bladder training	Usual care	Change in pressure digital scores adjusted for baseline difference in this variable			-0.49 (-35.7; 34.7)	
			Change in displacement digital scores adjusted for baseline difference in this variable			-0.57 (-42.8; 41.6)	

Table F95. Effects of behavioral interventions on perceived urinary incontinence in females (severity and quality of life measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
			Change in 24 hour urinary frequency adjusted for baseline difference in this variable			-0.35 (-13.3; 12.6)	
			Change in intervoid interval adjusted for baseline difference in this variable			-0.39 (-14.9; 14.1)	
Yoon, 2003[507] N = 50	Bladder training with increased interval between voluntary voids.	Usual care	Nocturia (number/night)	0.7 ± 0.8	1.5 ± 1.0	**-0.9 (-1.7; -0.1)**	-59.2 (-114.2; -4.1)
			Leaked urine: amount (g)	4.6 ± 6.2	8.4 ± 9.8	-0.5 (-1.3; 0.3)	-5.6 (-15.0; 3.9)
			Leaked urine: amount ratio (g/ml)	0.0 ± 0.0	0.0 ± 0.0	-0.4 (-1.2; 0.4)	
			Urinary incontinence scores	12.1 ± 7.8	14.2 ± 3.6	-0.3 (-1.1; 0.4)	-2.4 (-8.0; 3.2)
	Pelvic muscle exercise (30 contractions for 15-20 minutes/ day) with immediate and simultaneous visual feedback of pelvic muscles during a 20 minute weekly biofeedback session with electromyography.	Usual care	Leaked urine, amount (g)	3.3 ± 4.5	8.4 ± 9.8	-0.7 (-1.5; 0.1)	-8.1 (-17.7; 1.6)
			Leaked urine, amount ratio (g/ml)	0.0 ± 0.0	0.0 ± 0.0	-0.8 (-1.6; 0.0)	
			Nocturia (number/night)	1.9 ± 1.1	1.5 ± 1.0	0.4 (-0.4; 1.2)	25.3 (-27.5; 78.1)
			Urinary incontinence scores	10.8 ± 6.2	14.2 ± 3.6	-0.7 (-1.5; 0.1)	-4.7 (-10.4; 1.0)
Janssen, 2001[508] N = 530	Individual pelvic floor exercises 5 times/day and bladder training with delay voiding, training with 11 30-minute sessions.	Group pelvic floor exercises 5 times/day and bladder training with delay voiding, training with 9 2-hour sessions	Mean (SD) number of times of nocturnal loss/month at 9 months	2.5 ± 8.7	6.1 ± 12.2	**-0.3 (-0.5; -0.1)**	-5.1 (-8.4; -1.9)
			Mean (SD) number of times of urine loss/week at 3 months	7.3 ± 12.0	6.0 ± 9.3	0.1 (-0.1; 0.3)	2.2 (-1.2; 5.5)
			Mean (SD) number of times of urine loss/week at 9 months	8.6 ± 15.5	6.1 ± 10.5	0.2 (0.0; 0.4)	3.5 (0.2; 6.7)
			Mean (SD) number of times of nocturnal loss/month at 3 months	8.3 ± 17.7	7.7 ± 17.0	0.0 (-0.2; 0.2)	0.5 (-2.1; 3.1)

Table F95. Effects of behavioral interventions on perceived urinary incontinence in females (severity and quality of life measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
Wyman, 1998[491] N = 204	The pelvic muscle exercise with biofeedback-assisted instruction	Bladder training	Self reported number of incontinence episodes/week	9.6 ± 10.8	10.6 ± 16.3	-0.1 (-0.4; 0.3)	-0.7 (-3.8; 2.5)
			Self reported number of stress incontinence episodes/week	8.7 ± 0.0	12.5 ± 8.3		
Goode, 2003[490] N = 200	Behavioral training (biofeedback-assisted pelvic floor muscle training, home exercises, bladder control strategies, and self monitoring with bladder diaries) and pelvic floor electrical stimulation	Self-administered behavioral training administered with a self-help booklet	Self reported % reduction in incontinent episodes/week	71.9 ± 32.8	52.5 ± 42.7	**0.5 (0.2; 0.9)**	1.0 (0.3;' 1.6)
			Self-reported number of incontinent episodes/week	5.6 ± 13.3	7.5 ± 12.1	-0.1 (-0.5; 0.2)	-2.0 (-6.5; 2.5)
Cammu, 1998[514] N = 30	Weekly session of pelvic floor exercises vaginal probe EMG biofeedback using perineometer	Vaginal weight cones (20, 32, 45, 57, and 70g) for 15 minutes, twice daily	Number leakages/week	5.6 ± 5.5	8.7 ± 13.0	-0.3 (-0.8; 0.2)	-3.6 (-9.4; 2.3)
			Number pads/week	6.0 ± 5.6	8.8 ± 13.0	-0.3 (-0.8; 0.2)	-3.2 (-9.0; 2.6)
			Visual analogue scale (0–10)	2.6 ± 2.1	2.9 ± 2.4	-0.1 (-0.6; 0.4)	-4.6 (-22.1; 12.9)
			Visual analogue scale (0-10). Severity of incontinence	2.1 ± 2.1	3.4 ± 3.3	-0.5 (-1.0; 0.0)	-13.8 (-28.9; 1.3)
Wyman, 1998[491] N = 204	Pelvic muscle exercise with biofeedback-assisted instruction	Bladder training	Self reported number of incontinence episodes/week	9.6 ± 10.8	10.6 ± 16.3	-0.1 (-0.4; 0.3)	-0.7 (-3.9; 2.5)
			Self reported number of stress incontinence episodes/week	8.7 ± 0.0	12.5 ± 8.3		
Alewijnse, 2003[493] N = 129	Pelvic floor muscle exercise and reminder intervention	Bladder training and pelvic floor muscle exercise	Wet episodes/week	12.2 ± 16.6	8.8 ± 13.0	0.2 (-0.3; 0.8)	2.6 (-3.7; 9.0)
	Pelvic floor muscle exercise with reminder and self-help guide	Bladder training and pelvic floor muscle exercise	Wet episodes/week	12.2 ± 16.6	8.8 ± 13.0	0.2 (-0.3; 0.8)	2.6 (-3.5; 8.7)

Table F95. Effects of behavioral interventions on perceived urinary incontinence in females (severity and quality of life measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
	Pelvic floor muscle exercise with reminder, self-help guide and counseling intervention	Bladder training and pelvic floor muscle exercise	Wet episodes/week	12.2 ± 16.6	8.8 ± 13.0	0.2 (-0.3; 0.8)	2.6 (-3.4; 8.6)
Bo, 2000[512] N = 59	Pelvic floor muscle exercise with 8-12 maximum contractions in 3 series/day and 45 minutes/week group sessions	Untreated control group	Quality of Life Scale	90.1 ± 10.2	85.2 ± 12.0	0.4 (-0.1; 1.0)	0.5 (-0.1; 1.1)
			Change from baseline in leakage index	-0.9 ± 0.5	0.1 ± 0.6	**-1.8 (-2.4; -1.2)**	
			Change from baseline in social activity index	0.6 ± 1.0	-0.2 ± 1.7	0.6 (0.0; 1.1)	
Sung, 2000[524] N = 90	Functional electrical stimulation-biofeedback for 20 minutes/ session with frequency 35Hz-50Hz and contractions of 32 seconds, 2 sessions/week	Usual care	Frequency of incontinence (5-very serious problem)	1.8 ± 0.9	2.2 ± 0.5	-0.5 (-1.1; 0.0)	-25.0 (-48.4; -1.5)
			Quantity of urine leakage (5-very serious problem)	1.8 ± 0.8	2.3 ± 0.5	-0.7 (-1.3; -0.2)	-32.6 (-55.4; -9.8)
			Severity of incontinence (5-very serious problem)	1.8 ± 0.8	2.2 ± 0.6	-0.6 (-1.1; 0.0)	-25.7 (-49.2; -2.2)
			Discomfort due to incontinence (5-very serious problem)	1.6 ± 1.1	1.5 ± 0.6	0.1 (-0.4; 0.6)	7.5 (-26.2; 41.3)
			Wearing protection (5-very serious problem)	1.3 ± 0.6	1.3 ± 0.5	0.0 (-0.5; 0.5)	0.0 (-38.9; 38.9)
			Discomfort due to wearing protection (5-very serious problem)	2.0 ± 0.5	2.2 ± 0.4	-0.4 (-1.0; 0.1)	-20.1 (-43.4; 3.2)
			Avoidance of places and situations (5-very serious problem)	1.4 ± 0.9	1.5 ± 0.8	-0.1 (-0.6; 0.4)	-7.8 (-41.6; 25.9)
	Intensive pelvic floor muscle exercises	Usual care	Quantity of urine leakage (5-very serious problem)	2.1 ± 0.5	2.2 ± 0.5	-0.2 (-0.7; 0.3)	-9.1 (-32.2; 14.0)
			Severity of incontinence (5-very serious problem)	2.1 ± 0.7	2.3 ± 0.5	-0.3 (-0.8; 0.2)	-14.3 (-36.5; 7.9)
			Discomfort due to incontinence (5-very serious problem)	2.0 ± 0.7	2.2 ± 0.6	-0.3 (-0.8; 0.2)	-13.9 (-37.1; 9.2)

Table F95. Effects of behavioral interventions on perceived urinary incontinence in females (severity and quality of life measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
			Wearing protection (5-very serious problem)	1.4 ± 0.6	1.5 ± 0.6	-0.2 (-0.7; 0.3)	-11.1 (-44.9; 22.7)
			Discomfort due to wearing protection (5-very serious problem)	1.2 ± 0.4	1.3 ± 0.5	-0.2 (-0.7; 0.3)	-17.0 (-56.0; 22.1)
			Frequency of incontinence (5-very serious problem)	1.7 ± 1.0	2.2 ± 0.4	**-0.7 (-1.2; -0.1)**	-29.8 (-53.5; -6.2)
			Avoidance of places and situations (5-very serious problem)	1.4 ± 0.7	1.5 ± 0.8	-0.1 (-0.6; 0.4)	-8.9 (-42.6; 24.9)
Aukee, 2002[521] N = 30	Pelvic floor muscle exercise after verbal and written instructions for home practice of 20 minutes/day 5 times /week and individual EMG-assisted biofeedback device with vaginal probe and verbal control.	Pelvic floor muscle exercise after verbal and written instructions for home practice of 20 minutes/day 5 times/week	Leakage index	34.9 ± 10.4	38.1 ± 10.5	-0.3 (-1.0; 0.4)	-0.8 (-2.7; 1.1)
Sherman, 1997[518] N = 39	Pelvic muscle exercises with contractions for 10 seconds and relaxation for 10 seconds 5 times/session, 20 minutes twice/day with urethral biofeedback using vaginal EMG probe.	Pelvic muscle exercises with contractions for 10 seconds and relaxation for 10 seconds 5 times/session 20 minutes twice/day alone	Number of urinary leaks	2.9 ± 6.5	5.3 ± 7.2	-0.3 (-1.0; 0.3)	-6.6 (-18.8; 5.7)
			Number of voids/night	0.3 ± 0.5	0.3 ± 0.5	0.0 (-0.6; 0.7)	7.9 (-247.3; 263.1)
Aksac, 2003[516] N = 50	Pelvic floor muscle exercise (contractions for 10 seconds and relaxation for 20 seconds, 10	Usual care	Visual analog scale based social activity index: 0 - cannot undertake any social activity, 10 - does not have any problem.	7.5 ± 1.2	3.6 ± 0.6	**3.7 (2.5; 5.0)**	103.6 (69.3'; 138.0)

Table F95. Effects of behavioral interventions on perceived urinary incontinence in females (severity and quality of life measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
	times/session, 3 sessions/day) via digital palpation at home		Stress urinary incontinence frequency	3.5 ± 0.5	2.4 ± 0.9	**1.7 (0.8; 2.6)**	69.9 (33.4; 106.4)
	Pelvic floor muscle exercise (contractions for 10 seconds and relaxation for 20 seconds) via biofeedback (vaginal probe in EMG pressure mode) 3 times/ week	Usual care	Stress urinary incontinence frequency	3.6 ± 0.4	2.4 ± 0.9	**2.0 (1.1; 2.9)**	82.3 (44.0; 120.6)
			Visual analog scale based social activity index: 0 - cannot undertake any social activity, 10 - does not have any problem.	8.1 ± 0.8	3.6 ± 0.6	**6.1 (4.3; 7.8)**	168.5 (119.6; 217.5)
Wang, 2004[496] N = 120	Biofeedback-assisted pelvic floor muscle training with an Intravaginal electromyogram probe to contract or relax PFMs following the visual EMG signals.	Pelvic floor muscle training	Episodes of leakage per day	0.7 ± 1.8	0.7 ± 1.8	0.0 (-0.5; 0.4)	-2.3 (-63.1; 58.6)
Borello-France, 2006[528] N = 44	Pelvic-floor muscle exercises with EMG biofeedback in the supine position only using maximum 30-60 repetitions of 3-12	Pelvic-floor muscle exercises with EMG biofeedback in both supine and	Change in Incontinence Impact Questionnaire score (400 with poorer perceived quality of life)	27.6 ± 32.7	24.7 ± 31.0	0.1 (-0.5; 0.7)	0.4 (-2.0; 2.8)
			Change from baseline in amount of urine loss in pad test, g	3.9 ± 3.8	5.1 ± 3.9	-0.3 (-0.9; 0.3)	-6.1 (-17.8; 5.5)

Table F95. Effects of behavioral interventions on perceived urinary incontinence in females (severity and quality of life measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
	second contractions twice daily.	upright positions, 1 set (3- and 12-second contractions) in each position with maximum 20 repetitions (2 sets of 10) of the 3-12 second contractions twice daily.	Change from baseline in urine leaks/week	4.0 ± 4.7	5.4 ± 4.8	-0.3 (-0.9; 0.3)	-5.5 (-16.5; 5.5)
Kim, 2001[526] N = 33	Continence Efficacy Intervention Program: common pelvic floor muscle education, audiovisual tape, calendar, counseling, schedule guideline, assessing self care methods.	Conventional care.	Improved scores (from 0-100)	37.8 ± 23.9	23.6 ± 18.9	0.7 (0.0; 1.4)	2.8 (-0.2; 5.8)
Mørkved, 2003[486] N – 103 6 months	Pelvic floor muscle training with 3 sets of 10 contractions 3 times/day, individually supervised by a physical therapist. At home, 3 sets of 10 high intensity (close to maximum) contractions per day with a biofeedback apparatus	Pelvic floor muscle training with 3 sets of 10 contractions 3 times/day, individually supervised by a physical therapist. At home, 3 sets of 10 high intensity (close to maximum)	Leakage index	1.90±0.74	1.90±0.72	0.00 (-0.39; 0.39)	
			Social activity index	9.50±0.74	9.40±1.08	0.11 (-0.28; 0.50)	
			Standardized pad test	6.10±11.14	10.60±20.92	-0.27 (-0.66; 0.12)	-2.55 (-6.22; 1.11)
			48-hr home pad test	6.50±15.23	6.00±10.10	0.04 (-0.35; 0.42)	0.64 (-5.80; 7.08)

Table F95. Effects of behavioral interventions on perceived urinary incontinence in females (severity and quality of life measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
		contractions per day with a biofeedback apparatus					
McClurg, 2006[510] N = 30 24 months	Pelvic Floor Training and Advice and EMG Biofeedback	Pelvic Floor Training and Advice	Incontinence Impact Questionnaire (IIQ) Scores: Total score	62.50±44.20	101.60±46.10	-0.87 (-1.79; 0.06)	-0.85 (-1.76; 0.05)
			Incontinence Impact Questionnaire (IIQ) Scores: Physical activity	32.90±37.10	35.60±25.70	-0.08 (-0.96; 0.79)	-0.24 (-2.70; 2.23)
			Incontinence Impact Questionnaire (IIQ) Scores: Emotional health	28.70±39.20	28.70±26.00	0.00 (-0.88; 0.88)	0.00 (-3.05; 3.05)
			Incontinence Impact Questionnaire (IIQ) Scores: Travel	32.90±37.10	46.40±28.00	-0.41 (-1.30; 0.48)	-0.89 (-2.80; 1.03)
			Incontinence Impact Questionnaire (IIQ) Scores: Social relationships	28.80±39.30	14.90±12.40	0.48 (-0.41; 1.37)	3.20 (-2.77; 9.18)
			Urogenital Distress Inventory (UDI) Scores: Total score	77.90±33.50	139.60±66.50	**-1.17 (-2.13; -0.22)**	-0.84 (-1.52; -0.15)
			Urogenital Distress Inventory (UDI) Scores: Irritative symptoms	40.00±18.12	56.60±28.80	-0.69 (-1.59; 0.22)	-1.22 (-2.82; 0.38)
			Urogenital Distress Inventory (UDI) Scores: Obstructive/discomfort	23.70±18.20	49.10±36.10	-0.89 (-1.81; 0.03)	-1.81 (-3.69; 0.07)
			Urogenital Distress Inventory (UDI) Scores: Stress symptoms	19.90±23.30	47.50±34.70	-0.93 (-1.86; 0.01)	-1.97 (-3.92; -0.01)
			Incontinence Impact Questionnaire (IIQ) Scores: Total score	78.90±55.70	101.60±46.10	-0.44 (-1.33; 0.44)	-0.44 (-1.31; 0.44)
			Incontinence Impact Questionnaire (IIQ) Scores: Physical activity	27.00±30.50	35.60±25.70	-0.30 (-1.19; 0.58)	-0.86 (-3.33; 1.62)
				28.50±29.50	28.70±26.00	-0.01	-0.03 (-3.08; 3.03)
			Incontinence Impact				

Table F95. Effects of behavioral interventions on perceived urinary incontinence in females (severity and quality of life measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
			Questionnaire (IIQ) Scores: Emotional health			(-0.88; 0.87)	
			Incontinence Impact Questionnaire (IIQ) Scores: Travel	32.70±30.90	46.40±28.00	-0.46 (-1.35; 0.42)	-1.00 (-2.92; 0.92)
			Incontinence Impact Questionnaire (IIQ) Scores: Social relationships	25.00±30.60	14.90±12.40	0.43 (-0.46; 1.32)	2.90 (-3.06; 8.86)
			Urogenital Distress Inventory (UDI) Scores: Total score	100.50±43.10	139.60±66.50	-0.70 (-1.60; 0.21)	-0.50 (-1.15; 0.15)
			Urogenital Distress Inventory (UDI) Scores: Irritative symptoms	47.60±12.00	56.60±28.80	-0.41 (-1.29; 0.48)	-0.72 (-2.29; 0.85)
			Urogenital Distress Inventory (UDI) Scores: Obstructive/discomfort	31.50±22.80	49.10±36.10	-0.58 (-1.48; 0.31)	-1.19 (-3.01; 0.64)
			Urogenital Distress Inventory (UDI) Scores: Stress symptoms	23.20±26.20	47.50±34.70	-0.79 (-1.70; 0.12)	-1.66 (-3.59; 0.26)

Bold- significant differences in outcomes at 95% confidence level

Table F96. Effects of behavioral interventions on the results of pad test and urodynamic and perineometry outcomes in females (objective severity measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Elser, 1999[498] N = 204	Pelvic floor muscle training combined with bladder training	Bladder training	Mean Kegel urethral closure pressure	19.0 ± 10.0	21.0 ± 13.0	-0.2 (-0.5; 0.2)	-0.8 (-2.4; 0.8)
			Mean pressure transmission ratio, %	91.0 ± 15.0	87.0 ± 14.0	0.3 (-0.1; 0.6)	0.3 (-0.1; 0.7)
			Urethral axis straining	44.0 ± 21.0	40.0 ± 19.0	0.2 (-0.1; 0.5)	0.5 (-0.3; 1.3)
			Maximum cystometric capacity	470.0 ± 119.0	490.0 ± 139.0	-0.2 (-0.5; 0.2)	0.0 (-0.1; 0.0)
			Maximum Kegel urethral closure pressure	32.0 ± 19.0	31.0 ± 17.0	0.1 (-0.3; 0.4)	0.2 (-0.9; 1.3)
			Difference between MCC and FSV (MCC − FSV)	185.0 ± 141.0	217.0 ± 156.0	-0.2 (-0.6; 0.1)	-0.1 (-0.3; 0.1)
			Functional urethral length	23.0 ± 7.0	22.0 ± 7.0	0.1 (-0.2; 0.5)	0.6 (-0.9; 2.2)
			Maximum urethral closure pressure	31.0 ± 2.0	32.0 ± 17.0	-0.1 (-0.4; 0.3)	-0.3 (-1.3; 0.8)
			Mean urethral closure pressure	19.0 ± 9.0	22.0 ± 13.0	-0.3 (-0.6; 0.1)	-1.2 (-2.8; 0.3)
			First sensation to void	278.0 ± 124.0	279.0 ± 133.0	0.0 (-0.3; 0.3)	0.0 (-0.1; 0.1)
		Pelvic floor muscle training	Mean Kegel urethral closure pressure	19.0 ± 10.0	20.0 ± 11.0	-0.1 (-0.4; 0.2)	-0.5 (-2.2; 1.2)
			Mean pressure transmission ratio, %	91.0 ± 15.0	92.0 ± 17.0	-0.1 (-0.4; 0.3)	-0.1 (-0.4; 0.3)
			Urethral axis straining	44.0 ± 21.0	43.0 ± 20.0	0.0 (-0.3; 0.4)	0.1 (-0.7; 0.9)
			Mean urethral closure pressure	19.0 ± 9.0	19.0 ± 10.0	0.0 (-0.3; 0.3)	0.0 (-1.8; 1.8)
			Maximum Kegel urethral closure pressure	32.0 ± 19.0	30.0 ± 16.0	0.1 (-0.2; 0.5)	0.4 (-0.7; 1.5)
			First sensation to void	278.0 ± 124.0	258.0 ± 103.0	0.2 (-0.2; 0.5)	0.1 (-0.1; 0.2)
			Maximum cystometric capacity	470.0 ± 119.0	471.0 ± 141.0	0.0 (-0.3; 0.3)	0.0 (-0.1; 0.1)
			Difference between MCC and FSV (MCC − FSV)	185.0 ± 141.0	213.0 ± 147.0	-0.2 (-0.5; 0.1)	-0.1 (-0.2; 0.1)
			Functional urethral length	23.0 ± 7.0	21.0 ± 5.0	0.3 (0.0; 0.7)	1.6 (0.0; 3.2)

Table F96. Effects of behavioral interventions on the results of pad test and urodynamic and perineometry outcomes in females (objective severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
			Maximum urethral closure pressure	31.0 ± 2.0	35.0 ± 21.0	-0.3 (-0.6; 0.1)	-0.8 (-1.7; 0.2)
Goode, 2002[501] N = 70	Four sessions (over 8 weeks) of biofeedback-assisted behavioral training by nurse practitioners.	Usual care	First desire to void, ml	115.9 ± 64.9	133.5 ± 59.6	-0.3 (-0.8; 0.2)	-0.2 (-0.6; 0.1)
			Strong desire to void	228.9 ± 106.4	230.1 ± 78.8	0.0 (-0.5; 0.5)	0.0 (-0.2; 0.2)
			Bladder capacity	305.6 ± 117.9	323.0 ± 109.0	-0.2 (-0.6; 0.3)	0.0 (-0.2; 0.1)
Wang, 2004[496] N = 120	Biofeedback-assisted pelvic floor muscle training with an Intravaginal electromyogram probe to contract or relax PFMs following the visual EMG signals.	Electrical stimulation in management of overactive bladder with Intravaginal electrode at physiotherapy unit	Change from baseline in vaginal pressure	-8.9 ± 12.8	-38.4 ± 29.6	**1.3 (0.8; 1.8)**	-3.3 (-2.1; -4.6)
Bo, 2005[497] N = 47	Intensive pelvic floor exercise with 8-12 maximum contractions for 6-8 seconds 3 series/day under the supervision of physical therapist for 6 months	Home exercise groups	Median leakage index (range) 15 years followup	1.9 ± 0.5	1.9 ± 1.9	0.0 (-0.6; 0.6)	0.0 (-30.3; 30.3)
Dougherty, 2002[504] N = 218	Behavioral management for continence: self-monitoring, bladder training, pelvic muscle exercise	Usual care	Urine loss per 24 hours (g) at 2 years	21.3 ± 36.4	130.9 ± 315.5	**-0.5 (-0.8; -0.2)**	-0.4 (-0.6; -0.2)
Yoon, 2003[507] N = 50	Pelvic muscle exercise (30 contractions for 15 to 20 minutes/day) with immediate and simultaneous visual feedback of pelvic muscles during a 20 minute weekly biofeedback session with electromyography.	Usual care	Pelvic muscle contraction: average pressure (mm/Hg)	26.1 ± 12.5	12.2 ± 5.3	**1.4 (0.5; 2.3)**	11.7 (4.4; 19.0)
			Pelvic muscle contraction: Index computed as average pressure multiplied by duration.	392.4 ± 237.1	71.5 ± 26.4	**1.9 (0.9; 2.8)**	2.6 (1.3; 3.9)
			Pelvic muscle contraction: Peak pressure (mm/Hg)	39.7 ± 20.0	19.9 ± 7.5	**1.3 (0.4; 2.2)**	6.5 (2.1; 10.8)

Table F96. Effects of behavioral interventions on the results of pad test and urodynamic and perineometry outcomes in females (objective severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
			Pelvic muscle contraction: duration(seconds)	14.5 ± 3.0	5.9 ± 1.7	**3.5 (2.2; 4.8)**	59.1 (37.5; 80.8)
			Voided volume (ml)	239.7 ± 53.4	193.3 ± 37.8	**1.0 (0.2; 1.8)**	0.5 (0.1; 0.9)
	Bladder training with increased interval between voluntary voids.	Usual care	Voided volume (ml)	271.9 ± 47.3	193.3 ± 37.8	**1.8 (0.9; 2.8)**	0.9 (0.5; 1.4)
			Pelvic muscle contraction: Peak pressure (mm/Hg)	30.5 ± 9.1	19.9 ± 7.5	**1.3 (0.4; 2.1)**	6.4 (2.0; 10.7)
			Pelvic muscle contraction: Average pressure (mm/Hg)	18.3 ± 6.4	12.2 ± 5.3	**1.0 (0.2; 1.9)**	8.5 (1.6; 15.4)
			Pelvic muscle contraction: duration(seconds)	11.7 ± 3.7	5.9 ± 1.7	**2.0 (1.0; 3.0)**	33.7 (17.2; 50.1)
			Pelvic muscle contraction: Index computed as average pressure multiplied by duration.	222.9 ± 126.7	71.5 ± 26.4	**1.6 (0.7; 2.5)**	2.3 (1.0; 3.5)
Bergman, 1987[495] N = 89	Bladder training - scheduled clamping and unclamping of the suprapubic Bonnano catheter throughout postoperative period	Nonbladder training - continuous bladder drainage with suprapubic Bonnano catheter throughout postoperative period	Length of postoperative bladder catheterization in days after Burch retropubic urethropexy	3.3 ± 1.1	3.2 ± 1.4	0.1 (-0.3; 0.5)	2.5 (-10.5; 15.5)
			Length of postoperative bladder catheterization in days after Pereyra procedure	3.8 ± 1.2	3.6 ± 1.7	0.1 (-0.3; 0.6)	3.8 (-7.8; 15.3)
Theofrastous, 2002[492] N = 137	Pelvic floor muscle training: 4 office biofeedback sessions and home exercise	Bladder training	Vaginal pressure: mean sustained contraction	16.7 ± 12.9	13.1 ± 10.6	0.3 (0.0; 0.6)	2.3 (-0.2; 4.9)
			Vaginal pressure: mean fast contraction	22.3 ± 16.2	18.3 ± 14.0	0.3 (-0.1; 0.6)	1.4 (-0.4; 3.3)

Table F96. Effects of behavioral interventions on the results of pad test and urodynamic and perineometry outcomes in females (objective severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Fantl, 1991[503] N = 131	Bladder training using 6 weekly visits included patient education; voiding schedule to have micturition from every 30-60 minutes to every 2.5-3 hours; and positive reinforcement.	Usual care	Urinary loss, g	17.0 ± 36.0	47.0 ± 87.0	**-0.4 (-0.8; -0.1)**	-1.0 (-1.7; -0.2)
Aukee, 2004[494] N = 35	Pelvic floor training by physiotherapist 5 times/12 weeks with home biofeedback	Home program with verbal and written instructions for home practice	Pelvic floor muscle activity while supine (mV) at 12 weeks	15.1 ± 7.7	23.9 ± 7.9	**-1.1 (-1.8; -0.4)**	-4.7 (-7.7; -1.7)
			Pelvic floor muscle activity while supine (mV) at 1 year	24.7 ± 9.1	23.8 ± 8.6	0.1 (-0.6; 0.8)	0.4 (-2.4; 3.2)
Goode, 2003[490] N = 200	Behavioral training (biofeedback-assisted pelvic floor muscle training, home exercises, bladder control strategies, and self-monitoring with bladder diaries) and pelvic floor electrical stimulation	Self administered behavioral training administered with a self-help booklet	Bladder capacity in ml (cystometry)	370.4 ± 143.4	355.4 ± 115.3	0.1 (-0.2; 0.5)	0.0 (-0.1; 0.1)
Bo, 1999[513] N = 122	Pelvic floor muscle exercise with 8-12 maximum contractions in 3 series/day and 45 minute/week group sessions	Untreated control group	Change in the strength of pelvic floor muscle	19.2 ± 10.5	16.0 ± 4.2	0.4 (-0.1; 0.9)	2.5 (-0.6; 5.7)
	Electrical stimulation using vaginal intermittent stimulation with the MS 106 Twin at 50Hz 30 minutes/day.	Untreated control group offered the use of a continence guard	Change in strength of pelvic floor muscle	18.6 ± 15.3	16.0 ± 4.2	0.2 (-0.3; 0.7)	1.5 (-1.6; 4.5)
			Change from baseline in 24 hour pad test (g)	-0.5 ± 21.4	-7.1 ± 37.8	0.2 (-0.3; 0.7)	-3.0 (3.9; -9.9)
			Change from baseline in stress pad test (g)	-7.4 ± 34.4	-12.7 ± 41.8	0.1 (-0.4; 0.6)	-1.1 (2.8; -5.0)
	Pelvic floor exercise with 8-12 contractions	Untreated control group	Change from baseline in stress pad test (g)	-30.2 ± 33.9	-12.7 ± 41.8	-0.5 (-1.0; 0.1)	3.6 (7.6; -0.4)

Table F96. Effects of behavioral interventions on the results of pad test and urodynamic and perineometry outcomes in females (objective severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
	3 times/day and in groups with skilled physical therapists 1/week.	offered the use of a continence guard	Change from baseline in 24 hour pad test (g)	-6.6 ± 14.0	-7.1 ± 37.8	0.0 (-0.5; 0.5)	-0.2 (6.8; -7.3)
Cammu, 1998[514] N = 30	Weekly session of pelvic floor exercises vaginal probe-EMG biofeedback using perineometer	Vaginal weight cones (20, 32, 45, 57, and 70g) for 15 minutes twice daily	Squeezing capacity-fast (mV)	10.7 ± 5.9	9.0 ± 4.1	0.3 (-0.2; 0.8)	3.7 (-1.9; 9.4)
			Squeezing capacity-slow (mV)	11.4 ± 6.2	9.7 ± 5.4	0.3 (-0.2; 0.8)	3.0 (-2.2; 8.3)
Sung, 2000[524] N = 90	Functional electrical stimulation-biofeedback for 20 minutes/session with frequency 35Hz-50Hz and contractions of 32 seconds, 2 sessions/week	Usual care	Peak pressure, mm/Hg	41.5 ± 9.8	33 ± 7.3	**1.0 (0.4; 1.5)**	3.0 (1.4; 4.6)
			Duration of contraction, seconds	2.3 ± 1.2	1.6 ± 0.6	**0.7 (0.2; 1.3)**	46.1 (13.4; 78.8)
	Intensive pelvic floor muscle exercises		Duration of contraction, seconds	2.2 ± 0.5	1.6 ± 0.6	**1.1 (0.5; 1.6)**	67.9 (33.9; 101.9)
			Peak pressure, mm/Hg	38.7 ± 7.8	33 ± 7.3	**0.8 (0.2; 1.3)**	2.3 (0.7; 3.9)
Berghmans, 1996[522] N = 40	Pelvic floor muscle exercise with biofeedback with EMG vaginal probe and visual control.	Pelvic floor muscle exercise	Urine loss per 48 hour pad test	12.2 ± 15.4	12.5 ± 12	0.0 (-0.6; 0.6)	-0.2 (-5.1; 4.8)
Miller, 1998[515] N = 27	Immediate intervention group taught intentionally contracting the pelvic floor muscles before and during a cough (Knack)	Baseline levels	Urine leakage on medium cough paper towel test	0.4 ± 1.1	19.9 ± 36.7	-0.7 (-1.5; 0.0)	-3.7 (-7.6; 0.2)
			Urine leakage on deep cough paper towel test	8.0 ± 18.2	29.8 ± 36.2	-0.8 (-1.5; 0.0)	-2.5 (-5.2; 0.1)
		Wait-listed control group	Urine leakage on medium cough paper towel test	0.4 ± 1.0	21.2 ± 44.8	-0.6 (-1.4; 0.1)	-3.0 (-6.7; 0.6)
			Urine leakage on deep cough paper towel test from	5.4 ± 15.3	26.8 ± 46.7	-0.6 (-1.4; 0.2)	-2.3 (-5.1; 0.6)
			Areas of wetness (cm/H2O) on paper towel test after medium cough	0.4 ± 1.1	19.8 ± 36.7	-0.7 (-1.5; 0.0)	-3.7 (-7.7; 0.2)

Table F96. Effects of behavioral interventions on the results of pad test and urodynamic and perineometry outcomes in females (objective severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Liebergall-Wischnitzer, 2005[523] N = 63	Pelvic floor muscle exercise 15 minutes with 30 minute session/week	Paula method of circular muscle training 15-45 minutes/day with training sessions of 45 minutes/week	Change from baseline in pelvic muscle strength, cm/H20	0.14 ± 3.9	-0.02 ± 7.4	0.0 (-0.5; 0.5)	
			Urine loss per 1 hour pad test	2.7 ± 7.2	3.2 ± 5.8	-0.1 (-0.6; 0.4)	-2.4 (-17.8; 13.0)
Aukee, 2002[521] N = 30	Pelvic floor muscle exercise after verbal and written instructions for home practice of 20 minutes/day 5 times/ week and individual EMG assisted biofeedback device with vaginal probe and verbal control.	Pelvic floor muscle exercise after verbal and written instructions for home practice of 20 minutes/day 5 times/week	Pelvic floor muscle activity (mV) Supine	25.8 ± 10	20.1 ± 8.6	0.6 (-0.1; 1.3)	3.0 (-0.6; 6.7)
			Pelvic floor muscle activity (mV) Standing	21.4 ± 10.3	20.9 ± 8.6	0.1 (-0.7; 0.8)	0.3 (-3.2; 3.7)
			24 hour pad test (g)	19 ± 19.7	22.5 ± 19.6	-0.2 (-0.9; 0.5)	-0.8 (-4.0; 2.4)
Burns, 1993[517] N = 135	Pelvic muscle exercise with 4 sets of 20 increasing by 10/set until maximum 200 sets/day	Usual care	Electromyography	3.0 ± 3.4	3.5 ± 4.4	-0.1 (-0.6; 0.3)	-3.7 (-16.1; 8.7)
			Functional urethral length, cm/H20	20.0 ± 4.0	18.0 ± 6.0	0.4 (0.0; 0.8)	2.2 (-0.2; 4.6)
			Maximal urethral pressure, cm/H20	31.0 ± 18.0	30.0 ± 19.0	0.1 (-0.4; 0.5)	0.2 (-1.3; 1.6)
	Biofeedback using vaginal EMG probe, contraction for 10 seconds and relaxations for 10 seconds 10 times in each weekly session		Maximal urethral pressure, cm/H20	28.0 ± 12.0	30.0 ± 19.0	-0.1 (-0.6; 0.3)	-0.4 (-1.9; 1.1)
			Functional urethral length, (cm/H20)	21.0 ± 6.0	18.0 ± 6.0	**0.5 (0.1; 0.9)**	2.8 (0.3; 5.3)
			Electromyography	4.0 ± 3.1	2.0 ± 1.8	**0.8 (0.3; 1.2)**	39.3 (16.4; 62.2)
Burns, 1990[519] N = 128	Kegel Pelvic floor exercises 4 times/day	Usual care	Mean urethral closure pressure	30.2 ± 14.0	28.1 ± 11.0	0.2 (-0.3; 0.6)	0.6 (-1.0; 2.2)
			Electromyography contractions	3.0 ± 3.4	3.5 ± 4.4	-0.1 (-0.6; 0.3)	-3.5 (-16.3; 9.2)
	Biofeedback with vaginal EMG probe and visual control		Mean urethral closure pressure	28.7 ± 12.2	28.1 ± 11.0	0.1 (-0.4; 0.5)	0.2 (-1.4; 1.8)
			Electromyography contractions	6.0 ± 5.1	3.5 ± 4.4	**0.5 (0.1; 1.0)**	14.9 (2.1; 27.6)
Sherman,	Pelvic muscle	Pelvic muscle	Bladder capacity	398.9 ± 104.6	331.9 ± 101.7	0.6 (0.0; 1.3)	0.2 (0.0; 0.4)

Table F96. Effects of behavioral interventions on the results of pad test and urodynamic and perineometry outcomes in females (objective severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
1997[518] N = 39	exercises with contractions for 10 seconds and relaxation for 10 seconds 5 times/session, 20minutes twice/day with urethral biofeedback using vaginal EMG probe.	exercises with contractions for 10 seconds and relaxation for 10 seconds 5 times/session 20 minutes twice/day alone	Maximum urethral closure pressure	80.2 ± 27.5	77.2 ± 38.4	0.1 (-0.5; 0.7)	0.1 (-0.7; 0.9)
Aksac, 2003[516] N = 50	Pelvic floor muscle exercise (contractions for 10 seconds and relaxation for 20 seconds, 10 times/session, 3 sessions/day) via digital palpation at home	Usual care	1-hour pad test, g	2.1 ± 0.4	28.2 ± 3.7	**-12.3 (-15.6; -9.0)**	-43.6 (-55.3; -31.9)
			Perineometry, cm/H20	37.5 ± 8.7	20.0 ± 3.9	**2.3 (1.4; 3.3)**	11.7 (6.8; 16.5)
			Pelvic floor muscle strength via digital palpation	4.8 ± 0.4	3.3 ± 0.6	**3.2 (2.0; 4.3)**	96.0 (61.9; 130.1)
	Pelvic floor muscle exercise (contractions for 10 sec and relaxation for 20 sec) via biofeedback (vaginal probe in EMG pressure mode) 3 times/ week		1-hour pad test, g	1.2 ± 0.2	28.2 ± 3.7	**-12.8 (-16.3; -9.4)**	-45.5 (-57.7; -33.3)
			Perineometry, cm/H20	50.0 ± 11.5	20.0 ± 3.9	**3.1 (2.0; 4.2)**	15.4 (9.9; 21.0)
			Pelvic floor muscle strength via digital palpation	4.9 ± 0.2	3.3 ± 0.6	**4.2 (2.9; 5.6)**	128.3 (87.6; 169.0)
Arvonen, 2001[527] N = 37	Pelvic floor muscle training program with contractions/ relaxations for 5 seconds 10 times 2 times/day	Pelvic floor muscle training program with contractions/ relaxations for 20/20 seconds 10 times 2 times/day using weighted vaginal balls 50-100g	Urine Leakage (g)	5.0 ± 56.7	1.0 ± 66.0	0.1 (-0.6; 0.7)	6.5 (-58.0; 71.0)
			Muscle strength	3.0 ± 1.3	4.0 ± 0.7	**-0.9 (-1.6; -0.3)**	-23.6 (-40.6; -6.5)

Table F96. Effects of behavioral interventions on the results of pad test and urodynamic and perineometry outcomes in females (objective severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Wells, 1991[520] N = 157	Pelvic muscle exercises with contractions for 10 seconds and relaxation for 10 seconds 90-160 times/day	Phenylpropanol amine hydrochloride in a dose of 50mg /day, increasing to 50mg 2 times/day	Anterior-posterior pelvic muscle strength	1.5 ± 0.1	1.3 ± 0.1	**2.9 (2.5; 3.4)**	233.0 (197.1; 269.0)
Mørkved, 2003[486] N – 103 6 months	Pelvic floor muscle training with 3 sets of 10 contractions 3 times/day, individually supervised by a physical therapist. At home, 3 sets of 10 high intensity (close to maximum) contractions per day with a biofeedback apparatus	Pelvic floor muscle training with 3 sets of 10 contractions 3 times/day, individually supervised by a physical therapist At home, 3 sets of 10 high intensity (close to maximum) contractions per day without biofeedback	Change in Pelvic Floor Muscle Strength Measured by Vaginal Squeeze Pressure (cm H2O)	25.90±14.86	25.40±15.15	0.03 (-0.35; 0.42)	

Bold- significant differences in outcomes at 95% confidence level

Table F97. Effects of behavioral interventions on perceived urinary incontinence in males (severity measures)

Author	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Mathewson-Chapman, 1997[534] N = 53	Education booklet and instructions for pelvic muscle exercises with biofeedback: maximal contractions for 10 seconds, slow release and 10 seconds of muscular relaxation, 3 times/week.	Standard care with no pelvic muscle exercises. All patients were recommended to limit coffee, tea, chocolate, alcohol, and over counter medication for bladder control.	Self reported pad use for urinary incontinence	0.6 ± 1.6	1.8 ± 2.7	-0.5 (-1.1; 0.0)	-30.5 (-61.6; 0.6)
			Self reported episodes of urinary incontinence	0.8 ± 2.0	1.0 ± 0.3	-0.1 (-0.7; 0.4)	-10.9 (-66.0; 44.1)
Floratos, 2002[535] N = 42	2-channel electromyographic biofeedback as learning tool for pelvic muscle exercises immediately after catheter removal	Verbal feedback as learning tool for pelvic muscle exercises immediately after catheter removal: sub maximal contractions 3-5 seconds, relaxation for 6-10 seconds, 80-100 times/day	Pad use for urine incontinence, number/day	0.5 ± 0.1	0.8 ± 1.4	-0.4 (-1.0; 0.3)	-48.5 (-129.3; 32.4)
Porru, 2001[538] N = 58	Verbal instruction, feedback on contractions of pelvic floor muscles, and verbal reinforcement of appropriate responses to teach selective contractions of anal sphincter muscles and relaxation of abdominal muscles 45 times/day	Standard care without instruction on pelvic floor muscle exercises	Voiding interval, minutes	118.5 ± 24.0	110.0 ± 23.0	0.4 (-0.2; 0.9)	0.3 (-0.1; 0.8)

Table F98. Effects of behavioral interventions on pad test in males (severity measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Floratos, 2002[535] N = 42	2-channel electromyographic biofeedback as learning tool for pelvic muscle exercises immediately after catheter removal	Verbal feedback as learning tool for pelvic muscle exercises immediately after catheter removal: sub maximal contractions 3-5 seconds, relaxation for 6-10 seconds, 80-100 times/day.	Urine loss in pad test (g)	0.5 ± 10.1	0.5 ± 0.1	0.0 (-0.6; 0.6)	0.0 (-128.3; 128.3)
Moore, 1999[533] N = 63	Intensive pelvic muscle exercises conducted by a physiotherapist for 30 minutes 2/week: maximum contractions for 5 seconds, slow release and 10 seconds of muscular relaxation	Standard treatment with verbal and written instructions about postoperative pelvic muscle exercises from urologist and nurses at the pre-admission clinic.	Urine loss in pad test (g)	69.9 ± 8.7	54.1 ± 6.9	**2.0 (1.2; 2.8)**	3.8 (2.3; 5.2)
			Urine loss in pad test (g)	98.2 ± 9.0	54.1 ± 6.9	**5.6 (4.2; 7.0)**	10.3 (7.7; 12.8)
Mathewson-Chapman, 1997[534] N = 53	Education booklet and instructions for pelvic muscle exercises with biofeedback: maximum contractions for 10 seconds, slow release and 10 seconds of muscular relaxation 3 times/week.	Standard care with no pelvic muscle exercises. All patients were recommended to limit coffee, tea, chocolate, alcohol, and over counter medication for bladder control.	Urine loss in pad test (g)	1.0 ± 1.0	14.2 ± 48.2	-0.4 (-1.0; 0.2)	-2.8 (-6.7; 1.1)
Paterson, 1997[545] N = 49	Urethral milking after appropriate education	Counseling including drinking pattern, aperient use, toileting habits, dietary advice, and relaxation therapy.	Improvement in pad weight gain (g)	4.0 ± 8.0	0.0 ± 4.0	0.6 (-0.1; 1.4)	
	Pelvic muscle exercise with 1 second contractions (~5) to increase length and strengths of contractions as much as possible.			4.3 ± 8.9	0.0 ± 4.0	0.6 (-0.1; 1.4)	

Bold- significant differences in outcomes at 95% confidence level

Table F99. Effects of behavioral interventions on perceived urinary incontinence in males and females from the community (severity measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control 95% CI)
McDowell, 1999[543] N = 105 90% female	Biofeedback-assisted pelvic floor muscle training by nurse practitioners skilled in behavioral therapies for urinary incontinence	Usual care with attention control	Urinary incontinence episodes/day	1.8 ± 2.9	3.5 ± 3.0	**-0.6 (-1.0; -0.2)**	-16.5 (-27.6; -5.3)
Engberg, 2002[544] N = 19 68% female	Prompted voiding by caregivers to approach subjects hourly for perceived wet/dry status vs. objective wet checks, feedback and praising for correct response, toilet by request, positive feedback for appropriate toileting.	Usual care with attention control	Percent reduction in all incontinent episodes/day	47.0 ± 39.2	27.2 ± 26.1	0.6 (-0.3; 1.5)	2.2 (-1.2; 5.6)
			Percent decrease in daytime incontinent episodes/day	50.1 ± 41.3	37.3 ± 34.3	0.3 (-0.6; 1.2)	0.9 (-1.5; 3.3)
			Reduction in day and night % wet	40.6 ± 44.3	23.0 ± 22.7	0.5 (-0.4; 1.4)	2.2 (-1.8; 6.2)

Bold- significant differences in outcomes at 95% confidence level

Table F100. Electrical stimulation on risk and progression of urinary incontinence in adults

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Electrical stimulation of pelvic floor muscles				
But, 2003[546] Placebo controlled RCT to examine the effects of functional magnetic stimulation in the treatment of women with urinary incontinence. Duration: 2 months	55 women with urinary incontinence older than 18 years, not pregnant, and not physically or mentally disabled. Exclusion criteria: Implanted electronic equipment (pacemakers), urolithiasis, bladder infection, tumor, recent urethral or continence surgery, use of anticholinergic drugs, beta-blocking agents, and diuretics. Loss of followup: 7.7%	1. Functional magnetic stimulation with Pulsegen device, which produced a pulsating magnetic field of B = 10 microT intensity and a frequency of 10Hz. 2. Placebo treatment with sham not active device.	Pad test use and pad weight. Self reported nocturia. PFM contractions measured with perineometer after performing five maximal consecutive PFM contractions, with an interval of 30 seconds between every two contractions.. The power of the PFM contractions was measured as the percentage of the maximum (100% = 45mm/Hg); the time of the PFM contractions was measured in seconds.	No intention to treat. Double-blind. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Spruijt, 2003[547] RCT to examine the effects of intravaginal electrical stimulation of the pelvic floor for urinary incontinence in elderly women. Duration: 8 weeks	51 women ≥65 years of age, with symptoms of stress, urge or mixed urinary incontinence of >3 months' duration, and with urinary leakage >10cc /24hours. Exclusion criteria: Persistent urinary tract infection (positive urine culture after antibiotic treatment), recurrent urinary tract infection (within 4 weeks after treatment), bladder pathology or dysfunction because of fistula, tumor, pelvic irradiation, neurological or other chronic conditions (diabetes mellitus, Parkinson's disease), genital , pacemaker, and insufficient mental condition. Loss of followup: 3.9%	1. Intravaginal electrical stimulation of the pelvic floor using stimulator generated biphasic current pulses with duration of 1ms and a frequency of 50Hz (stress urinary incontinence) or 20Hz (urge urinary incontinence). 2. Kegel exercise program with verbal instructions on how to exercise at home.	Urinary leakage during a pad test, pelvic muscle strength measured by a perineometer, detrusor instability. Self reported change in urinary symptoms based on the PRAFAB score.	No intention to treat. Open label. Blocked randomization (Pocock). Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F100. Electrical stimulation on risk and progression of urinary incontinence in adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Yamanishi, 2000[548] Placebo controlled RCT to examine effects of electrical stimulation for urinary incontinence due to detrusor overactivity. Duration: 4 weeks	68 patients with urinary incontinence due to detrusor overactivity urodynamically defined as involuntary detrusor contractions of more than 15cm/H2O during the filling phase. Exclusion criteria: Use of anticholinergics or tricyclic depressants, pelvic floor exercise, bladder training, or pelvic surgery before entry into the study. Loss of followup: 11.8%	1. Electrical stimulation 15 minutes twice daily for 4 weeks (vaginal electrode in women and an anal or surface electrode in men to provide alternating pulses of 10Hz square waves of 1-ms pulse duration and a maximum output current of 60mA). 2. Sham inactive device	Self reported urinary incontinence in frequency/volume chart and urodynamic outcomes. Degree of urgency scored as 0-none, 1-slight, 2-moderate, and 3-very much.	No intention to treat. Double-blind. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Yamanishi, 2000[549] RCT to examine effects of functional magnetic stimulation and functional electrical stimulation on the inhibition of detrusor overactivity. Duration: acute	32 patients with urinary incontinence due to detrusor overactivity defined urodynamically as involuntary detrusor contractions of more than 15cm/H2O during the filling phase. Exclusion criteria: Not reported Loss of followup: No followup	1. Functional magnetic stimulation applied continuously at 10Hz 2. Functional electrical stimulation applied continuously at 10Hz with vaginal electrode in women and a surface electrode on the dorsal part of the penis in men.	Urodynamic outcomes before and after stimulation.	No intention to treat. Open label. Randomization not reported. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Lappin, 2003[550] Crossover, placebo controlled RCT to examine effects of pulsed electromagnetic fields on bladder control in patients with multiple sclerosis. Duration: 10 weeks, 2 weeks washout period.	145 patients 18-65 years old with clinically definite multiple sclerosis and light spasticity (>2 in 6 point scale) and bladder control problems. Exclusion criteria: Changes in medication last 2 months, pregnancy, pacemaker, chronic diseases. Loss of followup: 19%	1. Daily simulation with low frequency pulsed electromagnetic fields 2. Sham inactive device	The MS Quality of Life Inventory (MSQLI) was used to assess changes in bladder control form 0-none to 10-severe	No intention to treat. Double-blind. Central computer generated randomization. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F100. Electrical stimulation on risk and progression of urinary incontinence in adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Amaro, 2006[551] RCT to examine the effects of intravaginal electrical stimulation in treating mixed urinary incontinence. Duration: 7 weeks, Followup: 1 month	40 women with predominant urge urinary incontinence. Exclusion criteria: Use of anticholinergic and tricyclic antidepressants, pelvic floor exercise, bladder training, vaginal prolapse >II grade, urinary infection, metal implants, neurological diseases. Loss of followup: none	1. Effective and sham intravaginal electrical stimulation with 3 20-minute sessions/week using Dualpex Uro 996 frequency of 4Hz. 2. Sham intravaginal electrical stimulation.	Self reported Improvement in urge incontinence	Double blind. Randomization and allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.
Berghmans, 2002[552] RCT to examine effects of physiotherapy in women with proven bladder overactivity. Duration: 9 weeks	98 patients older than 18 years with proven bladder overactivity defined as Detrusor Activity Index (DAI) ≥0.50, able to understand Dutch. Exclusion criteria: Mechanical intravesical obstruction, urinary calculus, urinary tract infection, colpitis, pacemaker, pregnancy, physiotherapy within 3 months, uncontrolled diabetes mellitus. Loss of followup: 8%.	1. Pelvic floor exercises with contractions for >20 seconds controlled by physiotherapist palpation with relaxation period of 10 seconds. Bladder training to inhibit the sensation of urgency and to postpone voiding, voiding schedule with an interval >2 hours, positive reinforcement of patient motivation by the physical therapist. 2. Office- and home-based functional electrostimulation maximum 100mA frequency 4 - 10Hz. 3. Office-based functional electrostimulation, pelvic floor exercise, and bladder training. 4. No treatment. All treated subjects received 9 sessions, 1/week	Detrusor Activity Index - combined cystometry outcomes (number of contractions/hour, mean duration of a contraction and mean amplitude of a contraction) and voiding diary (mean volume drunk/hour, mean number of micturitions/hour and mean volume voided per micturition. The DAI represents a score between 0 and 1, where '0' represents no activity of the bladder during the filling phase and '1' represents severe overactivity of the bladder.	Intention to treat. Single blind. Randomization using blocks of 4. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F100. Electrical stimulation on risk and progression of urinary incontinence in adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Pages,2001[553] RCT to examine the effects of intensive group physical therapy program with individual biofeedback training for female patients with urinary stress incontinence. Duration: 4 weeks	51 women, referred by gynecologists for nonoperative treatment of genuine stress incontinence of mild-to-moderate severity. Exclusion criteria: Not reported. Loss of followup: 21%	1. Specific physical therapy program. Group therapy 5 times/week and home pelvic floor exercise with 50 contractions for 10 minutes 2times/day. Recommendation of weight loss and aerobic sports. 2. Biofeedback training daily 90 minutes in groups and individually for 15 minutes, 5 times/week. Intra vaginal pressure sensor and visual biofeedback in computer monitor.	Nocturnal urinary frequency and subjective improvement of incontinence, standardized exams of digital contraction strength, speculum tests, and manometric outcomes.	No intention to treat. Open label. Randomization and allocation concealment unclear. Baseline data not reported. Sample size not justified.
Sand, 1995[554] Placebo-controlled RCT to examine the effects of transvaginal electrical stimulation in treating genuine stress incontinence. Duration: 15-weeks	52 community dwelling women with urodynamically proven genuine stress incontinence, who would comply with visits, not use/seek other treatment for incontinence. Exclusion criteria: Detrusor instability, pregnancy, pacemaker, prior pelvic floor stimulation, pelvic implanted devices, active vaginal lesions or infections, urinary tract infection, hypermenorrhea or menorrhaghia, urinary retention (>100ml), pelvic surgery in past 6 months, atrophic vaginitis, genital prolapse to introitus, pelvic irradiation, intrinsic sphincteric deficiency. Loss of followup: 15%	1. Active pelvic floor stimulator with gradually adjusted 60-80mA from 5 seconds on/1 second off for 15 minutes to 5 seconds on/5 seconds off for 30 minutes. 2. Sham inactive device.	Self reported urinary stress incontinence and voiding in diaries, urodynamic outcomes, pad test, and pelvic muscle strength.	Intention to treat. Double-blind. Computer-generated random numbers with blocks at a 2:1 rate favoring active over placebo devices. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F100. Electrical stimulation on risk and progression of urinary incontinence in adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Indrekvam, 2001[555] Prospective cohort study to examine the effectiveness of home-managed electrical stimulation on urinary incontinence in females. Duration: 2 years	3,198 women treated with home-managed electrical stimulation in Norway from 1992-1994. Exclusion criteria: Pregnancy, use of a pacemaker, malignancy. Loss of followup: 1.2%; 15 women did not start treatment because of severe illness or because they had died, and 24 did not complete the treatment because of pregnancy or cancer.	Home-managed electrical stimulation with vaginal/anal stimulators (20–50Hz) for 6–8 hours/day for at least 3 months before evaluation of the effect. Before-after comparison. The stimulators Vitacon Norway AS for long-term stimulation (20–50 Hz) delivered below the sensory threshold. Devices were used for 6–8 hours/day for at least 3 months before evaluation of the effect. Max stimulation (10– 20 Hz) used a high-intensity stimulus. The companies recommended application of not more than 20 min (the machine switches off automatically) daily or at least twice weekly. Patients were advised to increase the stimulation intensity continuously using a control knob to as high as possible, but below the level of pain. The stimulator should be used at least 10–20 times before evaluation of the effect.	Self reported frequency of incontinence episodes and amount of leakage before and after treatment, number of voidings during the day and night, and number of protective pads used (4 item ordinal scale).	Intention to treat. Not random sampling adjustment for age, duration of incontinence, diagnosis (urge/stress component), previous surgery for urinary incontinence, urodynamic investigation, type of stimulator, frequency, amount of leakage, physicians' work, patients' practical problems and discomfort with treatment.
Amaro, 2006[551] RCT to examine the effects of intravaginal electrical stimulation in mixed urinary incontinence. Duration: 7weeks, Followup: 4 weeks.	40 women symptoms of predominant urge incontinence not taking anticholinergics or tricyclic antidepressants. Exclusion criteria: Use of pelvic floor exercises or bladder training, vaginal prolapse >grade II, retention complaint or obstruction diagnosis during UDS, urinary infection, changes in cutaneous sensitivity, metal implants, and neurological diseases. Loss of followup: Not reported	1. Effective intravaginal electrical stimulation using frequency of 4 Hz with 3 20-minute sessions/week 2. Sham intravaginal electrical stimulation using frequency of 4Hz with 3 20-minute sessions/week	Self reported urge urinary incontinence.	Intention to treat not stated. Double-blind. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F100. Electrical stimulation on risk and progression of urinary incontinence in adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Smith, 1996[556] RCT to examine the effects of intravaginal electrical stimulation on genuine stress urinary incontinence and detrusor instability in women. Duration: 4 months	57 women with urinary incontinence. Exclusion criteria: Type 3 stress urinary incontinence, pregnancy, urinary retention, vaginal prolapse, cardiac pacemaker, mixed incontinence with no major and minor components. Loss of followup: 1.8%	18 women with stress urinary incontinence: 1. Electrical stimulation using frequency 12.5Hz.-50Hz and amplitude 5-10mA-80mA for 15 to 60 minutes 2/day 2. Kegel exercise 38 women with detrusor instability: 1. Anticholinergic therapy with Propantheline bromide in dose of 7.5 to 45mg 2-3 times/day 2. Electrical stimulation using frequency 12.5Hz.-50Hz and amplitude 5-25mA for 15-60 minutes 2/day.	Self reported cure from urinary incontinence and no longer requiring pads. Reduction in episodes of urinary incontinence by >50 and 10 or fewer voids per 24 hours	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Brubaker, 1997[557] RCT to examine the effects of transvaginal electrical stimulation for treatment of urinary incontinence in women. Duration: 8 weeks, Followup: 2 weeks	121 women >25 years of age with either urinary incontinence due to detrusor instability or genuine stress incontinence, or both (mixed incontinence) diagnosed with filling urethrocystometry. Exclusion criteria: Urinary incontinence other than genuine stress incontinence, detrusor instability, or mixed incontinence; leakage episodes <3/week, inadequate genitourinary estrogen (minimum 3 months HRT), inadequate cognitive ability (investigator judgment), urinary tract infection, anatomic defect that precluded use of device, postvoid residual >100ml, implanted electric device, genitourinary surgery, drug treatment for urinary incontinence, anticipated geographic relocation during study. Loss of followup: 18%.	1. The transvaginal electric stimulation for 20 minutes 2 times/day using frequency of 20Hz, a 2-second-4-second work-rest cycle with a range of stimulation intensities, from 0-100mA 2. Sham inactive device	Multichannel urodynamic testing, quality-of-life scale, and urinary diaries	No intention to treat. Double-blind. Computer generated randomization stratified by incontinence type. Allocation concealment unclear but centralized data manager blinded for treatment status analyzed the data. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F100. Electrical stimulation on risk and progression of urinary incontinence in adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Amaro, 2005[558] RCT to examine the effect of intravaginal electrical stimulation on pelvic floor muscle strength in women with mixed urinary incontinence. Duration: 1 month	40 women with mixed urinary incontinence and predominant urge incontinence. Exclusion criteria: Anticholinergic and tricyclic antidepressant medications, pelvic floor exercise, bladder training, vaginal prolapse more than II grade, urinary tract infection, metal implants, and neurological diseases.	1. Intravaginal electrical stimulation with 3 20-minute sessions/week using 4Hz frequency. 2. Sham stimulation with inactive device	Objective evaluation of perineal muscle by perineometry, vaginal weight test, and urodynamic outcomes	No intention to treat. Double-blind. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.
But, 2005[559] RCT to examine effects of functional magnetic stimulation for treating women with mixed urinary incontinence. Duration: 2 months	39 women with mixed urinary incontinence and predominant urge incontinence. Exclusion criteria: Not reported. Loss of followup: Not reported	1. Functional magnetic stimulation applied continuously at 18.5Hz day and night 2. Sham inactive device	Urodynamic diagnosis of detrusor overactivity and patient subjective assessment of mixed urinary incontinence.	No intention to treat. Double blind. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.
Bo, 1997[560] Crossover RCT to examine the effect of voluntary pelvic floor muscle contraction and vaginal electrical stimulation on urethral pressure in women with genuine stress incontinence. Duration: 1 day experiment.	12 women with genuine stress incontinence participated in pelvic floor exercise program with 8-12 contractions. Exclusion criteria: Not reported Loss of followup: Not applicable	3 voluntary PFM contractions and 2 electrical stimulators 1. Conmax 50Hz – pulse width 0.75ms, 0-90mA 2. Medicon 50Hz - pulse width 0.5ms, 0-100mA	Urethral and bladder pressures	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data is not reported. Sample size not justified.

Table F100. Electrical stimulation on risk and progression of urinary incontinence in adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Luber, 1997[561] RCT to examine the effects of functional electrical stimulation for stress incontinence in women. Duration: 3 months	57 women with stress urinary incontinence who could adequately retain the vaginal probe and cooperate with the study protocol. Exclusion criteria: Significant pelvic prolapse and detrusor instability, postvoid residual urine >100cc, extra urethral incontinence, history of vaginal intraepithelial neoplasia, urinary tract infection, a fixed, immobile urethra, and urodynamic evidence consistent with intrinsic sphincteric deficiency. Loss of followup: 18.5%	1. Functional electrical stimulation with 15-minute treatment session/day using pulse-width of 2msec scheduled for 2 seconds with 4 seconds rest, frequency of 50Hz, and power 10-100mA. 2. Sham stimulation with inactive device.	Self reported improvement or cure from stress urinary incontinence and urodynamic outcomes. Objective cure: negative stress test on repeat urodynamics. Objective failure: positive stress test on repeat studies.	Double-blind. Randomization using the table of random numbers. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Emmons, 2005[562] RCT to examine the effects of acupuncture on overactive bladder in women. Duration: 4 weeks	85 women older than 18 years, with symptoms of overactive bladder with urge incontinence,>8 voids per day, subjective urgency to void, and urge-associated incontinence at least twice during a 3-day period of time. Exclusion criteria: Pregnancy, taking medications for overactive bladder or receiving acupuncture treatments for any condition, unable to ambulate or unable to complete a 3-day voiding diary, and hematuria or untreated urinary tract infection. Loss of followup: 13%	1. Acupuncture treatment expected to improve bladder symptoms 2. Placebo acupuncture treatment designed to promote relaxation	Number of incontinent episodes over 3 days, voiding frequency and urgency, cystometric bladder capacity, maximum voided volume, and the urinary distress inventory and incontinence impact questionnaire symptom scores.	No intention to treat. Single-blind. Computer-generated randomization with random numbers table. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F100. Electrical stimulation on risk and progression of urinary incontinence in adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Yamanishi, 1997[563] CT to examine the effects of electrical pelvic stimulation in stress incontinence. Duration: 4 weeks	35 patients with stress incontinence. Exclusion criteria: Persistent urinary infection, uterine or rectal prolapse and cystocele, severe cardiac or cerebrovascular disorders including on-demand heart pacemakers, hepatic disorders and renal dysfunction. Anticholinergics, calcium antagonists, alpha or beta agonists or antagonists, or tricyclic depressants were discontinued medications for 1 week. Loss of followup: 5.7%	1. Electrical pelvic stimulation with 50Hz. square waves of 1msec. pulse duration and vaginal electrode in women and an anal electrode in men for 15 minutes 2 or 3 times daily 2. Sham electrical pelvic stimulation with inactive device	Frequency/volume chart, results of 1-hour pad test and urodynamic parameters. Subjective data (patient impressions) ranked as very good, good, fair, or not good. Daily frequency of pad changes was scored as 0-no change, 1-once, 2-twice and 3-3 times or more. Degree of disturbance in daily activities was scored as 0-not disturbed, 1-slightly disturbed, 2-moderately disturbed and 3-very disturbed. Cured-no incontinence on the frequency/volume chart and leakage of <1.0gm in the pad test. Improved-frequency of incontinence decreased by >50% or if the pad test showed a decrease in leakage by >50%, Unchanged or aggravated-frequency of incontinence or amount of leakage in pad test was unchanged or aggravated	No Intention-to-treat. Double-blind (doctors and patients). Randomization and allocation concealment not reported. Unclear who assigned patients to the treatment groups. Baseline data confirmed no differences among groups. Sample size not justified.

Table F100. Electrical stimulation on risk and progression of urinary incontinence in adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Barroso, 2004[564] Placebo controlled RCT to examine the effects of transvaginal electrical stimulation on urinary incontinence. Duration: 12 weeks. Duration of followup: 6 months	36 women (24 patients and 12 controls) with stress, urge, or mixed urinary incontinence. Exclusion criteria: Prolapse or first degree urogenital prolapse, intrinsic sphincter deficiency, cardiac pacemaker; pregnancy, postmenopausal climacteric with symptoms and signs of urogenital atrophy (they could be included after 3 months of treatment with hormone-replacement therapy); urinary tract infection, genitourinary surgery during the previous 6 months; previous electrical stimulation of the pelvic floor; use medication chronically (e.g., antidepressants, diuretics and others) known to possibly change voiding function, reflex urinary incontinence (clear presence of neurological lesions); paradoxical urinary incontinence (presence of intravesical obstructive factor); urinary incontinence caused by overflow, characterized by the presence of a large urinary residual volume; urge incontinence treated with medication during the last 3 months. Loss of followup: Not reported	1. Transvaginal electrical stimulation at home twice a day (20-minute sessions) with frequency of 20 (urge) or 50Hz (stress UI), a pulse width of 300ms, with asymmetrical biphasic pulses, an adjustable current intensity (0-100mA), a 1 s rise time, sustained for 5 seconds and resting for 5 seconds. 2. Placebo (identical equipment but with no electrical current)	Self reported urinary incontinence in voiding diary. Urodynamic outcomes	No intention to treat. Double-blind. Randomization before the study by drawing lots. Allocation concealment not reported. Baseline data did not confirm adequacy of randomization. Sample size justified.
Neurostimulation				
Scheepens,2002[565] Crossover RCT to examine the effects of bilateral sacral neuromodulation. Duration: 4 days	33 patients with chronic voiding dysfunction (urge incontinence with or without urodynamic instabilities), complete urinary retention and incomplete voiding with residual of >100ml. Exclusion criteria: Stress incontinence, untreated urinary tract infection, stone disease, psychiatric disturbance, pregnancy, neurogenic voiding disorders (including diabetes mellitus, spinal cord injury, multiple sclerosis), Reiter's syndrome, pelvic pain syndrome, cerebrovascular accident less than 6 months ago, anatomical obstructive voiding disorders, malignancy of the urinary tract, severe (grade III/IV) pelvic prolapse, cystocele, urethrocele, enterocele, proven interstitial cystitis or evident functional neurological asymmetry. Loss of followup: none	1. Bilateral sacral stimulation with external stimulation device to deliver alternating pulses left and right programmed individually at amplitude just above sensory threshold. Patients were instructed to adjust the stimulation amplitude if necessary. 2. Unilateral sacral stimulation with external stimulation device in a side with the best response using the lowest amplitude	Standardized voiding diaries were used to record voiding, catheterization and leaking episodes	No intention to treat, but all subjects were analyzed. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F100. Electrical stimulation on risk and progression of urinary incontinence in adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Schmidt, 1999[566] RCT to examine the effects of sacral nerve stimulation for treatment of refractory urinary urge incontinence. Duration: 5 months	98 patients older than 16 years refractory to standard medical therapy, with 100ml bladder capacity and normal upper urinary tract, able to complete study documentation and return for followup evaluation. Exclusion criteria: Neurological conditions (multiple sclerosis, diabetes with peripheral nerve involvement, spinal cord injury, stroke), stress urinary incontinence, primary pelvic pain Loss of followup: 22%	1. Implantation of multiprogrammable neurostimulator subcutaneously in lower quadrant of the abdomen with lead positioned to target sacral nerve and anchored in place. 2. Standard medical therapy	Voiding diary results and pad test.	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Weil, 2000[567] RCT to examine effects of sacral root neuromodulation refractory urinary urge incontinence. Duration: 6 months.	44 patients >16 years with refractory urge incontinence, normal urinary tract function, muscular and sensory responsiveness, detrusor storage capacity >100ml and no sphincter anomaly. Exclusion criteria: Stress urinary incontinence, multiple sclerosis, Reiter's syndrome, uncontrolled diabetes, pregnancy, spinal cord injury or cerebrovascular accident, active degenerative disc diseases, bleeding complications, urinary tract infection. Loss of followup: 4.5%	1. Sacral root neuromodulation with an implantable impulse generator 2. Prior conservative management: medications, or pelvic floor exercise	Self reported urge urinary incontinence, voiding diaries, quality of life questionnaires, urodynamic testing	No intention to treat. Open label. Computer generated randomization, 1:1 ratio. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size not justified.
Karademir, 2005[568] RCT to examine the effects of Stoller afferent neurostimulation with and without a low-dose anticholinergic (oxybutynin hydrochloride) in patients with detrusor overactivity. Duration: 8 weeks	43 patients with symptoms of detrusor overactivity confirmed urodynamically. Exclusion criteria: Urinary tract obstruction, urinary retention, neurologic or metabolic disorder, other treatments for urinary incontinence. Loss of followup: Not reported	1. Stoller afferent neurostimulation with frequency 20Hz and amplitude 0.5-10mA 2. Stoller afferent neurostimulation with frequency 20Hz and amplitude 0.5-10mA combined with 5mg of oral oxybutynin hydrochloride	Self reported quality of life and voiding diaries	Intention to treat not stated. Randomization and allocation concealment not reported. Baseline data reported for age only. Sample size not justified.

Table F100. Electrical stimulation on risk and progression of urinary incontinence in adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Bower,1998[569] RCT to examine the effects of surface neuromodulation on cystometric pressure and volume parameters in women with detrusor instability or sensory urgency. Duration: unclear	48 women with proved detrusor instability or sensory urgency. Exclusion criteria: Urinary tract infection, pregnancy, cardiac pacemaker, impaired cognition, neurogenic bladder dysfunction or cystocele beyond the introitus. Loss of followup: Not reported	1. Active transcutaneous electrical nerve stimulation with 10Hz. frequency and 200 microsecond pulse width (sacral placement). 2. Active transcutaneous electrical nerve stimulation with 150Hz. frequency and 200 microsecond pulse with (suprapubic placement) 3. Sham transcutaneous electrical nerve stimulation with sacral or suprapubic placement.	Urodynamic outcomes.	No intention to treat. Double blind. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.
Fujishiro, 2000[570] RCT to examine the effects of magnetic stimulation of the sacral roots for the treatment of stress incontinence. Duration: 1 week	62 women, 37 to 79 years old with stress incontinence, >1 episodes of urinary leakage recorded in a 3-day voiding diary, and 2gm or more urine loss on a 1-hour pad test. Exclusion criteria: Urinary infection, interstitial cystitis and large uterine myoma, and other treatments for stress incontinence, including pelvic floor exercises, medical treatment and electrical stimulation. Loss of followup: Not reported	1. Magnetic stimulation of sacral roots with 15Hz. frequency, 50% intensity output for 5 seconds per minute for 30 minutes. 2. Sham stimulation with inactive device	Self reported number of voids daily, mean urine volume per void, and number of leaks for 3 days	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Fujishiro ,2002[571] RCT to examine the effects of magnetic stimulation of the sacral roots for treating urinary frequency and urge incontinence. Duration 1 week	37 women 43 to 75 years old with the complaint of urinary frequency and/or urge incontinence, >8 voids daily and/or >1 episode of urge incontinence on a 3-day voiding diary, and mean of less than 250ml. urine volume per void on a 3-day voiding diary. Exclusion criteria: neurological disorders suggesting neurogenic bladder dysfunction, apparent episode of stress incontinence, urinary infection, interstitial cystitis or large uterine myoma , other treatments for urinary frequency or urge incontinence, including pelvic floor exercises, medical treatment or electrical stimulation. Loss of followup: not reported	1. Magnetic stimulation of sacral roots with 15Hz. frequency , 50% intensity output for 5 seconds per minute for 30 minutes. 2. Sham stimulation with inactive device	Self reported number of voids daily, mean urine volume per void, and number of leaks for 3 days.	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F100. Electrical stimulation on risk and progression of urinary incontinence in adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Walsh, 2001[572] RCT to examine the effects of non-invasive third sacral nerve (S3) stimulation on bladder activity during filling cystometry. Duration: Acute experiment	146 patients with urge incontinence refractory to an average of three previous treatments, encompassing bladder retraining, anticholinergic medication, or bladder/urethral dilatation. Exclusion criteria: Not reported. Loss of followup: Not applicable	1. Antidromic transcutaneous sacral neurostimulation during the second fill of standard urodynamic filling cystometry with 10Hz frequency, a pulse width of 200msec in continuous mode at the maximum tolerable level. 2.Control group underwent a second fill of standard urodynamic filling cystometry without neurostimulation	Cystometric filling volumes and corresponding detrusor pressures at first desire to void, strong desire to void, sensation of urgency, and maximum cystometric capacity	Intention to treat nor stated. Open label. Randomization in age- and gender-matched control and study groups. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Borawski, 2007[573] RCT to examine the effects of percutaneous needle electrode technique or a surgical first stage lead placement on implantation of a pulse generator in older urge incontinent women. Duration: 2 weeks	30 women >55 years with refractory urge incontinence after failure of medical, behavioral, and pelvic floor reeducation management. Exclusion criteria: Not reported. Loss of followup: 6.6%	1. Electrical stimulation with percutaneous needle electrode (22-G spinal needle) placement 2. Electrical stimulation with surgical first stage lead placement	Self reported urinary incontinence in bladder diary, daily pad count, and a 24-hour pad weight test. Successful test stimulation period for implantation of the impulse generator->50% improvement in daily incontinence episodes or 24-hour pad weight.	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data did not confirm adequacy of randomization. Sample size justified.

Table F101. Effects of physiotherapy on urinary continence in females (events) (table sorted by rate of continence after active treatment, from highest to lowest)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
But, 2003[546] N = 52	Functional magnetic stimulation with Pulsegen device, which produced a pulsating magnetic field of B = 10 microT intensity and a frequency of 10Hz	Placebo treatment with sham not active device	Success of treatment of urge urinary incontinence	24	5	79.0	22.0	**3.5 (1.6; 7.8)**	2 (1;8)	570 (131; 1,488)E
	Functional magnetic stimulation applied continuously at 18.5Hz day and night	Sham inactive device	Cured form Detrusor over activity	17	11	75.0	66.6	1.1 (0.7; 1.6)		
	Functional magnetic stimulation with Pulsegen device, which produced a pulsating magnetic field of B = 10 microT intensity and a frequency of 10Hz	Placebo treatment with sham not active device	No urge incontinence (cured)	12	0	40.0	1.0	**18.5 (1.2; 297.4)**	3 (0;638)	390 (2; 2,964)E

Table F101. Effects of physiotherapy on urinary continence in females (events) (table sorted by rate of continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Smith, 1996[556] N = 57	Electrical stimulation using frequency 12.5Hz. -50Hz and amplitude 5-10mA-80mA for 15 to 60 minutes 2/day	Kegel exercise	Cured for incontinence	2	1	22.0	11.0	2.0 (0.2; 18.3)		
			Improved urinary incontinence	4	1	22.0	11.0	1.8 (0.2; 13.9)		
Pages, 2001[553] N = 51	Specific physical therapy program. Group therapy 5 times/week and home pelvic floor exercise with 50 contractions for 10 minutes 2 times/day. Recommendation of weight loss and aerobic sport	Biofeedback training 90 minutes/day in group and individually for 15 minutes, 5 times/week Intra vaginal pressure sensor and visual biofeedback in computer monitor	No stress urinary incontinence episodes and symptoms	6	4	22.0	28.0	0.7 (0.2; 2.1)		
Sand, 1995[554] N = 52	Active pelvic floor stimulator with gradually adjusted 60-80mA from 5 seconds on/1 sec off for 15 minutes to 5 seconds on/5 seconds off for 30 minutes	Sham inactive device.	Cured from stress urinary incontinence	7	2	20.0	12.0	1.7 (0.4; 7.3)		

Table F101. Effects of physiotherapy on urinary continence in females (events) (table sorted by rate of continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Smith, 1996[556] N = 57	Anticholinergic therapy with Propantheline bromide in dose of 7.5 to 45mg 2-3 times/day	Electrical stimulation using frequency 12.5Hz. - 50Hz and amplitude 5-25mA for 15-60 minutes 2/day	Cured for incontinence	3	4	16.7	11.0	0.4 (0.1; 1.3)		
Luber, 1997[561] N = 57	Functional electrical stimulation with15 minute treatment session/day using pulse-width of 2msec scheduled for 2 seconds with 4 seconds rest, frequency of 50Hz, and power 10–100mA	Sham stimulation with inactive device.	Objectively cured from stress urinary incontinence	3	3	15.0	12.5	1.2 (0.3; 5.3)		
			Subjectively cured from stress urinary incontinence	2	4	10.0	16.7	0.6 (0.1; 2.9)		
Fujishiro, 2000[570] N = 62	**Neuromodlation therapy :**Magnetic stimulation of sacral roots with 15Hz frequency, 50% intensity output for 5 seconds per minute for 30 minutes.	Sham stimulation with inactive device	Self reported cure from stress urinary incontinence	4	1	13.0	3.0	4.0 (0.5; 33.8)		

Bold - significant differences in outcomes at 95% confidence level; Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F102 Effects of electrical stimulation and neuromodulationon improvement of urinary incontinence in females (events) (table sorted by rate of improvement after active treatment, from highest to lowest)

Author Sample	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Amaro, 2006[551] N = 40	Effective Intravaginal electrical stimulation with 3 20-minute sessions/week using Dualpex Uro 996 (frequency = 4Hz)	Sham Intravaginal electrical stimulation	Self reported reduction in urge urinary incontinence	17	14	85.0	68.5	1.2 (0.9; 1.7)		
Fujishiro, 2000[570] N = 62	**Neuromodulation therapy:** Magnetic stimulation of sacral roots with 15Hz. frequency, 50% intensity output for 5 seconds each minute for 30 minutes	Sham stimulation with inactive device	Self reported improvement in stress urinary incontinence	23	10	74.0	32.0	**2.3 (1.3; 4.0)**	2 (1; 10)	420 (104; 957)E

Table F102 Effects of electrical stimulation and neuromodulationon improvement of urinary incontinence in females (events) (table sorted by rate of improvement after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Pages, 2001[553] N = 51	Specific physical therapy program. Group therapy 5 times/week and home pelvic floor exercise with 50 contractions for 10 minutes 2 times/day. Recommendation of weight loss and aerobic sports	Biofeedback training and stimulation daily 90 minutes in group and individually for 15 minutes, 5 times/week. Intra vaginal pressure sensor and visual biofeedback in computer monitor	Fewer stress urinary incontinence episodes (-50%) and symptoms	20	9	74.0	68.0	1.1 (0.7; 1.6)		
Spruijt, 2003[547] N = 51	Intravaginal electrical stimulation of the pelvic floor using stimulator generated biphasic current pulses with a duration of ms and a frequency of 50Hz (stress urinary incontinence) or 20Hz (urge urinary incontinence).	Kegel exercise program with verbal instructions on how to exercise at home	% of improved pelvic muscle strength	18	5	70.8	44.4	1.7 (0.8; 3.5)		

Table F102 Effects of electrical stimulation and neuromodulationon improvement of urinary incontinence in females (events) (table sorted by rate of improvement after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Bower, 1998[569] N = 48	**Neuromodulation therapy:** Active transcutaneous electrical nerve stimulation with 150Hz. frequency and 200 microsecond pulse with (suprapubic placement)	Sham trans-cutaneous electrical nerve stimulation with sacral or suprapubic placement	Detrusor pressure at max cystometric capacity <15cm	11	6	68.7	40.0	1.8 (0.9; 3.7)		
Smith, 1996[556] N = 57	Electrical stimulation using frequency 12.5Hz -50Hz and amplitude 5-25mA for 15 to 60 minutes 2/day	Kegel exercise	Improved urinary incontinence	10	3	50.0	33.0	1.5 (0.5; 4.2)		
Sand, 1995[554] N = 52	Active pelvic floor stimulator with gradually adjusted 60-80mA from 5 seconds on/1 sec off for 15 minutes to 5 seconds on/5 seconds off for 30 minutes.	Sham inactive device.	Improved by 50% pad test	16	3	46.0	18.0	2.6 (0.9; 7.7)		

Table F102 Effects of electrical stimulation and neuromodulationon improvement of urinary incontinence in females (events) (table sorted by rate of improvement after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Indrekvam, 2001[555] N = 3,008	Home-managed electrical stimulation with vaginal/anal stimulators (20-50Hz) for 6 -8 hours/day for at least 3 months before evaluation of the effect.	Baseline data	Reduction in frequency of urine loss: every day and/or night	1,384	1865	46.0	62.0	**0.7 (0.7; 0.8)**	6 (6; 7)	160 (137; 181)A
Spruijt, 2003[547] N = 51	Intravaginal electrical stimulation of the pelvic floor using stimulator generated biphasic current pulses with duration of 1ms and a frequency of 50Hz (stress urinary incontinence) or 20Hz (urge urinary incontinence).	Kegel exercise program with verbal instructions on how to exercise at home	% with improved subjective outcome variables PRAFAB score	11	5	45.8	45.4	1.1 (0.5; 2.4)		
			% with improved frequency of urine leakage	11	3	45.8	27.3	1.8 (0.6; 5.2)		
Smith, 1996[556] N -= 57	Electrical stimulation using frequency 12.5Hz-50Hz and amplitude 5-10mA-80mA for 15 to 60 minutes 2/day	Kegel exercise	Improved urinary incontinence	4	3	44.0	33.0	1.3 (0.4; 4.3)		

Table F102 Effects of electrical stimulation and neuromodulationon improvement of urinary incontinence in females (events) (table sorted by rate of improvement after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
But, 2005[559] N = 39	Functional magnetic stimulation applied continuously at 18.5Hz day and night	Sham inactive device	Improvement in mixed urinary incontinence	11	3	41.9	22.9	1.8 (0.6; 5.4)		
Smith, 1996[556] N -= 57	Anticholinergic therapy with Propantheline bromide in dose of 7.5 to 45mg 2-3 times/day	Electrical stimulation using frequency 12.5Hz-50Hz and amplitude 5-25mA for 15-60 minutes 2/day	Improved urinary incontinence	7	9	38.9	33.0	**0.4 (0.2; 0.7)**	-17 (4; 12)	193 (86; 253)A
Sand, 1995[554] N = 52	Active pelvic floor stimulator with gradually adjusted 60-80mA from 5 seconds on/1 second off for 15 minutes to 5 seconds on/5 seconds off for 30 minutes.	Sham inactive device.	Improved by 50% voiding diary	13	2	37.0	12.0	3.2 (0.8; 12.4)		

Table F102 Effects of electrical stimulation and neuromodulationon improvement of urinary incontinence in females (events) (table sorted by rate of improvement after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
But, 2003[546] N = 52	Functional magnetic stimulation with Pulsegen device, which produced a pulsating magnetic field of B = 10 microT intensity and a frequency of 10Hz.	Placebo treatment with sham not active device.	Less abdominal pain related to urge urinary incontinence	11	1	36.7	5.0	**8.1 (1.1; 57.9)**	3 (0; 163)	317 (6; 2,847)E
			Improvement in urge urinary incontinence at night	11	4	36.7	20.0	2.0 (0.7; 5.5)		
Brubaker, 1997[557] N = 148	Transvaginal electric stimulation for 20 minutes 2 times/day using frequency of 20Hz, a 2 second-4 second work-rest cycle with a range of stimulation intensities, from 0 to 100mA	Sham inactive device.	Adequate subjective improvement	21	10	35.0	17.0	**2.1 (1.1; 4.1)**	6 (2; 59)	180 (17; 535)E
Borawski, 2007[573] N = 30	**Neuromulation therapy:** Electrical stimulation with percutaneous needle electrode (22-G spinal needle) placement	Electrical stimulation with surgical first stage lead placement	>50% Improvement in 24 hour pad weight for urinary incontinence	4	13	30.8	76.5	**0.4 (0.2; 0.9)**	2 (2; 25)	457 (40; 634)A

Table F102 Effects of electrical stimulation and neuromodulationon improvement of urinary incontinence in females (events) (table sorted by rate of improvement after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Spruijt, 2003[547] N = 51	Intravaginal electrical stimulation of the pelvic floor using stimulator generated biphasic current pulses with duration of 1msec and a frequency of 50Hz (stress urinary incontinence) or 20Hz (urge urinary incontinence).	Kegel exercise program with verbal instructions on how to exercise at home	% with reduced amount of loss urine	7	3	29.2	27.3	1.1 (0.3; 3.6)		
			% of improved/cured from urinary incontinence	7	4	29.2	36.4	0.8 (0.3; 2.3)		
But, 2003[546] N = 52	Functional magnetic stimulation with Pulsegen device, which produced a pulsating magnetic field of B = 10 microT intensity and a frequency of 10Hz.	Placebo treatment with sham not active device.	Improvement in urge urinary incontinence during a day	7	1	23.0	5.0	5.1 (0.7; 38.8)		

Table F102 Effects of electrical stimulation and neuromodulationon improvement of urinary incontinence in females (events) (table sorted by rate of improvement after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Spruijt, 2003[547] N = 51	Intravaginal electrical stimulation of the pelvic floor using stimulator generated biphasic current pulses with duration of 1ms and a frequency of 50Hz (stress urinary incontinence) or 20Hz (urge urinary incontinence)	Kegel exercise program with verbal instructions on how to exercise at home	% improved Detrusor instability	6	3	22.2	28.6	1.0 (0.3; 3.2)		
Borawski, 2007[573] N = 30	**Neuromodualtion therapy:** Electrical stimulation with percutaneous needle electrode (22-G spinal needle) placement	Electrical stimulation with surgical first stage lead placement	>50% Improvement in 24 hour pad usage for urinary incontinence	2	11	15.4	64.7	**0.2 (0.1; 0.9)**	2 (2; 14)	493 (70; 606)A

Table F102 Effects of electrical stimulation and neuromodulationon improvement of urinary incontinence in females (events) (table sorted by rate of improvement after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Luber, 1997[561] N = 57	Functional electrical stimulation with15 minute treatment session/day using pulse-width of 2msec scheduled for 2 seconds with 4 seconds rest, frequency of 50Hz, and power 10–100mA	Sham stimulation with inactive device.	Subjectively improvement in stress urinary incontinence	3	3	15.0	12.5	1.2 (0.3; 5.3)		
Borawski, 2007[573] N = 30	**Neuromodu-lation therapy:** Electrical stimulation with percutaneous needle electrode (22-G spinal needle) placement	Electrical stimulation with surgical first stage lead placement	>50% Improvement in daily incontinence episodes	1	14	7.7	82.4	**0.1 (0.0; 0.6)**	1 (1; 3)	747 (311; 812)A

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F103. Effects of stimulation therapy on urinary incontinence in females (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Indrekvam, 2001[555] N = 3,008	Home-managed electrical stimulation with vaginal/anal stimulators (20-50Hz) for 6-8 hours/day for at least 3 months before evaluation of the effect	Baseline data	Frequency of urine loss: every day and/or night	1,384	1,865	46.0	62.0	**0.7 (0.7; 0.8)**	6 (6; 7)	160 (137;181)A
			Pad use during 24 hours >5	331	361	11.0	12.0	0.9 (0.8; 1.1)		
			Patients' assessment of impact: much bothered	391	632	13.0	21.0	**0.6 (0.6; 0.7)**	13 (11; 16)	80 (64; 94)A
			Severity index: moderate	361	90	12.0	3.0	4.0 (3.2; 5.0)		
			Severity index: severe	1053	1,444	35.0	48.0	**0.7 (0.7; 0.8)**	8 (7; 9)	130 (108; 151)A
			Two or more voidings during the night	1023	1,173	34.0	39.0	**0.9 (0.8; 0.9)**	20 (14; 38)	50 (26; 72)A
			Usual amount of leakage: substantial amounts	331	451	11.0	15.0	**0.7 (0.6; 0.8)**	25 (19; 41)	40 (24; 54)A
Stamp, 2001[574] N = 1,340	Massage and stretching of perineum during second stage of labor with a water soluble lubricant	Usual care	Urinary incontinence 3 months postpartum	123	115	17.4	18.2	1.0 (0.8; 1.2)		

Table F103. Effects of stimulation therapy on urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Spruijt, 2003[547] N = 51	Intravaginal electrical stimulation of the pelvic floor using stimulator generated biphasic current pulses with duration of 1msec and frequency of 50Hz (stress urinary incontinence) or 20Hz (urge urinary incontinence)	Kegel exercise program with verbal instructions on how to exercise at home	% with deterioration of urinary incontinence	6	7	25.0	54.5	**0.4 (0.2; 1.0)**	3 (2; 44)	295 (23; 449)A
			% with unchanged urinary incontinence	11	1	45.8	9.1	5.3 (0.8; 36.3)		
Amaro, 2005[558] N = 40	Intravaginal electrical stimulation with 3 20-minute sessions/week using 4Hz frequency.	Sham stimulation with inactive device.	Urge urinary incontinence at 1 month followup	3	6	15.0	31.5	0.5 (0.1; 1.7)		
But, 2005[559] N = 39	Functional magnetic stimulation applied continuously at 18.5Hz day and night	Sham inactive device	Incidence of idiopathic detrusor over activity	1	3	3.8	23.1	0.2 (0.0; 1.4)		
Emmons, 2005[562] N = 85	Acupuncture treatment expected to improve bladder symptoms	Placebo acupuncture treatment designed to promote relaxation	Proportion of subjects with detrusor contractions during cystometry	7	11	16.0	28.0	0.6 (0.3; 1.4)		

Table F103. Effects of stimulation therapy on urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Amaro, 2006[551] N = 40	Effective Intravaginal electrical stimulation using frequency of 4Hz with 3 20-minute sessions/week	Sham Intravaginal electrical stimulation using frequency of 4Hz with 3 20-minute sessions/week	Self reported urge incontinence	3	6	15.0	31.5	0.5 (0.1; 1.7)		
Brubaker, 1997[557] N = 148	Transvaginal electric stimulation for 20 minutes 2 times/day using frequency of 20Hz, a 2 second-4 second work-rest cycle with range of stimulation intensities, from 0-100mA	Sham inactive device.	Final urodynamic diagnosis of detrusor over activity	16	25	27.0	41.0	0.6 (0.4; 1.1)		
Bower, 1998[569] N = 48	**Neuromodulation therapy:** Active transcutaneous electrical nerve stimulation with 150Hz. frequency and 200 microsecond pulse with suprapubic placement	Sham transcutaneous electrical nerve stimulation with sacral or suprapubic placement	Detrusor pressure at maximum cystometric capacity <15cm	11	6	68.7	40.0	1.8 (0.9; 3.7)		
			Maximum detrusor pressure <15cm	7	2	43.7	13.3	3.5 (0.9; 14.3)		
			Change in detrusor pressure at first desire to void	7	2	44.0	13.0	3.5 (0.9; 14.3)		

Table F103. Effects of stimulation therapy on urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
			Change in detrusor pressure at first desire to void	7	2	44.0	13.0	3.5 (0.9; 14.3)		

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F104. Effects of electrical stimulation or neuromodulation therapy on urinary continence in adults (events) (sorted by rate of continence after active treatment, from highest to lowest)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Schmidt, 1999[566] N = 98 81% female	**Neuromodulation therapy:** Implantation of multi-programmable neurostimulator subcutaneously in lower quadrant of the abdomen with lead positioned to target sacral nerve and anchored in place.	Standard medical therapy	Self reported urge urinary continence (cured)	24	0	47.0	1.0	**43.5 (2.7; 695.0)**	2 (0; 58)	460 (17; 6,940)E
Weil, 2000[567] N = 44 91% female	**Neuromodulation therapy:** Sacral root neuromodulation with an implantable impulse generator	Prior conservative management: medications or pelvic floor exercise	Self reported urge urinary continence (cured)	9	1	42.9	4.3	**9.9 (1.4; 71.4)**	3 (0; 64)	385 (16; 3,059)E
Yamanishi, 2000[548] N = 68 57% female	Electrical stimulation 15 minutes twice daily for 4 weeks (vaginal electrode in women and an anal or surface electrode in men to provide alternating pulses of 10Hz square waves	Sham inactive device	Urinary continence (cured)	7	1	18.9	3.2	5.9 (0.8 (45.1)		

Table F104. Effects of electrical stimulation or neuromodulation therapy on urinary continence in adults (events) (sorted by rate of continence after active treatment, from highest to lowest (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
	of 1ms pulse duration and a maximum output current of 60mA).									
Karademir, 2005[568] N = 43 88% female	**Neuromodulation therapy:** Stoller afferent neurostimulation with frequency 20Hz and amplitude 0.5-10mA	Stoller afferent neuron-stimulation with frequency 20Hz and amplitude 0.5-10mA combined with 5mg of oral oxybutynin hydrochloride	Cured from urge incontinence	3	3	14.3	13.0	1.1 (0.2; 4.8)		
Yamanishi, 1997[563] N = 35 86% female	Electrical pelvic stimulation with 50Hz square waves of 1msec. pulse duration and vaginal electrode in women and an anal electrode in men for 15 minutes 2 or 3 times daily	Sham electrical pelvic stimulation with inactive device	Cured	2	0	8.0	1.0	3.3 (0.2; 64.3)		

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F105. Effects of electrical stimulation and neuromodulation therapy on improvement of urinary incontinence (events) (table sorted by rate of improvement after active treatment, from highest to lowest)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Schmidt, 1999[566] N = 98 81% female	**Neuromodulation therapy:** Implantation of multiprogrammable neurostimulator subcutaneously in lower quadrant of the abdomen with lead positioned to target sacral nerve and anchored in place	Standard medical therapy	Improvement in severity: heavy urge incontinence at baseline and none at 6 months	40	4	77.0	8.0	**8.8 (3.4; 22.8)**	1 (1; 5)	690 (194; 1,747)E
Karademir, 2005[568] N = 43 88% female	**Neuromodulation therapy:** Stoller afferent neurostimulation with frequency 20Hz and amplitude 0.5-10mA	Stoller afferent neurostimulation with frequency 20Hz and amplitude 0.5-10mA combined with 5mg of oral oxybutynin hydrochloride	% decrease in symptoms of urge incontinence	15	20	70.2	89.7	0.8 (0.6; 1.1)		
Schmidt, 1999[566] N = 98 81% female	**Neuromodulation therapy:** Implantation of multiprogrammable neurostimulator subcutaneously in lower quadrant of the abdomen with lead positioned to target sacral nerve and anchored in place.	Standard medical therapy	Self reported no use of absorbent pads or diapers for urge urinary incontinence	26	1	50.0	2.0	**23.0 (3.2; 162.9)**	2 (0; 22)	480 (45; 3,238)E

Table F105. Effects of electrical stimulation and neuromodulation therapy on improvement of urinary incontinence (events) (table sorted by rate of improvement after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Karademir, 2005[568] N = 43 88% female	**Neuromodulation therapy:** Stoller afferent neurostimulation with frequency 20Hz and amplitude 0.5-10mA	Stoller afferent neuro-stimulation with frequency 20Hz and amplitude 0.5-10mA combined with 5mg of oral oxybutynin hydrochloride	% decrease in symptoms of urgency	10	13	46.1	61.1	0.8 (0.5; 1.4)		
			% decrease in symptoms of frequency	8	10	36.7	44.2	0.8 (0.4; 1.7)		
Schmidt, 1999[566] N = 98 81% female	**Neuromodulation therapy:** Implantation of multiprogrammable neurostimulator subcutaneously in lower quadrant of the abdomen with lead positioned to target sacral nerve and anchored in place	Standard medical therapy	Significant reduction in daily urge urinary incontinence episodes (>50%)	15	2	29.0	5.0	**6.6 (1.6; 27.5)**	4 (1; 33)	240 (30; 1,324)E
Yamanishi, 2000[548] N = 68 57% female	Electrical stimulation 15 minutes twice daily for 4 weeks (vaginal electrode in women and an anal or surface electrode in men to provide alternating pulses of 10Hz square waves of 1ms pulse duration and a maximum output current of 60mA)	Sham inactive device	No Detrusor overactivity	8	2	21.6	6.5	3.4 (0.8; 14.6)		

Table F105. Effects of electrical stimulation and neuromodulation therapy on improvement of urinary incontinence (events) (table sorted by rate of improvement after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Yamanishi, 2000[549] N = 32 54% female	Functional magnetic stimulation applied continuously at 10Hz	Functional electrical stimulation applied continuously at 10Hz with vaginal electrode in women and a surface electrode on the dorsal part of the penis in men.	Abolished detrusor overactivity	3	0	20.0	0.5	7.9 (0.4; 141.1)		
Yamanishi, 1997[563] N = 35 86% female	Electrical pelvic stimulation with 50Hz. square waves of 1ms. pulse duration and vaginal electrode in women and an anal electrode in men for 15 minus 2 or 3 times/day	Sham electrical pelvic stimulation with inactive device	Improved: decrease >50% in pad test	3	0	13.0	3.0	4.7 (0.3; 83.5)		
			Improved: decrease in urinary leakage >50%	2	0	11.0	2.0	3.3 (0.2; 64.3)		

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F106. Effects of electrical stimulation or neuromodulation on perceived urinary incontinence in females (severity measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Differences (95% CI)	% Change from Baseline (95% CI)
Brubaker, 1997[557] N = 148	Transvaginal electric stimulation for 20 minutes 2 times/day using frequency of 20Hz, a 2-second, 4-second work-rest cycle with a range of stimulation intensities, from 0 to 100mA	Sham inactive device	Number of urinary accidents/24 hour (average)	2.4 ± 3.1	2.2 ± 2.7	0.1 (-0.3; 0.4)	3.1 (-13.1; 19.3)
Smith, 1996[556] N = 57	Electrical stimulation using frequency 12.5H - 50Hz and amplitude 5-10mA-80mA for 15 to 60 minutes 2/day	Kegel exercise	Leaks/24hours	2.4 ± 2.4	1.4 ± 2.4	0.4 (-0.5; 1.4)	29.8 (-37.0; 96.6)
	Anticholinergic therapy with Propantheline bromide in dose of 7.5 to 45mg 2-3 times/day	Electrical stimulation using frequency 12.5Hz -50Hz and amplitude 5-25mA for 15 to 60 minutes 2/day	Pads use/week	8.1 ± 5.3	6.5 ± 7.7	0.2 (-0.4; 0.9)	3.8 (-6.1; 13.6)
	Electrical stimulation using frequency 12.5Hz. -50 Hz and amplitude 5-10mA-80mA for 15 to 60 minutes 2/day	Kegel exercise	Pads use/week	5.4 ± 3.1	4.0 ± 4.0	0.4 (-0.5; 1.3)	9.8 (-13.6; 33.1)
Sand, 1995[554] N = 52	Active pelvic floor stimulator with gradually adjusted 60-80mA from 5 seconds on, 1 second off for 15 minutes to 5 seconds on, 5 seconds off for 30 minutes	Sham inactive device	Urinary leaks/24 hours	1.8 ± 2.5	3.8 ± 3.1	**-0.7 (-1.3; -0.1)**	-19.2 (-34.9; -3.5)
			Urinary leaks/week	10.0 ± 14.5	27.0 ± 53.8	-0.5 (-1.1; 0.1)	-1.9 (-4.1; 0.3)

Table F106. Effects of electrical stimulation or neuromodulation on perceived urinary incontinence in females (severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Differences (95% CI)	% Change from Baseline (95% CI)
Pages, 2001[553] N = 51	Specific physical therapy program. Group therapy 5 times/week and home pelvic floor exercise with 50 contractions for 10 minutes 2 times/day. Recommendation of weight loss and aerobic sports.	Biofeedback training daily 90 minutes in group and individually for 15 minutes, 5 times/week. Intra vaginal pressure sensor and visual biofeedback in computer monitor.	Nocturnal urination frequency	0.3 ± 0.5	0.4 ± 0.4	-0.1 (-0.7; 0.6)	-22.4 (-196.6; 151.8)
			digital contraction strength: cough scores (1–5)	4.0 ± 0.9	4.0 ± 0.6	0.0 (-0.7; 0.7)	0.0 (-16.5; 16.5)
			Digital contraction strength: voluntary contraction scores (1–5)	3.5 ± 1.0	4.0 ± 0.8	-0.5 (-1.2; 0.1)	-13.3 (-30.1; 3.5)
Sand, 1995[554] N = 52	Active pelvic floor stimulator with gradually adjusted 60-80mA from 5 seconds on, 1 second off for 15 minutes to 5 seconds on, 5 seconds off for 30 minutes	Sham inactive device	Pad use/week	4.1 ± 5.3	11.2 ± 16.8	**-0.7 (-1.3; -0.1)**	-6.1 (-11.4; -0.8)
Dumoulin, 2004[489] N = 64	Electrical stimulation of the pelvic floor + pelvic floor muscle exercise + biofeedback	Relaxation massage for the back and extremities	Change from baseline in VAS (from 10 possible)	2.5 2.0	0.0 ± 0.0	**1.7 (1.0; 2.5)**	
			Change from baseline in Urogenital Distress Inventory (from 57 possible)	7.0 ± 0.8	0.0 ± 5.2	**1.9 (1.2; 2.6)**	
			Change from baseline in Incontinence Impact Questionnaire (from 90 possible)	13.0 ± 9.6	0.5 ± 3.6	**1.7 (1.0; 2.4)**	341.6 (197.5; 485.6)

Table F106. Effects of electrical stimulation or neuromodulation on perceived urinary incontinence in females (severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Differences (95% CI)	% Change from Baseline (95% CI)
			Change from baseline in Urogenital Distress Inventory (from 57 possible)	4.0 ± 4.8	0.0 ± 5.2	**0.8 (0.2; 1.4)**	
			Change from baseline in Incontinence Impact Questionnaire (from 90 possible)	10.0 ± 4.8	0.5 ± 3.6	**2.2 (1.4; 3.0)**	446.2 (288.7; 603.7)
Jarvis, 2005[575] N = 60	Preoperative physiotherapy	No preoperative physiotherapy	Self reported scores of symptoms of urinary incontinence			**-3.8 (-0.7; -6.9)**	
Barroso, 2004[564] N = 34	Transvaginal electrical stimulation at home twice a day (20-minute sessions) with frequency of 20 (urge) or 50Hz (stress), a pulse width of 300ms, with asymmetrical biphasic pulses, an adjustable current intensity (0–100mA).	Placebo (identical equipment but with no electrical current)	Number of episodes of voiding urgency.	1.5 ± 1.8	6.5 ± 2.4	**-2.5 (-3.4; -1.6)**	-38.2 (-52.2; -24.2)
			Urinary leakage	1.3 ± 1.0	3.0 ± 0.9	**-1.8 (-2.6; -0.9)**	-58.5 (-85.5; -31.5)
			Number of nocturnal voids	1.1 ± 0.5	2.3 ± 0.9	**-1.8 (-2.6; -1.0)**	-79.5 (-115.0; -43.9)
Emmons, 2005[562] N = 85	Acupuncture treatment expected to improve bladder symptoms	Placebo acupuncture treatment designed to promote relaxation	Incontinence impact questionnaire score	4.3 ± 2.7	7.0 ± 3.5	**-0.9 (-1.3; -0.4)**	-12.4 (-18.8; -6.0)
			Urinary distress inventory score	3.6 ± 3.2	5.8 ± 4.8	**-0.5 (-1.0; -0.1)**	-9.4 (-16.8; -1.9)
			Number of total urinary incontinent episodes/3 days)	2.6 ± 3.1	5.3 ± 5.9	**-0.6 (-1.0; -0.1)**	-10.9 (-19.1; -2.7)

Table F106. Effects of electrical stimulation or neuromodulation on perceived urinary incontinence in females (severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Differences (95% CI)	% Change from Baseline (95% CI)
Fujishiro, 2000[570] N = 62	Neuromodulation therapy: Magnetic stimulation of sacral roots with 15Hz frequency, 50% intensity output for 5 seconds per minute for 30 minutes.	Sham stimulation with inactive device	Number of stress urinary leakage episodes/3 days	2.2 ± 3.6	3.2 ± 2.9	-0.3 (-0.8; 0.2)	-9.6 (-25.2; 6.1)
Dumoulin, 2004[489] N = 64	Electrical stimulation of the pelvic floor + pelvic floor muscle exercise + biofeedback	Relaxation massage for the back and extremities	Change from baseline in VAS (from 10 possible)	3.0 ± 0.8	0.0 ± 0.0	**5.2 (3.9; 6.5)**	
Emmons, 2005[562] N = 85	Acupuncture treatment expected to improve bladder symptoms	Placebo acupuncture treatment designed to promote relaxation	Number of urge urinary episodes/3 days)	11.4 ± 8.8	15.0 ± 9.4	-0.4 (-0.8; 0.0)	-2.6 (-5.5; 0.2)
Luber, 1997[561] N =- 57	Functional electrical stimulation with15-minute treatment sessions per day using pulse-width of 2msec scheduled for 2 seconds with4 second rest, frequency of 50Hz, and power 10-100mA	Sham stimulation with inactive device	Stress urinary incontinence episodes/ 24hours	2.4 ± 4.4	2.4 ±5.7	0.0 (-0.6; 0.6)	0.0 (-24.7; 24.7)
Fujishiro, 2002[571] N = 37	Neuromodulation therapy: Magnetic stimulation of sacral roots with 15Hz. frequency, 50% intensity output for 5 seconds per minute for 30 minutes	Sham stimulation with inactive device	Number of urinary voids/daily	9.3 ± 2.3	10.0 ± 2.0	-0.3 (-1.0; 0.3)	-3.2 (-9.8; 3.4)
			Number of urge urinary leakage episodes/3 days	1.6 ± 3.2	1.6 ± 1.2	0.0 (-0.7; 0.7)	0.0 (-41.0; 41.0)

Bold- significant differences in outcomes at 95% confidence level

Table F107. Effects of electrical stimulation or neuromodulation therapy on urinary incontinence in females (pad test and urodynamic evaluations)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Smith, 1996[556] N = 57	Anticholinergic therapy with Propantheline bromide in dose of 7.5 to 45mg 2 - 3 times/day	Electrical stimulation using frequency 12.5Hz. -50Hz and amplitude 5-25mA for 15 to 60 minutes 2/day	Bladder capacity, ml	220.0 ± 253.3	247.0 ± 235.3	-0.1 (-0.7; 0.5)	0.0 (-0.3; 0.2)
Bower, 1998[569] N = 48	**Neuromodulation therapy:** Active transcutaneous electrical nerve stimulation with 10Hz. frequency and 200 microsecond pulse width (sacral placement)	Sham transcutaneous electrical nerve stimulation with sacral or suprapubic placement	First desire to void	154.0 ± 61.0	186.0 ± 77.0	-0.5 (-1.2; 0.2)	-0.2 (-0.6; 0.1)
Amaro, 2005[558] N = 40	Intravaginal electrical stimulation with 3 20-minute sessions/week using 4Hz frequency	Sham stimulation with inactive device	Vaginal cone weight test	4.0 ± 1.3	2.0 ± 1.1	**1.7 (0.9; 2.4)**	83.0 (46.9; 119.2)
Smith, 1996[556] N = 57	Electrical stimulation using frequency 12.5Hz. -50Hz and amplitude 5-10mA-80mA for 15 to 60 minutes 2/day	Kegel exercise	Leak point pressure	95.0 ± 23.3	105.0 ± 16.7	-0.5 (-1.4; 0.4)	-0.5 (-1.4; 0.4)

Table F107. Effects of electrical stimulation or neuromodulation therapy on urinary incontinence in females (pad test and urodynamic evaluations) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Bower,. 1998[569] N = 48	**Neuromodulation therapy:** Active transcutaneous electrical nerve stimulation with 150Hz. frequency and 200 microsecond pulse with (suprapubic placement)	Sham transcutaneous electrical nerve stimulation with sacral or suprapubic placement	Max Detrusor pressure	18.2 ± 10.2	26.0 ± 12.3	-0.7 (-1.4; 0.0)	-2.7 (-5.4; 0.1)
Amaro, 2005[558] N = 40	Intravaginal electrical stimulation with 3 20-minute sessions/week using 4Hz frequency	Sham stimulation with inactive device	Perineal muscle strength	53.8 ± 18.6	46.8 ± 12.5	0.4 (-0.2; 1.1)	0.9 (-0.4; 2.3)
Bower, 1998[569] N = 48	**Neuromodulation therapy:** Active transcutaneous electrical nerve stimulation with 10Hz. frequency and 200 microsecond pulse width (sacral placement)	Sham transcutaneous electrical nerve stimulation with sacral or suprapubic placement	Change from baseline in max Detrusor pressure	12.7 ± 16.9	1.4 ± 4.9	**0.9 (0.2; 1.6)**	64.9 (12.7; 117.0)
			Change from baseline in max Detrusor pressure	7.0 ± 11.0	1.4 ± 4.9	0.7 (-0.1; 1.4)	47.0 (-3.9; 97.9)
			Threshold volume	224.0 ± 141.0	262.0 ±105.0	-0.3 (-1.0; 0.4)	-0.1 (-0.4; 0.1)
			Maximum Detrusor pressure	21.7 ± 17.2	26.0 ± 12.3	-0.3 (-1.0; 0.4)	-1.1 (-3.8; 1.6)
			Detrusor pressure at maximum cystometric capacity	15.1 ± 10.1	21.5 ± 12.2	-0.6 (-1.3; 0.1)	-2.7 (-5.9; 0.6)
			Detrusor pressure at maximum cystometric capacity	12.8 ± 8.1	21.5 ± 12.2	**-0.8 (-1.6; -0.1)**	-3.9 (-7.3; -0.6)

Table F107. Effects of electrical stimulation or neuromodulation therapy on urinary incontinence in females (pad test and urodynamic evaluations) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
			Detrusor pressure at first desire to void	11.3 ± 15.7	10.7 ± 9.5	0.0 (-0.7; 0.7)	0.4 (-6.1; 6.9)
			Detrusor pressure at first desire to void	7.3 ± 6.6	10.7 ± 9.5	-0.4 (-1.1; 0.3)	-3.9 (-10.5; 2.6)
			Maximum cystometric capacity	305.0 ± 146.0	313.5 ± 81.0	-0.1 (-0.8; 0.6)	0.0 (-0.2; 0.2)
			Threshold volume	295.0 ± 162.0	262.0 ± 105.0	0.2 (-0.5; 0.9)	0.1 (-0.2; 0.4)
Berghmans, 2002[552] N = 98	Office- and home-based functional electro-stimulation maximum 100mA frequency 4-10Hz	No treatment	Detrusor Activity Index	0.6 ± 0.3	0.8 ± 0.3	-0.8 (-1.5; 0.0)	-95.6 (-187.4; -3.8)
	Pelvic floor exercises with contractions for >20 seconds, relaxation for 10 seconds. Bladder training, voiding schedule, and positive reinforcement	No treatment	Detrusor Activity Index	0.6 ± 0.3	0.8 ± 0.3	-0.6 (-1.3; 0.1)	-74.6 (-163.9; 14.7)
Sand, 1995[554] N = 52	Active pelvic floor stimulator with gradually adjusted 60-80mA from 5 seconds on, 1-second off for 15 minutes to 5 seconds on, 5 seconds off for 30 minutes.	Sham inactive device.	Vaginal muscle strength (mm/Hg)	15.2 ± 15.1	8.9 ± 7.2	0.5 (-0.1; 1.1)	5.4 (-1.2; 12.0)
			Pad weight (g)	15.4 ± 26.0	32.3 ± 43.0	-0.5 (-1.1; 0.1)	-1.6 (-3.4; 0.2)
			Maximum cystometric capacity (ml)	494.6 ± 236.9	496.6 ± 225.3	0.0 (-0.6; 0.6)	0.0 (-0.1; 0.1)
			Residual urine (ml)	23.8 ± 34.1	12.9 ± 18.8	0.4 (-0.2; 0.9)	2.8 (-1.7; 7.3)
Berghmans, 2002[552] N = 98	Office-based functional electro stimulation, pelvic floor exercise, and bladder training	No treatment	Detrusor Activity Index	0.8 ± 0.3	0.8 ± 0.3	0.2 (-0.6; 0.9)	18.8 (-69.7; 107.4)

Table F107. Effects of electrical stimulation or neuromodulation therapy on urinary incontinence in females (pad test and urodynamic evaluations) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Pages, 2001[553] N = 51	Specific physical therapy program. Group therapy 5 times/week and home pelvic floor exercise with 50 contractions for 10 minutes 2 times/day. Recommendation of weight loss and aerobic sports	Biofeedback training daily for 90 minutes in group and individually for 15 minutes, 5 times/week. Intra vaginal pressure sensor and visual biofeedback in computer monitor.	Maximum forced cough pressure cm/H2O	38.0 ± 22.0	55.0 ± 12.0	**-0.9 (-1.6; -0.2)**	-1.6 (-2.8; -0.3)
			Maximum contraction pressure cm/H2O	38.0 ± 22.0	75.0 ± 21.0	**-1.7 (-2.5; -0.9)**	-2.3 (-3.3; -1.3)
			Average contraction pressure cm/H2O	16.0 ± 10.0	50.0 ± 14.0	**-3.0 (-3.9; -2.0)**	-6.0 (-7.8; -4.1)
Bower, 1998[569] N = 48	Neuromodulation therapy: Active transcutaneous electrical nerve stimulation with 150Hz frequency and 200 microsecond pulse with (suprapubic placement)	Sham transcutaneous electrical nerve stimulation with sacral or suprapubic placement	Maximum cystometric capacity	352.0 ± 145.0	313.5 ± 81.0	0.3 (-0.4; 1.0)	0.1 (-0.1; 0.3)
Dumoulin, 2004[489] N = 64	Electrical stimulation of the pelvic floor + pelvic floor muscle exercise + biofeedback	Relaxation massage for the back and extremities	Change from baseline in pelvic floor muscle maximum strength (N)	0.5 ± 1.6	-0.5 ± 1.2	0.7 (0.0; 1.3)	-140.7 (-9.4; -272.1)
			Change from baseline pad test (g)	19.0 ± 4.8	0.0 ± 7.8	**3.0 (2.1; 3.8)**	

Table F107. Effects of electrical stimulation or neuromodulation therapy on urinary incontinence in females (pad test and urodynamic evaluations) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Bower, 1998[569] N = 48	Neuromodulation therapy: Active transcutaneous electrical nerve stimulation with 150Hz. frequency and 200 microsecond pulse with (suprapubic placement)	Sham transcutaneous electrical nerve stimulation with sacral or suprapubic placement	First desire to void	208.0 ± 132.0	186.0 ± 77.0	0.2 (-0.5; 0.9)	0.1 (-0.3; 0.5)
Dumoulin, 2004[489] N = 64	Electrical stimulation of the pelvic floor + pelvic floor muscle exercise + biofeedback	Relaxation massage for the back and extremities	Change from baseline in pelvic floor muscle maximum strength (N)	0.7 ± 1.3	-0.5 ± 1.2	**0.9 (0.3; 1.6)**	-194.1 (-59.5; -328.8)
			Change from baseline in maximum rate of force development (N/s)	0.8 ± 1.7	-0.5 ± 1.0	**0.9 (0.3; 1.6)**	-201.3 (-60.8; -341.7)
Jarvis, 2005[575] N = 60	Preoperative physiotherapy	No preoperative physiotherapy	Leakage at paper towel test (cm2)			30 (-11; 72.3)	
Dumoulin, 2004[489] N = 64	Electrical stimulation of the pelvic floor + pelvic floor muscle exercise + biofeedback	Relaxation massage for the back and extremities	Change from baseline in pad test (g)	8.0 ± 13.8	0.0 ± 7.8	**0.7 (0.1; 1.3)**	
Barroso, 2004[564] N = 34	Transvaginal electrical	Placebo (identical	First desire to void, ml	161.3 ± 43.3	150.8 ± 42.5	0.2 (-0.5; 0.9)	0.2 (-0.3; 0.6)

Table F107. Effects of electrical stimulation or neuromodulation therapy on urinary incontinence in females (pad test and urodynamic evaluations) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
	stimulation at home twice a day (20-minute sessions) with frequency of 20 (urge) or 50Hz (stress), a pulse width of 300msec, with asymmetrical biphasic pulses, an adjustable current intensity (0-100mA)	equipment but with no electrical current)	Maximum bladder capacity, ml	425.0 ± 97.8	316.7 ± 71.8	**1.2 (0.5; 1.9)**	0.4 (0.1; 0.6)
Dumoulin, 2004[489] N = 64	Electrical stimulation of the pelvic floor + pelvic floor muscle exercise + biofeedback	Relaxation massage for the back and extremities	Change from baseline in maximum rate of force development (N/s)	0.3 ± 1.3	-0.5 ± 1.0	0.7 (0.0; 1.3)	-145.4 (-8.4; -282.4)
Emmons, 2005[562] N = 85	Acupuncture treatment expected to improve bladder symptoms	Placebo acupuncture treatment designed to promote relaxation	Functional bladder capacity	236.0 ± 99.0	196.0 ± 85.0	0.4 (0.0; 0.9)	0.2 (0.0; 0.4)
Fujishiro, 2000[570] N = 62	Neuromodulation therapy: Magnetic stimulation of sacral roots with 15Hz frequency, 50% intensity output for 5 seconds per minute for 30 minutes	Sham stimulation with inactive device	Urine loss on pad test (gm)	5.5 ± 7.5	8.0 ±6.8	-0.3 (-0.9; 0.2)	-4.4 (-10.6; 1.9)
Emmons, 2005[562] N = 85	Acupuncture treatment expected to improve bladder symptoms	Placebo acupuncture treatment designed to promote relaxation	Cystometric maximum capacity (ml)	415.0 ± 205.0	356.0 ± 193.0	0.3 (-0.1; 0.7)	0.1 (0.0; 0.2)

Table F107. Effects of electrical stimulation or neuromodulation therapy on urinary incontinence in females (pad test and urodynamic evaluations) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Luber, 1997[561] N = 57	Functional electrical stimulation with15-minute treatment sessions per day using pulse-width of 2msec scheduled for 2 seconds with 4 second rest , frequency of 50Hz, and power 10-100mA	Sham stimulation with inactive device	Valsalva leak-point pressure, cmH20	86.0 ± 27.3	80.0 ± 116.7	0.1 (-0.5; 0.7)	0.1 (-0.7; 0.8)
			Cystometrogram maximum volume, cm3	470.0 ± 106.7	465.0 ± 116.7	0.0 (-0.5; 0.6)	0.0 (-0.1; 0.1)
			Postvoid residual volume	23.0 ± 8.0	19.0 ± 11.3	0.4 (-0.2; 1.0)	2.1 (-1.0; 5.3)
Fujishiro, 2002[571] N = 37	Neuromodulation therapy: Magnetic stimulation of sacral roots with 15 Hz frequency, 50% intensity output for 5 seconds per minute for 30 minutes	Sham stimulation with inactive device	Mean urine volume/void, ml	195.2 ± 51.3	193.9 ± 47.5	0.0 (-0.6; 0.7)	0.0 (-0.3; 0.4)
Bo, 1997[560] N = 12	Electrical stimulation with Conmax 50Hz - pulse width 0.75ms, 0-90mA	Electrical stimulation with Medicon 50Hz - pulse width 0.5ms, 0-100mA	Change in maximum urethral pressure during voluntary pelvic floor muscle contraction	15.2 ± 11.5	10.4 ± 6.2	0.5 (-0.3; 1.3)	5.0 (-2.8; 12.8)
Emmons, 2005[562] N = 85	Acupuncture treatment expected to improve bladder symptoms	Placebo acupuncture treatment designed to promote relaxation	Cystometric volume at first urge to void (ml)	65.0 ± 80.0	57.0 ± 75.0	0.1 (-0.3; 0.5)	0.2 (-0.6; 0.9)
			Cystometric volume at strong urge to void (ml)	297.0 ± 167.0	276.0 ± 156.0	0.1 (-0.3; 0.6)	0.0 (-0.1; 0.2)

Bold- significant differences in outcomes at 95% confidence level

Table F108. Effects of electrical stimulation or neuromodulation therapy on self reported severity of urinary incontinence in adults

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Weil, 2000[567] N = 44 91% female	Neuromodulation therapy: Sacral root neuromodulation with an implantable impulse generator	Prior conservative management: medications or pelvic floor exercise	Pad use for urge urinary incontinence	0.7 ± 1.4	6.8 ± 4.2	**-1.9 (-2.7; -1.2)**	-28.4 (-39.0; -17.8)
			Urinary leakage severity	1.6 ± 1.9	2.1 ± 0.7	-0.4 (-1.0; 0.2)	-17.1 (-45.5; 11.3)
			Leakage episodes of urge urinary incontinence	1.4 ± 4.2	11.2 ± 5.6	**-2.0 (-2.7; -1.2)**	-17.5 (-24.0; -11.0)
Yamanishi, 1997[563] N = 35 86% female	Electrical pelvic stimulation with 50Hz. square waves of 1ms. pulse duration and vaginal electrode in women and an anal electrode in men for 15 minutes 2 or 3 times/day	Sham electrical pelvic stimulation with inactive device	Frequency of pad change: 0-no change 3->3times	1.1 ± 1.3	2.0 ± 1.2	-0.7 (-1.4; 0.0)	-35.7 (-71.7; 0.4)
			Disturbance in daily activities : 0-not at all, 3- very disturbed	1.0 ± 1.2	2.1 ± 1.0	**-1.0 (-1.7; -0.2)**	-46.5 (-81.7; -11.3)
Schmidt, 1999[566] N = 98 81% female	Neuromodulation therapy: Implantation of multiprogrammable neurostimulator subcutaneously in lower quadrant of the abdomen with lead positioned to target sacral nerve and anchored in place	Standard medical therapy	Severity rank of urge urinary incontinence	0.8 ± 0.9	2.0 ± 0.6	**-1.6 (-2.0; -1.1)**	-77.5 (-100.2; -54.9)
			Absorbent pads or diapers replaced daily due to urge urinary incontinence	1.1 ± 2.0	6.3 ± 3.6	**-1.8 (-2.3; -1.3)**	-28.8 (-36.3; -21.3)
			Self reported urge urinary Incontinent episodes/day	2.6 ± 5.1	11.3 ± 5.9	**-1.6 (-2.0; -1.1)**	-14.0 (-18.1; -10.0)

Table F108. Effects of electrical stimulation or neuromodulation therapy on self reported severity of urinary incontinence in adults (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Yamanishi, 2000[548] N = 68 57% female	Electrical stimulation 15 minutes twice daily for 4 weeks (vaginal electrode in women and an anal or surface electrode in men to provide alternating pulses of 10Hz square waves of 1msec pulse duration and a maximum output current of 60mA)	Sham inactive device	Self reported scores of urinary urgency (0-none, 3-very much)	1.7 ± 0.7	2.0 ± 0.8	-0.4 (-0.9; 0.1)	-20.1 (-44.2; 4.0)
			Daily frequency of pad changes for urinary incontinence	0.8 ± 1.2	1.1 ± 2.0	-0.2 (-0.7; 0.3)	-16.9 (-60.4; 26.6)

Bold- significant differences in outcomes at 95% confidence level

Table F109. Effects of electrical stimulation or neuromodulation therapy on urinary incontinence in adults (urodynamic evaluations)

Author Sample	Active	Control	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Yamanishi, 1997[563] N = 35 86% female	Electrical pelvic stimulation with 50Hz. square waves of 1ms. pulse duration and vaginal electrode in women and an anal electrode in men for 15 minutes 2 or 3 times daily	Sham electrical pelvic stimulation with inactive device	Average flow rate, ml/second	9.7 ± 6.9	7.4 ± 8.3	0.3 (-0.4; 1.0)	4.2 (-5.3; 13.7)
			Bladder compliance at maximum sensation, cm	91.9 ± 142.8	92.1 ± 107.2	0.0 (-0.7; 0.7)	0.0 (-0.8; 0.8)
			Maximum flow rate, ml/sec	22.0 ± 10.9	20.6 ± 18.4	0.1 (-0.6; 0.8)	0.5 (-2.9; 3.9)
			Functional profile length, cm	2.3 ± 0.8	2.1 ± 0.9	0.2 (-0.5; 0.9)	11.3 (-22.0; 44.7)
			Maximum urethral closure pressure, cm H20	52.5 ±27.0	35.9 ± 15.8	0.7 (0.0; 1.4)	2.0 (0.0; 4.0)
			Bladder capacity at first sensation, ml	214.3 ± 96.0	240.0 ± 42.2	-0.3 (-1.0; 0.4)	-0.1 (-0.4; 0.2)
			Bladder capacity at maximum sensation, ml	392.6 ± 110.6	423.3 ± 100.7	-0.3 (-1.0; 0.4)	-0.1 (-0.2; 0.1)
Walsh, 2001[572] N = 146 76% female	Neuromodulation therapy: Antidromic transcutaneous sacral neurostimulation during the second fill of standard urodynamic filling cystometry with 10Hz frequency, a pulse width of 200 milliseconds in continuous mode at the maximum tolerable level.	Control group underwent a second fill of standard urodynamic filling cystometry without neurostimulation	FDV, infused bladder volume (ml) at first desire to void	167.2 ± 97.2	114.2 ± 90.8	**0.6 (0.2; 0.9)**	0.5 (0.2; 0.8)
			SDV, infused bladder volume at perceived strong desire to void	247.4 ± 110.1	193.7 ± 156.1	**0.4 (0.1; 0.7)**	0.2 (0.0; 0.4)
			Urge, infused bladder volume at sensation of urgency;	331.5 ± 136.8	255.4 ± 96.7	**0.6 (0.3; 1.0)**	0.3 (0.1; 0.4)
			CMax, maximum infused cystometric capacity.	404.2 ± 229.7	315.9 ± 194.3	**0.4 (0.1; 0.7)**	0.1 (0.0; 0.2)
Yamanishi, 2000[548] N = 68 57% female	Electrical stimulation 15 minutes twice daily for 4 weeks (vaginal electrode in women and an anal or surface electrode in men to provide alternating pulses of 10Hz square waves of 1msec pulse duration and a maximum output current of 60mA).	Sham inactive device	Bladder capacity at first desire to void (ml)	174.2 ± 83.1	130.0 ± 69.9	**0.6 (0.1; 1.1)**	0.4 (0.1; 0.8)
			Maximum cystometric capacity (ml)	285.0 ± 143.4	182.9 ± 99.0	**0.8 (0.3; 1.3)**	0.4 (0.2; 0.7)
			Detrusor pressure at maximum sensation (cm/H2O)	34.6 ± 12.5	34.8 ± 13.6	0.0 (-0.5; 0.5)	0.0 (-1.4; 1.3)
			Amplitude of Detrusor overactivity (cm/H2O)	39.1 ± 36.6	50.9 ± 29.8	-0.4 (-0.8; 0.1)	-0.7 (-1.6; 0.3)
			Bladder compliance at maximum sensation (ml/cm/H2O)	27.8 ± 24.1	31.6 ± 35.7	-0.1 (-0.6; 0.4)	-0.4 (-1.9; 1.1)

(continued)

Author Sample	Active	Control	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Yamanishi, 2000[549] N = 32 54% female	Functional magnetic stimulation applied continuously at 10Hz	Functional electrical stimulation applied continuously at 10 Hz with vaginal electrode in women and a surface electrode on the dorsal part of the penis in men	Bladder capacity at first desire to void (ml)	225.1 ± 123.7	220.4 ± 110.9	0.0 (-0.7; 0.7)	0.0 (-0.3; 0.3)
			Bladder compliance at maximum sensation (ml/cm/H2O)	32.7 ± 25.6	24.3 ± 18.3	0.4 (-0.3; 1.1)	1.6 (-1.3; 4.5)
			Amplitude of Detrusor overactive contraction (cm/H2O)	51.5 ± 48.2	51.3 ± 36.9	0.0 (-0.7; 0.7)	0.0 (-1.3; 1.4)
			Maximum cystometric capacity (ml)	290.5 ± 146.3	266.9 ± 151.0	0.2 (-0.5; 0.9)	0.1 (-0.2; 0.3)
			Detrusor pressure at maximum capacity (cm/H2O)	13.9 ± 15.4	15.4 ± 10.5	-0.1 (-0.8; 0.6)	-0.7 (-5.3; 3.8)

Bold- significant differences in outcomes at 95% confidence level

Table F110. Effects of devices on risk and progression of incontinence in females

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Nygaard, 1995[576] Crossover RCT to examine the effects of Hodge pessary with support, a super tampon on urinary incontinence during exercise. Duration: three exercise sessions.	20 female exercisers ages 33-73 with urinary incontinence during exercise and positive coughing test. Exclusion criteria: Prolapse of the uterus, stenotic vagina, or pelvic mass. Loss of followup:10%	1. 40-minute standardized aerobics session wearing a Hodge pessary with support 2. 40-minute standardized aerobics sessions wearing a super tampon 3. 40-minute standardized aerobics sessions with no mechanical device	Urine loss as change in the weight of the pad during exercising. Continence-pad weight gain <4g	No intention to treat. Open label. Block randomization. Allocation concealment not reported. Baseline data not reported. Sample size not justified.
Thyssen, 2001[577] Crossover RCT to examine the effects of disposable intravaginal device on stress incontinence in women. Duration: 5 weeks	94 women with the predominant symptom of stress incontinence, 39 were recruited in Denmark, 28 in England, and 27 in Australia. Exclusion criteria: Major uterovaginal prolapse. Loss of followup: 34%	1. Conveen Continence Guard, CCG made of hydrophilic polyurethane and requires soaking in water before being placed on a handle like applicator for insertion. 2. Contrelle Continence Tampon, CCT, coloplastis made of hydrophobic polyurethane and supplied ready-assembled within an applicator, allowing insertion directly into the vagina with no manual contact.	24 hour pad test, uroflowmetry, postvoid residual urine volume and a voiding diary	No Intention to treat. Open label. Block randomization. Allocation concealment not reported. Baseline data not reported. Sample size not justified.
Seo, 2004[578] RCT to examine the effects of vaginal cone with conventional FES-biofeedback therapy for female urinary incontinence. Duration: 6 weeks.	120 patients, who required a non-surgical treatment for urinary incontinence. Exclusion criteria: not reported. Loss of followup: not reported.	1. Pelvic floor exercise (5 second contraction and 10 second relaxation, 3-5 times for >5 minutes/day) and functional electrical stimulation biofeedback (35Hz-50Hz for 24 seconds); 2 training sessions /week. 2. Vaginal cone, 150g dumbbell-shaped made of fine ceramic material.	Self reported urinary incontinence. Urodynamic outcomes.	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.

Table F110. Effects of devices on risk and progression of incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Robinson, 2003[579] RCT to examine the effects of new urethral device or the reliance insert on female urinary incontinence. Duration of followup: 4 months	24 women 30-75 years old with mixed or stress urinary incontinence >2 episodes/week >2g urine loss on baseline pad weight test, with sound mental condition, willing to use >3 devices/week. Exclusion criteria: overflow incontinence or neurogenic bladder, type III incontinence, kidney inflammatory diseases, urinary tract infection, use of anticoagulants or incontinence medications, allergy to antibiotics, diabetes mellitus type II, pregnancy, urethral mucosal abnormalities, prosthetic heart valve, HRT last 3 months, collagen injections or other urethral bulking agents last 3 months, detrusor contraction >20cm/H20. Loss of followup: 33.3 %	1. Urethral device (NEAT) – sterile urethral insert with disposable applicator packaged with device. 2. Reliance insert sterile balloon type device	Success was defined as a 50% or greater reduction in urine loss using the formula 100 [(pad weight without device -pad weight with device)/pad weight with device]. Pure stress incontinence-urine loss with no detrusor contractions >15cm/H20 in any point before cystometric bladder capacity achieved. Mixed urinary incontinence- urine loss with detrusor contractions at 16-20cm/H20 in any point before cystometric bladder capacity achieved.	No Intention to treat. Single blind. randomization and allocation concealment not reported . Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F110. Effects of devices on risk and progression of incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Bo,1999[513] RCT to examine the effects of pelvic floor exercises, electrical stimulation, vaginal cones, and no treatment on females' genuine stress incontinence. Duration: 6 months	107 women with clinically and urodynamically proved genuine stress incontinence >4g of leakage measured by pad test with standardized bladder volume. Exclusion criteria: Urinary incontinence other than genuine stress incontinence, involuntary detrusor contractions >10cm/H2O on cystometry, abnormal bladder function (residual urine >0ml and maximal uroflow <15 ml/s), previous surgery for genuine stress incontinence, neurological or psychiatric disease, ongoing urinary tract infections, other diseases that could interfere with participation, use of concomitant treatments during the trial, and inability to understand instructions given in Norwegian. Loss of followup: 12.3%	1. Pelvic floor exercise with 8-12 contractions 3 times/day in groups with skilled physical therapists 1/week. 2. Electrical stimulation using vaginal intermittent stimulation with MS 106 Twin at 50Hz 30 minutes/day. 3. Vaginal cones of 20, 40, and 70g for 20 minutes/day. 4. Untreated control group offered use of a continence guard	Muscle strength measured by vaginal squeeze pressure 1/month. Pad test with standardized bladder volume. 24 hour pad test. Self reported symptoms of severity. Leakage index. Patients indicated on a 5 point scale (5 always, 4 often, 3 sometimes, 2 seldom, 1 never) the frequency of urinary leakage during sneezing, coughing, laughing, walking, walking downhill, running, jumping, and lifting. The mean was calculated as an index of leakage frequency before and after treatment. Objective cure as <2g leakage on the pad test with standardized bladder volume. Subjective cure as (number of women stating that the condition was "unproblematic" after treatment).	Intention to treat. Single blind. Computer generated random numbers stratified by baseline leakage. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified

Table F110. Effects of devices on risk and progression of incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Nielsen, 1993[580] Cross-sectional RCT to examine effects of urethral plug on female genuine urinary stress incontinence. Duration: 2 weeks	40 women with genuine urinary stress incontinence. Exclusion criteria: not reported Loss of followup: 55%	1. Urethral plug as oval metal plate, a soft stalk, and 1 sphere along the stalk with fixed distances between the metal plate and the spheres. Inside the stalk is a removable semi-rigid guide pin to ease insertion. 2. Urethral plug as oval metal plate, a soft stalk, and 2 spheres along the stalk with fixed distances between the metal plate and the spheres. Inside the stalk is a removable semi-rigid guide pin to ease insertion.	Self reported urinary incontinence. Pad weighting test.	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.

Table F111. Effects of medical devices on female urinary incontinence (events rate)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)
Nygaard, 1995[576] N = 20	40 minute standardized aerobics sessions wearing a Hodge pessary with support	40 minute standardized aerobics sessions wearing a super tampon	Continent during exercise	7	12	36.0	58.0	0.6 (0.3; 1.2)
Thyssen, 2001[577] N = 94	Conveen continence disposable intravaginal device guard, CCG made of hydrophilic polyurethane requires soaking in water before being placed on a handle like applicator for insertion	Contrelle Continence Tampon, CCT, coloplastic made of hydrophobic polyurethane and supplied ready-assembled within an applicator, allowing insertion directly into the vagina with no manual contact	Cured from stress urinary incontinence	34	45	36.0	48.0	0.8 (0.5; 1.1)
			Self reported Improvement in stress urinary incontinence	38	34	40.0	36.0	1.1 (0.8; 1.6)
Seo, 2004[578] N = 120	Pelvic floor exercise (5 second contraction and 10 second relaxation, 3-5 times for >5 minutes/day) and functional electrical stimulation biofeedback (35Hz-50Hz for 24 seconds); 2 training sessions/week	Vaginal cone ,150g dumbbell-shaped made of fine ceramic material	Self reported improvement in urinary incontinence	55	53	91.7	88.3	1.0 (0.9; 1.2)
Robinson, 2003[579] N = 24	Urethral device (NEAT) sterile urethral insert with disposable applicator packaged with device	Reliance insert sterile balloon type device	Success as a 50% or greater reduction in urine loss	9	6	67.0	58.0	1.3 (0.7; 2.4)
			Success as negative pad weight test	9	7	73.0	62.0	1.1 (0.6; 1.9)

Table F111. Effects of medical devices on female urinary incontinence (events rate) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)
Bo, 1999[513] N = 122	Vaginal cones of 20, 40, and 70g for 20 minutes/day	Untreated control group offered use of a continence guard	Objective cure as <2g leakage on pad test with standardized bladder volume	4	2	13.8	6.3	2.2 (0.4; 11.2)
			Subjective cure as (number of women stating that condition was "unproblematic" after treatment)	2	1	6.9	3.1	2.2 (0.2; 23.1)
			Urinary continence and almost continent	5	1	17.2	3.1	5.5 (0.7; 44.5)

Table F112. Effects of medical devices on self reported severity of urinary incontinence, quality of life, and objective instrumental measures of severity (continuous variables)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Self reported severity of urinary incontinence							
Bo, 1999[513] N = 122	Vaginal cones of 20, 40, and 70g for 20 minutes/day.	Untreated control group offered use of a continence guard	Change from baseline in episodes of leakage in 3 days	0.8 ± 5.3	0.3 ± 2.3	0.1 (-0.4; 0.6)	41.5 (-126.2; 209.2)
Seo, 2004[578] N = 120	Pelvic floor exercise (5 second contraction and 10 second relaxation, 3-5 times for >5 minutes/day) and functional electrical stimulation biofeedback (35Hz-50Hz for 24 seconds); 2 training sessions/ week	Vaginal cone,150g dumbbell-shaped made of fine ceramic material	Changes in episodes of urine leakage	-1.1 ± 0.2	-0.6 ± 0.2	**-2.3 (-2.8; -1.9)**	369.8 (443.6; 296.0)
			Changes in amount of urine leakage	-0.6 ± 0.2	-0.6 ± 0.2	0.0 (-0.4; 0.4)	0.0 (56.8; -56.8)
Self reported quality of life							
Seo, 2004[578] N = 120	Pelvic floor exercise (5 second contraction and 10 second relaxation, 3-5 times for >5 minutes/day) and functional electrical stimulation biofeedback (35Hz-50Hz for 24 seconds); 2 training sessions/week	Vaginal cone,150g dumbbell-shaped made of fine ceramic material	Changes in scores: restriction in exercise due to incontinence	-0.6 ± 0.2	-0.4 ± 0.2	**-1.3 (-1.7; -0.9)**	364.9 (474.7; 255.2)
			Changes in scores: avoiding places due to urinary incontinence	-0.3 ± 0.1	-0.1 ± 0.2	**-1.1 (-1.5; -0.7)**	848.3 (1,144.1; 552.5)
Bo, 1999[513] N = 122	Vaginal cones of 20, 40, and 70g for 20 minutes/day.	Untreated control group offered use of a continence guard	Change from baseline in leakage index	-0.3 ± 0.5	0.1 ± 0.6	**-0.7 (-1.2; -0.2)**	-720.2 (-1,239.2; -201.2)
			Change from baseline in social activity index	0.1 ± 1.1	-0.2 ± 1.7	0.2 (-0.3; 0.7)	-103.3 (148.7; -355.2)

Table F112. Effects of medical devices on self reported severity of urinary incontinence, quality of life, and objective instrumental measures of severity (continuous variables) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Effects of medical devices on objective measured severity of urinary incontinence							
Nygaard, 1995[576] N = 20	40 minute standardized aerobics sessions wearing a Hodge pessary with support	40 minute standardized aerobics sessions with no mechanical device	Mean urine loss as change in weight of the pad during exercising.	36.4 ± 67.1	45.3 ± 45.7	-0.2 (-0.8; 0.5)	-0.3 (-1.7; 1.0)
	40 minute standardized aerobics sessions wearing a super tampon			31.0 ± 46.2	45.3 ± 45.7	-0.3 (-0.9; 0.3)	-0.7 (-2.1; 0.7)
Thyssen[577]	Conveen continence disposable intravaginal device guard, CCG made of hydrophilic polyurethane requires soaking in water before being placed on a handle like applicator for insertion	No device	24 hour pad test (g)	20.2 ± 12.8	43.1 ± 11.0	**-1.9 (-2.3; -1.6)**	-4.5 (-5.3; -3.6)
	Contrelle continence disposable intravaginal device tampon, CCT, coloplastic made of hydrophobic polyurethane and supplied ready-assembled within an applicator, allowing insertion directly into the vagina with no manual contact		24 hour pad test (g)	10.8 ± 5.4	43.1 ± 11.0	**-3.7 (-4.2; -3.3)**	-8.6 (-9.8; -7.5)
Seo, 2004[578] N = 120	Pelvic floor exercise (5 second contraction and 10 second relaxation, 3-5 times for >5 minutes/day) and functional electrical stimulation biofeedback (35Hz-50Hz for 24 seconds); 2 training sessions/week	Vaginal cone, 150g dumbbell-shaped made of fine ceramic material	Pad test	3.4 ± 5.4	3.7 ± 6.7	-0.1 (-0.4; 0.3)	-1.5 (-11.1; 8.1)

Table F112. Effects of medical devices on self reported severity of urinary incontinence, quality of life, and objective instrumental measures of severity (continuous variables) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Nielsen, 1993[580] N = 40	Urethral plug as oval metal plate, a soft stalk, and 1 sphere along the stalk with fixed distances between the metal plate and the spheres. Inside the stalk is a removable semi-rigid guide pin to ease insertion	Urethral plug as oval metal plate, a soft stalk and 2- spheres along the stalk with fixed distances between the metal plate and the spheres. Inside the stalk is a removable semi-rigid guide pin to ease insertion.	Urine leakage during pad weighting test.	6.0 ± 76.7	3.0 ± 80.0	0.0 (-0.4; 0.5)	1.3 (-13.3; 15.9)
Bo, 1999[513] N = 122	Vaginal cones of 20, 40, and 70g for 20 minutes/day	Untreated control group offered the use of a continence guard	Change from baseline in stress pad test (g)	-14.7 ± 34.2	-12.7 ± 41.8	-0.1 (-0.6; 0.5)	0.4 (4.4; -3.5)
			Change from baseline in 24 hour pad test (g)	-22.0 ± 89.3	-7.1 ± 37.8	-0.2 (-0.7; 0.3)	3.1 (10.2; -4.0)
Effects of medical devices on urodynamic outcomes							
Thyssen, 2001[577] N = 94	Conveen continence disposable intravaginal device guard, CCG made of hydrophilic polyurethane requires soaking in water before being placed on a handle like applicator for insertion	No device	Peak flow, ml/s	25.8 ± 22.8	25.9 ± 28.7	0.0 (-0.3; 0.3)	0.0 (-1.1; 1.1)
			Voided volume, ml	216.0 ± 256.0	251.0 ± 263.3	-0.1 (-0.4; 0.2)	-0.1 (-0.2; 0.1)
			Corrected peak flow, ml/s	1.9 ± 2.8	1.8 ± 1.4	0.0 (-0.2; 0.3)	2.5 (-13.4; 18.4)
			Residual urine, ml	17.1 ± 74.6	18.3 ± 81.1	0.0 (-0.3; 0.3)	-0.1 (-1.6; 1.5)
	Contrelle continence disposable Intravaginal device tampon, CCT, coloplastic made of hydrophobic polyurethane and supplied ready-	No device	Peak flow, ml/s	24.3 ± 24.5	25.9 ± 28.7	-0.1 (-0.3; 0.2)	-0.2 (-1.3; 0.9)
			Voided volume, ml	215.0 ± 243.3	251.0 ± 263.3	-0.1 (-0.4; 0.1)	-0.1 (-0.2; 0.1)
			Corrected peak flow, ml/s	2.1 ± 2.3	1.8 ± 1.4	0.2 (-0.1; 0.4)	8.8 (-7.1; 24.8)

Table F112. Effects of medical devices on self reported severity of urinary incontinence, quality of life, and objective instrumental measures of severity (continuous variables) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
	assembled within an applicator, allowing insertion directly into the vagina with no manual contact		Residual urine, ml	13.2 ± 55.9	18.3 ± 81.1	-0.1 (-0.4; 0.2)	-0.4 (-2.0; 1.2)
Seo, 2004[578] N = 120	Pelvic floor exercise (5 second contraction and 10 second relaxation, 3-5 times for >5 minutes/day) and functional electrical stimulation biofeedback (35Hz-50Hz for 24 seconds); 2 training sessions/week	Vaginal cone,150g dumbbell-shaped made of fine ceramic material	Maximum urethral closing pressure, mm/H20	77.9 ± 31.0	78.4 ± 18.3	0.0 (-0.4; 0.3)	0.0 (-0.5; 0.4)
			Maximum vaginal pressure, mmHg	33.6 ± 16.7	27.2 ± 13.2	**0.4 (0.1; 0.8)**	1.6 (0.2; 2.9)
			Duration of PEM contractions, seconds	10.2 ± 5.7	9.3 ± 5.4	0.2 (-0.2; 0.5)	1.8 (-2.1; 5.7)
Bo, 1999[513] N = 122	Vaginal cones of 20, 40, and 70g for 20 minutes/day.	Untreated control group offered use of a continence guard	Change in strength of pelvic floor muscle	15.4 ± 12.4	16.0 ± 4.2	-0.1 (-0.6; 0.4)	-0.4 (-3.6; 2.7)

Bold- significant differences in outcomes at 95% confidence level

Table F113. Effects of medical devices on urinary incontinence in community-dwelling males

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Chancellor, 1999[581] RCT to examine effects of sphincteric stent or external sphincterotomy on urinary incontinence in spinal cord injured men. Duration of followup: 24 months	57 men with spinal cord injury and electromyographic and manometric evidence of external detrusor-sphincter dyssynergia during involuntary detrusor contractions. Exclusion criteria: Concomitant documented bladder neck or prostatic obstruction Loss of followup: 42.5%	1. UroLume sphincteric stent (2, 2.5,or 3cm) prosthesis inserted using a 22F cystoscopic insertion tool with distal end of the prosthesis extended at least 5mm into the bulbous urethra and well beyond the distal aspect of the external sphincter. 2. Conventional external sphincterotomy.	Urodynamic outcomes. Self reported changes in urinary incontinence.	No Intention to treat. Open label. Randomization and allocation concealment not reported**.** Baseline data confirmed adequacy of randomization. Sample size not justified
Moore, 2004[582] Cross-over RCT to examine effects of penile compression devices on male urinary incontinence. Acute test.	12 men, 6 months after radical prostatectomy with stress urinary incontinence requiring continuous incontinence pad protection, normal perineal and penile sensation, intact penile skin, and the ability to read and speak English. Exclusion criteria: Neurologic or cognitive impairment (Mini-Mental State Examination score <27), neurologic disorders that could affect sensation or peripheral circulation, sufficient manual dexterity to manage the penile compression device, previous radiotherapy, symptoms of overactive bladder.	Penile Compression Devices: 1. C3 penile compression device with 2 styrofoam arms with a raised bottom arm applies pressure on the urethra. 2. Cunningham clamp 3. U-tex male adjustable tension nylon band with a urethral occlusion pad and nylon strap adjustable for comfort and continence.	4 hour pad test weight gain of 2g or more in one pad was considered urinary incontinence	Intention to treat not stated. Open label. Computer-generated randomization with random number table. Allocation concealment not adequate. Sample size justified.

Table F114. Clinical improvement in urinary incontinence in 57 males after inserted sphincter stent

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)
Chancellor, 1999[581] N = 57	UroLume sphincteric stent (2, 2.5, or 3cm) prosthesis inserted using a 22F cystoscopic insertion tool with distal end of prosthesis extended at least 5mm. into the bulbous urethra and well beyond the distal aspect of the external sphincter	Conventional external sphincterotomy	Significant improvement in bladder emptying ability	12	6	38.7	23.1	1.7 (0.7; 3.8)	-6 (16; -2)

Table F115. Effects of devices on urinary incontinence in males (severity measures)

Author Sample	Outcome	Active Treatment	Control Treatment	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Chancellor, 1999[581] N = 57	Mean maximum. detrusor. Cm/H20	UroLume sphincteric stent (2, 2.5, or 3cm) prosthesis inserted using a 22F cystoscopic insertion tool with distal end of prosthesis extended at least 5mm. into the bulbous urethra and well beyond the distal aspect of the external sphincter	Conventional external sphincterotomy	71.6 ± 43.8	41.6 ± 16.3	**0.9 (0.3; 1.4)**	2.1 (0.8; 3.4)
	Mean residual urine, ml			132.0 ± 159.0	112.0 ± 106.0	0.1 (-0.4; 0.7)	0.1 (-0.3; 0.6)
	Mean cystometric capacity, ml			262.0 ± 134.0	220.0 ± 135.0	0.3 (-0.2; 0.8)	0.1 (-0.1; 0.4)
Moore, 2004[582] N = 12	4 hour pad test: mean urine loss	U-tex male adjustable tension	Cunningham clamp	53.3 ± 65.7	17.1 ± 21.3	0.7 (-0.1; 1.6)	4.3 (-0.5; 9.2)
		C3 penile compression device with 2 styrofoam arms with a raised bottom arm applies pressure on the urethra		32.3 ± 24.3	17.1 ± 21.3	0.7 (-0.2; 1.5)	3.9 (-0.9; 8.7)
	Mean right resistance index	Cunningham clamp	No device	0.9 ± 0.1	0.9 ± 0.1	0.2 (-0.6; 1.0)	19.2 (-69.9; 108.2)
	Mean left resistance index			0.9 ± 0.3	0.9 ± 0.1	0.0 (-0.8; 0.8)	-5.3 (-97.3; 86.7)
	Mean right resistance index	C3 penile compression device with 2 styrofoam arms with a raised bottom arm applies pressure on the urethra	No device	0.9 ± 0.1	0.9 ± 0.1	0.2 (-0.6; 1.0)	22.2 (-66.9; 111.4)
	Mean left resistance index			0.9 ± 0.1	0.9 ± 0.1	0.5 (-0.3; 1.3)	54.7 (-38.7; 148.1)
	Mean right resistance index	U-tex male adjustable tension	No device	0.9 ± 0.1	0.9 ± 0.1	0.3 (-0.5; 1.1)	36.8 (-52.8; 126.4)
	Mean left resistance index			0.9 ± 0.1	0.9 ± 0.1	0.4 (-0.4; 1.2)	43.7 (-49.1; 136.6)

Table F116. Effects of bulking agents and transurethral radiofrequency energy collagen micro-remodeling on urinary incontinence in females

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Corcos, 2005[583] Noninferiority RCT to examine effects of collagen injection or surgery on female stress urinary incontinence. Duration of followup: 12 months	133 women older than 30 years with stress urinary incontinence lasted for >6 months. Exclusion criteria: Contraindications to surgery or collagen injections (allergic reaction), associated conditions (e.g., severe medical disease or indication for hysterectomy) or pelvic prolapse (vault, cystocele, rectocele), neurogenic bladder or interstitial cystitis or a history of pelvic radiation or previous treatment by collagen injection. Loss of followup: 3.7%	1. Intraurethral collagen submucosal injection 4 injections at 1-month intervals 2. Surgery (needle bladder neck suspensions, Burch, and slings). The choice of technique was left to the surgeon.	Success as dry 24 hour pad test (<2.5g). Symptoms of incontinence, general QOL, disease-specific QOL	Intention to treat. Centralized randomization stratified by center with randomly distributed blocks 4 and 6 in size. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Bano, 2005[584] RCT to examine effects of porcine dermal implant (Permacol) and silicone injection (Macroplastique) on urodynamic stress incontinence in females. Duration of followup: 6 months	50 women with urodynamically proven stress incontinence. Exclusion criteria: not reported. Loss of followup: 2%	1. Peri or transurethral porcine dermal implant injection (Permacol) 2. Transurethral silicone injection (Macroplastique)	International Continence Society (ICS) standard 1 hour pad test. Self reported incontinence using Stamey scoring system and Kings College Hospital Quality of Health Questionnaire (KCQ)	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Schulz, 2004[585] RCT to examine effects of periurethral and transurethral injections of bulking agents on stress urinary incontinence in females. Duration of followup: 12 months	40 women ages 18-80 years old, with genuine stress incontinence for >12 months, or mixed incontinence with a minor and controlled urge component, who failed 3 months conservative treatments. Exclusion criteria: Other treatments for incontinence, urinary tract infection, bladder capacity <250ml or postvoid residual volume >100ml, neurogenic bladder, grade 3 cystoele, uterine prolapse or rectocele, radiation of urethra, pregnancy, life expectancy <15 months. Loss of followup: 15%	1. Periurethral route of injection of bulking agent-dextran copolymer 2. Transurethral route of injection of bulking agent-dextran copolymer	Urinary continence as 100% improvement in self reported symptoms, no leakage episodes and negative pad test	Intention to treat. Open label. Computer generated block randomization scheme. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F116. Effects of bulking agents and transurethral radiofrequency energy collagen micro-remodeling on urinary incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Lightner, 2001[586] RCT to examine effects of bulking agents on stress urinary incontinence due to intrinsic sphincter deficiency in women. Duration of followup: 12 months	355 women diagnosed with stress urinary incontinence due to intrinsic sphincter deficiency, abdominal leak point pressure of less than 90cm/H2O, who failed prior surgical and medical treatment. Exclusion criteria: Prior injections of any urethral bulking agents, positive intradermal test injections of bovine collagen and beta-glucan Loss of followup: 38%	1. Injection of bulking agent 1.0ml durasphere maximum 5 times with a minimum 7 day interval. 2. Injection of bulking agent bovine collagen maximum 5 times with a minimum 7 day interval.	Self reported urinary incontinence with grade 0 (dry) to grade 3 (continuous) urinary leakage	No Intention to treat. Double blind. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.
Appell, 2006[587] Placebo controlled RCT to examine effects of transurethral radiofrequency energy collagen micro-remodeling on female stress urinary incontinence. Duration of followup: 12 months	173 women with stress urinary incontinence, bladder outlet hypermobility, and leak point pressure >60cm/H2O. Exclusion criteria: Evidence of detrusor overactivity on cystometrogram, post-void residual bladder volumes >50cc, significant pelvic organ prolapse (POP-QStage IV) on physical examination, history of dry or wet overactive bladder, previous surgical or bulking agent therapy, abnormal urinalyses, positive urine cultures, and positive pregnancy test. Loss of followup: 18%	1. Transurethral radiofrequency energy collagen micro-remodeling 2. Sham treatment probes lacked needle electrodes and sham treatment of radiofrequency generator	Self reported improvement in urinary incontinence as 25% reduction in both incontinence episode frequency and stress pad weight. Impact on subject quality of life as incidence of >10 point improvement on the Incontinence Quality of Life (I-QOL) score. A baseline I-QOL score of 0-30 points - “severe SUI,” 31- 60 points - ‘‘moderate SUI,” and 61-90 points – “mild SUI.”	No intention to treat. Single blind. Computer generated randomization with ratio 2:1. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F116. Effects of bulking agents and transurethral radiofrequency energy collagen micro-remodeling on urinary incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Lee, 2001[588] Placebo controlled RCT to examine effects of periurethral autologous fat injection on female stress urinary incontinence. Duration of followup: 24 months	68 women with stress urinary incontinence determined by history, urinary leakage via the urethra with cough provocation. Exclusion criteria: Detrusor instability on multichannel urodynamic, co-interventions, including hormone replacement, weight reduction, or Kegel exercises, other diagnoses causing incontinence, including bladder instability. Loss of followup:19%	1. Periurethral injections of autologous fat (30cc of fat from the anterior abdominal wall or buttock through a single 2-3mm) with 3 maximum injections depending on outcomes measures. 2. Placebo (saline).	Cure from urinary incontinence as no leakage on the 1 hour pad test, no leakage seen from the urethra with coughing and a continence questionnaire score of 0. Improvement was defined as a decrease in the continence questionnaire score of 5 points or greater.	No Intention to treat. Double blind. Computerized randomization with random number tables. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.
Strasser, 2007[589] RCT to examine the effects of ultrasonography-guided injections of autologous cells or endoscopic injections of collagen on stress urinary incontinence. Duration of follow up: 12 months	63 females 36-84 years old with intrinsic sphincter insufficiency or stress urinary incontinence with only mild hypermobility of the urethra and the urinary bladder; good state of health who failed pelvic floor muscle exercises. Exclusion criteria: urge incontinence and pronounced hypermobility of the urethra. Loss of follow up -none	1. Transurethral ultrasonography-guided injections of autologous myoblasts and fibroblasts; regular training of the rhabdosphincter for 12 weeks and trans vaginal electrical stimulation for 4 weeks. 2. Conventional endoscopic injections of collagen; regular training of the rhabdosphincter for 12 weeks and trans vaginal electrical stimulation for 4 weeks	24-hour voiding diary with incontinence score (range 0–6): 0 representing continence; 6 representing complete incontinence. 24-hour pad test. Quality of life questionnaire with possible scores from 22 (severely restricted quality of life) to 110 (no restrictions on quality of life).	Intention to treat. Single blind. Computer-generated randomization list with permuted blocks and ratio of 2:1. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F117. Effects of bulking agents and transurethral radiofrequency energy collagen micro-remodeling on urinary incontinence in females (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Active Cases	Number of Control Cases	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Corcos, 2005[583] N = 133	Intraurethral collagen sub mucosal injection	Surgery (needle bladder neck suspension, Burch, and slings)	Success as dry 24 hour pad test (<2.5g)	34	37	51.5	55.2	0.9 (0.7; 1.3)		
			Complete retention	1	9	1.5	13.4	**0.1 (0.0; 0.9)**	8.4 (8; 55)	119 (18; 132)A
Bano, 2005[584] N = 50	Peri or transurethral porcine dermal implant injection (Permacol)	Transurethral silicone injection (Macroplastique	Urinary continence (negative pad test)	15	9	60.0	36.0	1.7 (0.9; 3.1)		
			Improvement in urinary incontinence (pad test)	15	10	60.0	40.0	1.5 (0.8; 2.7)		
			Improved urinary incontinence scores (Stamey)	14	10	56.0	40.0	1.4 (0.8; 2.5)		
			Improved urinary incontinence scores (Kings College Hospital Quality of Health Questionnaire)	14	7	56.0	28.0	2.0 (1.0; 4.1)		
Schulz, 2004[585] N = 40	Periurethral route of injection of bulking agent-dextran copolymer	Transurethral route of injection of bulking agent-dextran copolymer	Objective urinary continence (dry in pad test)	1	3	5.0	15.0	0.3 (0.0; 2.9)		
			Subjective improvement in urinary incontinence	6	7	30.0	35.0	0.9 (0.3; 2.1)		

Table F117. Effects of bulking agents and transurethral radiofrequency energy collagen micro-remodeling on urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Active Cases	Number of Control Cases	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Lightner, 2001[586] N = 355	Injection of bulking agent 1.0ml Durasphere maximum 5 times with a minimum 7-day interval	Injection of bulking agent bovine collagen maximum 5 times with a minimum 7-day interval	Improvement of 1 or more continence grades	76	79	43.2	42.0	1.0 (0.8; 1.3)		
			Incidence of urgency	43	22	24.7	11.9	**2.1 (1.3; 3.3)**	7.8 (4; 28)	128 (36; 279)E
Appell, 2006[587] N = 173	Transurethral radiofrequency energy collagen micro-remodeling	Sham treatment	Improvement >10 point I-QOL score	53	28	48.0	44.0	1.1 (0.8; 1.5)		
Lee, 2001[588] N = 68	Periurethral injections of autologous fat (30cc of fat from the anterior abdominal wall or buttock through a single 2-3mm) with 3 maximum injections depending on outcome measures.	Placebo (saline)	Cured or improved	6	6	17.1	18.2	0.9 (0.3; 2.6)		
Strasser, 2007[589] N = 63 Followup: 12 months 100%	Transurethral ultrasonography-guided injections of autologous myoblasts and	Conventional endoscopic injections of collagen; regular	Continence	38	2	90.48	9.50	**9.50 (2.53; 35.63)**	1 (0; 7)	810 (146; 3,298)E
			Substantial improvement in urinary incontinence	3	1	7.14	4.76	1.50 (0.17; 13.56)		

Table F117. Effects of bulking agents and transurethral radiofrequency energy collagen micro-remodeling on urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Active Cases	Number of Control Cases	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
female	fibroblasts; regular training of the rhabdosphincter for 12 weeks and trans vaginal electrical stimulation for 4 weeks	training of the rhabdosphincter for 12 weeks and trans vaginal electrical stimulation for 4 weeks	Slight improvement in urinary incontinence	1	6	2.38	28.57	**0.08 (0.01; 0.65)**	4 (4; 10)	262 (101; 283)A
			Number of incontinent patients	4	19	9.52	90.48	**0.11 (0.04; 0.27)**	1 (1; 2)	810 (660; 868)A

Bold- significant differences in outcomes at 95% confidence level

Table 118. Effects of bulking agents and transurethral radiofrequency energy collagen micro-remodeling on severity of urinary incontinence

Author	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95 %CI)
Urodynamic outcomes							
Appell, 2006[587] N = 173	Transurethral radiofrequency energy collagen micro-remodeling	Sham treatment	Change in leak point pressure	13.2 ± 39.2	-2.0 ± 33.8	**0.4 (0.1; 0.7)**	-20.4 (-4.7; -36.0)
Lee, 2001[588] N = 68	Periurethral injections of autologous fat (30cc of fat from the anterior abdominal wall or buttock through a single 2-3mm) with 3 maximum injections depending on outcomes measures.	Placebo (saline).	Mean maximum. urethral closure pressure	37.0 ± 18.1	35.6 ± 24.2	0.1 (-0.4; 0.5)	0.2 (-1.2; 1.5)
			Mean leak point pressure (cm/H2O)	101.4 ±27.9	76.5 ± 27.9	**0.9 (0.4; 1.4)**	1.2 (0.5; 1.8)
Pad weight test							
Lightner, 2001[586] N = 355	Injection of bulking agent 1.0ml durasphere maximum 5 times with a minimum 7 day interval	Injection of bulking agent bovine collagen maximum 5 times with a minimum 7 day interval	Urine loss as measured by mean change in pad weight test	27.9 ± 43.6	26.4 ± 63.7	0.0 (-0.2; 0.2)	0.1 (-0.7; 0.9)
Lee, 2001[588] N = 68	Periurethral injections of autologous fat (30cc of fat from the anterior abdominal wall or buttock through a single 2-3mm) with 3 maximum injections depending on outcomes measures.	Placebo (saline)	Mean pad weight (gm)	14.8 ± 20.1	18.5 ± 27.6	-0.2 (-0.6; 0.3)	-0.8 (-3.4; 1.7)

Table 118. Effects of bulking agents and transurethral radiofrequency energy collagen micro-remodeling on severity of urinary incontinence) (continued)

Author	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95 %CI)
Quality of life							
Corcos, 2005[583] N = 133	Intraurethral collagen sub mucosal injection	Surgery (needle bladder neck suspensions, Burch, and slings)	Physical functioning	75.7 ± 59.3	73.8 ± 75.3	0.0 (-0.3; 0.4)	0.0 (-0.4; 0.5)
			Role physical	68.1 ± 85.9	71.2 ± 119.5	0.0 (-0.4; 0.3)	0.0 (-0.5; 0.4)
			Social functioning	79.4 ± 60.6	80.1 ± 56.5	0.0 (-0.4; 0.3)	0.0 (-0.4; 0.4)
Lee, 2001[588] N = 68	Periurethral injections of autologous fat (30cc of fat from the anterior abdominal wall or buttock through a single 2-3mm) with 3 maximum injections depending on outcomes measures	Placebo (saline)	Mean incontinence score	10.9 ± 4.5	12.2 ± 4.6	-0.3 (-0.8; 0.2)	-2.3 (-6.3; 1.6)
Strasser, 2007[589] N = 63	Transurethral ultrasonography -guided injections of autologous myoblasts and fibroblasts; regular training of the rhabdosphincter for 12 weeks and trans vaginal electrical stimulation for 4 weeks	Conventional endoscopic injections of collagen; regular training of the rhabdosphincter for 12 weeks and trans vaginal electrical stimulation for 4 weeks	Quality-of-life score	108.00±0.67	64.00±17.33	**4.43 (3.48; 5.37)**	6.92 (5.4; 8.39)
			Maximum residual urine (ml)	13.83±43.65	8.81±24.49	0.13 (-0.39; 0.65)	1.48 (-4.47; 7.43)
			Maximum urinary flow (ml/s)	25.29±8.17	19.63±10.22	**0.64 (0.10; 1.17)**	3.24 (0.51; 5.97)
			Maximum detrusor pressure during flow (cm/H2O)	31.26±16.78	34.76±12.21	-0.23 (-0.75; 0.30)	-0.65 (-2.16; 0.86)
			Maximum bladder capacity (ml)	469.86±158.95	404.05±104.94	0.46 (-0.07; 0.99)	0.11 (-0.02; 0.24)
			Maximum closure pressure at rest (cm H2O)	40.52±15.81	35.24±10.94	0.37 (-0.16; 0.89)	1.04 (-0.46; 2.54)

Table 118. Effects of bulking agents and transurethral radiofrequency energy collagen micro-remodeling on severity of urinary incontinence) (continued)

Author	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95 %CI)
			Maximum closure pressure during voluntary contraction of rhabdosphincter (cm H2O)	53.26±23.06	40.57±12.72	**0.63 (0.09; 1.16)**	1.54 (0.22; 2.86)
			Periurethral EMG recording at rest (μV)	44.23±15.01	31.57±10.86	**0.92 (0.37; 1.47)**	2.91 (1.17; 4.65)
			Periurethral EMG recording during voluntary contraction of rhabdosphincter (μV)	56.47±15.36	41.62±9.98	**1.07 (0.52; 1.63)**	2.58 (1.24; 3.92)

Bold- significant differences in outcomes at 95% confidence level

Table F119. Effects of obstetric interventions on incidence and progression of urinary incontinence in females

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Dannecke, 2005[590] Followup RCT to examine the effects of restrictive use of mediolateral episiotomy vs. routine episiotomy. Duration: 18 months	146 primiparous women with an uncomplicated singleton pregnancy >34 weeks of gestation intending a vaginal delivery. Exclusion criteria: Previous surgery at the pelvic floor and neurological disorder. Loss of followup: 45% in restrictive policy group, 32% in liberal policy group.	1. Restrictive episiotomy - avoidance of episiotomy (for fetal indications only) 2. Liberal – in addition to fetal indications use episiotomy when a tear is judged to be imminent	Self reported presence of urinary and fecal incontinence with standardized questionnaire. Anorectal manometry and urodynamic outcomes. Pelvic floor muscle strength with vaginal palpation. Effort to contract the elevator; graded with the Oxford Score (4-strongest).	Intention-to-treat. Open label. Simple random sampling. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Sartore, 2004[591] Non randomized CT to examine the effect of mediolateral episiotomy on puerperal pelvic floor strength and dysfunction. Duration: 3 months after vaginal delivery	519 consecutive primiparous women with singleton pregnancies and spontaneous vaginal delivery with fetal head in occiput anterior position, residents of Trieste. Exclusion criteria: Not delivered in lithotomy position, cesarean delivery, third and fourth-degree perineal lacerations, preterm, breech, and operative delivery, anal and urinary incontinence that pre-existed vaginal delivery, and history of vaginal or anal surgery.	1. Mediolateral episiotomy 2. No episiotomy	Stress urinary incontinence - observation of involuntary loss of urine synchronous with coughing (+stress test) with comfortably full bladder. Self reported urge incontinence - loss of urine associated with strong desire to void. Self reported anal incontinence - loss of flatus, liquid, or solid stool. Pelvic floor muscle strength scored 0-5. Vaginal manometry abnormal perineometric values <12cm H20. Urine stream interruption test abnormal any urine stream interruption test scores >5seconds.	No intention to treat. Open label. Groups were comparable at baseline except neonatal weight. Crude odds ratios reported.

Table F119. Effects of obstetric interventions on incidence and progression of urinary incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Hannah, 2002[592] Term Breech Trial, RCT to examine the effects of planned cesarean section on incontinence 3 months postpartum. Duration: 3 months	1,159 women with singleton live fetus in a frank or complete breech presentation at term (37 weeks' gestation). Exclusion criteria: Fetopelvic disproportion, fetus weight >4000g, hyperextension of the fetal head, lethal anomaly or a condition that might cause a mechanical problem at delivery, and contraindication to labor or vaginal delivery. Loss of followup: 16.5%	1. Planned vaginal birth group, management was expectant until spontaneous labor began, unless an indication to induce labor (e.g., post term pregnancy) 2. Planned cesarean delivery (egg, footling breech presentation) scheduled for 38 or more weeks' gestation. If the woman was in labor at the time of randomization, the caesarean section was undertaken as soon as possible. Immediately before caesarean section, the fetal presentation was reassessed and if cephalic, a vaginal birth was planned.	Self reported stress urinary incontinence and fecal or flatus incontinence within the previous 7 days. Perception of incontinence: no problem at all, a little problem, or a big problem.	Intention to treat. Open label. Centralized randomization stratified by parity with block sizes of two. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Hannah, 2004[593] Followup to Term Breech Trial, RCT to examine the effects of planned cesarean section on incontinence 2 years postpartum. Duration: 2 years	917 of 1,159 women with singleton live fetus in a frank or complete breech presentation at term (37 weeks' gestation). Exclusion criteria: Fetopelvic disproportion, fetus weight >4000g, hyperextension of the fetal head, lethal anomaly or a condition that might cause a mechanical problem at delivery, and contraindication to labor or vaginal delivery. Loss of followup: 20.9% in planned Cesarean groups and 19.6% in vaginal birth group.	1. Planned vaginal birth group, management was expectant until spontaneous labor began, unless an indication to induce labor (e.g., post term pregnancy) 2. Planned cesarean delivery (egg, footling breech presentation) scheduled for 38 or more weeks' gestation. If the woman was in labor at the time of randomization, the caesarean section was undertaken as soon as possible. Immediately before caesarean section, the fetal presentation was reassessed and if cephalic, a vaginal birth was planned.	Self-reported stress urinary incontinence and fecal or flatus incontinence within the previous 3 to 6 months. Perception of incontinence: no problem at all, a little problem, or a big problem.	Intention to treat. Open label. Centralized randomization stratified by parity with block sizes of two. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F119. Effects of obstetric interventions on incidence and progression of urinary incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Klein, 2005[594] Multi center RCT to examine the urinary and sexual consequences of vaginal delivery compared with Caesarean section. Duration: 3 months postpartum	1,044 women participated in RCT. Exclusion criteria: not reported. Loss of followup: 4.3%, from 135 women delivered by Caesarean section, only 25 were randomized to this group. Cross treatment occurred due to the decision made by attending physician.	1. Caesarean section 2. Vaginal delivery	Self reported non specified and stress urinary incontinence 3 months postpartum. Severe incontinence-wearing a pad.	No intention to treat. The article presented cohort analysis; subjects were grouped by received treatment, not by randomization status. Open label. Randomization not reported. No justification for sample size.
Sleep, 1987[595] Followup RCT to examine policies of restricted versus liberal episiotomy during spontaneous vaginal delivery on urinary incontinence. Duration: 3 years postpartum.	1,000 women with live singleton fetus of at least 37 completed weeks' gestational age presenting cephalically and spontaneous normal vaginal delivery. Exclusion criteria: 15 participants from the original trial (8-not fluent in English; 2 refused to complete 3 month questionnaire; 3 had given the baby up for adoption; 1 baby had been taken into care; and 1 baby had died in the neonatal period). Loss of followup: 33% of contacted participants did not respond to the survey 3 years postpartum.	Two management policies aimed to minimize perineal trauma during spontaneous vaginal delivery: 1. “Try to avoid episiotomy" : restrict episiotomy to fetal indications (fetal bradycardia, tachycardia, or meconium stained liquor) 2. "Try to prevent a tear" - use episiotomy more liberally to prevent tears.	Self reported presence of total, stress, and urge urinary incontinence. Frequency of incontinency episodes.	No intention to treat. Randomization procedure is not described. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified for the original RCT.
Johanson, 1999[596] Followup RCT to examine effects of delivery by forceps or vacuum extractor on maternal and child outcomes. Duration: 5 years postpartum.	607 women requiring assisted vaginal delivery. Exclusion criteria: 47% of participants from the original RCT were not contacted for unclear reasons. Loss of followup: 26.2% non responders to the survey 5 years postpartum.	1. Delivery with vacuum extractor 2. Forceps delivery.	Self reported fecal and urinary incontinence 5 years postpartum	No intention to treat. Open label. Randomization procedure is not described. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F119. Effects of obstetric interventions on incidence and progression of urinary incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Garcia, 2005[597] RCT to examine effects of surgical techniques for the primary repair of obstetric anal sphincter lacerations. Duration: 4 months postpartum	51 women with complete third- or fourth-degree anal sphincter laceration who underwent primary repair at the time of vaginal delivery. Exclusion criteria: not reported Loss of followup: 35.6%	1. End-to-end technique to repair obstetric anal sphincter lacerations: 4 separate sutures of polyglycolic acid to reapproximate the sphincter ends directly. 2. Overlapping repair of obstetric anal sphincter lacerations used 3 sutures of 2-0 PDS to reapproximate the sphincter ends in an overlapping fashion.	Self reported urinary and anal incontinence graded with the Fecal Incontinence Score (FIS) from 18 - total incontinence >2/week, scores 1-3 incontinence of flatus only. Anal incontinence was defined as a fecal incontinence score of >0.	No Intention to treat. Single blind. Computer-generated randomization table. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F120. Effects of obstetric interventions on incidence and progression of urinary incontinence in females (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Improvement in urinary incontinence										
Hannah, 2004[593] N = 2,088	Planned cesarean delivery	Planned vaginal birth	Stress urinary incontinence no problem at all 2 years postpartum	31	37	38.3	37.0	0.8 (0.5; 1.3)		
Sleep, 1987[595] N = 1,000	Restrictive policy for episiotomy	Liberal policy for episiotomy	Self reported urinary incontinence 3 months postpartum, no pads	38	45	7.6	9.0	0.9 (0.6; 1.3)		
Risk of urinary incontinence										
Dannecke, 2005[590] N = 146	Restrictive episiotomy	liberal episiotomy	Self reported urinary incontinence 18 months postpartum	13	11	48.0	27.0	1.3 (0.6; 2.7)		
Sartore, 2004[591] N = 519	Mediolateral episiotomy	No episiotomy	% with stress urinary incontinence (+ stress test)	33	32	12.9	12.1	1.1 (0.7; 1.7)		
			% with self reported urge urinary incontinence	5	2	1.9	0.7	2.6 (0.5; 13.3)		
Hannah, 2004[593] N = 2,088	Planned cesarean delivery	Planned vaginal birth	Self reported stress urinary incontinence 2 years postpartum	81	100	17.8	21.8	0.8 (0.6; 1.1)		
			Self reported stress urinary incontinence 3 months postpartum	36	58	4.5	7.3	**0.6 (0.4; 0.9)**	36 (23; 208)	28 (5; 43)A

Table F120. Effects of obstetric interventions on incidence and progression of urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
			Stress urinary incontinence 3 months postpartum is not a problem at all	4	17	16.7	37.0	**0.2 (0.1; 0.7)**	5 (3; 9)	203 (112; 341)A
Sleep, 1987[595] N = 1,000	Restrictive policy for episiotomy	Liberal policy for episiotomy	Self reported total incontinence of urine <1/week	69	82	13.9	16.3	0.8 (0.6; 1.1)		
			Self reported total incontinence of urine 1-2 times/week	37	35	7.4	7.0	1.1 (0.7; 1.7)		
			Self reported total incontinence of urine >3 times/week	6	7	1.2	1.4	0.9 (0.3; 2.6)		
			Self reported stress urinary incontinence	103	105	20.7	20.9	1.0 (0.8; 1.3)		
			Self reported urge urinary incontinence	41	41	8.2	8.2	1.0 (0.7; 1.5)		
Johanson, 1999[596] N = 607	Delivery with vacuum extractor	Forceps delivery	Self reported stress urinary incontinence sometimes	46	41	15.5	13.2	1.2 (0.8; 1.7)		
			Self reported urge urinary incontinence sometimes	30	32	10.1	10.3	1.0 (0.6; 1.6)		
Garcia, 2005[597] N = 41	End-to-end repair technique	Overlapping repair technique	Self reported urinary incontinence 4 months postpartum	1	4	4.3	22.2	0.2 (0.0; 1.6)		

Table F120. Effects of obstetric interventions on incidence and progression of urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Hannah, 2002[592] N = 2,088	Planned cesarean delivery	Planned vaginal birth	Stress urinary incontinence 3 months postpartum is big problem	5	6	20.8	13.0	0.8 (0.3; 2.7)		
Klein, 2005[594] N = 1,044	Caesarean section	Vaginal delivery	Self reported urinary incontinence in primiparous					**0.3 (0.1; 0.7)**		
			Self reported urinary incontinence in multiparous					0.9 (0.3; 2.8)		
			Self reported urinary incontinence in primiparous without history of UI					0.2 (0.1; 1.0)		
			Self reported urinary incontinence in primiparous with history of UI					**0.3 (0.1; 0.9)**		
			Self reported urinary incontinence in multiparous without history of UI					0.7 (0.2; 14.8)		
			Self reported urinary incontinence in multiparous with history of UI					0.8 (0.2; 2.8)		
			Self reported stress urinary incontinence in primiparous					**0.3 (0.2; 0.5)**		

Table F120. Effects of obstetric interventions on incidence and progression of urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
			Self reported stress urinary incontinence in multiparous					0.6 (0.3; 1.5)		
			Self reported stress urinary incontinence in primiparous without history of UI					**0.3 (0.0; 0.6)**		
			Self reported stress urinary incontinence in primiparous with history of UI					**0.3 (0.1; 0.6)**		
			Self reported stress urinary incontinence in multiparous without history of UI					0.8 (0.2; 3.8)		
			Self reported stress urinary incontinence in multiparous with history of UI					0.6 (0.2; 1.7)		
			Self reported severe (wearing pads) incontinence in primiparous					1.0 (0.2; 4.6)		
			Self reported severe (wearing pads) incontinence in multiparous					1.1 (0.2; 5.5)		

Table F120. Effects of obstetric interventions on incidence and progression of urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Severity of urinary incontinence										
Hannah, 2004[593] N = 2,088	Planned cesarean delivery	Planned vaginal birth	Stress urinary incontinence is a big problem 2 years postpartum	3	9	3.7	9.0	0.3 (0.1; 1.2)		
Sleep, 1987[595] N = 1,000	Restrictive policy for episiotomy	Liberal policy for episiotomy	Self reported urinary incontinence severe to wear pads, sometimes	26	24	5.2	4.8	1.1 (0.6; 1.9)		
			Self reported urinary incontinence severe to wear pads, every day	5	4	1.0	0.8	1.3 (0.3; 4.7)		
			Self reported urinary incontinence 3 months postpartum, pads	19	15	3.8	3.0	1.3 (0.7; 2.5)		
Johanson, 1999[596] N = 607	Delivery with vacuum extractor	Forceps delivery	Self reported frequent stress urinary incontinence	8	12	2.7	3.9	0.7 (0.3; 1.7)		
			Self reported frequent urge urinary incontinence	4		1.4	0.0			

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A- avoided; E - excessive events

Table F121. Effects of obstetric interventions on progression of urinary incontinence in females (instrumental severity measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Dannecke, 2005[590] N = 146	Restrictive episiotomy	liberal episiotomy	Pelvic floor contraction strength (oxford score 0-4)	2.2 ± 1.3	2.6 ± 1.3	-0.3 (-0.6; 0.0)	-11.8 (-24.4; 0.7)
			Functional urethral length (rest), mm	34.0 ± 8.2	30.0 ± 6.4	**0.5 (0.2; 0.9)**	1.8 (0.7; 2.9)
			Functional urethral length (contraction) mm	29.0 ± 15.0	25.0 ± 8.0	0.3 (0.0; 0.7)	1.3 (0.0; 2.7)
			Maximum urethral closure pressure (rest), mmH2O	98.0 ± 24.0	101.0 ± 28.0	-0.1 (-0.4; 0.2)	-0.1 (-0.4; 0.2)
			Maximum urethral closure pressure (contraction) cmH2O	95.0 ± 30.0	103.0 ± 38.0	-0.2 (-0.6; 0.1)	-0.2 (-0.5; 0.1)
Sartore, 2004[591] N = 519	Mediolateral episiotomy	No episiotomy	Urine stream interruption test score(s), % abnormal	3.9 ± 3.5	3.8 ± 2.9	0.0 (-0.1; 0.2)	0.8 (-3.7; 5.4)

Bold- significant differences in outcomes at 95% confidence level

Table F122. Effects of hysterectomy on incidence and progression of urinary incontinence in females

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Gimbel, 2003[598] RCT to examine effects of total abdominal hysterectomy and subtotal abdominal hysterectomy performed for benign uterine diseases. Duration: 1 year	319 women going to have a hysterectomy for benign diseases of the uterus able to read and write Danish. Exclusion criteria: Laparoscopic or vaginal hysterectomy, dysplasia of cervix, prolapse of uterus, former operation for a urological diseases, former or present malignancy, diabetes, neurological diseases, alcoholism, poor mental function. Loss of followup: 13.2% excluded from the intention to treat analysis	1. Total abdominal hysterectomy 2. Subtotal abdominal hysterectomy	Self reported urinary incontinence defined as 'always' or 'often' using the validated, self administered, postal questionnaire	Intention to treat. Open label, statistician was blinded. Restricted, computer-generated block randomization (1:1) stratified by clinical centers and clinical groups. Within each stratum, random permuted block sizes of 2, 4 and 6 occurred. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Thakar, 2002[599] RCT to examine effects of total abdominal hysterectomy and subtotal abdominal hysterectomy performed for benign uterine diseases. Duration: 1 year	279 women referred for hysterectomy because of benign disease; most of the women were premenopausal. Exclusion criteria: Age >60 years, suspected cancer, body weight that exceeded 100kg, previous pelvic surgery, known endometriosis, abnormal cervical smears, symptomatic uterine prolapse, and symptomatic urinary incontinence for which the patient might seek expert medical advice. Loss of followup: 16% in total and 12% in subtotal abdominal hysterectomy groups.	1. Subtotal hysterectomy 2. Total hysterectomy	Self reported urinary incontinence using standardized Questionnaire. Stress incontinence scores from 0-none to 4-always. Twin-channel subtracted cystometrography and uroflowmetry outcomes.	No intention to treat for cystometry outcomes. Double blind. Randomization with computer-generated numbers. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F122. Effects of hysterectomy on incidence and progression of urinary incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Lalos, 1986,[600] RCT to examine effects of subtotal or total hysterectomy on urinary symptoms. Duration of followup: 6 weeks.	22 women admitted to the hospital for hysterectomy. Exclusion criteria: pathological findings of the cervix. Loss of followup: not reported	1. Subtotal hysterectomy 2. Total hysterectomy	Urodynamic outcomes	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data not analyzed for comparability. Sample size not justified.
Kaya, 2004[601] RCT to examine effects of extrafascial and intrafascial total abdominal hysterectomy on urinary urge incontinence. Duration of followup: 12 months	90 women undergoing total abdominal hysterectomy. Exclusion criteria: gynecologic malignancy, stress incontinence, inflammatory bladder disorders, other gynecological surgery. Loss of followup: 11.1%	1. Extrafascial total abdominal hysterectomy 2. Intrafascial total abdominal hysterectomy	Surgical morbidity and presence of urge incontinence defined as urodynamically established detrusor overactivity at the end of 12 months	No intention to treat. Open label. Randomization with random numbers tables. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Learman, 2003[602] RCT to examine effects of total versus supracervical abdominal hysterectomy on clinical outcomes during 2 years of followup. Duration: 2 years.	135 premenopausal women over 30 years who had abdominal hysterectomy for symptomatic uterine leiomyomata, abnormal uterine bleeding refractory to hormonal treatment, or both, follicle stimulating hormone <30mIU/ml, and endometrial biopsy within 6 months was negative for hyperplasia or carcinoma. Exclusion criteria: Age >50 years at screening, positive results of pregnancy test, desire for future childbearing, known or suspected genital tract carcinoma, cervical dysplasia or carcinoma-in-situ, complex or atypical endometrial hyperplasia, candidate for vaginal hysterectomy (as determined by their gynecologist), and unlikely to remain geographically accessible for 4 years. Loss of followup: 4% assigned to total and 10% assigned to supracervical abdominal hysterectomy.	1. Total abdominal hysterectomy (removal of both the corpus uteri and cervix uteri) 2. Subtotal supracervical hysterectomy	Self reported urinary incontinence using questionnaires with checklists and Likert scales	Intention to treat. Open label. Stratified by clinical center computer-generated Randomization with permuted blocks 4, 6, and 8. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Long, 2005[603] RCT to examine the effects of vesicourethral function following laparoscopic	94 women with various indications for hysterectomy but no indication of uterine myomas. Exclusion criteria: incomplete records, combined procedures (colposuspension or tension-free vaginal tape procedure). Loss of follow up: 10.5%	1. Laparoscopic hysterectomy without vaginal cuff suspension. Patients with severe SUI underwent concomitant anti-incontinence procedures	Q-tip test, introital ultrasonography, and personal interviews using the Bristol Female Lower Urinary Tract	No Intention to treat. Open label. Computer-generated numbers. Allocation concealment

Table F122. Effects of hysterectomy on incidence and progression of urinary incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
hysterectomy with and without vaginal cuff suspension on urinary incontinence. Duration of follow up: 6 months		2. Laparoscopic hysterectomy with vaginal cuff suspension: the use of absorbable polyglactin sutures through the cardinal-uterosacral ligament complex, anchoring bilaterally to 3cm near the angle of vaginal cuff. Patients with severe SUI underwent concomitant anti-incontinence procedures	Symptoms Questionnaire. Stress urinary incontinence – urine leakage during stress urethral pressure profilometry. Intrinsic sphincter deficiency - maximum urethral closure pressure <20cm/H2O at maximum cystometric capacity. Sever stress incontinence - urine leakage during the pad test >10g. The anatomic position and dynamic mobility of the bladder neck by introital ultrasonography and Q-tip test with patients in the semi-supine position.	unclear. Baseline data confirmed adequacy of randomization. Sample size justified

Table F123. Effects of hysterectomy on incidence and progression of urinary incontinence in females (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)
Kaya, 2004[601] N = 90	Extrafascial total abdominal hysterectomy	Intrafascial total abdominal hysterectomy	Recover from urge urinary incontinence (cured)	4	14	8.89	31.11	**0.29 (0.10; 0.80)**	5 (4; 16)
			Develop urge urinary incontinence (incidence)	0	4	0.10	9.50	0.11 (0.01; 2.01)	
			Postoperative urge urinary incontinence	10	8	22.22	17.78	1.25 (0.54; 2.87)	
Learman, 2003[602] N = 135	Subtotal supracervical hysterectomy	Total abdominal hysterectomy	Self reported stress incontinence 1 year postpartum	8	6	13.00	9.50	0.66 (0.24; 1.83)	
			Self reported stress incontinence 2 years postpartum	8	3	13.00	4.70	2.63 (0.73; 9.48)	
			Self reported urge urinary incontinence 1 year postpartum	5	5	8.20	7.90	0.99 (0.30; 3.25)	
			Self reported urge urinary incontinence 2 years postpartum	4	2	6.60	3.10	1.97 (0.37; 10.40)	
Gimbel, 2003[598] N = 319	Subtotal abdominal hysterectomy	Total abdominal hysterectomy	Self reported urinary incontinence, always or often 1 year post operation	24	18	21.00	9.00	1.31 (0.74; 2.31)	

Table F123. Effects of hysterectomy on incidence and progression of urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)
			Proportion of urinary incontinence symptom relief 1 year post operation	14	20	8.70	12.66	0.69 (0.36; 1.31)	
			Proportion of women with new symptoms of urinary incontinence 1 year post operation	10	3	6.21	1.90	3.27 (0.92; 11.66)	
Thakar, 2002[599] N = 279	Subtotal hysterectomy	Total hysterectomy	Self-reported urge urinary incontinence at 12 months post operation	13	14	9.77	9.59	1.02 (0.50; 2.09)	
Long[603] N = 76 6 months	Laparoscopic hysterectomy without vaginal cuff suspension	Laparoscopic hysterectomy with vaginal cuff suspension	Stress incontinence	6	6	15.79	15.79	1.00 (0.35; 2.82	
			Severe	3	2	7.89	5.26	1.50 (0.27; 8.48)	
			Mild to moderate	3	4	7.89	10.53	0.75 (0.18; 3.13)	
			BN hypermobility	17	8	44.74	21.05	**2.13 (1.04; 4.32)**	4 (1 ;1601)

Bold- significant differences in outcomes at 95% confidence level

Table F124. Effects of hysterectomy on self reported and objectively measured severity of urinary incontinence

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Thakar, 2002[599] N = 279	Subtotal hysterectomy	Total hysterectomy	Scores of stress urinary incontinence at 12 months post operation (4-always)	1.5 ± 0.9	1.5 ± 0.9	0.0 (-0.2; 0.2)	0.0 (-15.7; 15.7)
			Scores of urinary urgency at 12 months post operation (4-always)	2.0 ± 1.4	2.0 ± 1.3	0.0 (-0.2; 0.2)	0.0 (-11.7; 11.7)
			Peak flow rate (ml/sec)	21.2 ± 14.1	21.6 ± 19.9	0.0 (-0.3; 0.2)	-0.1 (-1.2; 1.0)
			First desire to void, ml	229.7 ± 114.3	237.3 ± 106.6	-0.1 (-0.3; 0.2)	0.0 (-0.1; 0.1)
			Strong desire to void, ml	303.4 ± 141.9	318.1 ± 129.3	-0.1 (-0.3; 0.1)	0.0 (-0.1; 0.0)
			Maximum capacity, ml	391.5 ± 124.7	394.0 ± 130.4	0.0 (-0.3; 0.2)	0.0 (-0.1; 0.1)
Lalos, 1986[600] N = 22	Subtotal hysterectomy	Total hysterectomy	Nightly micturition/week	2.6 ± 3.1	1.5 ± 2.2	0.4 (-0.4; 1.3)	27.3 (-29.1; 83.6)
			Bladder volume, ml	494.0 ± 132.0	541.0 ± 125.0	-0.4 (-1.2; 0.5)	-0.1 (-0.2; 0.1)
			Bladder compliance, ml/mmHg	70.4 ± 25.2	98.1 ± 34.0	-0.9 (-1.8; 0.0)	-0.9 (-1.8; 0.0)
			Intravesical pressure at maximum urine flow, mmHg	33.0 ± 6.0	38.0 ± 7.0	-0.8 (-1.6; 0.1)	-2.0 (-4.3; 0.3)
			Maximum flow rate, ml/s	21.9 ± 6.5	19.6 ± 5.7	0.4 (-0.5; 1.2)	1.9 (-2.4; 6.2)
			Urethral conductance (ml2*sec2*mmHg-1)	16.8 ± 12.7	11.7 ± 8.0	0.5 (-0.4; 1.3)	4.1 (-3.1; 11.4)
Long, 2005[603] N = 76	Laparoscopic hysterectomy without vaginal cuff suspension	Laparoscopic hysterectomy with vaginal cuff suspension	Q-tip straining angle (degrees)	38.70 ± 10.00	33.80 ± 9.20	**0.51 (0.05; .97)**	1.51 (0.16; 2.86)

Bold- significant differences in outcomes at 95% confidence level

Table F125. Effects of vaginal tapes and sling procedures on risk and progression of incontinence in females

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Schraffordt Koops, 2006[604] Prospective cohort study to examine effects of tension-free vaginal tape in women with a history of surgery for urinary incontinence and/or prolapse. Duration: 2-36 months.	809 women with indication for TVT who had a history of previous incontinence or prolapse surgery were recruited from the Netherlands TVT database, 28 teaching and 13 local hospitals, patients of 54 gynecologists and urologists who performed tension-free vaginal tape. Exclusion criteria: Recurrent and difficult to-treat urinary tract infections, predominant symptoms of urge urinary incontinence (defined as urge incontinence being more prevailing than the stress incontinence), detrusor overactivity at cystometry, post voiding bladder retention (>150ml), bladder capacity <200ml, or a physical/mental impairment that would make participation impossible. Loss of followup: 1.8%	Tension-free vaginal tape (Gynecare, Ethicon Inc, Sommerville, NJ) was performed with Ulmsten's method.	Stress urinary incontinence as a positive response to the question "Do you experience urinary leakage during physical activity, coughing or sneezing?" Incontinence Impact Questionnaire (IIQ-7) and Urogenital Distress Inventory (UDI-6) ranked with 4-step scale from ''not at all'' to ''greatly'' impaired. The total score was transformed to a scale from 0 as continent to 100	Clinic based not random sampling. Adjustment was not reported. Sample size not justified.
Rafii, 2004[605] Case-control study to examine effects of tension-free vaginal tape alone or in conjunction with vaginal procedures on stress or mixed urinary incontinence in women. Duration of followup: 24 months	186 females with urodynamically confirmed stress urinary incontinence undergoing TVT. Exclusion criteria: not reported. Loss of followup: none	1. Tension-free vaginal tape with Ulmsten's method alone 2. Tension-free vaginal tape with Ulmsten's method and concomitant vaginal hysterectomy. 3. Tension-free vaginal tape with Ulmsten's method and pelvic floor reconstruction.	Postoperative voiding diaries, standing stress-test results, and patient satisfaction. Objectively cured - no stress incontinence (clinical stress provocation test and urodynamic examinations) and no urinary retention (residual urine volume >150ml or more). Subjective Cured - improvement and failure rates based on the Contilife 28-item questionnaire.	Clinic based not random sample. Adjustment was not reported. Sample size not justified.

Table F125. Effects of vaginal tapes and sling procedures on risk and progression of incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Rechberger, 2003[606] RCT to examine effects of monofilament and multifilament tapes positioned without tension at the midurethra on urinary incontinence. Duration of followup: 13.5 months	100 patients with stress urinary incontinence confirmed by a urodynamic profile including cystometry and urethral pressure profile. Exclusion criteria: Intrinsic sphincter deficiency, other gynecologic disease, such as uterine myoma, ovarian cyst or severe uterine or vaginal prolapse. Loss of followup: not reported.	1. Monofilament tape inserted at the midurethra using the tension-free vaginal tape delivery instrument 2. Multifilament tape using the intravaginal slingplasty delivery instrument	Urinary continence – no stress urinary incontinence symptoms; negative cough tests in the supine and standing positions; no need of hygienic pads. "improvement"- negative cough test but patients still experienced stress urinary leakage (much less frequent than previously) and the pads were occasionally wet.	Intention to treat not stated. Single blind. Simple computer generated randomization. Allocation concealment not reported. Baseline data not reported. Sample size not justified.
Wadie, 2005[607] RCT to examine effects of fascial sling or polypropylene tape stress urinary incontinence. Duration of followup: 6 months	53 female patients older than 21 years with stress urinary incontinence as leading symptom, life expectancy >1 year, normal upper tract, and normal manual dexterity. Exclusion criteria: Bladder or urethral pathology, as well as those with cystocele greater than grade 2, pelvic or vaginal surgery within 6 months, predominant urge incontinence, active urinary tract infection as evidenced by positive urine culture. Loss of followup: not reported.	1. Fascial sling with free ends of flap fixed by a 1-zero polyglactin suture and the sling is fixed to the underlying periurethral fascia using 4-zero polyglactin sutures at the 6 and 12 o'clock positions 2. Tension-free vaginal polypropylene tape	Urinary continence (cure) as complete dryness with no usage of pads, anti-incontinence surgery response score of 0 and negative stress test, Failure – visible leakage on stress test and a total score of 6.	Intention to treat not stated. Open label. Randomization with simple random numbers table. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Lightner, 2001[586] RCT to examine effects of bulking agents on stress urinary incontinence due to intrinsic sphincter deficiency in women. Duration of followup:12 months	355 women diagnosed with stress urinary incontinence due to intrinsic sphincter deficiency, abdominal leak point pressure of less than 90cm/H2O, who failed prior surgical and medical treatment. Exclusion criteria: Prior injections of any urethral bulking agents, positive intradermal test injections of bovine collagen and beta-glucan. Loss of followup: 38%	Injection of bulking agent 1.0ml Durasphere maximum 5 times with a minimum 7 day interval. Injection of bulking agent bovine collagen maximum 5 times with a minimum 7 day interval.	Self reported urinary incontinence with grade 0 (dry) to grade 3 (continuous urinary leakage)	No Intention to treat. Double-blind. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.

Table F125. Effects of vaginal tapes and sling procedures on risk and progression of incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Adamiak, 2002[608] RCT to examine effects of tension-free vaginal tape using local or spinal anesthesia on female stress urinary incontinence Duration of followup: 6 months	103 women with objectively confirmed stress urinary incontinence. Exclusion criteria: mixed urinary incontinence Loss of followup: 2.9%	1. Tension-free vaginal tape with local analgesia (injection of 0.5-0.75% lidocaine hydrochloride in subcutaneous tissue). 2.Tension-free vaginal tape with spinal analgesia (0.5% bupivacaine hydrochloride administered at L_3–L_4 or L_4–L_5 interspace)	Self reported urinary incontinence symptoms with three grades using Ingelman-Sundberg scale	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Ward, 2002[609] RCT to examine effects of tension-free vaginal tape or colposuspension on female stress incontinence. Duration of followup: 6 months	344 women with urodynamic stress incontinence. Exclusion criteria: Detrusor overactivity, vaginal prolapse requiring treatment, previous surgery for prolapse or incontinence, a major degree of voiding dysfunction (voiding pressure >50cm H20, maximum flow <15ml/s, and residual urine volume >100ml), neurological disease, and allergy to local anesthetic. Loss of followup: 3.5%	1. Tension-free vaginal tape procedure performed as described by Ulmsten, under local anesthesia and sedation. 2. Colposuspension was performed according to standard technique.	Self reported urinary incontinence using SF-36, the Bristol female lower urinary tract symptoms questionnaire, the EQ-5D health questionnaire. One week urinary diary, one hour perineal pad test, and cystometry outcome. objective cure of stress incontinence based on a negative stress test on urodynamic testing, combined with a negative one hour pad test (<1g change in weight).	Intention to treat. Open label. Computer generated randomization with permuted blocks of four and six. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.
Valpas, 2004[610] Double publication: Valpas 2003[611] RCT to examine effects of tension-free vaginal tape or laparoscopic mesh colposuspension on female stress urinary	128 women with urodynamic stress incontinence, unequivocal indication for operation according to the clinic's standards, urodynamically confirmed stress incontinence (stabile bladder in cystometry), positive stress test result (300ml of saline in the bladder, maximum repetitive coughs in a supine position. Exclusion criteria: Age older than 70 years, previous incontinence surgery, more than 3 episodes of urinary tract infection within the last 2 years, coincident other gynecological surgery, body mass index more than 32 kg/m(2), urethral closure pressure less than 20cm/H2O, and residual volume more than 100ml in preoperative	1. Tension-free vaginal tape under local anesthesia with polypropylene mesh tape placed under the midurethra. 2. Laparoscopic mesh colposuspension under general anesthesia (Hannah and Chin)	Urinary continence as negative stress test and negative 48-hour pad test (weight gain of pads was less than 8g in 48 hours). Urinary Incontinence Severity Score 0, 1, or 2 (no, slight, or marked impairment of quality of life,	No Intention to treat. Open label. Computer-generated randomization separately for each center. Allocation concealment not reported. Baseline data confirmed adequacy of randomization.

Table F125. Effects of vaginal tapes and sling procedures on risk and progression of incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
incontinence. Duration of followup: 12 months	urodynamic evaluation Loss of followup: 5.4%		respectively) 0 - no inconvenience at all, 20 - maximal inconvenience. Urge Score: >7 indicates increased risk of motor urge incontinence. King's College Health Questionnaire with 21 questions in 8 domains, with separate scales, to measure the severity of urinary symptoms. Scores in the domains range from 0 to 100, a higher score indicating greater quality of life impairment.	Sample size justified.
deTayrac, 2004[612] RCT to examine effects of tension-free vaginal tape or transobturator suburethral tape on female stress urinary incontinence. Duration of followup: 12 months	61 women with urodynamically proved genuine stress incontinence Exclusion criteria: Predominant urge incontinence, urodynamic detrusor instability, prolapse. Loss of followup: not reported	1. Tension-free vaginal tape. 2. Transobturator suburethral tape	Self reported symptoms of urinary incontinence in visual analog scale ranging from 0 to 10 (0 – no symptoms to 10 - maximum severity) ‘‘objectively cured’’ - negative stress test, ‘‘objectively improved’’ - improvement of SUI but positive stress test	Intention to treat not stated. Computer-generated random allocations in a ratio of 1:1 in balanced blocks of 10. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified
Andonian, 2005[613] RCT to examine effects of suprapubic arch sling or tension-free vaginal tape on female stress urinary	84 women with urodynamic stress incontinence with or without pelvic organ prolapse, stable bladder function and good flow rates without clinically significant post-void residual, who failed anti-incontinence surgeries or bulking agent treatments. Exclusion criteria: Mixed urinary incontinence with abnormal capacity, compliance and uninhibited contractions, obstructive, unstable bladder functions, or	1. Suprapubic arch sling 2. Tension-free vaginal tape by Ulmsten. Anterior and posterior colporrhaphy, and vaginal hysterectomy were performed simultaneously in symptomatic women with pelvic organ	Objective cure as 1-hour pad test of ≤2g Incontinence Impact Questionnaire score: <50 - good quality of life , 50-70 - moderate QoL, and >70 – poor quality of	No intention to treat. Single blind. Randomization with random numbers table. Allocation concealment not adequate. Baseline data confirmed

Table F125. Effects of vaginal tapes and sling procedures on risk and progression of incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
incontinence. Duration of followup: 12 months	neurogenic bladders, and urinary tract infection. Loss of followup: 1.2%	prolapse	life	adequacy of randomization. Sample size justified.
Lim, 2005[614] RCT to examine effects of three types of suburethral slings on female urodynamic stress incontinence. Duration of followup: 12 months	195 consenting patients with urodynamic stress incontinence that failed conservative management for symptomatic stress incontinence, or required prophylactic incontinence surgery during prolapse repair for occult stress incontinence (no subjective stress leakage but urodynamic incontinence). Exclusion criteria: Past history of urogenital malignancy, fistula or pelvic radiotherapy. Loss of followup: 6.7%	1. Suburethral slingplasty with tension-free vaginal tape macroporous monofilament threads, inserted using 'bottom to top' (caudocranial) approach. 2. Suburethral slingplasty with intravaginal sling multifilament threads with much smaller pore sizes, inserted using 'bottom to top' (caudocranial) approach. 3. Suburethral slingplasty with suprapubic arc sling macroporous monofilament threads, with an absorbable tensioning suture that is designed to aid tape tension adjustment inserted with a 'top to bottom' (craniocaudal) approach.	Urodynamic stress incontinence as positive cough leak with 300ml of water either in supine or erect position. intrinsic sphincter deficiency as maximum urethral closure pressure <20cm water. Improvement in urinary incontinence as >50% reduction in frequency of occurrence compared to preoperative state.	No Intention to treat. Single blind. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified
Lord, 2006[615] RCT to examine effects of tension-free vaginal tape and suprapubic urethral support sling on female stress incontinence. Duration of followup: 6 weeks	313 women with clinical diagnosis of stress urinary incontinence and a recommendation of minimally invasive sling surgery to treat their symptoms with possible previous incontinence and/or other pelvic surgery including combined treatment with other pelvic operations, e.g., vaginal hysterectomy and repair. Exclusion criteria: Age <18 years, pregnancy, major voiding dysfunction specified as an abnormal flow (i.e. maximum urinary flow rate <10ml/s) or residual urinary volume of ≥150ml. Loss of followup: 4.3%	1. Tension-free vaginal tape 2. Suprapubic urethral support sling	Subjective cure from stress urinary incontinence as no use of protection, improvement in symptoms and a scale of improvement (1-100). The objective definition of cure as observed absence of urinary leakage in stress cough test while supine and with a comfortably full bladder.	Intention to treat. Double blind. Central computer generated random numbers stratified based on previous surgery and experience of surgeon with permuted blocks of four, six and eight. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size justified

Table F125. Effects of vaginal tapes and sling procedures on risk and progression of incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Meschia, 2006[616] RCT to examine effects of tension-free vaginal tape or intravaginal slingplasty on female stress urinary incontinence. Duration of followup: 2 years	190 women with primary urodynamic stress incontinence and urethral hypermobility. Exclusion criteria: Previous anti-incontinence surgery, vaginal prolapse requiring treatment, coexisting pelvic pathology, known bleeding diathesis or current anticoagulant therapy, detrusor overactivity, and urethral hypomobility (difference in Q-tip % 20 degrees from horizontal with straining). Loss of followup: 15.37%	1. Tension-free vaginal tape under local or epidural anesthesia. 2. Intravaginal slingplasty under local or epidural anesthesia.	Objective cure as no leakage of urine in stress cough test, with at least 300ml of saline solution in the bladder and as a pad weight gain <1g during the 1-hour test. Subjective cure as no urine loss during ‘‘stress’’ and failure as any reported leakage of urine during exertion.	No Intention to treat. Open label. Centralized computer-generated random list. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified
Arunkalaivanan, 2003[617] RCT to examine effects of porcine dermal sling or tension-free vaginal tape on female stress incontinence. Duration of followup: 12 months	142 women with urodynamic genuine stress incontinence. Exclusion criteria: Detrusor instability. Loss of followup: none.	1. Porcine dermal sling (pelvicol implant) by Barrington 2. Tension-free vaginal tape by Ulmsten	Cure as no leakage in stress cough test, patient self reported urinary continence “dry,” improvement in quality of life scores >90%	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
David-Montefiore, 2006[618] RCT to examine effects of retropubic and transobturator suburethral sling procedure on female urinary stress incontinence. Duration of followup: 24 months	88 women undergoing sub-urethral sling procedure for stress urinary incontinence. Exclusion criteria: not reported Loss of followup: none	1. Retropubic suburethral sling procedure using I-STOP® device macroporous (>75-micron pore size) non-elastic monofilament polypropylene mesh 2. Transobturator suburethral sling procedure using I-STOP® device macroporous (>75-micron pore size) non-elastic monofilament polypropylene mesh	Self reported urinary continence (dry) and improvement in symptoms.	No Intention to treat. Open label. Computer-generated randomization Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F125. Effects of vaginal tapes and sling procedures on risk and progression of incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Dietz, 2005[619] RCT to examine effects of suburethral slings on female urinary incontinence. Duration of followup: 23 months	195 women with urinary incontinence. Exclusion criteria: missing data Loss of followup: 6.7%	Two-dimensional (2D) and three-dimensional (3D) pelvic floor ultrasound with a 7-4MHz volume transducer. 1. Tensionless vaginal tape 2. Intravaginal sling 3. Suprapubic arc sling	Self reported urinary continence (cured or improved). Free flowmetry outcomes.	No Intention to treat. Single blind. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization Sample size justified.
Maher, 2005[620] RCT to examine effects of pubovaginal sling or transurethral macroplastique on female stress urinary incontinence and intrinsic sphincter deficiency. Duration of followup:1 year and 5 years	45 women with stress urinary incontinence and intrinsic sphincter deficiency diagnosed by maximum urethral closure pressure <20cm/H2O who failed to respond to conservative treatments. Exclusion criteria: Required prolapse surgery, previous sling procedure, contraindications for general anesthesia. Loss of followup: 4.4%	1. Pubovaginal 11-12cm sling by McGuire positioned suburethrally at the proximal urethra 2. Transurethral macroplastique	Self reported urinary incontinence using validated questionnaires [Short Urinary Distress Inventory (SUDI) and Incontinence Impact Questionnaire (IIQ). 1-hour pad test. Objective success was defined as no urinary leakage due to stress urinary incontinence on repeat urodynamic studies	Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization Sample size justified.
Abdel-Fattah, 2004[621] RCT to examine effects of Pelvicol pubovaginal sling or tension-free vaginal tape on females urodynamic stress incontinence Duration of followup: 3 years	142 women with pure stress urinary incontinence Exclusion criteria: not reported Loss of followup: 4.2%	1. Pelvicol pubovaginal sling 2. Tension-free vaginal tape	Self reported urinary continence (dry) and improvement in urinary incontinence symptoms. Pad use.	No intention to treat. Open label. Randomization using random numbers table. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F125. Effects of vaginal tapes and sling procedures on risk and progression of incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Darai, 2007[622] RCT to examine effects of suburethral sling procedure on female urinary stress incontinence Duration of followup: 10 months	88 women older than 18 years undergoing suburethral sling procedure for urodynamic stress urinary incontinence (some had mixed incontinence). Exclusion criteria: Previous history of radio- or chemotherapy, use of anticoagulants or antipsychotic medications, and pregnancy. Loss of followup: none	1. Suburethral sling procedure with retropubic routes by Ulmsten 2. Suburethral sling procedure with transobturator routes by Delorme	Objective cure from stress urinary incontinence: no stress incontinence by clinical and urodynamic and during stress provocation test, and no urinary retention or a residual urine volume of <150ml. Objective improvement - no incontinence in stress provocation test. Self reported quality of life using Urinary Distress Impact Questionnaire [UDI]), and the social and emotional impact of SUI (Incontinence Impact Questionnaire [IIQ]).	Intention to treat not stated. Open label. Computer-generated randomization code. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.
Choe, 2000[623] RCT to examine effects of transvaginal antimicrobial mesh and anterior vaginal wall slings on females stress urinary incontinence Duration of followup: 6 months	40 women with stress urinary incontinence and vaginal prolapse. Exclusion criteria: not reported. Loss of followup: none	1. Transvaginal antimicrobial mesh synthetic mesh 2. Anterior vaginal wall slings	Subjective cure from stress urinary no involuntary loss of urine during physical activities incontinence objective cure-negative stress test and no leakage in urodynamic exam. Self reported urinary incontinence using standardized Medical Epidemiologic and Social Aspects of Aging Questionnaire, and validated visual analog scale.	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F125. Effects of vaginal tapes and sling procedures on risk and progression of incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Kuo, 2001[624] RCT to examine effects of pubovaginal sling procedure using rectus fascia or polypropylene mesh on female stress urinary incontinence. Duration of followup: 6 months	50 women with various types of stress urinary incontinence. Exclusion criteria: Stress incontinence with a large cystocele or uterine prolapse. Loss of followup: none.	1.Pubovaginal sling procedure using rectus fascia 2. Pubovaginal sling procedure using polypropylene mesh Sling was placed at the level of the bladder neck and tied with sufficient tension to prevent urinary leakage without obstructing the bladder outlet.	Video urodynamics. Type 2 stress incontinence : abdominal leak point pressure >90cm. H20 or significant urethral hypermobility. Type 3 stress incontinence: abdominal leak point pressure <60cm H20. Mixed type 2 to 3 stress incontinence abdominal leak point pressure. 60 and 90cm H20.	Intention to treat not stated. Open label. Randomization with random numbers table. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Cholhan, 2004[625] RCT to examine effects of conventional suburethral sling or modified sling on female genuine stress urinary incontinence. Duration of followup :3 months	48 women with genuine stress urinary incontinence diagnosed with demonstrated loss of urine with increased abdominal pressure (cough, Valsalva) in the absence of detrusor contractions on multichannel urodynamic. Exclusion criteria: not reported. Loss of followup: none	1. Conventional suburethral sling 2. Modified sling placed at the mid-urethra without tension	Multichannel urodynamic outcomes. Self reported urinary incontinence.	No intention to treat. Open label. Randomization with permuted blocks of 10. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Hilton, 1989[626] RCT to examine effects of suburethral sling or Stamey endoscopic bladder neck suspension on female genuine stress incontinence. Duration of followup:3 months and 2 years.	20 women with urodynamically proven genuine stress incontinence with or without other urinary symptoms and previous treatments. Exclusion criteria: not reported. Loss of followup: not reported.	1. Suburethral sling 2. Stamey endoscopic bladder neck suspension	Self reported urinary incontinence and urodynamic and profilometry outcomes.	No intention to treat. Open label. Randomization with random number list. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F125. Effects of vaginal tapes and sling procedures on risk and progression of incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Tseng, 2005[627] RCT to examine effects of suprapubic arc sling procedure or tension-free vaginal taping on female stress incontinence. Duration of followup: 2 years	62 women with genuine stress incontinence (GSI) alone or combined with pelvic prolapse less than International Continence Society (ICS) stage II treated with anterior colporrhaphy with or without posterior colporrhaphy and with vaginal total hysterectomy with or without sacrospinous ligament fixation for pelvic prolapse greater than ICS stage II. Exclusion criteria: Previous anti-incontinence surgery, pelvic prolapse >stage II Loss of followup: none	1. Suprapubic arc sling procedure 2. Tension-free vaginal taping by Ulmsten	Objective cure as pad weight 1g or less. Improvement as decreased >50% in urine loss. Urodynamic outcomes including free flowmetry urethral pressure profilometry, filling (provocative) and voiding cystometry, and a 1-hour pad test.	Intention to treat not stated. Double blind (patients and examiners). Computer-generated randomization code. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.
Barbalias, 1997[628] RCT to examine effects of Goretex pubovaginal sling or typical indigenous material graft made of rectal fascia on female stress urinary incontinence. Duration of followup: 30 months	48 consecutive women with type III incontinence. Exclusion criteria: not reported. Loss of followup: none	1. Vesicourethral suspension by allogenic Goretex sling 2. Vesicourethral suspension by indigenous rectus abdominis fascia sling	Cure as complete freedom from urinary stress incontinence. Urodynamic outcomes.	Intention to treat not stated. Computer generated random codes. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Laurikainen, 2007[629] RCT to examine effects of retropubic tension-free vaginal tape procedure or transobturator tension-free vaginal tape procedure on female urinary stress incontinence. Duration of followup: 2 months	273 women with history of stress urinary incontinence, indication for surgical treatment of stress incontinence, positive cough stress test, detrusor Instability Score 7 or less. Exclusion criteria: Previous incontinence surgery, postvoid residual urine volume >100ml, lower urinary tract anomaly, current urinary tract infection or >3 urinary tract infection episodes within the past year, urogenital prolapse of more than second degree, body mass index >35kg/m2, previous radiation therapy of the pelvis, active malignancy, anticoagulant therapy, hemophilia, neurogenic disease which can be associated with bladder disorders, use of antiholinergic medication or duloxetine, patient immobilization. Loss of followup: 3.7%	1. Retropubic tension-free vaginal polypropylene tape procedure by Ulmsten 2. Transobturator tension-free vaginal polypropylene tape procedure by de Leval	Objective cure as a negative stress test. Self reported symptoms using Urinary Incontinence Severity Score, Detrusor Instability Score, a visual analog scale (VAS 0-100), Incontinence Impact Questionnaire–Short Form, and Urogenital Distress Inventory–Short Form (UDI-6).	No intention to treat. Open label. Central computer-generated randomization in a ratio of 1:1 in balanced blocks of 4. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F125. Effects of vaginal tapes and sling procedures on risk and progression of incontinence in females (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Ward, 200 [630] RCT to examine the effects of tension-free vaginal tape or colposuspension on stress urinary incontinence. Duration of follow up: 2 years	344 women with urodynamic stress incontinence unresponsive to pelvic floor muscle exercise, who had completed their family. Exclusion criteria: vaginal prolapse requiring treatment, previous surgery for incontinence or prolapse, neurologic disease, known bleeding diathesis or current anticoagulant therapy, allergy to local anesthetic, detrusor over-activity, and voiding difficulty (maximum flow <15ml/sec or voiding pressure >50cm/H2O or residual volume >100ml). Loss of follow up: 15.7%	1. Tension Free Tape procedure using the Gynecare TVT device by Ulmsten 2. Colposuspension using either two or three sutures to support paravaginal fascia from the ileopectineal ligament on each side.	Objective cure of stress incontinence as negative 1-hour pad test (<1g change in weight). Subjective cure using Short Form-36 health status questionnaire, the Bristol Female Lower Urinary Tract Symptoms questionnaire. The responses were combined and transformed to generate eight health dimensions; with a potential score of 0 to 100 - higher scores indicate better perceived health.	Intention to treat. Open label. Randomization was computer generated using randomly varying block sizes of 4 and 6. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F126. Effects of vaginal tapes and sling procedures on urinary continence in women (events) (table is sorted by rate of urinary continence after active treatment, from highest to lowest)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Rafi, 2004[605]* N = 186	Tension-free vaginal tape with Ulmsten's method and concomitant vaginal hysterectomy	Tension-free vaginal tape with Ulmsten's method and pelvic floor reconstruction	Objective assessment: cured at 24 months	39	43	97.5	93.1	1.0 (1.0; 1.1)		
Lord, 2006[615] N = 313	Tension-free vaginal tape	Suprapubic urethral support sling	Stress incontinence: objective cure	150	155	97.3	97.4	1.0 (1.0; 1.0)		
Kuo, 2001[624] N = 50	Pubovaginal sling procedure using rectus fascia	Pubovaginal sling procedure using polypropylene mesh	Urinary continence: cured	23	26	95.8	100.0	1.0 (0.9; 1.1)		
Choe, 2000[623] N = 40	Transvaginal antimicrobial mesh synthetic mesh	Anterior vaginal wall slings	Objective cure from stress urinary incontinence	19	14	95.0	70.0	1.4 (1.0; 1.8)	4 (2; 1,046)	250 (1; 588)E
Adamiak, 2002[608] N = 103	Tension-free vaginal tape with local analgesia (injection of 0.5–0.75% lidocaine hydrochloride in subcutaneous tissue).	Tension-free vaginal tape with spinal analgesia (0.5% bupivacaine hydrochloride administered at L3–L4 or L4–L5 interspace)	Urinary continence (complete cure)	61	34	93.8	97.1	1.0 (0.9; 1.1)		
Rafii, 2004[605] N = 186	Tension-free vaginal tape with Ulmsten's method alone	Tension-free vaginal tape with Ulmsten's method and pelvic floor reconstruction	Objective assessment: cured at 24 months	93	43	93.0	93.1	1.0 (0.9; 1.1)		

Table F126. Effects of vaginal tapes and sling procedures on urinary continence in women (events) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
David-Montefiore, 2006[618] N = 88	Retropubic sub urethral sling procedure	Transobturator sub urethral sling procedure	Dry	39	43	92.9	93.5	1.0 (0.9; 1.1)		
Cholhan, 2004[625] N = 48	Conventional sub urethral sling	Modified sling placed at the mid-urethra without tension	Cure from urinary stress incontinence	19	24	92.0	89.0	1.0 (0.8; 1.2)		
Meshcia, 2004[631] N = 50	Tension-free vaginal tape	Application of the endopelvic fascia	Stress continent during the postoperative cough provocation test	23	14	92.0	56.0	**1.6 (1.1; 2.4)**	3 (1; 13)	360 (78; 767)E
Wadie, 2005[607] N = 53	Fascial sling with free ends of flap fixed by a 1-zero polyglactin suture and the sling is fixed to the underlying periurethral fascia using 4-zero polyglactin sutures at the 6 and 12 o'clock positions	Tension-free vaginal polypropylene tape	Urinary continence (cure) as complete dryness with no usage of pads, anti-incontinence surgery response score of 0 and negative stress test	23	26	92.0	92.9	1.0 (0.8; 1.2)		
deTayrac, 2004[612] N = 61	Tension-free vaginal tape	Transobturator sub urethral tape	Objective cure: negative stress test	27	26	90.0	86.7	1.0 (0.9; 1.2)		
Arunkalaivanan, 2003[617] N = 142	Porcine dermal sling (pelvicol implant) by Barrington	Tension-free vaginal tape by Ulmsten	Self reported urinary continence (dry)	66	58	89.2	85.3	1.0 (0.9; 1.2)		

Table F126. Effects of vaginal tapes and sling procedures on urinary continence in women (events) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Darai, 2007[622] N = 88	Suburethral sling procedure with retropubic routes by Ulmsten	Suburethral sling procedure with transobturator routes by Delorme	Objective cure	37	40	88.1	87.0	1.0 (0.9; 1.2)		
Rechberger, 2003[606] N = 100	Monofilament tape inserted at the midurethra using the tension-free vaginal tape delivery instrument	Multifilament tape using the Intravaginal slingplasty delivery instrument	Urinary continence (cured)	44	40	88.0	80.0	1.1 (0.9; 1.3)		
Lim, 2005[614] N = 195	Suburethral slingplasty with tension-free vaginal tape macroporous monofilament threads	Suburethral slingplasty with intravaginal sling multifilament threads	Urinary continence: (cured)	51	44	87.9	81.5	1.1 (0.9; 1.3)		
Lord, 2006[615] N = 313	Tension-free vaginal tape	Suprapubic urethral support sling	Stress incontinence: subjective cure	134	122	87.1	76.5	**1.1 (1.0; 1.3)**	9 (63; 5)	106 (16; 199)E
Valpas, 2004[610] N = 128	Tension-free vaginal tape under local anesthesia with polypropylene mesh tape placed under the midurethra.	Laparoscopic mesh colposuspension under general anesthesia (Hannah and Chin)	Negative stress test	60	29	85.7	56.9	**1.5 (1.2; 2.0)**	3 (2;11)	289 (94; 540)E

Table F126. Effects of vaginal tapes and sling procedures on urinary continence in women (events) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Meschia, 2006[616] N = 190	Tension-free vaginal tape under local or epidural anesthesia	Intravaginal slingplasty under local or epidural anesthesia	Subjects cure from stress urinary incontinence: no urine loss during ‘‘stress’’ and failure as any reported leakage of urine during exertion	80	68	84.2	71.6	**1.2 (1.0; 1.4)**	8 (4; 159)	126 (6; 266)E
			Negative stress test	79	65	83.2	68.4	**1.2 (1.0; 1.4)**	7 (3; 46)	147 (22; 295)E
Andonian, 2005[613] N = 84	Suprapubic arch sling	Tension-free vaginal tape by Ulmsten	Objective cure (1-hour pad test <2g)	34	41	83.0	95.0	0.9 (0.7; 1.0)		
Lim, 2005[614] N = 195	Suburethral slingplasty with the tension-free vaginal tape macroporous monofilament threads	Suburethral slingplasty with the Intravaginal sling multifilament threads	Stress urinary incontinence (cured)	48	47	82.8	87.0	1.0 (0.8; 1.1)		
Meschia, 2006[616] N = 190	Tension-free vaginal tape under local or epidural anesthesia	Intravaginal slingplasty under local or epidural anesthesia	Negative pad test pad test	78	63	82.1	66.3	**1.2 (1.0; 1.5)**	6 (35; 3)	158 (29; 311)E
Tseng, 2005[627] N = 62	Suprapubic arc sling procedure	Tension-free vaginal taping by Ulmsten	Objective cure from stress urinary incontinence: pad weight 1g or less	25	27	80.6	87.1	0.9 (0.7; 1.2)		

Table F126. Effects of vaginal tapes and sling procedures on urinary continence in women (events) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Lim, 2005[614] N = 195	Suburethral slingplasty with the suprapubic arc sling macroporous monofilament threads	Suburethral slingplasty with the intravaginal sling multifilament threads	Stress urinary incontinence: (cured)	45	47	77.6	87.0	0.9 (0.8; 1.1)		
Maher, 2005[620] N = 45	Pubovaginal sling	Transurethral macroplastique	Subjectively cured	17	19	77.3	82.6	0.9 (0.7; 1.3)		
Abdel-Fattah, 2004[621] N = 142	Pelvicol pubovaginal sling	Tension-free vaginal tape	Dry	56	53	75.7	77.9	1.0 (0.8; 1.2)		
Rafii, 2004[605] N = 186	Tension-free vaginal tape with Ulmsten's method and concomitant vaginal hysterectomy	Tension-free vaginal tape with Ulmsten's method and pelvic floor reconstruction	Subjective assessment: cured at 24 months	29	31	72.5	67.3	1.1 (0.8; 1.4)		
Lim, 2005[614] N = 195	Suburethral slingplasty with suprapubic arc sling macroporous monofilament threads	Suburethral slingplasty with Intravaginal sling multifilament threads	Urinary continence: (cured)	42	44	72.4	81.5	0.9 (0.7; 1.1)		
Rafii, 2004[605] N = 186	Tension-free vaginal tape with Ulmsten's method alone	Tension-free vaginal tape with Ulmsten's method and pelvic floor reconstruction	Subjective assessment: cured at 24 months	72	31	72.0	67.3	1.1 (0.8; 1.4)		
Ward, 2004[630] N = 344	Tension Free Tape procedure	Colposuspension	Objective cure as negative 1-hour pad test	111	86	63.43	50.89	**1.25 (1.03; 1.50)**	8 (56; 4)	125 (18; 255)E

Table F126. Effects of vaginal tapes and sling procedures on urinary continence in women (events) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
100% female Followup: 24 months			Subjective cure : no leakage under any circumstance	44	34	25.14	20.12	1.25 (0.84; 1.85)		
			Subjective cure from stress leakage	75	63	42.86	37.28	1.15 (0.89; 1.49)		
Lim, 2005[614] N = 195	Suburethral slingplasty with suprapubic arc sling macroporous monofilament threads	Suburethral slingplasty with intravaginal sling multifilament threads	Urge incontinence (cured)	24	18	41.4	33.3	1.2 (0.8; 2.0)		
			Urinary urgency (cured)	20	20	34.5	37.0	0.9 (0.6; 1.5)		
	Suburethral slingplasty with tension-free vaginal tape macroporous monofilament threads	Suburethral slingplasty with intravaginal sling multifilament threads	Urge incontinence (cured)	19	18	32.8	33.3	1.0 (0.6; 1.7)		
			Dysfunctional voiding (cured)	8	8	13.8	14.8	0.9 (0.4; 2.3)		
	Suburethral slingplasty with suprapubic arc sling macroporous monofilament threads	Suburethral slingplasty with intravaginal sling multifilament threads	Cured from intrinsic sphincter deficiency as maximum urethral closure pressure <20cm/H2O	6	9	10.3	16.7	0.6 (0.2; 1.6)		
Maher, 2005[620] N = 45	Pubovaginal sling	Transurethral macroplastique	Objectively (cured)	2	17	9.1	73.9	**0.1 (0.0; 0.5)**	2 (1; 3)	648 (391 ;715)A

Table F126. Effects of vaginal tapes and sling procedures on urinary continence in women (events) (table is sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Definition of Continence	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Lim, 2005[614] N = 195	Suburethral slingplasty with tension-free vaginal tape macroporous monofilament threads	Suburethral slingplasty with intravaginal sling multifilament threads	Cured from intrinsic sphincter deficiency as maximum urethral closure pressure <20cm/H2O	3	9	5.2	16.7	0.3 (0.1; 1.1)		

Case control study; Bold - significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient = 1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F127. Effects of vaginal tapes and sling procedures on improvement of urinary incontinence in women (events) (table is sorted by rate of improvement after active treatment, from highest to lowest)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Choe, 2000[623] N = 40	Transvaginal antimicrobial mesh synthetic mesh	Anterior vaginal wall slings	Improvement in symptoms of stress urinary incontinence	20	16	100.0	80.0	1.2 (1.0; 1.6)		
Barbalias, 1997[628] N = 48	Vesicourethral suspension by allogenic Goretex sling	Vesicourethral suspension by indigenous rectus abdominis fascia sling	Cure or improvement in stress urinary incontinence	16	26	100.0	81.3	**1.2 (1.0; 1.5)**	5 (904; 3)	188 (1; 373)E
Dietz, 2005[619] N = 195	Suprapubic arc sling	Intravaginal sling	Cured/improved for stress incontinence (%)	42	35	95.5	77.8	**1.2 (1.0; 1.5)**	6 (35; 3)	177 (28; 352)E
			Overall cure/improvement (%)	41	37	93.2	82.2	1.1 (1.0; 1.3)		
	Tensionless vaginal tape	Intravaginal sling	Cured/improved for stress incontinence (%)	39	35	83.0	77.8	1.1 (0.9; 1.3)		
			Overall cure/improvement (%)	37	37	78.7	82.2	1.0 (0.8; 1.2)		
Arunkalaivanan, 2003[617] N = 142	Porcine dermal sling (pelvicol implant) by Barrington	Tension-free vaginal tape by Ulmsten	Improvement in urinary stress incontinence by 90-100%	56	51	75.7	75.0	1.0 (0.8; 1.2)		
Dietz, 2005[619] N = 195	Suprapubic arc sling	Intravaginal sling	Cured/improved for urge incontinence (%)	30	32	68.2	71.1	1.0 (0.7; 1.3)		
	Tensionless vaginal tape	Intravaginal sling	Cured/improved for urge incontinence (%)	30	32	63.8	71.1	0.9 (0.7; 1.2)		

Table F127. Effects of vaginal tapes and sling procedures on improvement of urinary incontinence in women (events) (table is sorted by rate of improvement after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Lim, 2005[614] N = 195	Suburethral slingplasty with suprapubic arc sling macroporous monofilament threads	Suburethral slingplasty with Intravaginal sling multifilament threads	Urge incontinence pre and post symptom free	23	32	39.7	59.3	**0.7 (0.5; 1.0)**	5 (3; 115)	196 (9; 323)A
			Urge incontinence improved but not cured	23	8	39.7	14.8	**2.7 (1.3; 5.5)**	4 (2; 22)	248 (46; 662)E
			Urinary urgency pre and post symptom free	17	22	29.3	40.7	0.7 (0.4; 1.2)		
Rafii, 2004[605] N = 186	Tension-free vaginal tape with Ulmsten's method and concomitant vaginal hysterectomy	Tension-free vaginal tape with Ulmsten's method and pelvic floor reconstruction	Subjective assessment: improved at 24 months	10	10	25.0	21.7	1.2 (0.5; 2.5)		
Lim, 2005[614] N = 195	Suburethral slingplasty with suprapubic arc sling macroporous monofilament threads	Suburethral slingplasty with intravaginal sling multifilament threads	Urinary urgency Improved but not cured	12	9	20.7	16.7	1.2 (0.6; 2.7)		
Rafii, 2004[605] N = 186	Tension-free vaginal tape with Ulmsten's method alone	Tension-free vaginal tape with Ulmsten's method and pelvic floor reconstruction	Subjective assessment: improved at 24 months	20	10	20.0	21.7	0.9 (0.5; 1.8)		
Tseng, 2005[627] N = 62	Suprapubic arc sling procedure	Tension-free vaginal taping by Ulmsten	Objective improvement in stress urinary incontinence: decrease >50% in urine loss	6	4	19.4	12.9	1.5 (0.5; 4.8)		

Table F127. Effects of vaginal tapes and sling procedures on improvement of urinary incontinence in women (events) (table is sorted by rate of improvement after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Lim, 2005[614] N = 195	Suburethral slingplasty with suprapubic arc sling macroporous monofilament threads	Suburethral slingplasty with intravaginal sling multifilament threads	Stress urinary incontinence: Improved but not cured	10	7	17.2	13.0	1.3 (0.5; 3.2)		
	Suburethral slingplasty with tension-free vaginal tape macroporous monofilament threads	Suburethral slingplasty with intravaginal sling multifilament threads	Urge incontinence Improved but not cured	10	8	17.2	14.8	1.2 (0.5; 2.7)		
			Stress urinary incontinence: Improved but not cured	10	7	17.2	13.0	1.3 (0.5; 3.2)		
Arunkalaivanan, 2003[617] N = 142	Porcine dermal sling (pelvicol implant) by Barrington	Tension-free vaginal tape by Ulmsten	Improvement in urinary stress incontinence by 75-90%	10	7	13.5	10.3	1.3 (0.5; 3.3)		
Darai, 2007[622] N = 88	Suburethral sling procedure with retropubic routes by Ulmsten	Suburethral sling procedure with transobturator routes by Delorme	Improvement in stress urinary incontinence	5	6	11.9	13.0	0.9 (0.3; 2.8)		
Arunkalaivanan, 2003[617] N = 142	Porcine dermal sling (pelvicol implant) by Barrington	Tension-free vaginal tape by Ulmsten	Improvement in urinary stress incontinence <75%	8	10	10.8	14.7	0.7 (0.3; 1.8)		
Rechberger, 2003[606] N = 100	Monofilament tape inserted at the midurethra using tension-free vaginal tape delivery instrument	Multifilament tape using intravaginal slingplasty delivery instrument	Significant improvement in urinary incontinence	5	9	10.0	18.0	0.6 (0.2; 1.5)		

Table F127. Effects of vaginal tapes and sling procedures on improvement of urinary incontinence in women (events) (table is sorted by rate of improvement after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Abdel-Fattah, 2004[621] N = 142	Pelvicol pubovaginal sling	Tension-free vaginal tape	Improved incontinence	7	3	9.5	4.4	2.1 (0.6; 8.0)		
David-Montefiore, 2006[618] N = 88	Retropubic suburethral sling procedure	Transobturator suburethral sling procedure	Improved incontinence	2	1	4.8	2.2	2.2 (0.2; 23.3)		
Adamiak, 2002[608] N = 103	Tension-free vaginal tape with local analgesia (injection of 0.5-0.75% lidocaine hydrochloride in subcutaneous tissue)	Tension-free vaginal tape with spinal analgesia (0.5% bupivacaine hydrochloride administered at L3-L4 or L4-L5 interspace)	Improvement in urinary incontinence	3	1	4.6	2.9	1.6 (0.2; 15.0)		
deTayrac, 2004[612] N = 61	Tension-free vaginal tape	Transobturator suburethral tape	Objective improvement:- improvement of stress urinary incontinence but positive stress test	1	3	3.3	10.0	0.3 (0.0; 3.0)		
Arunkalaivanan, 2003[617] N = 142	Porcine dermal sling (pelvicol implant) by Barrington	Tension-free vaginal tape by Ulmsten	Self reported improved urinary continence	2	6	2.7	8.8	0.3 (0.1; 1.5)		

Bold - significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F128. Effects of vaginal tape and sling procedures on risk and progression of urinary incontinence in females (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Meschia, 2006[616] N = 190	Tension-free vaginal tape under local or epidural anesthesia	Intravaginal slingplasty under local or epidural anesthesia	Incidence of overactive bladder symptoms	8	10	8.4	10.5	0.8 (0.3; 1.9)		
			Incomplete emptying	5	4	5.3	4.2	1.3 (0.3; 4.5)		
			Overactive bladder symptoms	24	27	25.3	28.4	0.9 (0.6; 1.4)		
Lord, 2006[615] N = 313	Tension-free vaginal tape	Suprapubic urethral support sling	Incidence of positive stress test	1	1	0.6	0.6	1.0 (0.1; 16.4)		
			Incidence of urge urinary incontinence	12	17	7.8	10.7	0.7 (0.4; 1.5)		
			Objective leakage in stress test	4	4	2.6	2.5	1.0 (0.3; 4.1)		
			Persistent subjective symptoms of stress urinary incontinence	19	36	12.3	22.6	**0.5 (0.3; 0.9)**	10 (7; 48)	103 (21; 152)A
			Protection use for stress urinary incontinence	33	32	21.4	20.1	1.1 (0.7; 1.6)		
			Stress incontinence: objective failure	4	4	2.7	2.6	1.0 (0.3; 4.1)		
			Subjective treatment failure	20	37	12.9	23.5	**0.6 (0.3; 0.9)**	9 (6; 51)	106 (19; 155)A
			Urgency symptoms (overall)	80	84	51.9	52.8	1.0 (0.8; 1.2)		

Table F128. Effects of vaginal tape and sling procedures on risk and progression of urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
			Urgency symptoms (persistent)	65	70	42.2	44.0	1.0 (0.7; 1.2)		
			Urge urinary incontinence (persistent)	33	37	21.4	23.3	0.9 (0.6; 1.4)		
			Urge urinary incontinence (overall)	45	54	29.2	34.0	0.9 (0.6; 1.2)		
deTayrac, 2004[612] N = 61	Tension-free vaginal tape	Transobturator sub urethral tape	Incidence of urge urinary incontinence	2	2	6.7	6.7	1.0 (0.2; 6.6)		
			Incidence of voiding difficulties	5	7	16.7	23.3	0.7 (0.3; 2.0)		
			No obstruction in uroflow	19	17	63.3	56.7	1.1 (0.7; 1.7)		
			Free Qmax 15 ml/s	3	4	10.0	13.3	0.8 (0.2; 3.1)		
Adamiak, 2002[608] N = 103	Tension-free vaginal tape with local analgesia (injection of 0.5-0.75% lidocaine hydrochloride in subcutaneous tissue)	Tension-free vaginal tape with spinal analgesia (0.5% bupivacaine hydrochloride administered at L3-L4 or L4-L5 interspace)	Incidence of urge urinary incontinence	4	2	6.2	5.7	1.1 (0.2; 5.6)		
			Urinary retention	8	5	12.3	14.3	0.9 (0.3; 2.4)		
Tseng, 2005[627] N = 62	Suprapubic arc sling procedure	Tension-free vaginal taping by Ulmsten	Incidence of urge urinary incontinence	5	2	16.1	6.5	2.5 (0.5; 11.9)		
			Incidence of urinary urgency	5	3	16.1	9.7	1.7 (0.4; 6.4)		

Table F128. Effects of vaginal tape and sling procedures on risk and progression of urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Cholhan, 2004[625] N = 48	Conventional suburethral sling	Modified sling placed at the mid-urethra without tension	Incidence of urge urinary incontinence	2	1	8.0	4.0	2.6 (0.2; 26.5)		
Darai, 2007[622] N = 88	Suburethral sling procedure with retropubic routes by Ulmsten	Suburethral sling procedure with transobturator routes by Delorme	Incidence of urinary urgency	6	4	15.1	7.7	1.6 (0.5; 5.4)		
Choe, 2000[623] N = 40	Transvaginal antimicrobial mesh synthetic mesh	Anterior vaginal wall slings	Incidence of urinary urgency	1	1	5.0	5.0	1.0 (0.1; 14.9)		
Abdel-Fattah, 2004[621] N = 142	Pelvicol pubovaginal sling	Tension-free vaginal tape	Incidence of urinary urgency	12	9	16.2	13.2	1.2 (0.6; 2.7)		
Kuo, 2001[624] N = 50	Pubovaginal sling procedure using rectus fascia	Pubovaginal sling procedure using polypropylene mesh	Incidence of urinary urgency and mild urge incontinence	2	1	8.3	3.8	2.2 (0.2; 22.4)		
Lim, 2005[614] N = 195	Suburethral slingplasty with tension-free vaginal tape macroporous monofilament threads	Suburethral slingplasty with intravaginal sling multifilament threads	Increased bladder sensation (cured)	9	4	15.5	7.4	2.1 (0.7; 6.4)		
			Stress urinary incontinence: pre and post symptom free	3	4	5.2	7.4	0.7 (0.2; 3.0)		
			Incontinence still present	7	10	12.1	18.5	0.7 (0.3; 1.6)		
			Urinary urgency (cured)	20	20	34.5	37.0	0.9 (0.6; 1.5)		

Table F128. Effects of vaginal tape and sling procedures on risk and progression of urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
			Urinary urgency Improved but not cured	22	9	37.9	16.7	**2.3 (1.2; 4.5)**	5 (40; 2)	213 (25; 583)E
			Urinary urgency pre and post symptom free	15	22	25.9	40.7	0.6 (0.4; 1.1)		
			Urge incontinence pre and post symptom free	28	32	48.3	59.3	0.8 (0.6; 1.2)		
			Acquired (de novo)	4	5	6.9	9.3	0.7 (0.2; 2.6)		
			Stress urinary incontinence: acquired (de novo)	0	0	0.0	0.0			
			Acquired (de novo) detrusor over activity	2	2	3.4	3.7	0.9 (0.1; 6.4)		
			Acquired (de novo) dysfunctional voiding	3	2	5.2	3.7	1.4 (0.2; 8.0)		
			Acquired (de novo) increased bladder sensation	3	1	5.2	1.9	2.8 (0.3; 26.0)		
			Acquired (de novo) intrinsic sphincter deficiency as maximum urethral closure pressure <20 cm/H2O	10	4	17.2	7.4	2.3 (0.8; 7.0)		

Table F128. Effects of vaginal tape and sling procedures on risk and progression of urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
	Suburethral slingplasty with suprapubic arc sling macroporous monofilament threads	Suburethral slingplasty with intravaginal sling multifilament threads	Detrusor over activity (cured)	0	4	0.0	7.4	0.1 (0.0; 1.9)		
			Increased bladder sensation (cured)	7	4	12.1	7.4	1.6 (0.5; 5.3)		
			Stress urinary incontinence: pre and post symptom free	3	4	5.2	7.4	0.7 (0.2; 3.0)		
			Incontinence still present	16	10	27.6	18.5	1.5 (0.7; 3.0)		
			Acquired (de novo)	3	5	5.2	9.3	0.6 (0.1; 2.2)		
			Stress urinary incontinence: acquired (de novo)	0	0					
			Acquired (de novo) detrusor over activity	1	2	1.7	3.7	0.5 (0.0; 5.0)		
			Acquired (de novo) dysfunctional voiding	4	2	6.9	3.7	1.9 (0.4; 9.8)		
			Acquired (de novo) increased bladder sensation	2	1	3.4	1.9	1.9 (0.2; 20.0)		
			Acquired (de novo) intrinsic sphincter deficiency as maximum urethral closure pressure <20cm/H2O	3	4	5.2	7.4	0.7 (0.2; 3.0)		

Table F128. Effects of vaginal tape and sling procedures on risk and progression of urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
			Detrusor over activity (cured)	3	4	5.2	7.4	0.7 (0.2; 3.0)		
			Dysfunctional voiding (cured)	4	8	6.9	14.8	0.5 (0.1; 1.5)		
Ward, 2002[609] N = 344	Tensionfree vaginal tape procedure	Colposuspension	Interfering with life overall	48	28	27.4	16.6	**1.7 (1.1; 2.5)**	9 (65; 4)	109 (15; 250)E
			Interfering with physical activity	32	22	18.3	13.0	1.4 (0.9; 2.3)		
			Interfering with social relationships	19	17	10.9	10.1	1.1 (0.6; 2.0)		
			Night time frequency (>0)	99	83	56.6	49.1	1.2 (0.9; 1.4)		
			Nocturnal enuresis	14	11	8.0	6.5	1.2 (0.6; 2.6)		
			Number with voiding disorder	11	8	6.3	4.7	1.3 (0.5; 3.2)		
			Number with genuine stress incontinence	17	20	9.7	11.8	0.8 (0.4; 1.5)		
			Number with unstable detrusor contractions	12	13	6.9	7.7	0.9 (0.4; 1.9)		
			Quantity of urine loss (>none)	70	55	40.0	32.5	1.2 (0.9; 1.6)		
			Straining	25	25	14.3	14.8	1.0 (0.6; 1.6)		
			Stress incontinence	54	37	30.9	21.9	1.4 (1.0; 2.0)		
			Unexplained incontinence	27	17	15.4	10.1	1.5 (0.9; 2.7)		
			Urge incontinence	84	69	48.0	40.8	1.2 (0.9; 1.5)		
			Urgency	116	100	66.3	59.2	1.1 (1.0; 1.3)		
			Wearing protection	45	30	25.7	17.8	1.4 (1.0; 2.2)		

Table F128. Effects of vaginal tape and sling procedures on risk and progression of urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
			Ability to perform daily task	25	19	14.3	11.2	1.3 (0.7; 2.2)		
			Avoiding places or situations	52	41	29.7	24.3	1.2 (0.9; 1.7)		
			Bladder pain	49	36	28.0	21.3	1.3 (0.9; 1.9)		
			Changing outer clothing	35	37	20.0	21.9	0.9 (0.6; 1.4)		
			Dysuria	38	29	21.7	17.2	1.3 (0.8; 2.0)		
			Frequency of incontinent episodes (>never)	72	66	41.1	39.1	1.1 (0.8; 1.4)		
			Hesitancy	75	70	42.9	41.4	1.0 (0.8; 1.3)		
			History of retention	8	6	4.6	3.6	1.3 (0.5; 3.6)		
Choe, 2000[623] N = 40	Transvaginal antimicrobial mesh synthetic mesh	Anterior vaginal wall slings	Mixed urinary incontinence	1	4	5.0	20.0	0.3 (0.0; 2.0)		
Valpas, 2004[610] N = 128	Tension-free vaginal tape under local anesthesia with polypropylene mesh tape placed under the midurethra	Laparoscopic mesh colposuspension under general anesthesia (Hannah and Chin)	Negative 48 hour pad test	51	30	72.9	58.8	1.2 (0.9; 1.6)		
			Using pads	0	6	0.0	11.7	0.1 (0.0; 1.0)		
Zullo, 2005[632] N = 59	Tension-free vaginal tape procedure plus postoperative vaginal	Tension-free vaginal tape procedure alone	Nocturia	0	1	0.0	4.0	0.3 (0.0; 7.8)		
			Urgency of incontinence	1	8	4.0	29.0	**0.1 (0.0; 0.9)**	4 (4; 53)	250 (19; 285)A
			Detrusor over activity symptoms	1	1	4.0	4.0	1.0 (0.1; 15.2)		

Table F128. Effects of vaginal tape and sling procedures on risk and progression of urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
	estrogen: 1 estriol ovule (1mg) once daily for 1 month, then 2 ovules once weekly for 5 months		Frequency of incontinence episodes	2	5	7.0	18.0	0.4 (0.1; 1.9)		
Rafii, 2004[605] N = 186	Tension-free vaginal tape with Ulmsten's method alone	Tension-free vaginal tape with Ulmsten's method and pelvic floor reconstruction	Postoperative urinary leakage	8	6	8.0	13.0	0.6 (0.2; 1.7)		
			De novo urinary urge symptoms at 1 month followup	34	14	34.0	30.4	1.1 (0.7; 1.9)		
	Tension-free vaginal tape with Ulmsten's method and concomitant vaginal hysterectomy	Tension-free vaginal tape with Ulmsten's method and pelvic floor reconstruction	Postoperative urinary leakage	4	6	10.0	13.0	0.8 (0.2; 2.5)		
			De novo urinary urge symptoms at 1 month followup	6	14	15.0	30.4	0.5 (0.2; 1.2)		
Meshcia, 2004[631] N = 50	Tension-free vaginal tape	Plication of the endopelvic fascia	Self reported stress urinary incontinence	1	9	4.0	36.0	**0.1 (0.0; 0.8)**	3 (3; 15)	320 (67; 355)A
Hilton, 1989[626] N = 20	Suburethral sling	Stamey endoscopic bladder neck suspension	Stress incontinence	1	2	10.0	20.0	0.5 (0.1; 4.7)		
Maher, 2005[620] N = 45	Pubovaginal sling	Transurethral Macroplastique	Stress incontinence	4	0	18.2	0.0	9.4 (0.5; 164.8)		
			Urge incontinence	7	4	31.8	17.4	1.8 (0.6; 5.4)		
			Urgency in urination	7	4	31.8	17.4	1.8 (0.6; 5.4)		
			Voiding difficulty	1	2	4.5	8.7	0.5 (0.1; 5.4)		

Table F128. Effects of vaginal tape and sling procedures on risk and progression of urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Wadie, 2005[607] N = 53	Fascial sling with free ends of flap fixed by a 1-zero polyglactin suture and the sling is fixed to the underlying periurethral fascia using 4-zero polyglactin sutures at the 6 and 12 o'clock positions	Tension-free vaginal polypropylene tape	Treatment failure – visible leakage on stress test and a total score of 6.	2	2	8.0	7.1	1.1 (0.2; 7.4)		
Rechberger, 2003[606] N = 100	Monofilament tape inserted at the midurethra using tension-free vaginal tape delivery instrument	Multifilament tape using intravaginal slingplasty delivery instrument	Urgency de novo	8	4	16.0	8.0	2.0 (0.6; 6.2)		
Dietz, 2005[619] N = 195	Suprapubic arc sling	Intravaginal sling	Voiding dysfunction (%)	15	19	34.1	42.2	0.8 (0.5; 1.4)		
	Tensionless vaginal tape		Voiding dysfunction (%)	22	19	46.8	42.2	1.1 (0.7; 1.8)		
Ward, 2002[609] N = 344 24 months	Tension Free Tape procedure	Colpo-suspension	Urgency	76	79	43.43	46.75	0.93 (0.74; 1.17)		
			Urge incontinence	52	61	29.71	36.09	0.82 (0.61; 1.12)		
			Stress incontinence	40	38	22.86	22.49	1.02 (0.69; 1.50)		
			Unexplained incontinence	21	27	12.00	15.98	0.75 (0.44; 1.28)		

Table F128. Effects of vaginal tape and sling procedures on risk and progression of urinary incontinence in females (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
			Frequency incontinent episodes (>never)	52	59	29.71	34.91	0.85 (0.63; 1.16)		
			Quantity of urine loss (>none)	52	54	29.71	31.95	0.93 (0.68; .28)		
			Wearing protection	32	36	18.29	21.30	0.86 (0.56; 1.32)		
			Changing outer clothing	32	33	18.29	19.53	0.94 (0.60; 1.45)		
			History of retention	4	4	2.29	2.37	0.97 (0.25; 3.80)		
			Ability to perform daily tasks	13	19	7.43	11.24	0.66 (0.34; 1.30)		
			Avoiding places/situations	25	26	14.29	15.38	0.93 (0.56; 1.54)		
			Interfering with physical activity	14	19	8.00	11.24	0.71 (0.37; 1.37)		
			Interfering with social relationships	9	12	5.14	7.10	0.72 (0.31; 1.67)		
			Interfering with life overall	20	25	11.43	14.79	0.77 (0.45; 1.34)		

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F129. Effects of vaginal tapes and sling procedures on perceived urinary incontinence in females (severity measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Ward, 2002[609] N = 344	The tension free vaginal tape procedure	Colposuspension	Voided volume per 24 hours (ml)	1824.0 ± 206.0	1696.0 ± 234.7	**0.6 (0.4; 0.8)**	
			Episodes of nocturia	1.0 ± 0.0	1.0 ± 0.0		
			Leaks over 24 hours	0.0 ± 0.0	0.0 ± 0.0		
Valpas, 2004[610] N = 128	Tension-free vaginal tape under local anesthesia with polypropylene mesh tape placed under the midurethra	Laparoscopic mesh colposuspension under general anesthesia (Hannah and Chin)	King's College Health Questionnaire Scores Incontinence Impact			-46.7 (4.35; 24.6)	
			King's College Health Questionnaire Scores Physical Limitations			-49.5 (1.06; 16.9)	
			King's College Health Questionnaire Scores Social Limitations			-25.2 (1.04; 11.7)	
			Urinary Incontinence Severity Score (0–20)			**1.6 (0.27; 2.94)**	
			Urge score (0–20)			0.4 (-0.51; 1.5)	
deTayrac, 2004[612] N = 61	Tension-free vaginal tape	Transobturator suburethral tape	Daily activities (from 10 possible)	8.9 ± 1.9	7.9 ± 3.0	0.4 (-0.1; 0.9)	5.4 (-1.1; 11.9)
			Self reported symptoms of urinary incontinence in visual analog scale ranging from 0 to 10 (0 - complete continence)	2.7 ± 2.5	1.4 ± 2.8	0.5 (0.0; 1.0)	35.0 (-1.7; 71.7)
			Visual Analog Scale (1–10)			**1.3 (0.65; 2.07)**	
Andonian, 2005[613] N = 84	Suprapubic arch sling	Tension-free vaginal tape by Ulmsten	Subjective cure (IIQ scores)	49.9 ± 25.6	45.3 ± 18.4	0.2 (-0.2; 0.6)	0.5 (-0.5; 1.4)
Zullo, 2005[632] N = 59	Tension-free vaginal tape procedure plus postoperative vaginal estrogen: 1 estriol ovule (1mg) once daily for 1 month, then 2 ovules once weekly for the 5 months	Tension-free vaginal tape procedure alone	Self reported micturitions during 24 hours	4.9 ± 2.0	6.0 ± 3.7	-0.4 (-0.9; 0.2)	-6.2 (-15.0; 2.6)

Table F129. Effects of vaginal tapes and sling procedures on perceived urinary incontinence in females (severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Wadie, 2005[607] N = 53	Fascial sling with free ends of flap fixed by a 1-zero polyglactin suture and the sling is fixed to the underlying periurethral fascia using 4-zero polyglactin sutures at the 6 and 12 o'clock positions	Tension-free vaginal polypropylene tape	Urinary incontinence scores	0.5 ± 3.0	0.5 ± 2.3	0.0 (-0.5; 0.5)	0.0 (-107.9; 107.9)
Abdel-Fattah, 2004[621] N = 142	Pelvicol pubovaginal sling	Tension-free vaginal tape	Incontinence pads use/day	2.6 ± 3.6	2.9 ± 2.0	-0.1 (-0.4; 0.2)	-3.5 (-14.7; 7.7)
Darai, 2007[622] N = 88	Suburethral sling procedure with retropubic routes by Ulmsten	Suburethral sling procedure with transobturator routes by Delorme	Urinary Distress Impact Questionnaire, total score	4.7 ± 10.0	1.2 ± 5.0	0.4 (0.0; 0.9)	37.4 (2.1; 72.7)
			Urinary Distress Impact Questionnaire: global discomfort	1.2 ± 1.9	0.5 ± 0.9	**0.5 (0.1; 0.9)**	95.6 (10.7; 180.5)
			Incontinence Impact Questionnaire, total score	2.6 ± 16.0	0.0 ± 0.0		
			Urinary Distress Impact Questionnaire: Emotional and social discomfort	1.0 ± 1.7	0.5 ± 0.8	0.4 (0.0; 0.8)	76.4 (-8.0; 160.8)
David-Montefiore, 2006[618] N = 88	Retropubic suburethral sling procedure	Transobturator suburethral sling procedure	Quality of life scores (UDI scale)	5.4 ± 20.3	5.7 ± 25.2	0.0 (-0.4; 0.4)	-0.2 (-7.6; 7.1)
			Social and emotional status (IIQ scale)	0.6 ± 3.2	6.1 ± 24.6	-0.3 (-0.7; 0.1)	-5.0 (-11.9; 1.9)
Maher, 2005[620] N = 45	Pubovaginal sling	Transurethral macroplastique	Median Short Urinary Distress Inventory score	14.0 ± 57.3	11.0 ± 22.0	0.1 (-0.5; 0.7)	0.6 (-4.7; 5.9)
			Median Incontinence Impact Questionnaire score	5.0 ± 53.3	9.0 ± 50.7	-0.1 (-0.7; 0.5)	-0.9 (-7.4; 5.6)
Arunkalaivanan, 2003[617] N = 142	Porcine dermal sling (pelvicol implant) by Barrington	Tension-free vaginal tape by Ulmsten	Incontinence pad use	0.0 ± 5.3	0.0 ± 2.7	0.0 (-0.3; 0.3)	

Bold- significant differences in outcomes at 95% confidence level

Table F130. Effects of vaginal tapes and sling procedures on urinary incontinence in females (severity measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Ward, 2002[609] N = 344	Tension-free vaginal tape procedure	Colposuspension	Pressure transmission ratio (%):4th quarter	29.0 ± 9.3	38.0 ± 4.0	**-1.2 (-1.5; -1.0)**	-3.3 (-3.9; -2.7)
			Post micturition residual (ml)	0.0 ± 33.3	0.0 ± 23.3	0.0 (-0.2 ; 0.2	
			Functional urethral length at rest (mm)	30.0 ± 2.7	34.0 ± 2.0	**-1.7 (-1.9; -1.4)**	-5.0 (-5.7; -4.3)
			Maximum urethral closure pressure at rest (mm)	37.0 ± 10.0	46.0 ± 0.7	**-1.3 (-1.5; -1.0)**	-2.7 (-3.2; -2.2)
			Maximum flow rate (ml/s)	20.0 ± 3.3	20.0 ± 4.0	0.0 (-0.2; 0.2)	0.0 (-1.1; 1.1)
			Maximum urethral closure pressure at cough (mm)	45.0 ± 10.0	52.0 ± 23.3	**-0.4 (-0.6; -0.2)**	-0.8 (-1.2; -0.3)
			Cystometric capacity (ml)	450.0 ± 33.3	443.0 ± 39.3	0.2 (0.0; 0.4)	0.0 (0.0; 0.1)
			Change in pad weight (g)	0.0 ± 0.1	0.0 ± 0.2	0.0 (-0.2; 0.2)	
			Functional urethral length at cough (mm)	20.0 ± 4.0	25.0 ± 2.7	**-1.5 (-1.7; -1.2)**	-5.9 (-6.8; -4.9)
			Maximum voiding pressure (cm/H2O)	30.0 ± 5.3	30.0 ± 6.7	0.0 (-0.2; 0.2)	0.0 (-0.7; 0.7)
			Volume at first desire to void (ml)	236.0 ± 41.3	217.0 ± 48.0	**0.4 (0.2; 0.6)**	0.2 (0.1; 0.3)
Barbalias, 1997[628] N = 48	Vesicourethral suspension by allogenic Goretex sling	Vesicourethral suspension by indigenous rectus abdominis fascia sling.	Maximum flow rate	11.4 ± 1.7	10.5 ± 1.8	0.5 (-0.1; 1.1)	4.8 (-1.0; 10.6)
			Maximum closure pressure	43.5 ± 4.5	42.4 ± 3.9	0.3 (-0.3; 0.9)	0.7 (-0.8; 2.1)
			First sensation of bladder filling	180.4 ± 10.3	177.2 ± 9.4	0.3 (-0.3; 0.9)	0.2 (-0.2; 0.5)
			Bladder capacity	520.0 ± 58.1	490.0 ± 52.4	0.6 (-0.1; 1.2)	0.1 (0.0; 0.2)
			Detrusor pressure at maximum flow	35.7 ± 5.0	37.6 ± 5.9	-0.3 (-0.9; 0.3)	-0.9 (-2.5; 0.7)
			Maximum detrusor pressure	38.2 ± 4.2	37.9 ± 4.1	0.1 (-0.5; 0.7)	0.2 (-1.4; 1.8)
			Residual urine	82.0 ± 35.0	90.0 ± 45.0	-0.2 (-0.8; 0.4)	-0.2 (-0.9; 0.5)
			Urethral functional length	2.5 ± 0.1	2.3 ± 0.1	**1.9 (1.2; 2.6)**	81.3 (50.4; 112.3)
deTayrac, 2004[612] N = 61	Tension-free vaginal tape	Transobturator suburethral tape	Free Qmax (ml/s)	24.4 ± 7.7	23.3 ± 8.0	0.1 (-0.4; 0.6)	0.6 (-1.6; 2.8)
Zullo, 2005[632] N = 59	Tension-free vaginal tape procedure plus postoperative vaginal estrogen: 1	Tension-free vaginal tape procedure alone	Maximum cystometric capacity (ml)	445.0 ± 43.4	439.0 ± 46.8	0.1 (-0.4; 0.7)	0.0 (-0.1; 0.1)
			Peak flow (ml/s)	22.7 ± 3.2	23.6 ± 2.9	-0.3 (-0.8; 0.2)	-1.2 (-3.5; 1.0)
			Flow time (ml/s)	27.8 ± 4.1	27.9 ± 4.4	0.0 (-0.5; 0.5)	-0.1 (-2.0; 1.8)
			First voiding desire (ml)	174.0 ± 21.4	148.0 ± 32.8	**0.9 (0.4; 1.5)**	0.6 (0.3; 1.0)
			Detrusor pressure at peak flow (cm/H2O)	18.6 ± 2.1	17.8 ± 1.9	0.4 (-0.1; 0.9)	2.2 (-0.7; 5.2)

Table F130. Effects of vaginal tapes and sling procedures on urinary incontinence in females (severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
	estriol ovule (1mg) once daily for 1 month, then 2 ovules once weekly for the 5 months		Maximum urethral closure pressure (cm/H2O)	73.6 3.5	75.9 6.3	-0.5 (-1.0; 0.1)	-0.6 (-1.3; 0.1)
			Urethral functional length (mm)	25.0 ± 1.5	25.1 ± 1.7	-0.1 (-0.6; 0.5)	-0.2 (-2.3; 1.8)
			Post void residual (ml)	1.1 ± 4.2	1.3 ± 3.9	0.0 (-0.6; 0.5)	-3.8 (-44.1; 36.5)
Meshcia, 2004[631] N = 50	Tension-free vaginal tape	Plication of the endopelvic fascia	First desire (minutes)	175.0 ± 51.0	183.0 ± 59.0	-0.1 (-0.7; 0.4)	-0.1 (-0.4; 0.2)
			Very strong desire (ml)	347.0 ± 67.0	343.0 ± 45.0	0.1 (-0.5; 0.6)	0.0 (-0.1; 0.2)
			Average flow rate (ml/second)	11.0 ± 6.0	14.0 ± 5.0	-0.5 (-1.1; 0.0)	-3.9 (-7.9; 0.2)
			Voiding time (seconds)	48.0 ± 178.0	31.0 ± 12.0	0.1 (-0.4; 0.7)	0.4 (-1.4; 2.2)
			Functional length (mm)	22.0 ± 6.0	25.0 ± 6.0	-0.5 (-1.1; 0.1)	-2.0 (-4.3; 0.3)
Hilton, 1989[626] N = 20	Suburethral sling	Stamey endoscopic bladder neck suspension	Rest: functional length, mm	28.0 ± 5.5	26.0 ± 6.3	0.3 (-0.5; 1.2)	1.3 (-2.1; 4.7(
			Residual volume, ml	3.0 ± 4.0	1.0 ± 3.0	0.6 (-0.3; 1.5)	56.6 (-33.0; 146.1)
			First sensations, ml	266.0 ± 147.0	301.0 ± 143.0	-0.2 (-1.1; 0.6	-0.1 (-0.4; 0.2)
			Cystometric capacity, ml	584.0 ± 247.0	599.0 ± 132.0	-0.1 (-1.0; 0.8)	0.0 (-0.2; 0.1)
			Maximum voiding pressure, cm H20	28.0 ± 10.0	22.0 ± 16.0	0.4 (-0.4; 1.3)	2.0 (-2.0; 6.1)
			Rest: total profile length, mm	35.0 ± 9.2	35.0 ± 7.8	0.0 (-0.9; 0.9)	0.0 (-2.5; 2.5)
			Rest: length to peak pressure, mm	17.0 ± 7.3	17.0 ± 6.1	0.0 (-0.9; 0.9)	0.0 (-5.2; 5.2)
			Rest: maximum urethral pressure, cm H20	47.0 ± 12.7	39.0 ± 18.9	0.5 (-0.4; 1.4)	1.3 (-1.0; 3.6)
			Rest: maximum urethral closure pressure, cm H20	26.0 ± 14.4	26.0 ± 17.8	0.0 (-0.9; 0.9)	0.0 (-3.4; 3.4)
			Stress: functional length, mm	18.0 ± 5.2	14.0 ± 11.8	0.4 (-0.4; 1.3)	3.1 (-3.2; 9.5)
			Stress: maximum urethral closure pressure, cm H20	26.0 ± 23.6	19.0 ± 15.9	0.3 (-0.5; 1.2)	1.8 (-2.8; 6.5)
			Stress: length to peak pressure, mm	9.0 ± 6.5	12.0 ± 8.4	-0.4 (-1.3; 0.5)	-3.3 (-10.7; 4.1)
			Pressure transmission ratio, Q4,%	57.0 ± 27.5	33.0 ±18.7	**1.0 (0.1; 2.0)**	3.1 (0.3; 5.9)
			Peak flow rate, ml/s	17.0 ± 8.0	30.0 ± 13.0	**-1.2 (-2.2; -0.2)**	-4.0 (-7.2; -0.8)
Wadie, 2005[607] N = 53	Fascial sling with free ends of flap fixed by a 1-zero polyglactin suture and the	Tension-free vaginal polypropylene tape	Mean ml capacity	389.4 ± 124.4	382.1 ± 75.9	0.1 (-0.5; 0.6)	0.0 (-0.1; 0.2)
			Detrusor pressure at maximum flow	24.8 ± 14.2	30.6 ± 13.8	-0.4 (-1.0; 0.1)	-1.4 (-3.1; 0.4)
			Maximum flow, ml/second	19.4 ± 11.7	17.8 ± 8.3	0.2 (-0.4; 0.7)	0.9 (-2.1; 3.9)
			Mean ml/cm/H2O compliance	55.8 ± 31.7	69.2 ± 37.7	-0.4 (-0.9; 0.2)	-0.6 (-1.3; 0.2)

Table F130. Effects of vaginal tapes and sling procedures on urinary incontinence in females (severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
	sling is fixed to the underlying periurethral fascia using 4-zero polyglactin sutures at the 6 and 12 o'clock positions		Post-void residual urine, ml	8.8 ± 35.9	8.0 ± 22.1	0.0 (-0.5; 0.6)	0.3 (-6.4; 7.1)
Lim, 2005[614] N = 195	Suburethral slingplasty with the suprapubic arc sling macroporous monofilament threads	Suburethral slingplasty with the Intravaginal sling multifilament threads	Maximum urine flow rate	4.0 ± 8.7	15.0 ± 22.0	**-0.7 (-1.0; -0.3)**	-4.4 (-7.0; -1.9)
			Average urine flow rate	2.0 ± 6.7	8.0 ± 15.3	**-0.5 (-0.9; -0.1)**	-6.4 (-11.1; -1.7)
			Average urine flow rate	2.0 ± 6.7	12.0 ± 12.0	**-1.0 (-1.4; -0.6)**	-8.7 (-12.0; -5.4)
			Maximum urine flow rate	4.0 ± 8.7	9.0 ± 18.0	-0.4 (-0.7; 0.0)	-4.0 (-8.1; 0.2)
Cholhan, 2004[625] N = 48	Conventional sub urethral sling	Modified sling placed at the mid-urethra without tension	Peak CMG urinary flow rate, ml/second	16.1 ± 11.2	18.1 ± 8.0	-0.2 (-0.8; 0.4)	-1.2 (-4.3; 2.0)
			Free urinary flow rate, ml/sec	8.6 ± 5.3	9.8 ± 3.8	-0.3 (-0.8; 0.3)	-2.7 (-8.6; 3.1)
			Cystometric bladder capacity, ml	466.0 ± 185.0	429.0 ± 113.0	0.2 (-0.3; 0.8)	0.1 (-0.1; 0.2)
			Voiding volume, ml	341.0 ± 192.0	381.0 ± 120.0	-0.3 (-0.8; 0.3)	-0.1 (-0.2; 0.1)
			Peak detrusor pressure, cmH20	55.2 ± 18.0	54.5 ± 15.0	0.0 (-0.5; 0.6)	0.1 (-1.0; 1.1
			Urethral resistance cmH20ml-2s2	1.9 ± 2.6	0.7 ± 0.3	0.7 (0.1; 1.2)	90.3 (10.0; 170.5)
			Functional urethral length, cm; sitting	1.9 ± 0.6	2.1 ± 0.6	-0.3 (-0.9; 0.2)	-15.9 (-43.2; 11.5)
			Cotton swab test (degrees), strain	12.0 ± 13.0	18.0 ± 19.0	-0.4 (-0.9; 0.2)	-2.0 (-5.2; 1.2)
			Cotton swab test (degrees), rest	4.0 ± 12.0	9.0 ± 15.0	-0.4 (-0.9; 0.2)	-4.0 (-10.4; 2.4)
			Maximum urethral closure pressure (cm/H2O), supine	37.0 ± 17.0	36.0 ± 14.0	0.1 (-0.5; 0.6)	0.2 (-1.4; 1.8)
			Maximum urethral closure pressure (cm/H2O), sitting	39.0 ± 20.0	32.0 ± 15.0	0.4 (-0.2; 1.0)	1.3 (-0.5; 3.1)
			Functional urethral length, cm; Supine	2.3 ± 0.8	2.7 ± 0.6	-0.6 (-1.2; 0.0)	-21.3 (-42.9; 0.2)

Table F130. Effects of vaginal tapes and sling procedures on urinary incontinence in females (severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Tseng, 2004[627] N = 62	Suprapubic arc sling procedure	Tension-free vaginal taping by Ulmsten	Maximum flow rate, (ml/second)	18.7 ± 6.8	19.9 ± 7.9	-0.2 (-0.7; 0.3)	-0.8 (-3.4; 1.7)
			Average flow rate (ml/second)	7.8 ± 3.0	9.0 ± 5.7	-0.3 (-0.8; 0.2)	-3.0 (-8.5; 2.6)
			First desire to void (ml)	114.8 ± 60.8	99.3 ± 63.1	0.3 (-0.2; 0.8)	0.3 (-0.3; 0.8)
			Maximum cystometric capacity (ml)	370.6 ± 133.3	341.4 ± 136.0	0.2 (-0.3; 0.7)	0.1 (-0.1; 0.2)
			Maximum urethral closure pressure (resting)(cmH2O)	51.5 ± 23.7	50.4 ± 16.9	0.1 (-0.4; 0.5)	0.1 (-0.9; 1.1)
			Maximum urethral closure pressure (coughing) (cmH2O)	46.7 ± 36.8	51.7 ± 54.7	-0.1 (-0.6; 0.4)	-0.2 (-1.2; 0.8)
			Pressure transmission ratio	72.9 ± 27.1	78.3 ± 27.6	-0.2 (-0.7; 0.3)	-0.3 (-0.9; 0.4)
			Functional urethral length (resting) (mm)	21.8 ± 5.2	17.6 ± 6.0	**0.7 (0.2; 1.3)**	4.2 (1.3; 7.2)
			Functional urethral length (coughing) (mm)	20.0 ± 7.6	19.3 ± 9.0	0.1 (-0.4; 0.6)	0.4 (-2.2; 3.0)
Kuo, 2001[624] N = 50	Pubovaginal sling procedure using rectus fascia	Pubovaginal sling procedure using polypropylene mesh	Post-void (ml)	16.9 ± 26.7	29.6 ± 37.5	-0.4 (-0.9; 0.2)	-1.3 (-3.2; 0.6)
			Maximum urinary flow (ml/second)	19.2 ± 10.6	16.2 ± 8.1	0.3 (-0.2; 0.9)	2.0 (-1.5; 5.4)
			Capacity (ml)	327.0 ± 101.0	253.0 ± 96.7	**0.7 (0.2; 1.3)**	0.3 (0.1; 0.5)
			Bladder neck open time (second)	9.1 ± 6.1	13.0 ± 11.3	-0.4 (-1.0; 0.1)	-3.3 (-7.6; 1.1)
			Detrusor pressure (cm/H2O)	18.4 ± 10.4	20.7 ± 9.0	-0.2 (-0.8; 0.3)	-1.1 (-3.8; 1.5)
Lord, 2006[615] N = 313	Tension-free vaginal tape	Suprapubic urethral support sling	Voiding volume, ml	65.9 ± 139.7	2.0 ± 164.3	**0.4 (0.2; 0.6)**	20.9 (9.7; 32.1)
			Decrease in voiding volume	25.0 ± 10.0	26.0 ± 9.3	-0.1 (-0.3; 0.1)	-0.4 (-1.3; 0.5)
			Maximum flow rate, ml/s	9.0 ± 6.7	6.0 ± 6.0	**0.5 (0.2; 0.7)**	7.8 (4.1; 11.6)
			Decrease in maximum flow rate, ml/s	9.0 ± 3.3	10.0 ± 4.0	-0.3 (-0.5; 0.0)	-2.7 (-4.9; -0.5)
			Decrease in average flow rate, ml/s	9.0 ± 21.3	4.0 ± 22.7	0.2 (0.0; 0.4)	5.7 (0.1; 11.2)
			Average flow rate, ml/s	4.0 ± 3.3	4.0 ± 3.3	0.0 (-0.2; 0.2)	0.0 (-5.5; 5.5)
Lim, 2005[614] N = 195	Suburethral slingplasty with tension-free vaginal tape macroporous monofilament threads	Suburethral slingplasty with intravaginal sling multifilament threads	Average urine flow rate	2.0 ± 6.7	12.0 ± 12.0	**-1.0 (-1.4; -0.6)**	-8.7 (-12.0; -5.4)
			Maximum urine flow rate	4.0 ± 8.7	9.0 ± 18.0	-0.4 (-0.7; 0.0)	-4.0 (-8.1; 0.2)
			Average urine flow rate	2.0 ± 6.7	8.0 ± 15.3	**-0.5 (-0.9; -0.1)**	-6.4 (-11.1; -1.7)
			Maximum urine flow rate	4.0 ± 8.7	15.0 ± 22.0	**-0.7 (-1.0; -0.3)**	-4.4 (-7.0; -1.9)

Table F130. Effects of vaginal tapes and sling procedures on urinary incontinence in females (severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Maher, 2005[620] N = 45	Pubovaginal sling	Transurethral macroplastique	1-hour pad test (g)	5.0 ± 34.7	2.0 ± 12.0	0.1 (-0.5; 0.7)	5.8 (-23.4; 35.1)
			Maximum urethral closure pressure (cm/H2O)	20.0 ± 17.3	26.0 ± 20.7	-0.3 (-0.9; 0.3)	-1.2 (-3.5; 1.1)

Bold- significant differences in outcomes at 95% confidence level

Table F131. Surgical interventions on risk and progression of incontinence in women

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
Colombo, 1996 [633] RCT to examine effects of cystopexy alone versus cystopexy with posterior pubourethral ligaments placation on prevention of urinary incontinence in women with genitourinary prolapse. Duration of followup: 6 months, 1 and 2 years	107 continent women admitted for surgical correction of severe urethrocystocele grade 2 or greater, a negative stress test with repositioning, and a positive cotton swab test. Exclusion criteria: urethrocystocele <grade 2, positive stress test with repositioning (potential stress incontinence), maximum urethral closure pressure less than 30cm/H2O, uninhibited detrusor contraction of any size during bladder filling, and previous retropubic anti-incontinence surgery. Loss of followup: 3.7%, one patient (cystopexy alone) died on day 2 of a hemorrhagic complication due to a chronic hepatic dysfunction	1. Cystopexy alone 2. Cystopexy with posterior pubourethral ligaments plication	Urinary incontinence as occurrence both subjectively (patient's history) and objectively (positive stress test). Stress incontinence at any time after surgery. Urethral Functional Length and Maximum Urethral Closure Pressure	No intention to treat. Open label. Computer-generated randomization. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size not justified.
Brubaker, 2006[634] RCT to examine the effect of standardized Burch colposuspension in addition to abdominal sacrocolpopexy for the treatment of pelvic-organ prolapse on postoperative stress urinary incontinence in women without preoperative symptoms of stress incontinence. Duration of followup: 3 months after surgery	322 women who did not report symptoms of stress incontinence and who chose to undergo sacrocolpopexy to treat prolapse. 22 women had prior surgery for incontinence, 60 women at baseline had stress incontinence and 89 had urge incontinence. Exclusion criteria: unable to undergo the Burch colposuspension on the basis of the assessment of the mobility of the urethrovesical junction. Loss of followup: none	1. Sacrocolpopexy with Burch colposuspensions. 2. Sacrocolpopexy alone	Self reported stress incontinence and urge incontinence. Maximum cystometric capacity	Intention to treat. Single blind. Computer-generated, stratified by surgeon and intention to perform paravaginal repair randomization in blocks of various sizes. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
Bump, 1996 [635] RCT to examine the effect of needle colposuspension or bladder neck endopelvic fascia plication as part of vaginal reconstructive surgery on urinary symptoms. Duration of followup: 6 weeks and 6 months	32 women with bladder neck hypermobility and stage III or IV pelvic organ prolapse. Exclusion criteria: not reported. Loss of followup: 12.5%	1. Needle colposuspension. 2. Bladder neck endopelvic fascia plication as part of vaginal reconstructive surgery	Stress incontinence diagnosed based on self reported symptoms and positive stress test or abnormal urethral pressure profilometry or a positive direct visualization test immediately after catheters were removed in total absence of detrusor instability during urethrocystometry.	No intention to treat. Open label. Randomization with block size 4 or 6 chosen randomly. Allocation concealment unclear. Baseline data not provided but states the same in groups. Sample size justified.
Meshcia, 2004 [631] RCT to examine the effect of tension-free vaginal tape or plication of the endopelvic fascia in women with severe genital prolapse. Duration: 6 months after surgery	50 patients with ≥ stage II anterior defect and a positive stress test result with prolapse reduction. Exclusion criteria: age >75 years, obesity (body mass index, >30kg/ml), diabetes mellitus, previous pelvic and anti-incontinence surgery, symptoms of SUI, cotton swab test <30 degrees, and uninhibited detrusor contraction of any size during bladder filling. Loss of followup: none	Vaginal hysterectomy, McCall culdoplasty, and cystocele repair for pelvic floor defects and 1. Tension-free vaginal tape 2. Plication of the endopelvic fascia	Self reported stress urinary incontinence, stress test, cotton swab test, and urodynamic outcomes.	Intention to treat not stated but all patients were analyzed. Open label. Computer-generated random list. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Colombo, 1997,[636] RCT to examine effects of posterior pubourethral ligament plication or Pereyra suspension in patients with severe genitourinary prolapse and coexisting clinical or potential stress incontinence. Duration: 6 months	109 patients with urethrocystocele of ≥grade 2 and a positive stress test result with prolapse reduction. Exclusion criteria: urethrocystocele <2, negative stress test results with repositioning, maximum urethral closure pressure <30cm/H_20, occurrence of uninhibited detrusor contraction of any size during bladder filling, or previous retropubic anti-incontinence surgery. Loss of followup: none	Cystopexy and 1. Posterior pubourethral ligament placation. 2. Pereyra suspension	Self reported and clinical stress incontinence - positive stress test result with repositioning	Intention to treat not stated but all patients were analyzed. Open label. Computer-generated random list. Allocation concealment unclear. Baseline data differ by incontinence score, no adjustment reported. Sample size not justified.

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
Jarvis, 2005 [575] RCT to examine the effect of perioperative physiotherapy in women undergoing corrective surgery for pelvic organ prolapse and/or incontinence Duration: 12 weeks	60 women undergoing corrective surgery for pelvic organ prolapse and/or incontinence, able to follow verbal and written instructions in English. Exclusion criteria: neuromuscular disorders or other significant medical problems, pelvic floor muscle intervention, tension-free vaginal tape. Loss of followup: 6.6%	Incontinence and/or prolapse surgeries and 1. Preoperative physiotherapy 2. No preoperative physiotherapy	Paper towel test, urinary symptom specific health and quality of life questionnaire, frequency/volume chart and pelvic floor muscle manometry. Urinary symptoms (frequency, nocturia, urgency, urge, stress incontinence, coital incontinence, nocturnal enuresis, frequent urinary tract infections, bladder pain and difficulty passing urine) were estimated with self-reported scores, max score of 33 indicates high negative impact.	Intention-to treat. Single-blind. Computer-generated randomization with balanced blocks of 20. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Roovers, 2004 [637] RCT to examine effects of vaginal hysterectomy and abdominal sacro-colpopexy on urogenital function in women undergoing surgical correction of uterine prolapse stages II-IV. Duration: one year.	82 women undergoing surgical correction of uterine prolapse stages II-IV. Exclusion criteria: the presence of adnexal mass, history of two or more abdominal pelvic surgical procedures, BMI>35kg/ml, inflammatory bowel or pelvic diseases, fecal incontinence. Loss of followup: 4.9%	1. Vaginal hysterectomy (combined with anterior and/or posterior colporraphy). 2. Abdominal sacro-colpopexy (with preservation of the uterus) on urogenital function	Urogenital distress inventory (UDI) to measure discomfort of urinary incontinence symptoms Domain scores of the UDI (from 0 = lowest to 100 = highest discomfort)	Intention-to treat. Single-blind. Computer-generated randomization. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Surgical treatments to treat female stress urinary incontinence				
Sand, 2000[638] RCT to examine effects of modified Burch procedure	36 women with stress incontinence, low-pressure urethra, and urethral hypermobility (straining cotton swab angle >30 degrees), maximum urethral closure pressure of ≤20cm/H_2O in the sitting position, who failed previous	1. Burch procedures with 4 2-0 polytetrafluoroethylene sutures and tension placed on the periurethral sutures (modified	Objective cure of stress incontinence as no leakage of urine at maximum	Intention to treat not stated. Open label. Randomization and allocation

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
or suburethral sling on females stress incontinence complicated by a low-pressure urethra. Duration of followup: 3 months	surgery and medications. Exclusion criteria: significant anterior pelvic support defects. Loss of followup: none	Tanagho method). 2. Suburethral sling with continuous polytetraflouroethylene strip from rectus fascia into retropubic space and beneath urethra at urethrovesical junction level	cystometric capacity during coughing or Valsalva maneuvers in sitting or standing position. Subjective cure as no loss of urine during any activity that increases intra-abdominal pressure.	concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.
Demirci, 2001 [639] RCT to examine effects of pubovaginal sling or Burch colposuspension operations on females with type I/type II genuine stress urinary incontinence. Duration of followup: 1 year	46 women with type I/type II genuine stress urinary incontinence. Exclusion criteria: preoperative detrusor instability, recurrent genuine stress urinary incontinence, severe pelvic prolapse, Valsalva leak point pressure >90 cm/H20. Loss of followup: 26%	1. Burch colposuspension (Tanagho); 9 patients had abdominal hysterectomy with or without bilateral salpingo-oopherectomy. 2. McGuire's free-rectus fascial sling from inferior leaf of rectus fascia (5 to 6cm in length, 2cm center diameter and 1.5cm at either end; 8 patients had abdominal hysterectomy with or without bilateral salpingo-oopherectomy.	Self reported urinary continence (dry) urodynamic outcomes.	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Culligan, 2003 [640] RCT to examine effects of modified Burch procedure or sling procedure on female stress incontinence with a low-pressure urethra. Duration of followup: 72.6 months	36 women with urodynamic stress incontinence, low-pressure urethra, urethral hypermobility. Exclusion criteria: significant anterior or apical pelvic floor support defects. Loss of followup: 18%	1. Burch colposuspension (Tanagho). 2. Suburethral sling (Horbach) with polytetrafluororthylene strip from rectum fascia beneath urethra under minimal tension.	Objective cure of the stress incontinence as negative stress test and negative pad-weight test. Subjective cure of stress incontinence, no incontinence episodes on a 1-week voiding diary and voiding function studies	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.
Bai, 2005[641] RCT to examine effects of Burch colposuspension, pubovaginal sling, and tension-free	92 women with Grade 1 or 2 stress urinary incontinence. Exclusion criteria: detrusor overactivity, urinary tract infection, intrinsic sphincter deficiency, pelvic organ prolapse >stage II. Loss of followup: not reported.	1. Burch colposuspension. 2. Pubovaginal sling using autologous rectus muscle fascia. 3. Tension-free vaginal tape	Self reported urinary continence.	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
vaginal tape on female stress urinary incontinence. Duration of followup: 12 months				data confirmed adequacy of randomization. Sample size not. Justified.
Liapis, 2002[642] RCT to examine effects of tension-free vaginal tape or Burch colposuspension on female genuine stress incontinence. Duration of followup: 12-24 months	72 women with genuine stress incontinence. Exclusion criteria: prolapse >1degree, previous surgical treatment of stress urinary incontinence, and detrusor instability. Loss of followup: not reported	1. Laparoscopic Burch colposuspension. 2. Tension-free vaginal tape procedure	Objective cure as pad weight difference <1g, and improvement as a reduction of urine loss to less than 50% of urine loss prior to the operation - measured with 1 hour pad test	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not. justified
Paraiso, 2004[643] RCT to examine effects of laparoscopic Burch colposuspension or tension-free vaginal tape procedure on female stress urinary incontinence. Duration of followup: 12 months. The trial was stopped early due to slow recruitment and lack of funding, prior to statistical analysis	72 females candidates for surgical correction of primary urodynamic stress incontinence , with abdominal leak-point pressures greater >60cm/H2O (or a positive cough stress test if the patient did not leak with the catheters in place); urethral hypermobility defined as maximal straining cotton-tipped swab angle >30°; and ability to undergo general anesthesia and laparoscopy. Exclusion criteria: previous anti-incontinence surgery; detrusor overactivity on urodynamic studies defined by a rise in the true detrusor pressure not due to bladder compliance of >15cm/H2O; anterior vaginal wall prolapse to or beyond the hymen. Loss of followup: 8.3%	1. Burch colposuspension (Tanagho). 2. Tension-free vaginal tape procedure. Concomitant procedures were performed in both groups.	Objective cure as no urinary leakage during urodynamic studies. Self reported urinary symptoms using Urogenital Distress Inventory with score range of 0 to 300, higher scores indicating greater distress. Incontinence Impact Questionnaire with score range of 0 to 400, higher scores indicating greater adverse impact on quality of life.	Intention-to-treat Single blind. Computer-generated randomization. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
Ustun, 2003[644] RCT to examine effects of laparoscopic Burch colposuspension or tension-free vaginal tape procedure on female genuine stress incontinence. Duration of followup: 18 months	46 women with genuine stress incontinence. Exclusion criteria: not reported. Loss of followup: not reported.	1. Laparoscopic Burch colposuspension. 2. Tension-free vaginal tape procedure	Urodynamic outcomes. Objective cure as no urinary leakage in urodynamic exam. Subjective cure as no pad use and no urinary leakage in urodynamic exam	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified
El-Barky, 2005[645] RCT to examine effects of Burch colposuspension or tension-free vaginal tape procedure on female genuine stress incontinence. Duration of followup: 6 months	50 women with genuine stress incontinence Exclusion criteria: high grade cystocele, previous surgical failure for stress incontinence, uninhibited detrusor contraction during bladder filling on urodynamic study, incompetent internal sphincters. Loss of followup: not reported	1. Burch colposuspension. 2. Tension-free vaginal tape procedure	Self reported stress urinary incontinence	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified
Wang, 2003[646] RCT to examine effects of modified Burch colposuspension tension-free vaginal taping on female genuine stress incontinence. Duration of followup: 1 year	116 women with genuine stress incontinence. Exclusion criteria: pelvic prolapse, bladder outlet obstruction defined as presence of maximal flow rate of noninvasive uroflowmetry <2ml/second in repeated free uroflow studies combined with detrusor pressure at maximal flow >20cm/H2O or postvoid residual urine >100ml; previous anti-incontinence surgery. Loss of followup: 16.3%	1. Modified Burch colposuspension. 2. Tension-free vaginal taping	Objective cure as no demonstrable involuntary urine loss during any provocative maneuver in multi-channel urodynamic tests in the absence of detrusor instability or pad weight 2g or less. Objective improvement as decrease in urine loss during pad test by >50% from	No intention to treat. Open label. Computer-generated randomization. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
			baseline. Subjective cure as no loss of urine during physical exercise. Subjective improvement as reduction by >50% in amount of preoperative leakage episode	
Colombo, 1996[647] RCT to examine effects of Burch colposuspension or abdominal paravaginal defect repair on female stress urinary incontinence. Duration of followup: 6 months	36 women with stress urinary incontinence. Exclusion criteria: urethral sphincter weakness (maximum urethral closure pressure <20cm/H20), detrusor instability (occurrence of uninhibited detrusor contraction of any size during bladder filling), and previous failed abdominal anti-incontinence procedures. Loss of followup: none.	1. Burch colposuspension with placement of 2 couples of permanent polybutylate-coated polyester sutures. 2. Abdominal paravaginal defect repair with 5-7 pairs of permanent braided silicone-coated polyester suture.	Cure as no incontinence episodes by history and no urine loss at stress test Profilometry outcomes.	Intention to treat not stated. Open label Computer-generated randomization table. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified
Gilja, 1998[648] RCT to examine effects of Raz, Burch and transvaginal Burch procedures on females stress urinary incontinence. Duration of followup: 3 years.	146 women operated on for stress urinary incontinence. Exclusion criteria: prior gynecological or urological operation for urinary incontinence and a clear neuropathic condition. Loss of followup: 28%.	1. Transvaginal Burch procedure. 2. Burch retropubic urethropexy. 3. Modified bladder neck suspension by Raz	Subjective cure from stress urinary incontinence as no leakage episodes and symptoms. Objective cure as no urine loss in urodynamic exam.	No Intention to treat. Open label. Randomization with random numbers table. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Berglund, 1996[649] RCT to examine effects of retropubic urethrocystopexy or pubococcygeal repair on females stress urinary	45 women with stress urinary incontinence. Exclusion criteria: age>65 years, previous surgery for stress urinary incontinence, other gynecological diseases necessitating immediate surgical treatment, severe somatic diseases, e.g. diabetes mellitus, neurological diseases, heart failure, chronic kidney disease and psychiatric disorders. Loss of followup: not reported	1. Retropubic urethrocystopexy. 2. Pubococcygeal repair	Subjective cure as self reported urinary continence. Objective cure as negative 1hour pad test.	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
incontinence. Duration of followup: 12 months				justified.
Lalos, 1993[650] RCT to examine effects of retropubic urethrocystopexy or pubococcygeal repair on females stress urinary incontinence. Duration of followup: 1 year	45 women with stress incontinence. Exclusion criteria: age>65 years, previous surgery for stress urinary incontinence. Loss of followup: 20%	1. Retropubic urethrocystopexy. 2. Pubococcygeal repair	Subjective cure as self reported urinary continence. Objective cure as negative 1hour pad test.	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.
Osman, 2003 [651] RCT to examine effects of anticholinergic treatment or surgery on female urinary incontinence. Duration of followup: 6 months	75 women with mixed urinary incontinence and negative cystometrogram for detrusor overactivity for >6 months. Exclusion criteria: other treatment for incontinence for ≥3 months, non-sterile urine culture; cystometrogram positive for motor detrusor overactivity and detrusor pressure rise of >5cm/H2O); obstructed uroflow; previous surgery for incontinence; carcinoma *in situ* and interstitial cystitis. Loss of followup: 9.3%	1. Burch retropubic suspension (if Valsalva leak-point pressure >90cm/H20) with simple elevation of vaginal wall and periurethral fascia to 1/2way between original position of bladder neck and Cooper ligament Pubovaginal sling (if Valsalva leak-point pressure <90cm/H20) with minimal tension by McGuire. 2. Oxybutynin hydrochloride 5mg 3 times/day	Self reported symptoms of urinary incontinence and urodynamic test	No intention to treat. Open label. Block randomization. Allocation concealment not reported. Baseline data not reported. Sample size not justified.
Costantini, 2007[652] RCT to examine effects of sacropexy combined with a Burch colposuspension on urinary incontinence in females with advanced prolapse. Duration of followup: 40 months	66 consecutive continent patients with advanced prolapse with negative stress test before and after prolapse reduction. Exclusion criteria: history of symptoms of urinary incontinence, positive symptoms questionnaire, and leakage during urodynamics tests. Loss of followup: not reported	1. Sacropexy combined with a Burch colposuspension. 2. Colposacropexy, no prophylactic colposuspension	Incidence of ex novo urinary incontinence measured with Ingelman Sunderberg scale for incontinence, Urogenital Distress Inventory. Urodynamic outcomes.	No Intention to treat. Open label. Randomized block design. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
Persson, 2002[653] RCT to examine effects of laparoscopic colposuspension or tension-free vaginal tape on female stress urinary incontinence. Duration of followup: 1 year	79 consecutive women presenting for evaluation of stress urinary incontinence symptoms urethral closing pressure ≥20cm/H2O, urethral functional length ≥25mm, hypermobility of the bladder neck (>45 degrees of down rotation at valsalva maneuver), and >5ml leaking on pad test. Exclusion criteria: predominant urge incontinence, previous surgery for stress urinary incontinence, incontinence after previous vaginal repair, >2 grad uterovaginal prolapse, not having completed childbirth, need of gynecologic surgery, contraindication to incontinence surgery, increased risk for complications during general anesthesia or laparoscopic surgery, i.e. those with cardiovascular disease, known or suspected intra-abdominal adhesions, or abdominal obesity. Loss of followup: 13.9%	1. Laparoscopic colposuspension. 2. Tension-free vaginal tape by Ulmsten	Objective cure as no leaking at postoperative pad-test, improvement as less than one third of the preoperative leakage	No Intention to treat. Open label. Randomization with self selected envelopes assigned to two treatments. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Fatthy, 2001[654] RCT to examine effects of laparoscopic or open Burch colposuspension on female genuine stress incontinence. Duration of followup: 18 months	74 women with genuine stress incontinence. Exclusion criteria: urinary tract infection, detrusor instability, under-active detrusor, intrinsic sphincter deficiency (Valsalva leak point pressure <90cm/H20), limited vaginal mobility, stages III and IV of vaginal prolapse, contraindications to surgery. Loss of followup: 1.4%	1. Laparoscopic Burch colposuspension with polypropylene suture. 2. Open Burch colposuspension with polypropylene suture	Cure as no self reported urine loss, negative stress test and no leakage in urodynamic exam. Urodynamic outcomes.	No Intention to treat. Open label. Randomization with random numbers tables and permuted blocks. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size not justified.
Kitchener, 2006[655] RCT to examine effects of open or laparoscopic colposuspension on female stress urinary incontinence. Duration of followup: 24 months	291 women with urodynamic stress urinary incontinence requiring colposuspension who failed previous anterior colporrhaphy. Exclusion criteria: comprised detrusor overactivity, previous retropubic surgery, severe obesity. Loss of followup: 7.9%	1. Open abdominal retropubic colposuspension. 2. Laparoscopic colposuspension	Objective cure as negative 1-hour pad test (<1g/hour). Subjective cure as response of 'perfectly happy/pleased' to question 33 of the Bristol questionnaire (If you had to spend the rest of your life with your urinary symptoms as they	Intention to treat Open label. Central computer generated randomization with random permuted block sizes 2 and 4 with a dispersed block throughout the string, stratified by centre, age >50 years and previous bladder neck surgery. Allocation

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
			are now, how would you feel?). Quality of life using UK version of Short Form-36 (SF-36), the Bristol Female Lower Urinary Tract Symptom questionnaire, Symptom Severity and Symptom Impact Index and the EQ-5D.	concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified
Cheon,2003[656] RCT to examine effects of laparoscopic and open colposuspension in women with genuine stress incontinence. Duration of followup: 12 months	90 women with urodynamically proven genuine stress incontinence. Exclusion criteria: intrinsic sphincter deficiency, reduced vaginal capacity or fibrosis, previous anti-continence surgery or intrinsic sphincter deficiency (resting maximum urethral closure pressure <20cm/H2O or Valsalva leak point pressure <60cm/H2O). Loss of followup: not reported.	1. Laparoscopic colposuspension. 2. Burch open colposuspension	Objective cure as dry during severe cough on urodynamic testing. Self reported improvement in urinary incontinence symptoms.	No Intention to treat. Open label. Computer generated random number table. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Su, 1997[657] RCT to examine effects of laparoscopic or open colposuspensions on female genuine stress incontinence. Duration of followup: 12 months	92 patients with urodynamically proven genuine stress incontinence. Exclusion criteria: reduced vaginal capacity or fibrosis, uterine prolapse or cystocele>1 Grade, detrusor instability, under-active detrusor or outflow obstruction, previous anti-incontinent surgery or hysterectomy. Loss of followup: none	1. Laparoscopic colposuspension. 2. Open Burch colposuspension	Urodynamic outcomes. Objective cure as no leakage during urodynamic exam.	Intention to treat not stated. Open label. Randomization with computer generated random numbers table. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
German, 1994[658] RCT to examine effects of modified needle suspension procedure or	50 women with proven genuine stress incontinence. Exclusion criteria: not reported. Loss of followup: not reported.	1. Modified needle suspension procedure. 2. Vagina/obturator shelf procedure	Self reported urinary continence and de novo urge incontinence.	Intention to treat not stated. Open label. Randomization and allocation concealment not

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
vagina/obturator shelf procedure on female genuine stress incontinence. Duration of followup: 2 years				reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Zullo ,2002[659] RCT to examine effects of transperitoneal laparoscopic urethropexy on female genuine stress incontinence Duration of followup: 12 months	60 women with mild or moderate genuine stress incontinence. Exclusion criteria: sphincteric dysfunction (urethral pressure <20cm/H20 and Valsalva leak point pressure<60cm/H20), severe stress urinary incontinence. Prolapse >2 grade, previous pelvic or incontinence surgery, severe abdomino-pelvic infection, extensive abdominal adhesions, detrusor instability, other gynecological diseases, BMI>30kg/ml. Loss of followup: 6.7%	1. Transperitoneal laparoscopic retropubic urethropexy using nonabsorbable sutures. 2. Transperitoneal laparoscopic retropubic urethropexy using polypropylene mesh fixed with tacks or staples	Objective cure as no leakage during cough and Valsalva maneuver in standing position with bladder filled to maximum cystometric capacity during multichannel urodynamic exam. Subjective cure as self reported continence in Visual analog Scale (0=dry sensation, 10=severe leakage).	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.
Colombo, 2000[660] RCT to examine effects of Burch colposuspension or the anterior colporrhaphy in women with both stress urinary incontinence and advanced anterior vaginal wall prolapse. Duration of followup: 14 years	71 women undergoing surgery for primary genuine stress incontinence and concurrent grade 2 or 3 cystocele (descending at or outside the vaginal introitus) and positive cotton swab test. Exclusion criteria: detrusor instability, previous anti-incontinence or prolapse surgery (retropubic or vaginal), concomitant pelvic diseases requiring laparotomy, medical conditions with a high risk of abdominal surgery. Loss of followup: 4.2%	1. Burch colposuspension with abdominal hysterectomy. 2. Anterior colporrhaphy with vaginal hysterectomy	Subjective cure as no incontinence episodes. Objective cure as negative stress test result.	No Intention to treat. Open label. Computer generated random numbers table. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Quadri, 1999[661] RCT to examine effects of Burch colposuspension or Marshall-	30 women with stress urinary incontinence and low pressure (maximum urethral closure pressure of ≤20cm/H_2O throughout its entire length) and hypermobility of the urethra (difference of >30 degrees between results of the cotton swab test performed in the supine position at	1. Burch colposuspension. 2. Marshall-Marchetti-Krantz urethropexies with videourethroscopic control	Subjective cure as no incontinence episodes. Objective cure as negative stress test	Intention to treat not stated. Open label. Computer-generated random numbers. Allocation

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
Marchetti-Krantz urethropexy with videourethroscopic control on stress urinary incontinence in females with low pressure and hypermobility of the urethra. Duration of followup: 12 months	rest and during stress and as a straining angle of >30 degrees from the horizontal). Loss of followup: none		result.	concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Colombo, 1994[662] RCT to examine effects of Burch colposuspension or modified Marshall-Marchetti-Krantz urethropexy on female genuine stress urinary incontinence. Duration of followup: 2-7 years, median 3 years.	80 women with moderate or severe genuine stress urinary incontinence. Exclusion criteria: urethral sphincter weakness (maximum urethral closure pressure <30cm/H_2O), detrusor instability (occurrence of uninhibited detrusor contraction of any size during bladder filling), prolapse of genitourinary tract ≥ 2º, urethral diverticula, urogenital fistulas, and previous failed abdominal anti-incontinence procedures. Loss of followup: none.	1. Burch colposuspension. 2. Modified Marshall-Marchetti-Krantz urethropexy	Subjective cure as no incontinence episodes by history. Objective cure as no urine loss at stress test. Subjective improvement as clinical score of incontinence decreased from 8 to ≤4 or from 4 to ≤2.	No Intention to treat. Open label. Computer-generated random assignment. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.
Bergman, 1995[663] RCT to examine effects of Kelly plication, modified Pereyra needle suspension, or Burch urethropexy on female stress urinary incontinence. Duration of followup: 5 years	127 consecutive women with stress urinary incontinence. Exclusion criteria: failure of previous anti-incontinence procedures, gynecologic disease necessitating hysterectomy, other gynecologic operations, or other indications for laparotomy. Loss of followup: 26.7%	1. Anterior colporrhaphy with Kelly plication. 2. Modified Pereyra needle urethropexy using inclusions of the pubourethral ligaments and endopelvic fascia at the level of the proximal urethra and bladder neck. 3. Burch urethropexy included the basic principles of the Tanagho modification: (1) minimal dissection within 2cm of the urethrovesical junction and urethra, (2) placement of sutures	Subjective cure as absence of complaint of persistent incontinence. Objective cure as no evidence of loss of urine on cough profile during urodynamic evaluation at maximum cystometric capacity.	No Intention to treat. Open label. Randomization with computer generated random numbers table. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
		through full thickness of shiny white paravaginal fascia, (3) use of two sutures on each side, one opposite to the urethrovesical junction and another at the level of the midurethra, (4) removal of adipose tissue lateral to the sutures to stimulate fibrosis, and (5) facilitating typing of sutures to the Cooper ligament with intravaginal fingers elevating the anterior vaginal wall.		
Kammerer-Doak , 1999[664] RCT to examine effects of Burch retropubic urethropexy or modified anterior colporrhaphy on female genuine stress urinary incontinence. Duration of followup: 1 year	35 women with stress incontinence with grading of prolapse (grades 0–4). Exclusion criteria: incontinence of neurological origin, detrusor instability, history of previous radical pelvic surgery, pelvic radiation, intrinsic sphincteric deficiency (low abdominal leak point and maximal urethral closure pressures <65 and <20cm/H20) and history of interstitial cystitis or urethral syndrome. Loss of followup: 5.7%	1. Burch retropubic urethropexy by Tanagho. 2. Modified anterior colporrhaphy	Objective cure as absence of urine loss during cough and valsalva maneuver in the supine and standing positions, with the bladder filled to maximal cystometric capacity. Multichannel urodynamic outcomes. 20-minute pad test, and subjective grading of incontinence severity with questionnaires (0 =none, 4 = more than one daily), number of incontinent episodes (0 = none, 6 = with every cough, sneeze, or laugh) and self assessment score (1 =dry, 10 = severe leakage), and overall quality of life according to the Incontinence Impact Questionnaire	No Intention to treat. Double blind. Computer-generated randomization table. Allocation concealment not reported. Baseline data confirmed adequacy of randomization except age and post menopausal status. Sample size not justified

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
Bergman, 1989[665] RCT to examine effects of anterior colporrhaphy, revised Pereyra procedure, or Burch retropubic urethropexy on female genuine stress incontinence. Duration of followup: 1 year.	127 consecutive patients with urodynamic genuine stress incontinence. Exclusion criteria: other gynecological diseases necessitating hysterectomy, previous anti incontinence surgery, other indications for laparotomy. Loss of followup: 5.5%	1. Anterior colporrhaphy with Kelly placation. 2. Modified Pereyra needle urethropexy using inclusions of the pubourethral ligaments and endopelvic fascia at the level of the proximal urethra and bladder neck. 3. Burch urethropexy included the basic principles of the Tanagho modification: (1) minimal dissection within 2cm of urethrovesical junction and urethra, (2) placement of sutures through full thickness of shiny white paravaginal fascia, (3) use of two sutures on each side, one opposite to the urethrovesical junction and another at the level of the midurethra, (4) removal of adipose tissue lateral to sutures to stimulate fibrosis, and (5) facilitating typing of sutures to the Cooper ligament with intravaginal fingers elevating the anterior vaginal wall	Subjective cure as absence of complaint of persistent incontinence. Objective cure as no evidence of loss of urine on cough profile during urodynamic evaluation at maximum cystometric capacity	No Intention to treat. Open label. Randomization with computer generated random numbers table. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Persson, 2000[666] RCT to examine effects of laparoscopic Burch colposuspension using one double-bite or two single-bite sutures on each side of the urethra on female stress urinary incontinence. Duration of followup: 1 year	161 women with primary stress urinary incontinence, with normal urethral closing pressure and hypermobility of the bladder neck. Exclusion criteria: urge incontinence, stress incontinence due to low urethral closing pressure (< 20cm/H2O) , uterovaginal descent > grade 1 cystocele, incontinence after previous vaginal repair, recurrent incontinence, at increased risk for general anesthesia (i.e.), significant respiratory or cardiac disease, former complications attributable to general anesthesia, age >70 years old) and surgical complications (BMI>35kg/m2), known or suspected intra-abdominal adhesions, history of complications with laparoscopic surgery. Loss of followup: 2.5%	1. Laparoscopic Burch colposuspension using one double-bite of polytetrafluoroethylene sutures placed on each side of the urethra under transperitoneal video laparoscopy. 2. Laparoscopic Burch colposuspension using two single-bite sutures of polytetrafluoroethylene sutures placed on each side of the urethra under transperitoneal video laparoscopy	Objective cure as negative pad test. Improvement as maximal one third of preoperative leaking volume on pad test. Failure as > one third of preoperative leaking volume on pad test. Subjective cure rate as no reported leakage.	No intention to treat. Open label. Randomization 1:1 with random numbers table. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
Zullo, 2001[667] RCT to examine effects of 2 transperitoneal laparoscopic Burch procedures on female genuine stress incontinence. Duration of followup: 1 year	60 women with mild or moderate genuine stress incontinence. Exclusion criteria: severe genuine stress incontinence (loss of urine with minimal physical activity), prolapse >2º, previous pelvic or anti-incontinence surgery, history of severe abdomino-pelvic infections or known extensive abdomino-pelvic adhesions, detrusor instability and/or intrinsic sphincter dysfunction, presence of other gynecologic pathologies (e.g., fibroids, ovarian cysts), BMI>30kg/ml. Loss of followup: 11.7%	1. Transperitoneal laparoscopic Burch procedure using nonabsorbable sutures. 2. Transperitoneal laparoscopic Burch procedure using Prolene mesh fixed with tacks or staples	The subjective self reported urine loss on a visual analog scale graded from 0 (dry sensation) to 10 (severe leakage). Subjective failure as a postoperative visual analog scale value equal to or higher than that obtained before surgery. The objective cure failure as involuntary loss of urine during cough and Valsalva maneuver in the standing position with the bladder filled to maximal cystometric capacity during clinical observation or abnormal urodynamic tests.	No Intention to treat. Single blind. Computer-generated randomization list. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified
Ankardal, 2005[668] RCT to examine effects of open Burch colpo-suspension using sutures with laparoscopic colpo-suspension using sutures and laparoscopic colpo-suspension using mesh and staples on female stress UI. Duration of followup: 1 year	Women with genuine stress urinary incontinence or mixed incontinence with a predominantly stress component. Exclusion criteria: recurrent incontinence, detrusor instability diagnosed during filling cystometry, other gynaecologic surgery, e.g. hysterectomy or anterior colporaphia. Loss of followup: 1.4%	1. Open Burch colposuspension using sutures. 2. Laparoscopic colposuspension using sutures. 3. Laparoscopic colposuspension using mesh and staples	48-hour frequency-volume chart, a 48-hour pad test and a standardized stress test. Cure was defined as a urinary leakage <8g/24 hours. Stress test cure was defined as urinary leakage <5g. The patients' degree of overall satisfaction regarding the result of the operation was also estimated using a VAS scale (0 = lowest degree of	No intention to treat. Open label. Randomization with block ratio 2:1:2. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
			satisfaction and 100 = maximum satisfaction).	
Ankardal, 2004[669] RCT to examine effects of open Burch colposuspension using sutures or laparoscopic colposuspension using mesh and staples on female stress urinary incontinence Duration of followup: 1 year	240 women with genuine stress urinary incontinence or mixed incontinence with a predominant stress component. Exclusion criteria: recurrent incontinence, need of additional gynecological surgery, extremely large 24 hours urinary volumes. Loss of followup: 2.1%	1. Open Burch colposuspension using sutures. 2. Laparoscopic transperitoneal colposuspension using polypropylene mesh and staples	Objective and subjective cure rates from 48-hour frequency-volume chart, a 48-hour pad test and a subjective assessment of the woman's incontinence and quality of life(Visual analog scale graded with maximum score of 100 for maximum bother)	No intention to treat. Open label. Central randomization with random numbers table. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified
Ross, 1996[670] RCT to examine effects of laparoscopic Burch procedure with mesh and staples or suture technique on female genuine stress incontinence. Duration of followup: 1 year	69 previously untreated women with genuine stress incontinence and hyper mobile urethrovesical junction. Exclusion criteria: previous incontinence surgery, detrusor instability, inferred intrinsic sphincter dysfunction. Loss of followup: for cure rate not reported. Urodynamic outcomes reported in 30%.	1. Laparoscopic Burch procedure with sutures for bladder neck elevation. 2. Laparoscopic Burch procedure with mesh and staples for bladder neck elevation	Objective cure as negative stress test.	No intention to treat. Open label. Randomization with random numbers table. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Klarskov, 1986[671] RCT to examine effects of pelvic floor training program or surgery on female genuine urinary stress incontinence. Duration of followup: 4 months	50 consecutive female patients with genuine urinary stress incontinence Exclusion criteria: previous surgery or pelvic floor training, significant urge incontinence, need of other gynecological surgery (prolapse, hysterectomy), mental impairment. Loss of followup: not reported. 14 patients did not have urodynamic exam.	1. Pelvic floor training program 5 times/week guided by trained physiotherapists. 2. Surgery: Burch colposuspension for anterior suspension defect. Vaginal repair for posterior bladder descent.	Self reported urinary incontinence and cystometric outcomes.	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
Albo, 2007[672] RCT of "The Stress Incontinence Surgical Treatment Efficacy Trial" to examine effects of pubovaginal sling, using autologous rectus fascia, or Burch colposuspension on female stress incontinence. Duration of followup: 24 months	655 women with predominant stress urinary incontinence for at least 3 months, positive standardized urinary stress test and urethral hyper mobility. Exclusion criteria: not reported. Loss of followup: 21%	1. Burch colposuspensions. 2. Pubovaginal sling, using autologous rectus fascia. Key elements of the two surgical procedures were standardized among all participating surgeons (the use of preoperative antibiotics, skin-incision length, number and type of Burch sutures, fascial-sling length and width, and cystoscopic evaluation of the bladder).	Overall success as no self-reported symptoms of urinary incontinence, an increase <15g in pad weight during a 24-hour pad test, no incontinence episodes recorded in a 3-day diary, a negative urinary stress test (no leakage noted on examination during cough and Valsalva maneuvers at a standardized bladder volume of 300ml), and no retreatment for urinary incontinence. Incidence if urge incontinence 6 weeks after surgery. Patient satisfaction assessed with the question; ("How satisfied or dissatisfied are you with the result of bladder surgery related to urine leakage?"). 5 response options: from "completely satisfied" to "completely dissatisfied."	No Intention to treat. Open label. Central randomization using permuted-block randomization schedule with stratification according to clinical site. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified
Carey, 2006[673] RCT to examine the effects of laparoscopic	200 women with urodynamic stress incontinence who failed conservative therapy. Exclusion criteria: previous retropubic continence surgery, maximum urethral closure pressure <20cm/H2O;	1. Laparoscopic Burch colposuspension 2. Open Burch colposuspension by Tanagho with 2 polyester	Cure as absence of USI at 6 months following surgery. Self reported quality	Intention-to-treat. Single blind. Computer generated randomization lists

Table F131. Surgical interventions on risk and progression of incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes (Incidence)	Quality Issues
Burch colposuspension and open Burch colposuspension on urinary stress incontinence. Duration of follow up: 6 months	medically unsuitable for laparoscopic or open surgery; major degrees of coexisting pelvic organ prolapse, requiring surgery other than a simple rectocele repair. Loss of follow up: 12.5%	sutures in each side and third suture if a cystocele was present	of life using. The Short Form-36 (SF-36) with lower scores for better general, physical, and mental health; the Short Urinary Distress Inventory (SUDI) and Short Incontinence Impact Questionnaire (SIIQ)	with a block size of 6, stratified for each centre and for women undergoing concomitant rectocele repair for symptomatic rectocele. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F132. Effects of surgical interventions on improvement of urinary incontinence in females (events) (table sorted by rate of improvement after active group treatment, from highest to lowest)

Author	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Cheon, 2003[656] N = 90	Laparoscopic colposuspension	Burch open colposuspension	Subjective improvement in stress urinary incontinence	38	37	80.9	86.0	0.9 (0.8; 1.1)		
Persson, 2000[666] N = 161	Laparoscopic Burch colposuspension using one double-bite of polytetrafluoroethylene sutures placed on each side of the urethra under transperitoneal video laparoscopy	Laparoscopic Burch colposuspension using two single-bite sutures of polytetrafluoroethylene sutures placed on each side of the urethra under transperitoneal video laparoscopy	Subjective improvement	25	6	32.1	7.2	**4.4 (1.9; 10.2)**	4 (15; 1)	248 (67; 667)E
Ankardal, 2004[669] N = 240	Open Burch colposuspension using sutures	Laparoscopic transperitoneal colposuspension using polypropylene mesh and staples	Improvement in Visual analog scale	37	62	30.8	51.7	**0.6 (0.4; 0.8)**	5 (3; 11)	208 (92; 293)A
Ankardal, 2005[668] N = 121	Open Burch colposuspension using sutures	Laparoscopic colposuspension using mesh and staples	Improvement in Visual analog scale	24	19	30.4	35.8	0.8 (0.5; 1.4)		
			Improvement in Visual analog scale	24	41	30.4	77.4	**0.4 (0.3; 0.6)**	2 (2; 3)	470 (336; 563)A

Table F132. Effects of surgical interventions on improvement of urinary incontinence in females (events) (table sorted by rate of improvement after active group treatment, from highest to lowest) (continued)

Author	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Klarskov, 1986[671] N = 40	Surgery: Burch colposuspension when patients had anterior suspension defect. Vaginal repair when patients had posterior bladder descent	Pelvic floor training program 5 times in weekly lessons guided by trained physiotherapists	Self reported improvement in urinary incontinence	7	14	26.9	58.3	**0.5 (0.2; 0.9)**	3 (2; 32)	314 (31; 452)A
Berglund, 1996[649] N = 45	Retropubic urethrocystopexy	Pubococcygeal repair	Improved stress urinary incontinence	8	3	26.7	20.0	1.3 (0.4; 4.3)		
Kitchener, 2006[655] N = 291	Laparoscopic colposuspension	Open abdominal retropubic colposuspension	Improvement in stress urinary incontinence with <1 leak/month	39	48	26.5	33.3	0.8 (0.6; 1.1)		
Persson, 2000[666] N = 161	Laparoscopic Burch colposuspension using one double-bite of polytetrafluoroethylene sutures placed on each side of the urethra under transperitoneal video laparoscopy	Laparoscopic Burch colposuspension using two single-bite sutures of polytetrafluoroethylene sutures placed on each side of the urethra under transperitoneal video laparoscopy	Improved pad test	20	9	25.6	10.8	**2.4 (1.1; 4.9)**	7 (63; 2)	148 (16; 420)E
Lalos, 1993[650] N = 36	Retropubic urethrocystopexy	Pubococcygeal repair	Improved stress urinary incontinence	5	3	22.7	21.4	1.1 (0.3; 3.8)		
El-Barky, 2005[645] N = 50	Burch colposuspension	Tension-free vaginal tape procedure	Improved stress urinary incontinence	4	5	16.0	20.0	0.8 (0.2; 2.6)		

Table F132. Effects of surgical interventions on improvement of urinary incontinence in females (events) (table sorted by rate of improvement after active group treatment, from highest to lowest) (continued)

Author	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Wang, 2003[646] N = 98	Modified Burch colposuspension	Tension-free vaginal taping	Objective improvement as decrease un urine loss during pad test by >50% from baseline	5	4	10.2	8.2	1.3 (0.4; 4.4)		
Colombo, 1994[662] N = 80	Burch colposuspension	Modified Marshall-Marchetti-Krantz urethropexy	Subjective improvement as clinical score of incontinence decreased; from 8 to ≤4 or from 4 to ≤2.	3	6	7.5	15.0	0.5 (0.1; 1.9)		
Liapis, 2002[642] N = 71	Burch colposuspension	Tension-free vaginal tape procedure	Improvement as reduction of urine loss to less than 50% of urine loss at baseline during 1hour pad test	2	3	6.0	7.0	0.7 (0.1; 3.9)		

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F133. Effects of surgical interventions on risk and progression of urinary incontinence in females (events)

Author	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Sand, 2000[638] N = 36	Burch procedures with four 2-0 polytetrafluoroethylene sutures and tension placed on the periurethral sutures (modified Tanagho method)	Suburethral sling with continuous polytetraflouroethylene strip from rectus fascia into Retropubic space and beneath urethra at urethrovesical junction level	De novo Detrusor instability	1	4	5.3	23.5	0.2 (0.0; 1.8)		
Culligan, 2003[640] N = 36	Burch colposuspension (Tanagho)	Suburethral sling (Horbach) with polytetrafluororthylene strip from rectum fascia beneath urethra under minimal tension	De novo Detrusor instability	1	4	5.3	23.5	0.2 (0.0; 1.8)		
Laurikainen, 2007[629] N = 273	Retropubic tension-free vaginal polypropylene tape procedure by Ulmsten	Transobturator tension-free vaginal polypropylene tape procedure by de Leval	De novo urge symptoms	3	3	2.2	2.3	1.0 (0.2; 4.7)		
Paraiso, 2004[643] N = 72	Laparoscopic Burch colposuspension	Tension-free vaginal tape procedure	Detrusor over activity	2	6	5.6	16.7	0.3 (0.1; 1.5)		
Bump, 1996[635] N = 32	Needle colposuspension	Bladder neck endopelvic fascia plication	Emptying phase dysfunction	5	7	31.0	43.0	0.7 (0.3; 1.8)		

Table F133. Effects of surgical interventions on risk and progression of urinary incontinence in females (events) (continued)

Author	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Demirci, 2001[639] N = 46	Burch colposuspension (Tanagho); 9 patients had abdominal hysterectomy with or without bilateral salpingo-oopherectomy.	McGuire's free-rectus Fascial sling from inferior leaf of rectus fascia (length 5 to 6cm, 2cm in center diameter and 1.5cm at either end; 8 patients had abdominal hysterectomy with or without bilateral salpingo-oopherectomy.	Incidence of Detrusor instability	1	1	4.3	4.3	1.0 (0.1; 15.0)		
Costantini, 2007[652] N = 66	Sacropexy combined with a Burch colposuspension	Colposacropexy, no prophylactic colposuspension	Incidence of mixed urinary Incontinence	3	2	8.8	6.3	1.4 (0.3; 7.9)		
			Incidence of stress urinary Incontinence	9	1	26.5	3.1	**8.5 (1.1; 63.1)**	4 (2; 235)	233 (4; 1,942)E
Gilja, 1998[648] N = 204	Burch retropubic urethropexy	Modified bladder neck suspension by Raz	Incidence of urge urinary incontinence	1	3	1.8	6.5	0.3 (0.0; 2.5)		
	Transvaginal Burch procedure	Modified bladder neck suspension by Raz	Incidence of urge urinary incontinence	2	3	4.5	6.5	0.7 (0.1; 4.0)		
Costantini, 2007[652] N = 66	Sacropexy combined with a Burch colposuspension	Colposacropexy, no prophylactic colposuspension	Incidence of urinary Incontinence	12	3	35.3	9.4	**3.8 (1.2; 12.1)**	4 (1;63)	259 (16; 1,043)E
			Incidence of urinary Incontinence in those with MUCP<35cm/H20	5	2	14.7	6.3	2.4 (0.5; 11.3)		

Table F133. Effects of surgical interventions on risk and progression of urinary incontinence in females (events) (continued)

Author	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
			Incidence of urinary Incontinence in those with MUCP>35cm/H20	6	1	17.6	3.1	5.6 (0.7; 44.4(		
El-Barky, 2005[645] N = 50	Burch colposuspension	Tension-free vaginal tape procedure	Incidence of urinary urgency	3	2	12.0	8.0	1.5 (0.3; 8.2)		
German, 1994[658] N = 50	Modified needle suspension procedure	Vagina/obturator shelf procedure	Incidence of urinary urgency	2	1	7.7	4.2	1.8 (0.2; 19.1)		
Ankardal, 2005[668] N = 211	Open Burch colposuspension using sutures	Laparoscopic colposuspension using sutures	Leakage <5g at stress test	55	43	69.6	81.1	0.9 (0.7; 1.0)		
	Open Burch colposuspension using sutures	Laparoscopic colposuspension using mesh and staples	Leakage <5g at stress test	55	44	69.6	83.0	0.8 (0.7; 1.0)		
	Open Burch colposuspension using sutures	Laparoscopic colposuspension using sutures	Leakage<8g/ 24 hour at 48-hour pad test	56	39	70.9	73.6	1.0 (0.8; 1.2)		
	Open Burch colposuspension using sutures	Laparoscopic colposuspension using mesh and staples	Leakage<8g /24 hour at 48-hour pad test	56	51	70.9	96.2	**0.7 (0.6; 0.9)**	4 (3; 7)	253 (138;353)A
Ankardal, 2004[669] N = 240	Open Burch colposuspension using sutures	Laparoscopic transperitoneal colposuspension using mesh and staples	Leakage<8g /24 hour at 48-hour pad test	84	71	70.0	59.2	1.2 (1.0; 1.4)		
Colombo, 1996[633] N = 107	Cystopexy alone	Cystopexy with posterior pubourethral ligaments plication	negative cotton swab test 6 months after surgery	23	40	42.6	75.5	**0.6 (0.4; 0.8)**	3 (2; 7)	329 (153;453)A

Table F133. Effects of surgical interventions on risk and progression of urinary incontinence in females (events) (continued)

Author	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Kammerer-Doak, 1999[664] N = 35	Burch retropubic urethropexy	Modified anterior colporrhaphy	Pad weight <1g	15	6	78.9	37.5	**2.1 (1.1; 4.1)**	2 (36; 1)	414 (27; 1,174)E
Culligan, 2003[640] N = 36	Burch colposuspension (Tanagho)	Suburethral sling (Horbach) with polytetrafluororthylene strip from rectum fascia beneath urethra under minimal tension.	Positive pad test	1	0	7.6	0.1	2.7 (0.1; 62.2)		
Ustun, 2003[644] N = 46	Laparoscopic Burch colposuspension	Tension-free vaginal tape procedure	Positive Q-Tip test	0	2	0.1	8.6	0.2 (0.0; 4.0)		
Bergman, 1989[665] N = 127	Burch urethropexy	Modified Pereyra needle urethropexy	Positive Q-tip test (>35 degrees)	1	18	2.6	52.9	**0.0 (0.0; 0.4)**	2 (2; 3)	503 (343;526)A
	Burch urethropexy	Anterior colporrhaphy with Kelly plication	Positive Q-tip test (>35 degrees)	1	27	2.6	77.1	**0.0 (0.0; 0.2)**	1 (1; 2)	745 (588;768)A
Culligan, 2003[640] N = 36	Burch colposuspension (Tanagho)	Suburethral sling (Horbach) with polytetrafluororthylene strip from rectum fascia beneath urethra under minimal tension.	Positive stress test	3	0	15.4	0.1	6.3 (0.3; 113.8)		
Brubaker, 2006[634] N = 322	Sacrocolpopexy with Burch colposuspension	Sacrocolpopexy alone	Positive Stress testing (bladder volume at maximum cystometric capacity of 300ml)	7	14	4.7	8.6	0.5 (0.2; 1.3)		

Table F133. Effects of surgical interventions on risk and progression of urinary incontinence in females (events) (continued)

Author	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Colombo, 1997[636] N = 109	Posterior pubourethral ligament placation	Pereyra suspension	Self reported stress urinary incontinence	20	21	36.4	38.9	0.9 (0.6; 1.5)		
Brubaker, 2006[634] N = 322	Sacrocolpopexy with Burch colposuspension	Sacrocolpopexy alone	Self reported symptoms of stress incontinence 3 months after surgery	29	60	19.0	39.7	**0.5 (0.3; 0.7)**	5 (4; 10)	207 (100; 260)A
	Sacrocolpopexy with Burch colposuspension	Sacrocolpopexy alone	Self reported urge urinary incontinence 3 months after surgery	10	18	6.8	11.9	0.6 (0.3; 1.2)		
	Sacrocolpopexy with Burch colposuspension	Sacrocolpopexy alone	Self reported urinary urgency 3 months after surgery	9	14	5.9	9.2	0.7 (0.3; 1.5)		
	Sacrocolpopexy with Burch colposuspension	Sacrocolpopexy alone	Stress incontinence 3 months after surgery	35	67	23.8	44.1	**0.5 (0.4; 0.8)**	5 (4; 10)	203 (99; 270)A
Osman, 2003[651] N = 75	Burch retropubic suspension or Pubovaginal sling	Oxybutynin hydrochloride 5mg 3 times/day	Stress urinary incontinence	1	12	2.0	48.0	**0.0 (0.0; 0.3)**	2 (2; 3)	460 (335; 477)A
Colombo, , 1996[633] N = 107	Cystopexy alone	Cystopexy with posterior pubourethral ligaments plication	Stress urinary incontinence 1 year after surgery	4	4	7.4	7.5	1.0 (0.3; 3.7)		
	Cystopexy alone	Cystopexy with posterior pubourethral ligaments plication	Stress urinary incontinence 6 months after surgery	4	3	7.4	5.7	1.3 (0.3; 5.6)		

Table F133. Effects of surgical interventions on risk and progression of urinary incontinence in females (events) (continued)

Author	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Brubaker, 2006[634] N = 322	Sacrocolpopexy with Burch colposuspension	Sacrocolpopexy alone	Urge outcome 3 months after surgery	50	58	32.7	38.4	0.9 (0.7; 1.2)		
Paraiso, 2004[643] N = 72	Laparoscopic Burch colposuspension	Tension-free vaginal tape procedure	Urge urinary incontinence	11	5	30.0	15.0	2.2 (0.9; 5.7)		
Osman, 2003[651] N = 75	Burch retropubic suspension or Pubovaginal sling	Oxybutynin hydrochloride 5mg 3 times/day	Urge urinary incontinence	4	0	8.0	0.0	4.6 (0.3; 82.0)		
Kammerer -Doak, 1999[664] N = 35	Burch retropubic urethropexy	Modified anterior colporrhaphy	Urinary urgency several times/week	4	8	21.1	50.0	0.4 (0.2; 1.1)		
Paraiso, 2004[643] N = 72	Laparoscopic Burch colposuspension	Tension-free vaginal tape procedure	Urodynamic stress incontinence	6	1	16.7	2.8	6.0 (0.8; 47.4)		
			Using pads for urinary incontinence	11	10	30.0	29.0	1.1 (0.5; 2.3)		
Brubaker, 2006[634] N = 322	Sacrocolpopexy with Burch colposuspension	Sacrocolpopexy alone	Bothersome stress incontinence 3 months after surgery	9	37	6.1	24.5	**0.3 (0.1; 0.5)**	5 (5; 8)	184 (120; 214)A
Albo, 2007[672] N = 655	Burch colposuspension	Pubovaginal sling, using autologous rectus fascia	Voiding dysfunction	7	46	2.0	14.0	**0.2 (0.1; 0.3)**	8 (8; 11)	120 (94; 130)A
			Incidence of urge incontinence	11	11	3.3	3.4	1.0 (0.4; 2.3)		
			Postoperative urge incontinence that needed treatment	65	87	19.8	26.7	0.7 (0.6; 1.0)		
			Persistent urge incontinence	59	79	17.9	24.2	0.7 (0.5; 1.0)		

Table F133. Effects of surgical interventions on risk and progression of urinary incontinence in females (events) (continued)

Author	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
			Treatment failure	179	151	54.3	46.3	**1.2 (1.0; 1.4)**	13 (459; 6)	79 (2; 169)E
			Positive stress test	74	34	22.5	10.6	**2.2 (1.5; 3.1)**	8 (20; 4)	119 (51; 226)E
Carey, 2006[673] N = 200 6 months	Laparoscopic Burch colposuspension	Open Burch colposuspension	Self reported urinary stress incontinence	20	23	19.23	23.96	0.80 (0.47; 1.37)		
			Detrusor overactivity	13	10	12.50	10.42	1.20 (0.55; 2.61)		
			Self reported urinary stress incontinence and/or Detrusor overactivity	29	30	27.88	31.25	0.89 (0.58; 1.37)		
			Stress incontinence Occasionally	18	24	17.31	25.00	0.69 (0.40; 1.19)		
			Stress incontinence Frequently	9	5	8.65	5.21	1.66 (0.58; 4.78)		
			Urinary urgency: Occasionally	44	30	42.31	31.25	1.35 (0.93; 1.96)		
			Urinary urgency: Frequently	9	17	8.65	17.71	0.49 (0.23; 1.04)		
			Urge incontinence: Occasionally	334	29	32.69	30.21	1.08 (0.72; 1.63)		
			Urge incontinence Frequently	9	13	8.65	13.54	0.64 (0.29; 1.43)		

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group) ; A - avoided; E- excessive events

Table F134. Effect of surgical interventions on self reported severity of urinary incontinence in females

Author	Active	Control	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95%CI)	Change % From Control (95%CI)
Kammerer-Doak, 1999[664] N = 35	Burch retropubic urethropexy	Modified anterior colporrhaphy	Self assessment score (1 =dry, 10 = severe leakage)	1.0 ± 4.7	5.0 ± 2.7	**-1.0 (-1.7; -0.3)**	-20.6 (-34.8; -6.4)
Brubaker, 2006[634] N = 322	Sacrocolpopexy with Burch colposuspension	Sacrocolpopexy alone	Medical, Epidemiological, and Social Aspects of Aging score for stress incontinence (0-never to 3-often for 9 questions)	13.3 ± 19.0	23.3 ± 24.7	**-0.5 (-0.7; -0.2)**	-1.9 (-2.9; -1.0)
Klarskov, 1986[671] N = 40	Surgery: Burch colposuspension when patients had anterior suspension defect. Vaginal repair when patients had posterior bladder descent	Pelvic floor training program 5 times in weekly lessons guided by trained physiotherapists	Number of incontinence episodes/3 days	0.0 9± .3	2.0 ± 12.0	-0.2 (-0.7; 0.4)	-9.4 (-37.2; 18.5)
Kammerer-Doak1999[664] N = 35	Burch retropubic urethropexy	Modified anterior colporrhaphy	Overall quality of life according to the Incontinence Impact Questionnaire	0.3 ± 0.2	0.9 ±0.0	**-4.3 (-5.5; -3.0)**	-469.7 (-604.6; -334.9)
			Incontinence episodes/week	0.0 ± 4.0	4.0 ± 1.3	**-1.3 (-2.0; -0.6)**	-32.4 (-50.8; -14.0)
			Pads/week	0.0 ± 2.7	3.0 ± 0.7	**-1.5 (-2.2; -0.7)**	-49.5 (-74.7; -24.3)

Table F134. Effect of surgical interventions on self reported severity of urinary incontinence in females (continued)

Author	Active	Control	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95%CI)	Change % From Control (95%CI)
Brubaker2006[634] N = 322	Sacrocolpopexy with Burch colposuspension	Sacrocolpopexy alone	Medical, Epidemiological, and Social Aspects of Aging score for urinary urge (0-never to 3-often for 9 questions)	11.8 ± 14.0	16.8 ± 18.8	**-0.3 (-0.5; -0.1)**	-1.8 (-3.1; -0.5)
Paraiso, 2004[643] N = 72	Laparoscopic Burch colposuspension	Tension-free vaginal tape procedure	Questionnaire with scores range from 0 to 400, with larger scores indicating greater adverse impact on quality of life.	38.0 ± 51.0	49.0 ± 38.0	-0.2 (-0.7; 0.2)	-0.5 (-1.4; 0.4)
	Laparoscopic Burch colposuspension	Tension-free vaginal tape procedure	Urogenital Distress Inventory scores from 0 to 300, larger scores indicating greater distress	4.0 ± 2.0	6.0 ± 2.0	**-1.0 (-1.5; -0.5)**	-16.7 (-24.8; -8.5)
	Laparoscopic Burch colposuspension	Tension-free vaginal tape procedure	Incontinence episodes/week	0.4 ± 1.6	1.8 ± 5.1	-0.4 (-0.8; 0.1)	-20.6 (-46.5; 5.3)
Kitchener, 2006[655] N = 291	Laparoscopic colposuspension	Open abdominal retropubic colposuspension	Physical subscale in quality of life (SF-36 scores)	79.3 ± 27.6	77.6 ± 27.7	0.1 (-0.2; 0.3)	0.1 (-0.2; 0.4)
Ankardal, 2004[669] N = 240	Open Burch colposuspension using sutures	Laparoscopic transperitoneal colposuspension using polypropylene mesh and staples	Quality of life: working ability (100 = maximum bother)	0.0 ± 0.0	0.0 ± 8.7		

Table F134. Effect of surgical interventions on self reported severity of urinary incontinence in females (continued)

Author	Active	Control	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95%CI)	Change % From Control (95%CI)
Laurikainen, 2007[629] N = 273	Retropubic tension-free vaginal polypropylene tape procedure by Ulmsten	Transobturator tension-free vaginal polypropylene tape procedure by de Leval	Urogenital Distress Inventory–Short Form	7.0 ± 2.0	7.0 ± 1.0	0.0 (-0.2; 0.2)	0.0 (-3.4; 3.4)
			Incontinence Impact Questionnaire–Short Form	8.0 ± 2.0	7.0 ± 2.0	**0.5 (0.3; 0.7)**	7.1 (3.7; 10.6)
			Visual analog scale	7.0 ± 14.0	6.0 ± 1.0	0.1 (-0.1; 0.3)	1.7 (-2.3; 5.7)
			Detrusor Instability Score	2.0 ± 2.0	2.0 ± 2.0	0.0 (-0.2; 0.2)	0.0 (-12.0; 12.0)
			Urinary Incontinence Severity Score	0.7 ± 1.6	0.4 ± 1.0	0.2 (0.0; 0.5)	56.0 (-4.0; 116.1)
Ankardal, [669] N = 240	Open Burch colposuspension using sutures	Laparoscopic transperitoneal colposuspension using polypropylene mesh and staples	Quality of life: social life (100 = maximum bother)	0.0 ± 0.0	0.0 ± 13.3		
			Quality of life: physical activity (100 = maximum bother)	0.0 ± 2.7	1.0 ± 30.7	0.0 (-0.3; 0.2)	-4.6 (-29.9; 20.7)
Laurikainen, [629] N = 273	Retropubic tension-free vaginal polypropylene tape procedure by Ulmsten	Transobturator tension-free vaginal polypropylene tape procedure by de Leval	Euro Quality-of-Life Five Dimensions Index	0.9 ± 0.1	0.9 ± 0.1	-0.1 (-0.4; 0.1)	-12.8 (-38.4; 12.8)
Roovers, 2004[637] N = 82	Vaginal hysterectomy (combined with anterior and/or posterior colporraphy)	Abdominal sacro-colpopexy (with preservation of the uterus) on Urogenital function	Urogenital distress inventory scores for overactive bladder	9.4 ± 2.2	18.1 ± 3.5	**-3.0 (-3.6; -2.3)**	-16.4 (-19.9; -12.9)
			Urogenital distress inventory scores for urinary incontinence	7.2 ± 2.1	13.2 ± 3.5	**-2.1 (-2.6; -1.5)**	-15.7 (-19.8; -11.7)
Carey, 2006[673] N = 200	Laparoscopic Burch	Open Burch colposuspension	General health	2.60 ± 1.02	2.22 ± 1.06	0.37 (0.09; 0.65)	16.47 (3.87; 29.07)

Table F134. Effect of surgical interventions on self reported severity of urinary incontinence in females (continued)

Author	Active	Control	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95%CI)	Change % From Control (95%CI)
	colposuspension		SF-36 Physical Component Summary	49.54 ± 10.41	49.14 ± 11.21	0.04 (-0.24; 0.31)	0.08 (-0.49; 0.64)
			SF-36 Mental Component Summary	42.70 ± 13.03	48.31 ± 10.01	-0.48 (-0.76; -0.20)	-0.99 (-1.58; -0.41)
			the Short Urinary Distress Inventory	23.92 ± 17.90	21.56 ± 16.92	0.14 (-0.14; 0.41)	0.63 (-0.66; 1.92)
			Short Incontinence Impact Questionnaire	31.40 ± 23.83	26.87 ± 29.36	0.17 (-0.11; 0.45)	0.63 (-0.40;)1.67

Bold- significant differences in outcomes at 95% confidence level

Table F135. Effect of surgical interventions on progression of urinary incontinence in females (severity measures)

Author	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean difference (95%CI)	Change % From Control (95%CI)
Demirci, 2001[639] N = 46	Burch colposuspension (Tanagho), 9 patients had abdominal hysterectomy with or without bilateral salpingo-oopherectomy.	McGuire's free-rectus Fascial sling from inferior leaf of rectus fascia (length 5 to 6cm, 2cm in center diameter and 1.5cm at either end; 8 patients had abdominal hysterectomy with or without bilateral salpingo-oopherectomy.	Bladder neck position, (mm)	25.0 ± 4.6	24.4 ± 3.7	0.2 (-0.4; 0.7)	0.6 (-1.7; 3.0)
Culligan, 2003[640] N = 36	Burch colposuspension (Tanagho)	Suburethral sling (Horbach) with polytetrafluororthylene strip from rectum fascia beneath urethra under minimal tension.	Post void residual volume (ml)	51.8 ± 89.7	31.1 ± 27.0	0.3 (-0.4; 1.0)	1.0 (-1.1; 3.1)
			Average flow rate during void (ml/second)	4.7 ± 3.0	4.8 ± 2.8	0.0 (-0.7; 0.6)	-0.7 (-14.3; 12.9)
			Maximum cystometric capacity (ml)	398.0 ± 76.8	444.0 ± 95.9	-0.5 (-1.2; 0.1)	-0.1 (-0.3; 0.0)
			Functional urethral length (mm)	25.7 ± 10.0	27.2 ± 7.3	-0.2 (-0.8; 0.5)	-0.6 (-3.0; 1.8)
			Pressure transmission ratio	1.1 ± 0.2	1.5 ± 0.4	-1.4 (-2.1; -0.7)	-91.3 (-139.0; -43.6)
			Maximum urethral closure pressure (cm/H2O)	16.4 ± 8.2	39.8 ± 23.0	-1.4 (-2.1; -0.7)	-3.5 (-5.3; -1.6)
Ustun, 2003[644] N = 46	Laparoscopic Burch colposuspension	Tension-free vaginal tape procedure	Bladder capacity, (ml)	489.4 ± 1,16.0	484. ± 140.1	0.0 (-0.5; 0.6)	0.0 (-0.1; 0.1)
Lalos, 1993[650] N = 36	Retropubic urethrocystopexy	Pubococcygeal repair	Maximal flow rate	19.5 ± 19.7	18.0 ± 10.7	0.1 (-0.6; 0.8)	0.5 (-3.2; 4.2)
			Bladder volume, (ml)	567.5 ± 178.3	662.5 ± 171.7	-0.5 (-1.2; 0.1)	-0.1 (-0.2; 0.0)

Table F135. Effect of surgical interventions on progression of urinary incontinence in females (severity measures) (continued)

Author	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean difference (95%CI)	Change % From Control (95%CI)
Colombo, 1996[647] N = 36	Burch colposuspension with placement of two couples of permanent polybutylate-coated polyester sutures	Abdominal paravaginal defect repair with 5-7 pairs of permanent braided silicone-coated polyester suture.	Maximum straining angle at cotton swab test	17.4 ± 5.8	31.4 ± 11.2	-1.6 (-2.3; -0.8)	-5.0 (-7.4; -2.6)
Wang, 2003[646] N = 98	Modified Burch colposuspension	Tension-free vaginal taping	PdetQmax (cm/H2O)	13.0 ± 18.7	17.0 ± 38.7	-0.1 (-0.5; 0.3)	-0.8 (-3.1; 1.6)
			Pdetmax (cm/H2O)	30.0 ± 58.7	28.0 ± 45.3	0.0 (-0.4; 0.4)	0.1 (-1.3; 1.6)
			Residual urine (ml)	20.0 ± 320.0	20.0 ± 53.3	0.0 (-0.4; 0.4)	0.0 (-2.0; 2.0)
Ustun, 2003[644] N = 46	Laparoscopic Burch colposuspension	Tension-free vaginal tape procedure	First desire to mixture (ml)	158.2 ± 112.5	161.7 ± 58.7	0.0 (-0.6; 0.5 0	0.0 (-0.4; 0.3)
Wang, 2003[646] N = 98	Modified Burch colposuspension	Tension-free vaginal taping	Volume voided (ml)	271.0 ± 283.3	255.0 ± 342.7	0.1 (-0.3; 0.4)	0.0 (-0.1; 0.2)
Sand, , 2000[638] N = 36	Burch procedures with four 2-0 polytetrafluoroethylene sutures and tension placed on the periurethral sutures (modified Tanagho method)	Suburethral sling with continuous polytetraflouroethylene strip from rectus fascia into Retropubic space and beneath urethra at urethrovesical junction level	Pressure transmission ratio	1.1 ± 0.2	1.5 ± 0.4	-1.4 (-2.1; -0.7)	-91.3 (-139.0; -43.6)
Ustun, 2003[644] N = 46	Laparoscopic Burch colposuspension	Tension-free vaginal tape procedure	Maximum flow rate (ml/second)	42.9 ± 8.1	35.9 ± 9.3	0.8 (0.2; 1.4)	2.2 (0.6; 3.9)
			Maximum Detrusor activity (cm/H20)	12.0 ± 6.2	9.2 ± 6.4	0.4 (-0.1; 1.0)	4.9 (-1.5; 11.3)
			Leak point pressure (cm/H20)	68.3 ± 22.3	104.7 ± 9.1	-2.1 (-2.9; -1.4)	-2.0 (-2.7; -1.3)
Liapis, 2002[642] N = 71	Burch colposuspension	Tension-free vaginal tape procedure	Peak flow rate (ml/second)	25.8 ± 9.5	26.7 ± 9.0	-0.1 (-0.6; 0.4)	-0.4 (-2.1; 1.4)

Table F135. Effect of surgical interventions on progression of urinary incontinence in females (severity measures) (continued)

Author	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean difference (95%CI)	Change % From Control (95%CI)
Culligan, 2003[640] N = 36	Burch colposuspension (Tanagho)	Suburethral sling (Horbach) with polytetrafluororthylene strip from rectum fascia beneath urethra under minimal tension.	Average flow rate during void (ml/second)			0.58 (-2.5; 4.4)	
Wang, 2003[646] N = 98	Modified Burch colposuspension	Tension-free vaginal taping	FreeQmax (ml/second)	19.1 ± 16.2	19.0 ± 19.2	0.0 (-0.4; 0.4)	0.0 (-2.1; 2.1)
Bump, 1996[635] N = 32	Needle colposuspension	Bladder neck endopelvic fascia plication	Mean pressure transmission %6 weeks after operation	120.0 ± 22.0	94.0 ± 14.0	**1.4 (0.6; 2.2)**	1.5 (0.7; 2.3)
			Mean closure pressure (cm/H20) 6 weeks after operation	16.0 ± 4.0	21.0 ± 12.0	-0.6 (-1.3; 0.1)	-2.7 (-6.0; 0.7)
			Maximum closure pressure (cm/H20) 6 weeks after operation	35.0 ± 21.0	27.0 ± 10.0	0.5 (-0.2; 1.2)	1.8 (-0.8; 4.4)
			Functional length (mm) 6 weeks after operation	35.0 ± 12.0	25.0 ± 6.0	**1.1 (0.3; 1.8)**	4.2 (1.2; 7.2)
Colombo, 1996[633] N = 107	Cystopexy alone	Cystopexy with posterior pubourethral ligaments plication	Maximum urethral closure pressure (cm/H2O) 6 months after surgery	72.8 ± 30.0	75.6 ± 36.4	-0.1 (-0.5; 0.3)	-0.1 (-0.6; 0.4)
Bump1996[635] N = 32	Needle colposuspension	Bladder neck endopelvic fascia plication	Maximum closure pressure (cm/H20) 6 months after operation	47.0 ± 29.0	44.0 ± 23.0	0.1 (-0.6; 0.8)	0.3 (-1.3; 1.8)

Table F135. Effect of surgical interventions on progression of urinary incontinence in females (severity measures) (continued)

Author	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean difference (95%CI)	Change % From Control (95%CI)
	Needle colposuspension	Bladder neck endopelvic fascia plication	Mean closure pressure (cm/H20) 6 months after operation	25.0 ± 12.0	26.0 ± 12.0	-0.1 (-0.8; 0.6)	-0.3 (-3.0; 2.3)
Colombo, 1996[633] N = 107	Cystopexy alone	Cystopexy with posterior pubourethral ligaments plication	Urethral functional length (mm) 6 months after surgery	25.7 ± 5.4	28.1 ± 5.3	**-0.4 (-0.8; -0.1)**	-1.6 (-3.0; -0.2)
Sand, 2000[638] N = 36	Burch procedures with four 2-0 polytetrafluoroethylene sutures and tension placed on the periurethral sutures (modified Tanagho method)	Suburethral sling with continuous polytetraflouroethylene strip from rectus fascia into Retropubic space and beneath urethra at urethrovesical junction level	Functional urethral length (mm)	25.7 ± 10.0	27.2 ± 7.3	-0.2 (-0.8; 0.5)	-0.6 (-3.0; 1.8)
			Maximum voiding Detrusor pressure (cm/H2O)	21.3 ±8.0	28.8 ± 12.3	**-0.7 (-1.4; -0.1)**	-2.5 (-4.9; -0.2)
			Average flow rate during void (ml/second)	4.7 ± 3.0	4.8 ± 2.8	0.0 (-0.7; 0.6)	-0.7 (-14.3; 12.9)
			Maximum flow rate during void (ml/second)	10.6 ± 5.3	13.5 ± 6.6	-0.5 (-1.2; 0.2)	-3.6 (-8.5; 1.3)
			Post void residual volume (ml)	51.8 ± 89.7	31.1 ± 27.0	0.3 (-0.4; 1.0)	1.0 (-1.1; 3.1)
Bump, 1996[635] N = 32	Needle colposuspension	Bladder neck endopelvic fascia plication	Functional length (mm) 6 months after operation	25.0 ± 7.0	25.0 ± 7.0	0.0 (-0.7; 0.7)	0.0 (-2.8; 2.8)
Sand, 2000[638] N = 36	Burch procedures with four 2-0 polytetrafluoroethylene sutures and tension placed on the periurethral sutures (modified Tanagho method)	Suburethral sling with continuous polytetraflouroethylene strip from rectus fascia into Retropubic space and beneath urethra at urethrovesical junction level	Maximum urethral closure pressure (cm/H2O)	16.4 ± 8.2	39.8 ± 23.0	**-1.4 (-2.1; -0.7)**	-3.5 (-5.3; -1.6)
Lalos, 1993[650] N = 36	Retropubic urethrocystopexy	Pubococcygeal repair	Urethral length, (mm)	25.0 ± 8.7	26.0 ± 6.7	-0.1 (-0.8; 0.5)	-0.5 (-3.1; 2.1)

Table F135. Effect of surgical interventions on progression of urinary incontinence in females (severity measures) (continued)

Author	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean difference (95%CI)	Change % From Control (95%CI)
Colombo, 1997[636] N = 109	Posterior pubourethral ligament placation	Pereyra suspension	Maximum urethral closure pressure (cm/H2O)	56.2 ± 23.5	70.6 ± 35.9	**-0.5 (-0.9; -0.1)**	-0.7 (-1.2; -0.1)
Culligan, 2003[640] N = 36	Burch colposuspension (Tanagho)	Suburethral sling (Horbach) with polytetrafluororthylene strip from rectum fascia beneath urethra under minimal tension	Maximum voiding Detrusor pressure (cm/H2O)	21.3 ± 8.0	28.8 ± 12.3	**-0.7 (-1.4; -0.1)**	-2.5 (-4.9; -0.2)
Colombo, 1997[636] N = 109	Posterior pubourethral ligament placation	Pereyra suspension	Urethral functional length (mm)	26.8 ± 4.2	25.5 ± 4.9	0.3 (-0.1; 0.7)	1.1 (-0.4; 2.6)
Bump, 1996[635] N = 32	needle colposuspension	Bladder neck endopelvic fascia plication	Mean pressure transmission % 6 months after operation	125.0 ± 55.0	104.0 ± 30.0	0.5 (-0.2; 1.2)	0.5 (-0.2; 1.1)
Su, 1997[657] N = 92	Laparoscopic colposuspension	Open Burch colposuspension	Bladder neck position, rest	0.8 ± 0.4	0.9 ± 0.5	-0.3 (-0.7; 0.1)	-34.2 (-80.9; 12.5)
Kammerer-Doak, 1999[664] N = 35	Burch retropubic urethropexy	Modified anterior colporrhaphy	Proximal transmission ratio	102.4 ± 15.0	77.2 ± 23.0	**1.3 (0.6; 2.1)**	1.7 (0.8; 2.7)
Cheon, 2003[656] N = 90	Laparoscopic colposuspension	Burch open colposuspension	Urine loss in pad test ,g	3.6 ± 11.1	4.4 ± 20.3	0.0 (-0.5; 0.4)	-1.1 (-10.5; 8.3)
Bergman, 1995[663] N = 127	Burch urethropexy	Modified Pereyra needle urethropexy	Urethral functional test	2.3 ± 1.3	2.9 ± 1.3	-0.5 (-0.9; 0.0)	-15.9 (-32.0; 0.1)
			Urethral closure pressure	25.0 ± 10.0	36.0 ± 9.0	**-1.2 (-1.7; -0.7)**	-3.2 (-4.6; -1.8)
Su, 1997[657] N = 92	Laparoscopic colposuspension	Open Burch colposuspension	Volume at first desire to void, ml	175.9 ± 65.3	164.4 ± 26.0	0.2 (-0.2; 0.6)	0.1 (-0.1; 0.4)
			Maximum cystometric capacity, ml	344.9 ± 52.7	335.3 ± 40.1	0.2 (-0.2; 0.6)	0.1 (-0.1; 0.2)
			Maximal urethral pressure (cm/H20)	78.3 ± 16.9	82.5 ± 19.8	-0.2 (-0.6; 0.2)	-0.3 (-0.8; 0.2)

Table F135. Effect of surgical interventions on progression of urinary incontinence in females (severity measures) (continued)

Author	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean difference (95%CI)	Change % From Control (95%CI)
			Urethral closure pressure at rest (cm/H20)	67.1 ± 16.6	71.2 ± 18.1	-0.2 (-0.6; 0.2)	-0.3 (-0.9; 0.2)
Bergman, 1995[663] N = 127	Burch urethropexy	Modified Pereyra needle urethropexy	Pressure transmission ratio	89.0 ± 6.0	89.0 ± 10.0	0.0 (-0.5; 0.5)	0.0 (-0.5; 0.5)
Su, 1997[657] N = 92	Laparoscopic colposuspension	Open Burch colposuspension	Minimal urethral resistance	0.2 ± 0.2	0.3 ± 0.3	-0.3 (-0.7; 0.1)	-99.9 (-223.8; 24.1)
Kammerer-Doak, 1999[664] N = 35	Burch retropubic urethropexy	Modified anterior colporrhaphy	Midurethral pressure transmission ratio	94.3 ± 11.0	75.7 ± 13.0	**1.6 (0.8; 2.3)**	2.1 (1.0; 3.1)
Bergman, 1995[663] N = 127	Burch urethropexy	Anterior colporrhaphy with Kelly plication	Urethral functional test	2.3 ± 1.3	3.1 ± 1.3	**-0.6 (-1.1; -0.1)**	-19.9 (-35.0; -4.7)
Su, 1997[657] N = 92	Laparoscopic colposuspension	Open Burch colposuspension	Urine loss in 1 hour pad test	1.6 ± 4.9	2.9 ± 8.4	-0.2 (-0.6; 0.2)	-6.4 (-20.4; 7.5)
			Bladder neck position, stress	0.2 ± 0.5	0.6 ± 0.6	**-0.7 (-1.2; -0.3)**	-132.6 (-209.4; -55.8)
Bergman, 1995[663] N = 127	Burch urethropexy	Anterior colporrhaphy with Kelly plication	Urethral closure pressure	25.0 ± 10.0	44.0 ± 22.0	**-1.1 (-1.6; -0.6)**	-2.6 (-3.7; -1.4)
			Pressure transmission ratio	89.0 ± 6.0	74.0 ± 14.0	**1.4 (0.9; 1.9)**	1.9 (1.2; 2.6)
Colombo, 1994[662] N = 80	Burch colposuspension	Modified Marshall-Marchetti-Krantz urethropexy	Urethral resistance	0.6 ± 0.1	0.3 ± 0.1	**3.0 (2.3; 3.6)**	1,017.8 (797.9; 1,237.7)
			Detrusor pressure at peak flow, cm/H20	28.7 ± 12.6	21.4 ± 11.8	**0.6 (0.1; 1.0)**	2.8 (0.7; 4.9)
			Mean flow, ml/second	8.8 ± 4.8	6.7 ± 4.2	0.5 (0.0; 0.9)	6.9 (0.3; 13.6)
			Peak flow. Ml/second	13.0 ± 5.6	16.5 ± 7.7	**-0.5 (-1.0; -0.1)**	-3.2 (-5.9; -0.4)
Quadri, 1999[661] N = 30	Burch colposuspensions	Marshall-Marchetti-Krantz urethropexy with video urethroscopic control	Urethral functional length (mm) in cured	21.5 ± 4.2	23.6 ± 7.5	-0.3 (-1.1; 0.4)	-1.5 (-4.5; 1.6)
			Maximum urethral closure pressure (cm/H2O) in cured	20.3 ± 6.3	23.9 ± 12.1	-0.4 (-1.1; 0.3)	-1.6 (-4.6; 1.5)

Table F135. Effect of surgical interventions on progression of urinary incontinence in females (severity measures) (continued)

Author	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean difference (95%CI)	Change % From Control (95%CI)
Laurikainen, 2007[629] N = 273	Retropubic tension-free vaginal polypropylene tape procedure by Ulmsten	Transobturator tension-free vaginal polypropylene tape procedure by de Leval	Post void residual urine volume	28.0 ± 49.0	43.0 ± 78.0	-0.2 (-0.5; 0.0)	-0.5 (-1.1; 0.0)
Culligan, 2003[640] N = 36	Burch colposuspension (Tanagho)	Suburethral sling (Horbach) with polytetrafluororthylene strip from rectum fascia beneath urethra under minimal tension.	Maximum flow rate during void (ml/second)	10.6 ± 5.3	13.5 ± 6.6	-0.5 (-1.2; 0.2)	-3.6 (-8.5; 1.3)
Su, 1997[657] N = 92	Laparoscopic colposuspension	Open Burch colposuspension	Transmission ratio, Q4	0.3 ± 0.2	0.2 ± 0.2	0.4 (-0.1; 0.8)	149.1 (-21.2; 319.3)

Bold- significant differences in outcomes at 95% confidence level

Table F136. Effects of radiotherapy on urinary incontinence in adults with adenocarcinoma of the rectum

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Peeters, 2005,[674] RCT to examine effects of preoperative short-term radiotherapy in patients treated with total mesorectal excision. Duration of followup: 5 years	1,861 patients with histologically confirmed adenocarcinoma of the rectum with inferior margin of the tumor had <15cm from the anal verge and below the level of S1 and S2. Exclusion criteria: distant metastases, fixed tumors, locally treated (transanal resected) tumors. Loss of followup: 32%, 597responded to questionnaire.	1. Radiotherapy with total dose of 25Gy administered in 5 fractions over 5 to 7 days before total mesorectal excision. 2. Total mesorectal excision	Self reported urinary and fecal incontinence with 4-point scale from “no, never” to “sometimes” (<1/week), “often” (>1/ week but not every day), and “yes, always” (every day) for time-dependent symptoms and from “no, not at all” to “a little,” “pretty much,” and “very seriously” for time-independent symptoms.	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F137. Effects of radiotherapy on urinary incontinence in 597 adults (38% women) adenocarcinoma of the rectum (events)

Active	Control	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Peeters, 2005[674] Radiotherapy with total dose of 25Gy administered in 5 fractions over 5 to 7 days before total mesorectal excision.	Total mesorectal excision	Use of pads for urinary incontinence	67	62	21.9	21.3	1.0 (0.8; 1.4)		
	Total mesorectal excision	Urinary incontinence	118	109	38.6	37.5	1.0 (0.8; 1.3)		
Pollack, 2006[675] N = 1,406 56% female Followup 180 Abdominal rectal resection with preoperative radiotherapy	Abdominal rectal resection without preoperative radiotherapy	Urinary incontinence	29	20	4.87	2.47	**1.97 (1.13, 3.45)**	42 (322; 17)	24 (3; 60)E

Table F138. Clinical interventions to reduce risk and progression of urinary incontinence in males with urologic diseases

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Little, 2003[676] Followup RCT to examine effects of radiotherapy for prostate cancer on urinary incontinence and bowel function. Duration of followup: 3 years	301 patients 3 with histologically confirmed adenocarcinoma of the prostate and no metastatic disease treated with a four-field box technique to a dose of 46Gy. Exclusion criteria: not reported. Response rate 70%.	1. Radiation with a four-field box technique to a dose of 70Gy arm. 2. Radiation with three-dimensional conformal techniques to generate a six-field boost plan of a total dose of 78Gy	Self reported bladder, bowel and sexual function (Fowler)	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Srougi ,2005[677] RCT to examine effects of bladder neck mucosal eversion during retropubic radical prostatectomy on urinary incontinence Duration of followup: 6 months	100 patients with stage T1c–T2c prostate cancer. Exclusion criteria: previous TURP, suprapubic prostatectomy or local radiotherapy; a history of neurological diseases; surgical pathology specimens that showed positive margins at bladder neck. Loss of followup: 5%	1. Retropubic radical prostatectomy and vesico-urethral anastomosis with bladder neck mucosal eversion. 2. Retropubic radical prostatectomy and vesico-urethral anastomosis without bladder neck mucosal eversion	Self reported urinary incontinence (more than one pad/day)	Intention to treat. Double blind. Computer generated randomization. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Wasson, 1995[678] RCT to examine effects of transurethral resection of the prostate or watchful waiting in men with moderate symptoms of benign prostatic hyperplasia. Duration of followup: 3 years	556 men over the age of 54 years with symptoms of benign prostatic hyperplasia. Exclusion criteria: < 55 years old, previous prostate surgery or radiation treatment, unable to walk, active urinary tract infection not responding to treatment, diagnosed prostate or bladder cancer, residual urinary volume after voiding >350ml, serious medical conditions including uncontrolled diabetes, neurogenic bladder, cirrhosis, active alcoholism, bleeding diathesis, psychosis, and late-stage cardiac or respiratory disease, creatinine concentration >3.0mg/deciliter (265 µmol per liter) Loss of followup: 7.4%	1. Transurethral resection of prostate. 2. Watchful waiting	Urinary symptoms were scored on a scale ranging from 0 to 27 points with the use of a nine-question interview. Persistent incontinence requiring the use of a pad, penile clamp, or condom	Intention-to-treat Open label. Stratified randomization by participating hospital and the severity of disease. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F138. Clinical interventions to reduce risk and progression of urinary incontinence in males with urologic diseases (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Van Cangh, 1998[679] RCT to examine effects of postoperative radiotherapy for locally advanced disease on urinary incontinence. Duration of followup: 3 years 24 months	100 patients with N0M0 prostate cancer treated with radical prostatectomy for locally advanced disease (positive surgical margin, capsular perforation and/or seminal vesicle infiltration). Exclusion criteria: not reported. Loss of followup: none	1. 60Gy. external radiotherapy with 18MV photon beams between 12 and 16 weeks after radical prostatectomy. 2. Radical prostatectomy alone	A validated modified pad weighing test by the International Continence Society: grade 0 - dry-< 1gm. with no pads, grade 1 –"minimal" between 1 and 9gm with 1 to 4 pads, grade 2 –"moderate" 10 - 50gm. with 1 to 4 pads (soaked) and grade 3 "severe"- >50gm. with >4 pads	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Srougi ,2001[680] RCT to examine effects of bladder neck preservation and resection radical retropubic Prostatectomy. Duration of followup: 6 months	70 patients with clinical stage T1 or T2 prostate cancer who were scheduled for radical prostatectomy and 2 patients with T3a with small prostatic nodules that may have been invading the prostatic capsule but with no established periprostatic tumor extension. Exclusion criteria: transurethral prostate resection, neurogenic dysfunction of the lower urinary tract. Loss of followup: 1.4%	1. Radical retropubic prostatectomy with bladder neck preservation according to the technique described by Malizia. 2. Radical retropubic prostatectomy with bladder neck resection according to that of Walsh, .	Self reported urinary continence (1 or no protective pad daily)	No Intention to treat. Double blind. Randomization by the toss of coin. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Ghaly, 2003[681] RCT to examine effects of supplemental beam radiation on prostate brachytherapy-related urinary incontinence. Duration of followup: 12 months	Trial 1: 106 low-risk patients, with Gleason Grade 2–6, prostate-specific antigen (PSA) 4–10ng/ml, Trial 2: 108 intermediate-risk patients, with Gleason Grade 7 or higher or PSA of 10—20ng/ml Exclusion criteria: not reported. Loss of followup: not reported.	Trial 1: 1. I-125 (144Gy, TG-43) I-125 source strength ranged from 0.4 to 0.89mCi (median .55mCi). 2. Pd-103 (125Gy, NIST-99) and Pd-103 source strength ranged from 1.6 to 2.0mCi (median 2.0mCi). Trial 2: 1. Pd-103, delivering 90Gy (with 44Gy external beam irradiation delivered with a four-field arrangement, designed to cover the prostate and seminal vesicles with a 2cm margin (reduced to 1.0cm posteriorly). 2. Pd-103, delivering 115Gy 20Gy external beam irradiation delivered with a four-field arrangement, designed to cover the prostate and seminal vesicles with a 2cm margin (reduced to 1.0cm posteriorly).	Self reported urinary incontinence using standard American Urologic Association (AUA) Grade 1: Occasional use of incontinence pads (<1/week), Grade 2: Intermittent use of incontinence pads (<1/day), Grade 3: Regular use of incontinence pad or self-catheterization, Grade 4: Permanent catheter or surgical intervention	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F138. Clinical interventions to reduce risk and progression of urinary incontinence in males with urologic diseases (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Imamoglu, 2005[682] RCT to examine effects of macroplastique injection with artificial urinary sphincter implantation on postprostatectomy incontinence. Duration of followup: 48-60 months	45 patients with urinary incontinence for >6 months after radical retropubic prostatectomy, transvesical prostatectomy, and transurethral prostatectomy. Exclusion criteria: radiotherapy for prostate carcinoma, minimum bladder capacity of 150cc, detrusor instability or hyperreflexia. Loss of followup: not reported.	1. Artificial urethral sphincter implantation. 2. Macroplastique injection (polydimethylslioxane elastomer implants as the solute component and hydrogel as the carrier) of 5–7.5cc above or around the striated sphincter region of the urethra submucosally.	Minimal incontinence was defined as total number of pads, total weight of pads. Continent (“dry”)- no need to use pads; ‘‘socially continent’’ - <1pad; ‘incontinent’’- >1pad/day	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Deliveliotis, 2005 [683] RCT to examine effects of applying local steroids to the neurovascular bundles of the prostate after bilateral nerve-sparing radical retropubic prostatectomy. Duration of followup: 12 months	60 potent men <60 years old undergoing bilateral nerve-sparing radical retropubic prostatectomy for clinically localized prostate cancer Exclusion criteria: allergy to steroids, assistance to obtain erections. Loss of followup: not reported.	1. 10ml of betamethasone cream 0.1% was applied locally to both neurovascular bundles. 2. Usual neurovascular bundles with no corticoid cream.	Urinary continence - wearing no pads or one pad that remained dry.	Intention to teat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Parsons , 2004[684] Placebo controlled RCT to examine effects of postoperative methylprednisolone on urinary incontinence after nerve-sparing radical retropubic prostatectomy. Duration: 6 days Duration of followup: 12 months	70 potent men ≤ 60 years old, undergoing bilateral nerve-sparing radical retropubic prostatectomy for clinically localized adenocarcinoma of the prostate. Exclusion criteria: no sexual partner, prior history of an allergic reaction to steroids, prior steroid use, or active use of sildenafil citrate for the treatment of erectile dysfunction. Loss of followup: 11.4%.	1. Methylprednisolone beginning on postoperative day 1: 24mg intravenously on postoperative day 1, 20mg orally on day 2, 16mg orally on day 3, 12mg orally on day 4, 8mg orally on day 5, and 4mg/orally on day 6. 2. Placebo.	Urinary continence as participant-reported wearing no pads or a single pad that remained dry.	No Intention to treat. Double blind. Central randomization. Allocation concealment unclear Baseline data did not confirm adequacy of randomization. Sample size justified

Table F138. Clinical interventions to reduce risk and progression of urinary incontinence in males with urologic diseases (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Akakura, 1999[685] RCT to examine effects of radical prostatectomy versus radiotherapy with the combination of endocrine therapy on urinary incontinence. Duration of followup: 58.5 months	100 patients 75 years old or younger with a performance status of 0 or 1 and adenocarcinoma of the prostate by needle core biopsy before treatment. Exclusion criteria: obvious enlargement of pelvic lymph nodes by computed tomography or magnetic resonance imaging. Loss of followup: 5%.	1. Radical prostatectomy with pelvic lymph node dissection with 300mg of diethylstilbestrol diphosphate/day 8 weeks before surgery or radiation, and continued thereafter. 2. External beam radiation by linear accelerator with 40 to 50Gy to the whole pelvis and a 20Gy boost to the prostatic area and with 300mg of diethylstilbestrol diphosphate/day 8 weeks before surgery or radiation, and continued thereafter	Urinary incontinence using quality-of-life questionnaire of EORTC.	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data did not confirm adequacy of randomization. Sample size not justified.
Fransson, 2001[686] RCT to examine effects of radiotherapy for localized prostate carcinoma. Duration of followup: 30-40 months	166 patients with localized prostate carcinoma cytologically or histologically verified as T1a-T2, G1-G2, pN0, and M0. Exclusion criteria: expected survival <10 years. Loss of followup: 35%.	1. Radiotherapy with a total dose of 4.8Gy (range, 62.3–70.0Gy) given for 5 days a week, 2Gy per fraction. 2. Active surveillance	Self reported urinary and fecal incontinence using validated symptom specific self-assessment questionnaire, QUFW94 with values between 0 and 10; 0 - “no problem/very good function” and 10 - “many problems/very bad function.”	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Gupta, 2002[687] RCT to examine effects of transurethral vesection of the prostate or vapor resection of prostate on urinary incontinence. Duration of followup: 1 year	100 patients with benign prostatic hyperplasia and prostate size >40cc. Exclusion criteria: finasteride preoperatively, histopathologic adenocarcinoma of the prostate. Loss of followup: not reported	1. Transurethral vesection of the prostate with the thick vapor resection loop using electrosurgical generator with settings of 120 to 150W and 50 to 70W for cutting and coagulating. 2. Transurethral resection of the prostate with standard wire loop using electrosurgical generator with settings of 70 to 80W and 40 to 50W for cutting and coagulating	Self reported urinary incontinence using International Prostate Symptom Score. Urodynamic outcomes.	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Gallucci ,1998[688] RCT to examine effects of transurethral electrovaporization of the prostate on urinary incontinence. Duration of followup: 12 months	150 patients with symptoms due to obstructive benign prostatic hypertrophy, urodynamically obstructed. Exclusion criteria: complete urinary retention, bladder calculi, neurogenic bladder, prostate weight>70g, bladder cancer, prostate cancer, mental illness. Loss of followup: none	1. Transurethral electrovaporization of the prostate. 2. Transurethral resection of the prostate	I-PSS score. Urodynamic outcomes	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F138. Clinical interventions to reduce risk and progression of urinary incontinence in males with urologic diseases (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Wilson, 2006[689] RCT to examine effects of holmium laser enucleation of the prostate or transurethral resection of the prostate for treatment of men with bladder outflow obstruction secondary to benign prostatic hyperplasia. Duration of followup: 24 months	61 men with bladder outflow obstruction secondary to benign prostatic hyperplasia and prostate size 40-200g, maximum urinary flow rate of 15 ml/second or less, American Urological Association symptom score of ≥8, post-void residual assessment of less than 400ml, and urodynamic Schaffer grade 2 or greater. Exclusion criteria: prostatic carcinoma, catheterization, history of previous urethral or prostatic surgery. Loss of followup: 21.3%	1. Holmium laser enucleation of the prostate with maximum power set at 100W for each case. 2. Transurethral resection of the prostate with a tungsten cutting wire at 160W cutting and 80W coagulating current	Urinary incontinence using American Urological Association symptom score. Maximum urinary flow rates	No Intention to treat. Open label. Balanced blocked randomization schedule (block of six patients). Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Steineck , 2002[690] RCT to examine the effects of radical prostatectomy or watchful waiting of incontinence in patients with localized cancer. Duration of follow up: 12 months after surgery and 14 months after randomization	376 men <75 years with life expectancy >10 years (as judged by the attending physician) from the Scandinavian Prostatic Cancer Group Study # 4, with localized prostate cancer (T0d, T1, or T2 and grade 1 or 2 according to the criteria of the World Health Organization Against Cancer). Exclusion criteria: previously diagnosed cancer, concurrent disorder considered to increase the risk of operative mortality, or inability to comply with treatment and follow-up. Loss of follow up: 13.3%	1. Radical prostatectomy 2. Watchful waiting with no advice for initial radical therapy was given	Self reported urinary incontinence using the Spielberger's Trait Measure from the State–Trait Anxiety Inventory	Intention-to-treat. Open label. Randomization not described in this paper. Allocation concealment not clear. Baseline data did not confirm the adequacy of randomization. Adjustment for age, time from randomization to completion of the questionnaire, date of responding to the questionnaire, and educational level did not effect the relative risks

Table F139. Effects of clinical intervention on urinary continence in males (events) (sorted by rate of urinary continence after active treatment, from highest to lowest)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)
Srougi, 2001[680] N = 70	Radical Retropubic prostatectomy with bladder neck preservation according to the technique described by Malizia	Radical Retropubic prostatectomy with bladder neck resection according to that of Walsh et. al.	Urinary continence using 1 or no pad daily	30	36	96.8	92.3	1.0 (0.9; 1.2)
Imamoglu, 2005[682] N = 24	Macroplastique injection (polydimethylslioxane elastomer implants as the solute component and hydrogel as the carrier) of 5–7.5cc above or around the striated sphincter region of the urethra submucosally.	Artificial urethral sphincter implantation.	Self reported urinary continence in patients with minimal baseline incontinence	8	10	80.0	90.9	0.9 (0.6; 1.3)
Van Cangh, 1998[679] N = 100	60Gy. external radiotherapy with 18MV photon beams 12 - 16 weeks after radical prostatectomy	Radical prostatectomy alone	Complete Urinary continence	37	43	77.0	83.0	0.9 (0.8; 1.1)

Table F139. Effects of clinical intervention on urinary continence in males (events) (sorted by rate of urinary continence after active treatment, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)
Imamoglu, 2005[682] N = 24	Macroplastique injection (polydimethylslioxane elastomer implants as the solute component and hydrogel as the carrier) of 5–7.5cc above or around the striated sphincter region of the urethra submucosally.	Artificial urethral sphincter implantation.	‘‘socially continent’’ - <1pad/day in patients with total baseline incontinence	5	2	38.5	18.2	2.1 (0.5; 8.8)
			‘‘socially continent’’ - <1pad/day in patients with minimal baseline incontinence	1	1	10.0	9.1	1.1 (0.1; 15.4)

Table F140. Effects of clinical interventions on urinary incontinence in males (events) (sorted by rate of urinary incontinence after active treatment, from lowest to highest)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Gupta*, 2002[687] N = 100	Transurethral vesection of the prostate with the thick vapor resection loop using electrosurgical generator with settings of 120 to 150W and 50 to 70W for cutting and coagulating	Transurethral vesection of the prostate with standard wire loop using electrosurgical generator with settings of 70 to 80W and 40 to 50W for cutting and coagulating	Self reported urinary incontinence	0	2	0.0	4.0	0.2 (0.0; 4.1)		
Gallucci*, 1998[688] N = 150	Transurethral resection of the prostate	Transurethral electro vaporization of the prostate	Transient stress urinary incontinence	0	13	0.1	18.6	**0.0 (0.0; 0.5)**	5 (5; 12)	185 (86;1 86; 86)A
Ghaly, 2003[681] N = 54	I-125 (144Gy, TG-43) I-125 source strength ranged from 0.4 to 0.89mCi (median .55mCi)	Pd-103 (125Gy, NIST-99) and Pd-103 source strength ranged from 1.6 to 2.0mCi (median 2.0mCi)	Regular use of incontinence pad or self-catheterization incontinence pad or self-catheterization for urinary incontinence	1	5	1.0	10.0	0.2 (0.0; 1.5)		
Wasson*, 1995[678] N = 556	Transurethral resection of prostate	Watchful waiting	High residual urinary volume	3	16	1.1	5.8	**0.2 (0.1; 0.6)**	21 (18; 46)	47 (22; 55)A
Gallucci*, 1998[688] N = 150	Transurethral resection of the prostate	Transurethral electro vaporization of the prostate	Stress urinary incontinence	1	4	1.3	5.7	0.2 (0.0; 1.9)		

Table F140. Effects of clinical interventions on urinary incontinence in males (events) (sorted by rate of urinary incontinence after active treatment, from lowest to highest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Wasson*, 1995[678] N = 556	Transurethral resection of prostate	Watchful waiting	Persistent urinary incontinence	4	4	1.4	1.4	1.0 (0.2; 3.9)		
Van Cangh, 1998[679] N = 100	60Gy. external radiotherapy with 18MV photon beams 12 - 16 weeks after radical prostatec-tomy	Radical prostatectomy alone	Severe urinary incontinence with implantation of artificial sphincter	1	1	2.1	1.9	1.1 (0.1; 16.8)		
Gallucci*, 1998[688] N = 150	Transurethral resection of the prostate	Transurethral electro vaporization of the prostate	Urge urinary incontinence	2	0	2.5	0.1	4.4 (0.2; 89.8)		
Wilson*, 2006[689] N = 61	Holmium laser enucleation of the prostate with maximum power set at 100W for each case	Transurethral resection of the prostate with a tungsten cutting wire at 160W cutting and 80W coagulating current	Incident of stress incontinence	1	0	3.3	0.1	3.0 (0.1; 70.8)		
			Incident of urge incontinence	1	0	3.3	0.1	3.0 (0.1; 70.8)		
Little, 2003[676] N = 301	Radiation with a four-field box technique to a dose of 70Gy arm	Radiation with three-dimensional conformal techniques to generate a six-field boost plan of a total dose of 78Gy	Wears protection for urinary incontinence	4	5	3.7	4.9	0.8 (0.2; 2.8)		
Ghaly, 2003[681] N = 108	Pd-103, delivering 90Gy (with 44Gy external	Pd-103, delivering 115Gy, 20Gy external beam irradiation delivered with a	Regular use of incontinence pad or self-catheterization incontinence	3	5	5.0	10.0	0.5 (0.1; 2.1)		

Table F140. Effects of clinical interventions on urinary incontinence in males (events) (sorted by rate of urinary incontinence after active treatment, from lowest to highest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
	beam irradiation delivered with a four-field arrangement, designed to cover the prostate and seminal vesicles with a 2cm margin (reduced to 1.0cm posteriorly).	four-field arrangement, designed to cover the prostate and seminal vesicles with a 2cm margin (reduced to 1.0cm posteriorly).	pad or self-catheterization incontinence pad or self-catheterization for urinary incontinence							
Little, 2003[676] N = 301	Radiation with a four-field box technique to a dose of 70Gy arm	Radiation with three-dimensional conformal techniques to generate a six-field boost plan of a total dose of 78Gy	Nocturia present: 4-5 times/night	7	7	6.5	6.8	1.0 (0.3; 2.6)		
			Stress urinary incontinence: Leakage with cough/sneeze	7	7	6.5	6.8	1.0 (0.3; 2.6)		
			Urinary Incontinence amount: >1 Tablespoon/day	7	2	6.5	1.9	3.3 (0.7; 15.7)		
Steineck, 2002[690] N = 376 12 months	Radical prostatectomy	Watchful waiting	Great distress	14	5	7.41*	2.67	2.77 (1.02; 7.54)		
			Urinary problems affecting sexual life :Moderately or severely	15	5	7.94*	2.67	**2.97 (1.10; 8.00**)	19 (5; 370)	53 (3; 187)E
			Great distress from all urinary symptoms	15	8	7.94*	4.28	1.86 (0.81; 4.27)		

Table F140. Effects of clinical interventions on urinary incontinence in males (events) (sorted by rate of urinary incontinence after active treatment, from lowest to highest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
			Regular dependence on diaper or urine bag	23	1	12.17*	0.53	**22.76 (3.10; 166.79)**	9 (1; 89)	116 (11; 887)E
			Moderate or severe leakage	30	3	15.87*	1.60	**9.89 (3.07; 31.86)**	7 (2;30)	143 (33; 495)E
Fransson, 2001[686] N = 166	Radiotherapy with a total dose of 4.8Gy (range, 62.3–70.0Gy) given for 5 days a week, 2Gy per fraction.	Active surveillance	Use of pad for urinary incontinence	10	1	17.5	2.1	**8.3 (1.1; 62.6)**	6 (1;470)	154 (2; 1,294)E
Imamoglu, 2005[682] N = 24	Macro-plastique injection (polydimethyl slioxane elastomer implants as the solute component and hydrogel as the carrier) of 5–7.5cc above or around the striated sphincter region of the urethra submucosally	Artificial urethral sphincter implantation.	Self reported urinary continence in patients with total baseline incontinence	3	8	23.1	72.7	**0.3 (0.1; 0.9)**	2 (2; 16)	496 (64; 647)A

Table F140. Effects of clinical interventions on urinary incontinence in males (events) (sorted by rate of urinary incontinence after active treatment, from lowest to highest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Steineck, 2002[690] N = 376 12 months	Radical prostatectomy	Watchful waiting	Moderate or great distress from all urinary symptoms	44	28	23.28*	14.97	**1.55 (1.01; 2.39)**	12 (5; 518)	83 (2; 208)E
			Moderate or great distress from urinary leakage	47	15	24.87*	8.02	**3.10 (1.80; 5.35)**	6 (3;16)	168 (64; 349) E
Little, 2003[676] N = 301	Radiation with a four-field box technique to a dose of 70Gy arm	Radiation with three-dimensional conformal techniques to generate a six-field boost plan of a total dose of 78Gy	Urinary Incontinence frequency: >once per day	26	30	24.1	29.1	0.8 (0.5; 1.3)		
			Urinary Incontinence present	40	32	37.0	31.1	1.2 (0.8; 1.7)		
Steineck, 2002[690] N = 376 12 months	Radical prostatectomy	Watchful waiting	Regular dependence on some form of protective aid	71	16	37.57*	8.56	**4.39 (2.65; 7.26)**	3 (2;7)	290 (142; 536)E
Imamoglu, 2005[682] N = 24	Macroplastique injection (polydimethylsiloxane elastomer implants as the solute component and hydrogel as the carrier) of 5–7.5cc above or around the striated sphincter region of the urethra submucosally.	Artificial urethral sphincter implantation.	Urinary incontinence: >1pad/day in patients with total baseline incontinence	5	1	38.5	9.1	4.2 (0.6; 31.0)		

Table F140. Effects of clinical interventions on urinary incontinence in males (events) (sorted by rate of urinary incontinence after active treatment, from lowest to highest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Akakura, 1999[685] N = 100	Radical prostatec-tomy with pelvic lymph node dissection with 300mg of diethylstilbestrol diphosphate/ day 8 weeks before surgery or radiation, and continued thereafter	External beam radiation by linear accelerator with 40 to 50Gy to the whole pelvis and a 20Gy boost to the prostatic area and with 300mg of diethylstilbestrol diphosphate/day 8 weeks before surgery or radiation, and continued thereafter	Urinary incontinence using quality-of-life questionnaire of EORTC	22	0	40.0	1.0	**35.5 (2.2; 569.8)**	3 (0; 82)	390 (12; 5,688)E
Steineck, 2002[690] N = 376 12 months	Radical prostatectomy	Watchful waiting	Leakage once a week or more often	80	33	42.33*	17.65	**2.40 (1.69; 3.41)**	4 (2;8)	247 (121; 425)E
Little, 2003[676] N = 301	Radiation with a four-field box technique to a dose of 70Gy arm	Radiation with three-dimensional conformal techniques to generate a six-field boost plan of a total dose of 78Gy	Urge urinary incontinence: Leakage with full bladder	47	37	43.5	35.9	1.2 (0.9; 1.7)		
Wilson*, 2006[689] N = 61	Holmium laser enucleation of the prostate with maximum power set at 100W for each case	Transurethral resection of the prostate with a tungsten cutting wire at 160W cutting and 80W coagulating current	Self reported regained urinary incontinence	15	8	50.0	26.7	1.9 (0.9; 3.7)		

Table F140. Effects of clinical interventions on urinary incontinence in males (events) (sorted by rate of urinary incontinence after active treatment, from lowest to highest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Steineck, 2002[690] N = 376 12 months	Radical prostatectomy	Watchful waiting	At least some leakage	101	53	53.44*	28.34	**1.89 (1.45; 2.45)**	4 (2;8)	251 (127; 412)E
Sroug, 2005[677] N = 100	Retropubic radical prostatec-tomy and vesico-urethral anastomosis with bladder neck mucosal eversion	Retropubic radical prostatectomy and vesico-urethral anastomosis without bladder neck mucosal eversion	Urinary incontinence	44	43	91.7	91.5	1.0 (0.9; 1.1)		

Bold- significant differences in outcomes at 95% confidence level; *- the patients were continent at baseline (no baseline UI reported); Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F141. Effect of surgical intervention on perceived urinary incontinence in males (severity measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95%CI)	Change % From Control (95%CI)
Ghaly, 2003[681] N = 54	I-125 (144Gy, TG-43) I-125 source strength ranged from 0.4 to 0.89mCi (median .55mCi)	Pd-103 (125Gy, NIST-99) And Pd-103 source strength ranged from 1.6 to 2.0mCi (median 2.0mCi)	Self reported urinary scores American Urologic Association and Radiation Therapy Oncology Group criteria	0.2 ± 0.0	0.1 ± 0.0	**11.0 (9.5; 12.5)**	
Ghaly, 2003[681] N = 108	Pd-103, delivering 90Gy (with 44Gy external beam irradiation delivered with a four-field arrangement, designed to cover the prostate and seminal vesicles with a 2cm margin (reduced to 1.0cm posteriorly).	Pd-103, delivering 115Gy 20Gy external beam irradiation delivered with a four-field arrangement, designed to cover the prostate and seminal vesicles with a 2cm margin (reduced to 1.0cm posteriorly).	Regular use of incontinence pad or self-catheterization incontinence pad or self-catheterization incontinence pad or self-catheterization for urinary incontinence	0.3 ± 0.1	0.3 ± 0.1	0.0 (-0.4; 0.4)	0.0 (-151.1; 151.1)
Wasson, 1995[678] N = 556	Transurethral resection of prostate	Watchful waiting	Bother from urinary difficulties on a scale ranging from 0 (greatest impairment) to 100 (least impairment).	75.7± 23.9	57. ± 28.3	**0.7 (0.5; 0.9)**	1.2 (0.9; 1.5)
Wilson2006[689] N = 61	Holmium laser enucleation of the prostate with maximum power set at 100W for each case	Transurethral resection of the prostate with a tungsten cutting wire at 160W cutting and 80W coagulating current	Urinary incontinence using American Urological Association symptom score	6.1 ± 1.0	5.2 ± 0.8	**1.0 (0.5; 1.5)**	19.1 (8.8; 29.4)

Table F141. Effect of surgical intervention on perceived urinary incontinence in males (severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95%CI)	Change % From Control (95%CI)
Fransson, 2001[686] N = 166	Radiotherapy with a total dose of 4.8Gy (range, 62.3–70.0Gy) given for 5 days a week, 2Gy per fraction.	Active surveillance	Self reported urinary incontinence0 - “no problem/very good function” and 10 - “many problems/very bad function.”	1.5 ± 2.7	0.6 ± 1.4	0.4 (0.0; 0.8)	68.4 (4.6; 132.2)
Wilson, 2006[689] N = 61	Holmium laser enucleation of the prostate with maximum power set at 100W for each case	Transurethral resection of the prostate with a tungsten cutting wire at 160W cutting and 80W coagulating current	Urinary incontinence using American Urological Association symptom score	4.6 ± 0.7	4.7 ± 0.9	-0.1 (-0.6; 0.4)	-2.6 (-13.4; 8.1)

Bold- significant differences in outcomes at 95% confidence level

Table F142. Effect of surgical interventions on progression of urinary incontinence in males (urodynamic measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95%CI)	Change % From Control (95%CI)
Wasson, 1995[678] N = 556*	Transurethral resection of prostate	Watchful waiting	Peak urinary-flow rate (ml/sec)	17.8 ± 9.1	12.7 ± 7.6	**0.6 (0.4; 0.8)**	4.8 (3.4; 6.1)
Wilson*, 2006[689] N = 61	Holmium laser enucleation of the prostate with maximum power set at 100W for each case	Transurethral resection of the prostate with a tungsten cutting wire at 160W cutting and 80W coagulating current	Maximum urinary flow rate	21.0 ± 2.0	19.3 ± 2.2	**0.8 (0.3; 1.3)**	4.2 (1.5; 6.9)
			Maximum urinary flow rate	21.3 ± 2.1	18.9 ± 2.8	**1.0 (0.4; 1.5)**	5.1 (2.3; 8.0)
Gallucci*, 1998[688] N = 150	Transurethral resection of the prostate	Transurethral electro vaporization of the prostate	Post void residual volume (ml)	3.2 ± 17.5	5.2 ± 20.4	-0.1 (-0.4; 0.2)	-2.1 (-8.2; 4.0)
Wasson, 1995[678] N = 556	Transurethral resection of prostate	Watchful waiting	Residual urinary volume (ml)	51.0 ± 54.0	72.0 ± 73.0	**-0.3 (-0.5; -0.2)**	-0.5 (-0.7; -0.2)

* Patients with benign prostate diseases; Bold - significant differences in outcomes at 95% confidence level

Table F143. Effects of hormone replacement therapy on risk and progression of urinary incontinence in women

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Goldstein, 2005[691] Placebo-controlled RCT to examine the efficacy and safety of raloxifene for osteoporosis prevention in postmenopausal women. Duration: 36 months	619 women age 40 - 60 years, postmenopausal (naturally or surgically), with a hysterectomy no more than 15 years before beginning study, serum estradiol ≤73pmol/l (≤ 20pg/ml) and follicle-stimulating hormone ≥40 IU/l. Exclusion criteria : history of breast carcinoma or estrogen-dependent tumors, cancer within the last 5 years (except excised skin cancers), estrogen therapy (other than vaginal estrogens), progestin, androgen, calcitonin, or systemic corticosteroids within the previous 6 months, a history of thromboembolic disorders or diabetes mellitus or other endocrine disorders requiring therapy (except thyroid hormone replacement), or serious postmenopausal symptoms. Loss of followup 4.5%; Discontinuation - adverse events (17.6%), personal reasons (11.0%). The percentage of women missing at least 20% of study medication was similar across the groups (10% to 14%; *P* = 0.71)	1. Raloxifene HCl 60mg/day. 2. Raloxifene HCl 150mg/day. 3. Conjugated equine estrogen 0.625mg/day 4. Placebo supplement of 400/600mg/day elemental calcium	Self-reported new or worsening urinary incontinence rated as "mild," "moderate," or "severe."	Intention to treat. Double-blind. Randomized block design (block size = 4); baseline data confirmed adequate randomization. No justification of sample size. Incontinence - secondary outcome.
Vardy, 2003[692] Placebo-controlled RCT to examine urogenital effects of raloxifene, tamoxifen, conjugated equine estrogen, and placebo in healthy postmenopausal women Duration: 5 month	100 healthy white postmenopausal women > 1 year from last menstrual period, age 45 - 70 years, with normal mammogram within 6 months of the study and free from any serious acute or chronic medical disorder. Exclusion criteria: previous hysterectomy or reconstructive pelvic surgery, intake of estrogen, calcitonin, fluoride steroid, or diuretic therapy within 6 months, contraindication to hormone replacement therapy or either SERM	1. 0.625mg/day conjugated equine estrogen 2. 20mgday tamoxifen 3. 60mg/day raloxifene 4. Placebo	Weekly symptom diaries to report urinary urgency, frequency, and incontinence ranked as “new,” “worsened,” “improved,” or “remained the same.” Pelvic organ prolapse quantitation. Urethral axis deflection by cotton swab.	Intention to treat not stated. Double-blind. Allocation concealment unclear. Subjects had Incontinence at baseline (32.7%) with unknown distribution in the groups. No justification for sample size.
Warming, 2003[693] Placebo-controlled RCT To examine the adverse events after 12 month treatment with levormeloxifene and followup of 12	234 generally healthy women, age 45 - 65 years, at least 1 year postmenopausal and with an intact uterus. Exclusion criteria: known or suspected acute or chronic disease, or taking medication known to interfere with the results of the study. Completed 12 months treatment 77% Withdrawn at the end of 12 months 0.7% Included in followup 78% Withdrawn during followup (adverse event) 0.3% Completed 12-month followup 77%	1. Levormeloxi-fene at 1.25 ,5, 10, or 20mg/per day, 2. Continuous combined HRT (17β-oestradiol 1 mg and norethisterone acetate 0.5mg per	Self-reported urinary incontinence (including worsening of a previously existing condition). Utero-vaginal prolapse detected by transvaginal ultrasonography	Intention to treat not stated. Double-blind. Allocation Concealment unclear. No justification for sample size. Outcomes reported independent of the

Table F143. Effects of hormone replacement therapy on risk and progression of urinary incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
months without treatment.		day). 3. Placebo: calcium supplement 500/mg/day		dose of levormeloxifene.
Steinauer, 2005[694] Placebo-controlled RCT The Heart Estrogen/progestin Replacement Study to examine HRT for the prevention of heart disease events in women with established heart disease Duration: 4.2 years	1,208 postmenopausal women age <80 years, with coronary heart disease and an intact uterus who reported no loss of urine in the previous 7 days at baseline Loss of followup: 1 participant taking hormone therapy discontinued due to adverse reactions, 58 died, and 5 failed to return, and 11 were lost to followup for other reasons. Placebo group: 60 died, 5 failed to return, and 12 were lost to followup for other reasons. The compliance rates were 80% in the placebo group and 68% in the hormone groups	1. Conjugated estrogen (0.625mg) and medroxy progesterone acetate (2.5mg) in 1 pill 2. Identical looking placebo	Self-reported urinary incontinence (including worsening of a previously existing condition). Stress incontinence : unintentionally leaking some urine with coughing, sneezing, straining, laughing, or lifting Urge incontinence: unintentionally leaking some urine before getting to the bathroom. Weekly incontinence >1 episodes in the previous week	Intention to treat. Double-blind. Randomization in each of 20 clinical centers using randomly permuted blocks of 4. Groups of continent women were comparable at baseline. No justification for sample size Incontinence - secondary outcome.
Hendrix, 2005[695] Placebo-controlled RCT. Women's Health Initiative Study to examine effects of HRT in preventing coronary heart disease and hip fractures in postmenopausal women. Duration: 1 year	25,597 women age 50 to 79 years, postmenopausal, and likely to reside in the study area for 3 years with adherence rate of 80% or greater during 4-week placebo run-in. Exclusion criteria: breast cancer, other invasive cancer in the last 10 years, venous thromboembolism, hypertriglyceridemia, medical condition likely to result in death within 3 years, or unwillingness to be randomized to placebo, severe menopausal symptoms. Loss of followup: in 1st group 0.2% deceased and 0.1% lost to followup, [9.7]% and 6.6% in placebo stopped taking study pills for various reasons. Adherence 74% and 81% in the placebo group at 1 year. 2nd active group: 0.4% deceased, 8.4% and 8.0% in placebo stopped taking study pills for various reasons. Adherence: 77.4% and 81.4% in placebo at 1 year.	1. 0.625mg/day conjugated equine estrogen plus 2. 5mg/day of medroxyprogesterone acetate 2. 0.625mg/day conjugated equine estrogen 3. Placebo estrogen plus progestin 4. Placebo estrogen alone	Self-reported incident at 1 year. Prevalent incontinence: ever leaking any amount of urine. Stress incontinence: leaking of urine during a cough, laugh, sneeze, lift, stand up or exercise. Urge incontinence – leaking of urine before getting to the toilet. Mixed incontinence – a combination of stress and urge	Intention to treat Double-blind. Central randomization at a 1:1 ratio. The study pill bottles had unique bar codes and computer-based selection to enable double-blinded dispensing. Incontinence - secondary outcome. Baseline data confirmed adequacy of randomization.

Table F143. Effects of hormone replacement therapy on risk and progression of urinary incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
			symptoms. Continence – no leaking urine once during the past year or no longer leaking urine. Changes in self-reported frequency, amount (barely noticeable, soaked underpants, soaked through to outer clothing), limitations in daily activities (never to very often), and bother/disturbance (not at all to very disturbing) as better, same, or worse	
Vestergaard, 2003[696] RCT of The Danish Osteoporosis Prevention Study (DOPS) to examine effects of HRT for primary prevention of osteoporotic fractures in healthy recently postmenopausal women. Duration: 5 years.	1,006 women age (45-58 years) from a random sample of 47,720 with intact uterus and 3-24 months past last menstrual bleeding or experiencing perimenopausal symptoms (including irregular menstruations), the latter combined with elevated serum follicular stimulating hormone (FSH), and hysterectomised women age 45-52 years with elevated FSH. Exclusion criteria: (1) Metabolic bone disease, including osteoporosis defined as nontraumatic vertebral fractures on X-ray. (2) Current oestrogen use or oestrogen use within the past 3 months. (3) Current or past treatment with glucocorticoids <6 months. (4) Current or past malignancy. (5) Newly diagnosed or uncontrolled chronic disease. (6) Alcohol or drug addiction	1. Sequential oestrogen and progestogen (28 day cycle: 2mg oestradiol for the first 12 days, 2mg oestradiol and 1mg norethisterone acetate for the next 10 days followed by 1mg oestradiol for 6 days, in women with intact uterus 2. Continuous oestradiol 2mg/day in hysterectomised women 3. No HRT	Self reported presence of incontinence. Symptom scores were recorded on a modified Greene scale (range 0-4 with 0 equaling no symptoms, and 4 maximal symptoms).	Intention to treat. Open label. Group 1 and 2 were block-randomized in groups of ten by the envelope method. Baseline data providing difference between treatment regimens not analyzed. No justification for sample size. Outcomes reported in two groups: HRT vs. No HRT.

Table F143. Effects of hormone replacement therapy on risk and progression of urinary incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Goldstein, 2002[697] Placebo-controlled RCT to examine different doses of levormeloxifene for the treatment of postmenopausal osteoporosis and prevention of vertebral compression fractures in elderly women. Planned duration: 3 years, stopped after 10 months	2,924 generally healthy women age ≥65 years, with diagnosed osteoporosis. Exclusion criteria: known or suspected hormone-dependent or other cancers, previous myocardial infarctions, deep venous thrombosis, corticosteroid treatment, or endometrial thickness >8mm, as gauged by transvaginal ultrasound scanning. Loss of followup: 9.6% before the trial was discontinued because of adverse events and other reasons that included noncompliance	1. 0.5 or 1.25mg of levormeloxifene 2. Placebo: Daily dietary supplement of 800/1000mg calcium and 400IU vitamin D	Self reported new urinary incontinence, micturition frequency, and the frequency of urinary incontinence as an adverse event	Intention to treat not stated. Double-blind. No justification for the sample size. Allocation concealment unclear. Only a subset of the data was ever validated; no summary statistics were calculated for demographic data. No justification for sample size.
Kok, 1999[698] Randomized non controlled clinical trial to examine effects of HRT for endometrial protection in healthy postmenopausal women. Duration: 6 months	102 healthy postmenopausal nonhysterectomized women amenorrhoeic for at least 12 months with postmenopausal status confirmed by elevated serum FSH (>35 IU/l) and LH (>10 IU/l) levels and decreased oestradiol (<120pmol/l) levels. Loss of followup: 7% stopped HRT due to irregular bleeding episodes, lack of medication compliance and lack of improvement of climacterial complaints other than urinary complaints	2mg 17 beta-estradiol continuously combined with one of four doses (2.5, 5, 10, or 15mg) of dydrogesterone. No placebo group: before-after comparison in one active group	Diurnal micturition – number of reported voids during the day, frequency as more than seven times a day. Nocturnal micturition - number of times one has to get up to void at night and nocturia, a condition with more than two voids a night	Intention to treat not stated. Double-blind. Randomization with permuted blocks Allocation concealment unclear. Nonparametric tests for randomization bias. Baseline data confirmed the adequacy of randomization. No justification for sample size.
Long, 2006[699] RCT to examine effects of oral and vaginal estrogen therapy on the lower urinary tract in postmenopausal	57 hysterectomised, postmenopausal women with serum FSH level of >40 IU/l and an E_2 level of <20pg/ml. Exclusion criteria: vasoactive medication, prior breast or endometrial cancer, diabetes, anemia (Hg <10g/dl), urinary tract infection, use of HRT in the previous 12 months, and non visible periurethral vessels during ultrasonographic assessment. 16 patients interrupting ET were excluded from the analysis	1. Oral 0.625mg of conjugated equine estrogen per tablet 2. Topical 0.625mg conjugated equine estrogen per 1g vaginal cream	The Bristol Female Lower Urinary Tract Symptoms Questionnaires and standardized urinary diary to report episodes of total, urge, and stress	No Intention to treat. Two investigators were blind to each other's results. Allocation concealment unclear. No

Table F143. Effects of hormone replacement therapy on risk and progression of urinary incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
women with prior hysterectomy Duration: 3 months			urinary incontinence and episodes of stress urinary incontinence/week	justification for the sample size. No comparison provided between groups, before/after treatments only.
Jackson, 2002[700] Placebo-controlled RCT to examine effects of HRT in improvement of quantity or quality, of pelvic collagen in postmenopausal women. Duration: 6 months	67 postmenopausal women with urodynamic diagnosis of genuine stress incontinence without symptomatic prolapse. 55 consented to vaginal biopsy and were randomized. Loss of followup: 3 dropped the trial due to personal reasons, vaginal discharge, and advice from general practitioner. 3 preferred not to undergo a second biopsy. 49 women included in the analysis	1. Oestradiol valerate 2mg/day. 2. Placebo	Clinical improvement in urinary incontinence diagnosed with urodynamic tests	No Intention to treat. Double-blind. Randomization (computer generated simple random sampling) by hospital pharmacy. Allocation concealment unclear. Sample size justified for the primary outcome-% of total collagen. No baseline comparison reported.
Fantl, 1996[701] Placebo-controlled RCT to examine efficacy of cyclic postmenopausal hormone replacement in treating urinary incontinence in hypo estrogenic women. Duration: 3 months	83 hypo estrogenic women 45 years or older, who reported involuntary loss of urine at least once a week. Exclusion criteria: institutionalization, permanent catheterization, impaired mental status, functional disability limiting use of the toilet (alone or assisted), neuropathic or uncontrolled metabolic conditions, chronic urinary tract infection, reversible causes of urinary incontinence, or major contraindications for the use of estrogen therapy. Loss of followup: none	1. Conjugated equine estrogens (0.625mg) and medroxy-progesterone (10mg) cyclically. 2. Placebo	Number of incontinent episodes/week recorded in standardized urinary diary. Amount of fluid loss (measured by a standardized pad test) and the number of voluntary diurnal and nocturnal micturition per week obtained with the same diary technique.	Intention to treat not stated. Double-blind. Blocked randomization stratified by baseline severity of urinary incontinence was performed at each site with sets of sequenced, sealed, opaque envelopes, each containing the bottle number to be given to an individual patient. Sample size not justified.

Table F143. Effects of hormone replacement therapy on risk and progression of urinary incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Jackson,1999[702] Placebo-controlled RCT to examine effect of hormone replacement therapy on post-menopausal urinary stress incontinence Duration: 6 months	67 post-menopausal women with genuine stress incontinence confirmed with urodynamic evaluation, not taking hormone replacement therapy. Exclusion criteria: history of cancer of the endometrium, liver, or breast; endometrium more than 4mm thick. Loss of followup: 5 women did not complete the trial; one woman underwent surgical treatment	1. Oestradiol valerate 2mg daily. 2. Placebo	Urinary diary to report subjective incontinence symptoms, frequency, and severity. Standard perineal pad test, and urodynamic evaluation to measure functional capacity, detrusor pressure, voiding flow, post-micturition residual, and volume at first desire to micturate	Intention to treat not stated. Double-blind. Randomization by hospital pharmacy with computer generated blocks (5 oestradiol and 5 placebos). Baseline data confirmed the adequacy of randomization. Sample size justified.
Ishiko, 2001[703] RCT to examine effects of combination pelvic floor muscle exercise and estriol on postmenopausal stress incontinence. Duration: 2 years	73 women with postmenopausal stress incontinence. Exclusion criteria: urge or mixed incontinence. Loss of followup: 6 women withdrew for personal reasons, one due to adverse effects	1. Combination of estriol (1 mg/day) and pelvic floor muscle exercise 2. Pelvic floor muscle exercise alone	Standardized questionnaire to report severity of stress incontinence scored ranked mild (10-17), moderate (18-23), and severe (24-26) incontinence. Continent rate in groups	No Intention to treat. Open label. Allocation concealment unclear. Baseline data confirmed the adequacy of randomization. No justification for sample size.
Rufford, 2003[704] Placebo-controlled RCT to examine the effect of systemic estrogen on the 'urge syndrome' in postmenopausal women. Duration: 6 months	40 postmenopausal women (>1 year at menopause) with the 'urge syndrome'; with estradiol <150pmol/l in women after hysterectomy with no contraindication for estrogen therapy. Exclusion criteria: medication treatment of urge syndrome, diuretics, HRT, history of diabetes, endometrial thickness >4mm urinary tract infection, pelvic masses and urogenital prolapse. Loss of followup: 11 women decided not to participate	1. 25mg 17 beta-estradiol implant subcutaneous tissue. 2. Placebo implant	Urodynamic outcome; frequency volume chart with self reported incontinence symptoms	No intention to treat. Double blind. Allocation concealment adequate. Baseline data confirmed the adequacy of randomization. Sample size justified.

Table F143. Effects of hormone replacement therapy on risk and progression of urinary incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Ahlstrom, 1990[705] Placebo-controlled crossover RCT to examine effects of estrogen with alpha-adreno-receptor agonist compared to estrogen alone on incontinence in postmenopausal women. Duration: 6 weeks	29 postmenopausal women with slight to severe stress urinary incontinence and estrogen deficiency symptoms confirmed during urodynamic exam. Exclusion criteria: use of hypotensives, neuroleptics, sedatives, antihistamines, ephedrine, HRT, bacteriuria, history of breast cancer. Loss of followup: none, one woman was excluded from the analysis due to failure in medication	1. Estriol 4mg/day and 50mg phenyl-propanolamine twice daily. 2. Estriol 4mg/day and placebo	Urodynamic outcomes : mean maximum urethral pressure, mean maximum urethral closure, mean functional urethral length, and abdominal pressure transmission ratio to the urethra	No intention to treat. Double blind. Allocation concealment unclear. Baseline data not provided but reported as balanced. Sample size not justified.
Cardozo, 1993[706] Placebo-controlled multicenter RCT to examine effects of oestriol in treatment of postmenopausal sensory and motor urge incontinence. Duration: 3 months	64 postmenopausal women with symptoms of sensory and motor urge incontinence, at least 1 year without menstruation, FSH>40UI/l and oestradiol <220pmol/l. Exclusion criteria: voiding difficulties, incontinence before menopause, pelvic anatomical defect requiring surgery, neurological disease, medications to treat incontinence. Loss of followup: 27%	3mg oral oestriol/day. Placebo	Self reported incontinence episodes/day. Urodynamic outcomes.	No intention to treat. Double-blind. Central stratified by incontinence randomization. Allocation concealment adequate. Baseline data confirmed the adequacy of randomization. Sample size justified.
Kinn, 1988[707] Cross-over RCT to examine effects of oral estriol, phenylpropanolamine, and its combination on stress urinary incontinence in postmenopausal women Duration: 4 weeks/treatment	36 women 1 or more years after post-menopause with stress incontinence verified with urodynamic examination. Exclusion criteria: use of hormones, alpha-agonists and alpha-antagonists, urinary tract infection. Loss of followup: 16.6%	1. Oral estriol (Triovex, 2mg x 1) + Placebo. 2. Phenylpro-panolamine (Kontexin, 50mg x 2) + Placebo. 3. Combination of oral estriol and phenylpropano-lamine	Micturition schedule recorded in the diary. Urodynamic outcomes.	Intention to treat. Single blind (subjects). Randomization and allocation concealment not reported. Baseline data not reported but stated the same in the treatment groups. Sample size not justified.
Wilson, 1987[708] Placebo-controlled RCT to examine	36 postmenopausal women with stress incontinence confirmed with urodynamic examination. Exclusion criteria: outflow obstruction, use of HRT, urinary tract infection.	1. Cyclical treatment with piperazine	7-day bladder charts, urethral pressure profiles (UPP)	No intention to treat. Double-blind. Randomization with

Table F143. Effects of hormone replacement therapy on risk and progression of urinary incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
effect of oestrogens in treatment of genuine stress incontinence in postmenopausal women Duration: 3 months	Loss of followup: 6%.	oestrone sulphate 2. Placebo		standard statistical tables with random numbers. Allocation concealment not reported. Baseline data not reported but stated the same in the treatment groups. Sample size not justified.
Waetjen, 2004[709] RCT to examine effects of treatment with raloxifene on urinary incontinence in postmenopausal women. Duration: 3 years.	Multiple Outcomes of Raloxifene trial included women age ≤80 years, >2 years past menopause, who met the World Health Organization criteria for osteoporosis. Exclusion criteria: use of estrogen, progestins, or androgens within 6 months of enrollment, known or suspected cancer, abnormal uterine bleeding, history of thromboembolic disease, and secondary causes of osteoporosis. Loss of followup: 21%	Daily supplements of 400 to 600IU of cholecalciferol and 500mg of calcium raloxifene 60mg/day or raloxifene 120mg/day Placebo	Severity of incontinence using the validated Sandvik 4-level index: mild, moderate, severe, and very severe. "Worsened" – severity score was higher 3 years after baseline, "no change" when there was no change from baseline, and "improved" if the severity score decreased. The effect of incontinence on daily activities in 0 (none) to 10(most of the time). The effect of incontinence on feeling with scale from 0 (not at all) to-10 (extremely disturbing)	No intention to treat Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.
Grady, 2001[710] RCT to examine the effects of postmenopausal hormone therapy on severity of	2,763 postmenopausal women < 80 years with coronary disease and intact uteri- from the Heart and Estrogen/Progestin Replacement Study. The outcomes are reported for 1,525 women who reported at least one episode of incontinence/week at baseline. Exclusion criteria: average compliance with treatment <80% by pill count Loss of follow up: 21% and 16% in active and placebo groups	1. 0.625mg/day of conjugated estrogens plus 2.5 mg of medroxyprogester one acetate in one	Self reported severity of incontinence as -improved (decrease of at least 2 episodes/week),	No Intention to treat. Double blind. Randomization using randomly permuted blocks of size 4 stratified by

Table F143. Effects of hormone replacement therapy on risk and progression of urinary incontinence in women (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
urinary incontinence. Duration of follow up: 4.1 years	respectively (excluded from analysis because of bad compliance).	tablet 2.Placebo	-unchanged (change of at most 1 episode/week), -worsened (increase of at least 2 episodes/week)	site. Allocation concealment adequate (reported previously). Sample size justified

Table F144. Effects local estrogen therapy on progression of urinary incontinence in women

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Von Holst, 2000[711] Placebo controlled RCT with initial screening phase (phase I), a 3-month placebo-controlled phase (phase II) and a 3-month open followup phase (phase III) to examine the efficacy and tolerability of a continuously applied 7-day-Estradiol patch in the treatment of hysterectomised women with postmenopausal complaints compared with placebo Duration: 6 months	186 hysterectomised women age 40-65 years, with postmenopausal complaints, normal gynecological history and examination, serum estradiol < 30pg/ml and follicle stimulating hormone > 30IU/ml. Exclusion criteria: use of sex hormones taken orally within the last 28 days; locally-applied sex hormones within the last 21 days or injectable sex hormones within the last 6 months. Loss of followup: one patient did not receive any study medication and 12 patients (5 in active and 7 in placebo group) were excluded from the intention-to-treat analysis of the placebo-controlled phase due to lack of availability of efficacy data	1. 7-day-Estradiol patch (1.5mg estradiol/week or 50mg estradiol/24 hours). All patients received active drug therapy (7-days). Estradiol patch) for a further 3 months (three cycles). 2. Placebo once-weekly	The sum of scores for self-reported incontinence symptoms that occurred since the previous visit. The severity of these symptoms was assessed on a four-point scale (0; no symptoms, 1; mild symptoms; 2; moderate symptoms, 3; severe and heavy symptoms).	Intention to treat. Double-blind. Randomization with 1:1 ratio. Allocation concealment unclear. Baseline data confirmed the adequacy of randomization (no data presented). No justification for sample size.
Waetjen, 2005[712] Placebo-controlled RCT to examine effect of ultra low-dose transdermal estradiol (E2) on incontinence in postmenopausal women Duration: 2 years	417 postmenopausal women age 60-80 years, with a uterus and at least 5 years after menopause, with normal bone mineral density for age (*z* score not below –2.0 at the lumbar spine). Exclusion criteria: use of estrogen or progestin within 3 months of randomization or having unexplained uterine bleeding, endometrial hyperplasia or an endometrium 5mm or more in double-wall thickness, abnormal mammogram, breast cancer, a history of metabolic bone disease, cancer, coronary disease, cerebrovascular disease, uncontrolled hypertension, uncontrolled thyroid disease, liver disease, fasting triglycerides >300mg/dl, or fasting glucose >180mg/dl. Loss of followup: 10%. 83% of the women in active group and 77% in the placebo group continued to use their assigned patch; 84% in both groups used at least 75% of their patches	1. 14mg of transdermal E2 per day. 2. Placebo.	Self-reported stress Incontinence: leakage “while coughing, sneezing, straining, laughing, or lifting”; and urge incontinence: “an urge to urinate and could not get to the toilet fast enough.” Changes in frequency of incontinence from baseline to 4 months and 2 years as	Intention to treat. Double-blind. Computer-generated randomization stratified by clinical center in blocks of 4. Treatment numbers were printed on labels adhered to identical-looking study medications. Allocation concealment

Table F144. Effects local estrogen therapy on progression of urinary incontinence in womenwomen (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
			"worsened": episodes increased by 2 or more per week; "unchanged": frequency changed by no more than 1 episode per week; "improved": incontinence episodes per week decreased by 2 or more	adequate. Baseline data confirmed the adequacy of randomization. Sample size justified.
Holtedahl, 1998[713] RCT to examine effects of conservative treatment for urinary incontinence Duration: 6 months for controlled trial	95 women, 50-74 years of age with regular incontinence (>2 leakage episodes per month) diagnosed during gynecological examinations, with positive pad test, or self reported in 48 hour chart. Exclusion criteria: Cardiac pacemaker, dementia, medical conditions that would prevent following the protocol. Loss of followup: 3 patients were found protocol deviant and excluded from the analysis.	1. Local estrogen in vagitories or jelly plus physiotherapy and electrostimulation 2. Delayed treatment	1. Change in severity of incontinence from start of treatment (index range 0-8). 2. Change in impact from start of treatment (index range 0-4). 3. Quantitative measures in relation to micturition. 4. Criteria based classification; cured, improved, unchanged, worse	No intention to treat. Randomization by phone from the university department. Allocation concealment unclear. Open label. Baseline data confirmed adequacy of randomization. Sample size justified.
Dessole, 2004 [714] Placebo-controlled RCT to examine the efficacy and safety of intravaginal estriol administration on urinary incontinence, urogenital atrophy, and recurrent urinary tract infections in postmenopausal women.	88 postmenopausal women with incontinence confirmed by the direct visualization of loss of urine from the urethra during the standard stress test and by urodynamic investigation. Exclusion criteria: estrogen treatment, anatomical lesions of the urogenital tract, detrusor over activity and abnormal maximal cystometric capacity; presence of severe systemic disorders, thromboembolic diseases, biliary lithiasis, previous breast or uterine cancer, abnormal uterine bleeding, and body mass index of ≥25kg/ml. Loss of followup: 11 women, 4 due to discomfort and 3 due to local adverse reactions	1. Intravaginal estriol ovules: 1 ovule/day (1mg) for 2 weeks and then 2 ovules/week for 6 months. 2. Placebo: vaginal suppositories	Self-reported urinary incontinence complaints as none, mild, moderate, or severe. Cured: change from "mild," "moderate," "severe" to "none." Improved – change from "moderate" to "mild" or from "severe" to "moderate/mild." Urodynamic outcomes: mean	Intention to treat. Double-blind. Randomization was obtained using sets of sequenced, sealed, opaque envelopes, each containing the bottle number to be given to each participant. Allocation concealment adequate. Baseline data confirmed

Table F144. Effects local estrogen therapy on progression of urinary incontinence in womenwomen (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Duration: 6 months			maximum urethral pressure, mean maximum urethral closure, mean functional urethral length, and abdominal pressure transmission ratio to the urethra. Urethrocystometry outcomes.	adequacy of randomization. Sample size justified.
Zullo, 2005[632] RCT to examine the efficacy of tension-free vaginal tape procedure and topical estrogen therapy on overactive bladder symptoms in menopausal women. Duration: 6 months	59 women with confirmed urodynamic stress incontinence, at least 1 year at menopause status, with serum estradiol <150pmol/l after hysterectomy, without contraindications to local estrogen therapy or to vaginal surgery. Exclusion criteria: urogenital prolapse above grade 1, detrusor over activity, intrinsic urethral sphincter deficiency, previous urogynecologic surgery, endometrial thickness more than 4mm, previous estrogen therapy within the past 6 months, unexplained uterine bleeding, or history of diabetes mellitus or insipidus, congestive cardiac failure, diuretic therapy, or neoplasms. Loss of followup: 3 eligible patients (5%) refused to participate	1. Tension-free vaginal tape procedure plus postoperative vaginal estrogen: 1 estriol ovule/day (1mg) for 1 month, then 2 ovules a week for the 5 months. 2. Tension-free vaginal tape procedure alone	Self-reported urinary symptoms using standardized questions (International Continence Society definition). Urodynamic outcomes.	No intention to treat. Single blind (physicians who performed all examinations and urodynamic assessment). Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.
Mikkelsen, 1995[715] Placebo-controlled RCT to examine effects of low-dose vaginal treatment with oestradiol before vaginal operation. Duration: 3 years	47 postmenopausal women (>1 year after menopause) scheduled for vaginal repair operation for genital descensus, 7 patients with urinary stress incontinence. Exclusion criteria: previous breast and uterine malignancies and other hormone dependent neoplasm, genital bleeding, acute thrombophlebitis. Loss of followup: 3 patients preferred conservative treatment, one died, 43 patients included in the analysis.	1. Vagifem (25mg/day oestradiol) administered as vaginal pessaries 3 weeks prior to surgery. 2. Placebo administered daily as vaginal pessaries 3 weeks prior to surgery.	Self perceived satisfaction with the treatment results, presented as cured rate.	No intention to treat. Double blind. Allocation concealment unclear. Baseline data not presented. Sample size not justified.
Akhila, 2006[716] RCT to examine the clinical efficacy of oral hormone	116 menopausal women with self-reported post-menopausal symptoms. Exclusion criteria: contraindications for hormone replacement therapy Loss of followup: 28 women excluded from the analysis.	1. Conjugated equine oral estrogen 0.625mg/day.	Self reported urinary symptoms of incontinence	No intention to treat. Open label. Allocation concealment

Table F144. Effects local estrogen therapy on progression of urinary incontinence in womenwomen (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
therapy, percutaneous gel, and transdermal patch in incontinent menopausal women. Duration: 1 year		2. Estradiol gel percutaneous 1.25g/day. 3. Transdermal patch with 50mg/day estradiol		unclear. Baseline data confirmed the adequacy of randomization. Sample size not justified.
Lose, 2000[717] RCT to examine the efficacy of an oestradiol-releasing vaginal ring and oestriol pessaries on lower urinary tract symptoms in postmenopausal women. Duration: 24 weeks	251 women reporting at least one bothersome lower urinary tract symptom after spontaneous or surgical post menopause. Exclusion criteria: known or suspected oestrogen-dependent neoplasia or malignancy, vaginal bleeding, clinically significant liver diseases, acute or intermittent porphyria, uterovaginal prolapse II-III, sex hormone treatment within 6 months, vaginal irritation or atrophy or ulceration. Loss of followup: none	1. Oestradiol-releasing ring, 7.5mg oestradiol. 2. Oestriol pessaries 0.5mg every second day.	Subjective scores of urgency, frequency, nocturia, dysuria, stress incontinence and urge incontinence.	Intention to treat. Open label. Central randomization. Allocation concealment unclear. Baseline data confirmed the adequacy of randomization. Sample size justified.
Chompootaweep 1998, [718] RCT to examine Effects of combined contraceptive intravaginal pill and standard conjugated estrogen cream on urogenital symptoms in postmenopausal Thai women. Duration: 8 weeks	40 postmenopausal women with urogenital symptoms related to estrogen deficiency. Exclusion criteria: thromboembolic disorders, severe liver diseases, estrogen-dependent tumors, high blood pressure (diastolic >140mm/Hg). Loss of followup: none.	1. Combined contraceptive intravaginal 1 pill/week at bedtime with 250mg levonorgestrel +30mg ethinyl estradiol. 2. Intravaginal conjugated estrogen cream (1g=0.625mg conjugated equine estrogens) at bedtime, 3/week in week 1, 2/week in week 2, and then 1/week for the 6 weeks	Self reported urinary urgency	Intention to treat not stated. Open label. Randomization procedure not reported. Allocation concealment unclear. Baseline data confirmed the adequacy of randomization. Sample size not justified.

Table F144. Effects local estrogen therapy on progression of urinary incontinence in womenwomen (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Blom,1995,[719] Crossover RCT to examine effects of a transdermal estradiol delivery system, alone and in combination with naproxen, in elderly women with confirmed urge incontinence. Duration: 8 weeks, 2 week washout period.	19 ambulant elderly women (52 years and older) with confirmed urge incontinence. Exclusion criteria: history of breast and endometrial cancer, thromboembolic disorders, severe hypertension, cardiac failure, diabetes mellitus, peptic ulceration. Loss of followup: 15.8%	1. Estradiol transdermal therapeutic system (0.05mg estradiol/day). 2. Estradiol transdermal therapeutic system (0.05mg estradiol/day) combined with naproxen 250mg tablets twice daily. 3. Placebo matching estradiol transdermal therapeutic system	Bladder-diary charts with frequency of urination, nocturia, and episodes of incontinence. Cystometric outcomes	No intention to treat. Single-blind. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.

Table F145. Effects of hormone therapy on urinary continence in females (events) (sorted by the rate of continence after the active treatments, from highest to lowest)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Akhila, 2006[716] N = 116	Estradiol gel percutaneous 1.25g/day	Transdermal patch with 50mg/day estradiol	% cured	26	40	90.0	100.0	0.9 (0.8; 1.0)		
	Conjugated equine estrogen 0.625mg/day orally	Transdermal patch with 50mg/day estradiol	% cured	19	40	40.0	100.0	**0.4 (0.3; 0.6)**	2 (1; 2)	600 (420; 708)A
Waetjen, 2004[709] N = 963	Raloxifene 60mg/day or raloxifene 120mg/day	Placebo	Continence at 3 years	243	125	38.2	38.5	1.0 (0.8; 1.2)		
Rufford, 2003[704] N = 40	25mg 17 beta-estradiol implant subcutaneous tissue	Placebo implant	Urge incontinence % cured	7	6	35.0	30.0	1.2 (0.5; 2.9)		
Mikkelsen, 1995[715] N = 47	Vagifem (25mg/day oestradiol) administered as vaginal pessaries 3 weeks prior to surgery	Placebo administered as vaginal pessaries daily 3 weeks prior to surgery	Cured rate	5	6	25.0	33.0	0.8 (0.3; 2.1)		
Kok, 1999[698] N = 102	2mg 17 b-oestradiol in combination with 2.5, 5, 10 or 15mg dydrogesterone orally once a day.	Changes from baseline. No placebo group	Cured Incontinence (became continent)	23	0	23.0	0.1	**47.0 (2.9; 763.5)**	4 (1;528)	229 (2; 763)E

Table F145. Effects of hormone therapy on urinary continence in females (events) (sorted by the rate of continence after the active treatments, from highest to lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Holtedahl, 1998[713] N = 90	Local estrogen in vagitories or jelly plus physiotherapy and electro stimulation	No treatment	Number of cured : no reported leakage and no wet episodes	8	0	22.0	0.0	**20.7 (1.2; 346.5)**		
Rufford, 2003[704] N = 40	25mg 17beta-estradiol implant subcutaneous tissue	Placebo implant	Stress incontinence % cured	4	3	20.0	15.0	1.3 (0.3; 5.2)		
			Dysuria, % of cured	4	3	20.0	15.0	1.3 (0.3; 5.2)		
			Urgency, % of cured	3	2	15.0	10.0	1.5 (0.3; 8.0)		
Grady, 2001[710] N = 1,525 100% female Followup 48 months	0.625 mg of conjugated estrogens plus 2.5 mg of medroxyprogesterone acetate in one tablet daily	Placebo	No incontinent episodes in the previous week	109	134	14.19	17.70	0.80 (0.64; 1.01)		
Jackson, 1999[702] N = 67	Change from baseline after oestradiol valerate 2mg/day	Change from baseline after placebo	% with cured stress incontinence	5	5	14.0	14.0	1.0 (0.3; 3.2)		

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group; Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F146. Effects of hormone therapy on improvement of urinary incontinence in females (events) (sorted by rate of improvement in continence after active treatment, from the highest to the lowest)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Dessole, 2004[714] N = 88	Intravaginal estriol ovules: 1 ovule/day (1mg) for 2 weeks and then 2 ovules once weekly for 6 months.	Placebo vaginal suppositories	Rate of cured and improved	30	7	68.2	16.0	**4.3 (2.1; 8.7)**	2 (1; 6)	522 (178; 1233)E
Kok, 1999[698] N = 102	2mg 17 b-oestradiol in combination with 2.5, 5, 10 or 15mg/day dydrogesterone, orally	Changes from baseline. No placebo group	Disappear-acne of Nocturia	67	0	65.4	0.1	**135.0 (8.5; 2151.4)**	2 (0; 134)	653 (7; 2150)E
Waetjen, 2004[709] N = 963	Raloxifene 60mg/day or raloxifene 120mg/day	Placebo	Improved urinary incontinence at 3 years	102	48	27.4	25.5	1.1 (0.8; 1.5)		
Ahlstrom, 1990[705] N = 29	Estriol 4mg/day and phenylpropanolamine 50mg twice daily	Estriol 4mg once daily	Self-reported improvement in incontinence symptoms	13	11	45.0	40.0	1.2 (0.6; 2.2)		

Table F146. Effects of hormone therapy on improvement of urinary incontinence in females (events) (sorted by rate of improvement in continence after active treatment, from the highest to the lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Holtedahl, 1998[713] N = 90	Local estrogen in vagitories or jelly plus physic-therapy and electro stimulation	No treatment	Number of improved: reduction in frequency amount, or wet episodes	14	4	39.0	9.0	**4.3 (1.5; 11.9)**	3 (1;20)	300 (49; 978)E
Grady; 2001[710] N = 1,525 100% female	0.625 mg of conjugated estrogens plus 2.5 mg of medroxyprogesterone acetate in one tablet daily	Placebo 4 months	Improved; decrease of at least 2/week in episodes	214	248	27.89*	32.77	**0.85 (0.73; 0.99)**	20 (11; 340)	49 (3; 88)A
		Placebo 12 months	Improved; decrease of at least 2/week in episodes	191	236	24.89*	31.17	**0.80 (0.68; 0.94)**	16 (10; 52)	63 (19; 100)A
		Placebo 24 months	Improved; decrease of at least 2/week in episodes	181	222	23.55*	29.36	**0.80 (0.68; 0.95)**	17 (11; 70)	58 (14; 94)A
		Placebo 36 months	Improved; decrease of at least 2/week in episodes	162	203	21.08*	26.84	**0.79 (0.66; 0.94)**	17 (11; 64)	58 (16; 92)A
		Placebo 48 months	Improved; decrease of at least 2/week in episodes	215	241	27.96*	31.87	0.88 (0.75; 1.03)		
		Placebo 48 months	Improved or markedly improved	158	194	20.57*	25.66	**0.80 (0.67; 0.97)**	20 (12; 113)	51 (9; 85)A

Table F146. Effects of hormone therapy on improvement of urinary incontinence in females (events) (sorted by rate of improvement in continence after active treatment, from the highest to the lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Waetjen, 2005[712] N = 417	14mg/day transdermal E2 for 2 years	Placebo 2 years	Improved incontinence; the number of incontinence episodes per week decreased by 2 or more	57	80	27.4	38.2	**0.7 (0.5; 0.9)**	9 (6; 50)	108 (20; 175)A
Vardy, 2003[692] N = 58	Conjugated equine estrogen 0.625mg	Placebo	Pelvic organ prolapse quantization, % of subjects with improved scores	4	0	25.0	0.1	7.9 (0.5; 133.8)		
Waetjen, 2005[712] N = 417	14mg/day of transdermal E2 for 4 months	Placebo for 4 months	Improved incontinence: the number of incontinence episodes per week decreased by 2 or more	52	74	25.0	35.2	0.7 (0.5; 1.0)		
Long,2006[699] N = 73	Oral 0.625mg of conjugated equine Estrogen/tablet	Topical 0.625mg conjugated equine Estrogen/1g vaginal cream	Bristol Female Lower Urinary Tract Symptoms Question-naires. improvement in stress urinary incontinence	8	9	21.6	25.0	0.86 (0.38; 1.99)		

Table F146. Effects of hormone therapy on improvement of urinary incontinence in females (events) (sorted by rate of improvement in continence after active treatment, from the highest to the lowest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Vardy, 2003[692] N = 58	Conjugated equine estrogen 0.625mg;	Placebo	Improvement of urinary symptoms; Average change in angle of deflection	3	0	20.0	0.0	**6.1 (0.3; 108.6)**		
Waetjen, 2005[712]	14mg of transdermal E2 per day for 2 years	Placebo 2 years	Improved stress incontinence: the number of incontinence episodes per week decreased by 2 or more	37	61	17.9	29.2	**0.6 (0.4; 0.9)**	9 (6; 27)	113 (37;168)A
			Improved urge incontinence: the number of incontinence episodes per week decreased by 2 or more	27	35	13.1	16.9	0.8 (0.5; 1.2)		
Vardy, 2003[692] N = 58	Raloxifene 60mg	Placebo	Improvement of urinary symptoms; Average change in angle of deflection	1	0	6.7	0.0	2.6 (0.1; 59.4)		

Bold- significant differences in outcomes at 95% confidence level; Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F147. Effects of hormone therapy on risk of urinary incontinence in females (events) (sorted by rate of outcome after active treatment, from lowest to highest)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Goldstein, 2005[691] N = 619	Raloxifene, 150mg/day	Placebo	New or worsening urinary incontinence during the study	1	2	0.6	1.3	0.5 (0.0; 5.3)		
			Newly developed urinary incontinence	1	1	0.6	0.7	1.0 (0.1: 15.3)		
			New or worsening urinary incontinence during the study	1	2	0.7	1.3	0.5 (0.0; 5.5)		
			Newly developed urinary incontinence	1	1	0.7	0.7	1.0 (0.1; 15.8)		
Warming, 2003[693] N = 301	12 months after discontinuation of levormeloxifene 1.25, 5, 10, or 20mg/day,	Placebo	Urogenital prolapse	2	0	1.0	0.1	1.3 (0.1; 25.9)		
	Levormeloxifene 1.25, 5, 10, or 20mg/day	Placebo	Urogenital prolapse	6	0	3.0	0.1	3.3 (0.2; 57.3)		
Hendrix, 2005[695] N = 5,182	Estrogen plus progestin (E+P): 0.625mg of CEE plus 2.5mg of medroxyprogester1 acetate	Placebo	Incident mixed incontinence	99	69	3.7	2.8	1.3 (1.0; 1.8)		

Table F147. Effects of hormone therapy on risk of urinary incontinence in females (events) (sorted by rate of outcome after active treatment, from lowest to highest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
	Estrogen alone: 0.625mg conjugated equine estrogen	Placebo	Incident mixed incontinence	76	50	5.0	3.2	**1.5 (1.1 2.2)**	56 (26; 363)	18 (3; 38)E
Goldstein, 2005[691] N = 619	Conjugated equine estrogen 0.625mg/day	Placebo	Newly developed urinary incontinence	8	1	5.1	0.7	7.7 (1.0; 60.8)		
Long, 2006[699] N = 73	Oral 0.625mg of conjugated equine Estrogen tablet	Topical 0.625mg conjugated equine Estrogen/1 g vaginal cream	Bristol Female Lower Urinary Tract Symptoms Questionnaire -urge urinary incontinence	2	3	5.4	8.3	0.65 (0.12; 3.66)		
Jackson, 1999[702] N = 67	Post oestradiol valerate 2mg/day	Post placebo	Incontinence with intercourse	2	1	7.0	3.0	2.1 (0.2; 21.7)		
Goldstein, 2005[691] N = 619	Conjugated equine estrogen 0.625mg/day	Placebo	New or worsening urinary incontinence during the study	11	2	7.0	1.3	**5.3 (1.2; 23.5)**	18 (3; 400)	57 (3; 292)E
Vestergaard, 2003[696] N = 1,006	Sequential oral oestrogen and progestogen oral continuous oestradiol	No HRT	Incontinence with moderate to severe discomfort (2-4)	40	45	8.0	9.0	0.9 (0.6; 1.3)		
Long, 2006[699] N = 73	Oral 0.625mg of conjugated equine Estrogen tablet	Topical 0.625mg conjugated equine Estrogen/1 g vaginal cream	Bristol Female Lower Urinary Tract Symptoms Questionnaire -urinary frequency	3	12	8.1	33.3	0.24 (0.07; 0.79)	4 (3; 14)	252 (70; 308)

Table F147. Effects of hormone therapy on risk of urinary incontinence in females (events) (sorted by rate of outcome after active treatment, from lowest to highest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Goldstein, 2002[697] N = 2,924	Levormeloxifene 0.5mg/day	Placebo	Self reported micturition frequency in both active groups	184	39	9.0	4.0	**4.7 (3.4; 6.5)**	20 (5; 11)	50 (94; 221)E
Hendrix, 2005[695] N = 5,182	Estrogen plus progestin (E + P): 0.625mg CEE plus 2.5mg medroxyprogester1 acetate	Placebo	Incident urge incontinence	304	272	11.4	10.0	1.0 (0.9; 1.2)		
	Estrogen alone: 0.625mg conjugated equine estrogen	Placebo	Incident urge incontinence	210	184	13.8	11.9	1.2 (1.0; 1.4)		
	0.625mg CEE plus 2.5mg medroxyprogester1 acetate	Placebo	Incident Stress Urinary Incontinence	429	218	16.0	8.7	**1.8 (1.6; 2.2)**	14 (10; 20)	73 (51; 100)E
Long, 2006[699] N = 73	Oral 0.625mg conjugated equine Estrogen/tablet	Topical 0.625mg conjugated equine Estrogen/1 g vaginal cream	Bristol Female Lower Urinary Tract Symptoms Questionnaires stress urinary incontinence	6	13	16.2	36.1	0.45 (0.19; 1.05)		
Goldstein, 2002[697] N = 2,924	Levormeloxifene 0.5mg/day	Placebo	Self reported Urinary incontinence on both active groups	338	37	17.0	4.0	**9.1 (6.5; 12.6)**	8 (2;5)	130 (221; 463)E
Hendrix, 2005[695] N = 3,073	Estrogen alone: 0.625mg conjugated equine estrogen	Placebo	Incident Stress Urinary Incontinence	266	131	17.4	8.5	**2.1 (1.7; 2.5)**	11 (8;17)	89 (59; 128)E

Table F147. Effects of hormone therapy on risk of urinary incontinence in females (events) (sorted by rate of outcome after active treatment, from lowest to highest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Vestergaard, 2003[696] N = 1,006	Sequential oral oestrogen and progestogen	No HRT	Incontinence with mild discomfort	100	101	20.0	20.0	1.0 (0.8; 1.3)		
Vardy, 2003[692] N = 58	Conjugated equine estrogen 0.625mg;	Placebo	Consideration of any indicator of prolapse.	3	2	22.0	18.0	1.3 (0.3; 6.6)		
Lose, 2000[717] N = 251	Oestradiol-releasing ring, 7.5mg oestradiol	Oestriol pessaries 0.5mg every second day	Self reported urgency	36	39	27.0	33.0	0.8 (0.6; 1.2)		
Long, 2006[699] N = 73	Oral 0.625mg of conjugated equine Estrogen tablet	Topical 0.625mg conjugated equine Estrogen/1 g vaginal cream	Bristol Female Lower Urinary Tract Symptoms Questionnaire Nocturia	10	3	27.0	8.3	3.24 (0.97; 10.83)		
Jackson, 1999[702] N = 67	Post oestradiol valerate 2mg/day	Post placebo	Abnormal stream	10	7	30.0	22.0	1.5 (0.6; 3.4)		
Lose, 2000[717] N = 251	Oestradiol-releasing ring, 7.5mg oestradiol	Oestriol pessaries 0.5mg every second day	Self reported Nocturia	42	41	31.0	35.0	0.9 (0.6; 1.3)		
Dessole, 2004[714] N = 88	Intravaginal estriol ovules: 1 ovule (1mg)/day for 2 weeks and then 2 ovules once weekly for 6 months.	Placebo vaginal suppositories	Subjective complaints of stress urinary incontinence.	14	37	31.8	84.1	**0.4 (0.2; 0.6)**	2 (2; 3)	523 (341; 638)A
Lose, 2000[717] N = 251	Oestradiol-releasing ring, 7.5mg	Oestriol pessaries 0.5mg	Self reported urge incontinence	44	0	33.0		**77.8 (4.8; 1,249.4)**		

Table F147. Effects of hormone therapy on risk of urinary incontinence in females (events) (sorted by rate of outcome after active treatment, from lowest to highest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
	oestradiol	every second day	Self reported stress incontinence	46	48	34.0	41.0	0.8 (0.6; 1.2)		
Waetjen, 2005[712] N = 417	14mg/day of transdermal E2 for 2 years	Placebo 2 years	New developed incontinence at 2 years	81	77	39.0	36.8	1.1 (0.8; 1.4)		
Steinauer, 2005[694] N = 1,208	Oral conjugated estrogen (0.625mg) and medroxy progesterone acetate (2.5mg) in 1 pill/day	Placebo	New report of weekly urge incontinence	287	220	48.0	36.0	**1.3 (1.2; 1.5)**	-8 (-17; -5)	-120 (-60; -190)
Jackson, 1999[702] N = 67	Post oestradiol valerate 2mg daily	Post placebo	Intermittent stream	17	20	50.0	60.0	0.9 (0.5; 1.3)		
			Changing outer clothing	17	17	53.0	50.0	1.0 (0.6; 1.7)		
Steinauer, 2005[694] N = 1,208	Oral conjugated estrogen (0.625mg) and medroxy progesterone acetate (2.5mg) in 1 pill/day	Placebo	New report of weekly stress incontinence	322	232	54.0	38.0	**1.4 (1.3; 1.6)**	6 (4; 10)	160 (96; 232)E
			New report of weekly incontinence in women , 60 years of age	57	42	59.0	48.0	1.2 (0.9; 1.6)		
Vardy, 2003[692] N = 58	Tamoxifen 20mg;	Placebo	Consideration of any indicator of prolapse.	9	2	60.0	18.0	3.9 (1.0; 14.9)		
Jackson, 1999[702] N = 67	Post oestradiol valerate 2mg/day	Post placebo	Inability to stop midstream	20	24	60.0	72.0	0.9 (0.6; 1.2)		

Table F147. Effects of hormone therapy on risk of urinary incontinence in females (events) (sorted by rate of outcome after active treatment, from lowest to highest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Steinauer, 2005[694] N = 1,208	Oral conjugated estrogen (0.625mg) and medroxy progesterone acetate (2.5mg) in 1 pill/day	Placebo	New report of weekly incontinence	382	302	64.0	49.0	**1.3 (1.2; 1.4)**	7 (5;12)	150 (84; 211)E
Jackson, 1999[702] N = 67	Oestradiol valerate 2mg/day	Placebo	Unexplained incontinence	24	16	73.0	47.0	**1.5 (1.0; 2.3)**	4 (2; 95)	260 (10; 628)E
			Wearing protection	24	24	73.0	72.0	1.0 (0.8; 1.4)		
Vardy, 2003[692] N = 58	Raloxifene 60mg	Placebo	Consideration of any indicator of prolapse.	11	2	75.0	18.0	**4.8 (1.3; 17.7)**	2 (0; 19)	570 (51; 3003)E
Jackson, 1999[702] N = 67	Oestradiol valerate 2mg/day	Placebo	Urinary urgency	31	33	93.0	97.0	1.0 (0.9; 1.1)		
			Stress Incontinence	33	34	100.0	100.0			
			Urge Incontinence	33	33	100.0	97.0	1.0 (0.9; 1.1)		
Waetjen, , 2004[709] N = 963	Raloxifene 60mg/day or raloxifene 120mg/day	Placebo	Stress urinary incontinence at 3 years	99	55	15.6	16.9	0.9 (0.7; 1.2)		
			Urge urinary incontinence at 3 years	164	89	25.8	27.4	0.9 (0.8; 1.2)		
			Mixed urinary incontinence at 3 years	111	47	17.5	14.5	1.2 (0.9; 1.6)		

Bold- significant differences in outcomes at 95% confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F148. Effects of hormone therapy on progression of urinary incontinence in females (events) (sorted by rate of progression after the active treatment, from lowest to highest)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Goldstein, 2005[691] N = 619	Raloxifene, 60mg/day	Placebo	Severity of incontinence: moderate or severe	0	1	0.0	50.0	0.5 (0.0; 7.1)		
	Raloxifene, 150mg/d	Placebo	Severity of incontinence: moderate or severe	0	1	0.0	50.0	0.5 (0.0; 7.1)		
Waetjen, 2005[712] N = 417	14mg/day transdermal E2 for 4 months	Placebo 4 months	Worsened urge incontinence: the number of incontinence episodes/week increased by 2 or more.	5	21	2.4	10.2	**0.2 (0.1; 0.6)**	13 (11; 26)	78 (39; 93)A
	14mg/day transdermal E2 for 2 years	Placebo 2 years	Worsened stress incontinence: the number of incontinence episodes/week increased by 2 or more.	20	19	9.5	9.0	1.1 (0.6; 1.9)		
Holtedahl, 1998[713] N = 90	Local estrogen in vagitories or jelly plus physiotherapy and electro stimulation	No treatment	Worse incontinence: self reported worsening of severity or impact	4	13	11.0	30.0	0.4 (0.1; 1.1)		
Waetjen, 2005[712] N = 417	14mg/day transdermal E2 for 2 years	Placebo 2 years	Worsened urge incontinence: the number of incontinence episodes/week increased by 2 or more.	27	38	13.1	18.0	0.7 (0.5; 1.1)		

Table F148. Effects of hormone therapy on progression of urinary incontinence in females (events) (sorted by rate of progression after the active treatment, from lowest to highest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Vestergaard, 2003[696] N = 1,006	Sequential oral oestrogen and progestogen	No HRT	Frequent voiding: Mild discomfort (1)	70	81	14.0	16.0	0.9 (0.6; 1.2)		
Vardy, 2003[692] N = 58	Raloxifene 60mg	Placebo	Increase or worsening in symptoms of incontinence	2	2	15.0	18.0	0.9 (0.1; 5.3)		
Waetjen, 2005[712] N = 417	14mg/day transdermal E2 for 2 years	Placebo 2 years	Worsened incontinence: the number of incontinence episodes/week increased by 2 or more.	35	35	16.7	16.9	1.0 (0.7; 1.5)		
Vardy, 2003[692] N = 58	Conjugated equine estrogen 0.625mg	Placebo	Increase or worsening in symptoms of incontinence	2	2	18.0	18.0	0.9 (0.1; 5.3)		
Vestergaard, 2003[696] N = 1,006	Sequential oral oestrogen and progestogen	No HRT	Frequent voiding: Moderate to severe discomfort (2-4)	100	96	20.0	19.0	1.0 (0.8; 1.3)		
Waetjen, 2005[712] N = 417	14mg/day transdermal E2 for 4 months	Placebo 4 months	Worsened stress incontinence: the number of incontinence episodes/week increased by 2 or more.	42	28	20.2	13.6	1.5 (1.0; 2.3)		
			Worsened incontinence: the number of incontinence episodes/week increased by 2 or more.	50	40	23.8	19.3	1.3 (0.9; 1.8)		

Table F148. Effects of hormone therapy on progression of urinary incontinence in females (events) (sorted by rate of progression after the active treatment, from lowest to highest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Vardy, 2003[692] N = 58	Conjugated equine estrogen 0.625mg	Placebo	Pelvic organ prolapse quantitation, % of subjects with worsened scores	4	2	25.0	18.0	1.7 (0.4; 8.0)		
Holtedahl, 1998[713] N = 90	Local estrogen in vagitories or jelly plus physiotherapy and electro stimulation	No treatment	Unchanged incontinence: no changes in frequency, amount, or wet episodes	10	27	28.0	61.0	**0.5 (0.3; 0.8)**	3 (2; 8)	330 (119; 455;)A
Grady, 2001[710] N = 1,525	0.625 mg of conjugated estrogens plus 2.5 mg of medroxyprogesterone acetate in one tablet daily	Placebo	Worsened-increase of at least 2/ week episodes 4 months	202	166	26.35	21.91	**1.20 (1.00; 1.43)**	23 (10, 664)	44 (1; 95)E
			Worsened-increase of at least 2/ week episodes 12 months	224	180	29.18	23.80	**1.23 (1.04; 1.45)**	19 (9; 116)	54 (9; 108)E
			Worsened-increase of at least 2/ week episodes 24 months	246	178	32.05	23.56	**1.36 (1.16; 1.61)**	12 (7; 27)	85 (37; 143)E
			Worsened-increase of at least 2/ week episodes 36 months	256	187	33.33	24.73	**1.35 (1.15; 1.58)**	12 (7; 27)	86 (37; 144)E
			Worsened-increase of at least 2/ week episodes 48 months	290	212	37.80	28.02	**1.35 (1.17; 1.56)**	10 (6; 22)	98 (46; 157)E

Table F148. Effects of hormone therapy on progression of urinary incontinence in females (events) (sorted by rate of progression after the active treatment, from lowest to highest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
			Worsened or markedly worsened 48 months	293	202	38.19	26.64	**1.43 (1.23; 1.66)**	9 (6; 16)	116 (62; 175)E
Vardy, 2003[692] N = 58	Tamoxifen 20mg	Placebo	Pelvic organ prolapse quantitation, % of subjects with worsened scores	5	2	31.0	18.0	2.2 (0.5; 9.3)		
			Increase or worsening in symptoms of incontinence	5	2	33.0	18.0	2.2 (0.5; 9.3)		
Waetjen, 2005[712] N = 417	14mg/day transdermal E2 for 4 months	Placebo for 4 months	Unchanged incontinence: the number of incontinence episodes/week increased or decreased no more than 1	106	95	51.2	45.5	1.1 (0.9; 1.4)		
Vardy, 2003[692] N = 58	Raloxifene 60mg	Placebo	Pelvic organ prolapse quantitation, % of subjects with worsened scores	10	2	67.0	18.0	**4.3 (1.2; 16.3)**	2 (0; 36)	490 (28; 2,752)E
Waetjen, 2005[712] N = 417	14mg/day transdermal E2 for 2 years	Placebo 2 years	Unchanged stress incontinence: the number of incontinence episodes/week increased or decreased no more than 1	151	129	72.6	61.8	1.2 (1.0; 1.3)		

Table F148. Effects of hormone therapy on progression of urinary incontinence in females (events) (sorted by rate of progression after the active treatment, from lowest to highest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
Jackson, 1999[702] N = 67	Post oestradiol valerate 2mg/day	Post placebo	More than 7 episodes of daytime incontinence	25	23	77.0	69.0	1.1 (0.8; 1.5)		
Goldstein, 2005[691] N = 619	Conjugated equine estrogen 0.625mg/day	Placebo	Severity of incontinence: moderate or severe	9	1	81.8	50.0	1.6 (0.4; 6.7)		
Waetjen, 2005[712] N = 417	14mg/day transdermal E2 for 4 months	Placebo 4 months	Unchanged urge incontinence: the number of incontinence episodes/week increased or decreased no more than 1	178	162	85.7	77.3	**1.1 (1.0; 1.2)**	12 (182; 6)	84 (5; 163)E
Jackson, 1999[702] N = 67	Post oestradiol valerate 2mg/day	Post placebo	More than 7 episodes of nocturnal incontinence	31	28	93.0	81.0	1.1 (1.0; 1.4)		
			Frequency of incontinence episodes (more than never)	33	34	100.0	100.0			
			Quantity of lost urine (more than none)	33	34	100.0	100.0			
Waetjen, 2004[709] N = 963	Raloxifene 60mg/day or Raloxifene 120mg/day	Placebo	Severe and very severe at 3 years	29	14	4.5	4.3	1.1 (0.6; 2.0)		
			Incontinent episodes <1/month at 3 years	146	67	22.9	20.6	1.1 (0.9; 1.4)		
			Incontinent episodes/day at 3 years	57	22	8.9	6.8	1.3 (0.8; 2.1)		

Table F148. Effects of hormone therapy on progression of urinary incontinence in females (events) (sorted by rate of progression after the active treatment, from lowest to highest) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated 95% CI)
			Wears protection for incontinence at 3 years	161	67	41.1	33.5	1.2 (1.0; 1.6)		
			Restricts daily activities: sometimes at 3 years	389	198	99.2	99.0	1.0 (0.9; 1.1)		
			Restricts daily activities: Most of the time at 3 years	3	2	0.8	1.0	0.8 (0.1; 4.6)		
			Effect on feelings: Somewhat at 3 years	373	191	95.2	95.5	1.0 (0.9; 1.1)		
			Effect on feelings: Extremely at 3 years	19	9	4.8	4.5	1.1 (0.5; 2.4)		
			No change in urinary incontinence at 3 years	218	119	58.4	63.3	0.9 (0.8; 1.1)		
			Worsened urinary incontinence at 3 years	53	21	14.2	11.2	1.3 (0.8; 2.1)		

Bold- significant differences in outcomes at 95% confidence level**;** Number needed to treat to have avoided or excessive outcome inn1 patient = 1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F149. Effects of hormone therapy on perceived urinary incontinence in females (severity measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
Cardozo, 1993[706] N = 64	3mg oral oestriol/day	Placebo	Diurnal incontinence, episodes/day	2.7 ± 3.5	1.3 ± 2.3	0.5 (0.0; 1.0)	35.9 (-2.4; 74.2)
			Nocturnal incontinence, episodes/day	0.3 ± 0.7	0.3 ± 0.8	0.0 (-0.5; 0.5)	0.0 (-163.7; 163.7)
Rufford, 2003[704] N = 40	25mg 17 beta-estradiol implant subcutaneous tissue	Placebo implant	Micturition/24 hours	8.6 ± 1.4	8.0 ± 0.9	0.5 (-0.1; 1.1)	6.4 (-1.5; 14.3)
Fantl, 1996[701] N = 83	Post conjugated equine estrogens (0.625mg) and medroxyprogesterone (10mg) cyclically	Post placebo	No. of diurnal voluntary micturition//week	50.0 ± 14.0	49.0 ± 15.0	0.1 (-0.4; 0.5)	0.1 (-0.8; 1.1)
			Number of nocturnal voluntary micturition/week	9.0 ± 6.0	8.0 ± 5.0	0.2 (-0.3; 0.7)	2.3 (-3.7; 8.3)
von Holst, 2000[711] N = 186	7-day-Estradiol patch (1.5mg estradiol/week or 50mg estradiol/24 hour)	Placebo	Change from baseline in Incontinence scores	-1.3 ± 2.0	-0.8± 1.5	-0.3 (-0.6; 0.0)	35.3 (71.4; -0.8)
Jackson, 1999[702] N = 67	Change from baseline after oestradiol valerate 2mgday	Change from baseline after placebo	Change in median frequency of Nocturia	-0.1 ± 1.3	0.1± 0.1	-0.2 (-0.7; 0.3)	-223.8 (-704.3; 256.7)
			Change in median in leaks/day	0.4 ± 0.5	0.0 ± 0.4	**0.9 (0.3; 1.4)**	
			Change in median in pads/day	0.0± 1.1	0.0 ± 0.2	0.0 (-0.5; 0.5)	
			Change in median frequency in micturition/24hour	0.1 ± 5.6	-0.6 ± 0.2	0.2 (-0.3; 0.7)	-29.7 (50.3; -109.7)

Table F149. Effects of hormone therapy on perceived urinary incontinence in females (severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Baseline (95% CI)
Fantl, 1996[701] N = 83	Post conjugated equine estrogens (0.625mg) and medroxyprogesterone (10mg) cyclically	Post placebo	Number of incontinent episodes/week	10.0 ± 10.0	13.0± 14.0	-0.2 (-0.7; 0.2)	-1.9 (-5.2; 1.5)
	Pre conjugated equine estrogens (0.625mg) and medroxyprogesterone (10mg) cyclically	Post placebo	Number of nocturnal voluntary micturition/week	9.0 ± 6.0	8.0 ± 5.0	0.2 (-0.3; 0.7)	2.3 (-3.7; 8.3)
Wilson, 1987[708] N = 36	Cyclical treatment with piperazine oestrone sulphate	Placebo	Number of pads changes/day	1.0 ± 1.9	1.7 ± 2.4	-0.3 (-1.0; 0.3)	-18.9 (-57.6; 19.8)
			Micturition/day	8.4 ± 3.0	10.4 ± 3.2	-0.6 (-1.3; 0.0)	-6.1 (-12.6; 0.3)
Fantl, 1996[701] N= =83	Pre conjugated equine estrogens (0.625mg) and medroxyprogesterone (10mg) cyclically	Post placebo	Number of incontinent episodes/week	10.0 ± 10.0	13.0 ± 14.0	-0.2 (-0.7; 0.2)	-1.9 (-5.2; 1.5)
			No. of diurnal voluntary micturition/week	50.0 ± 14.0	49.0 ± 15.0	0.1 (-0.4; 0.5)	0.1 (-0.8; 1.1)
Vardy, 2003[692] N = 58	Tamoxifen 20mg;	Placebo	Improvement of urinary symptoms; Average change in angle of deflection	0.0 ± 0.0	-0.5 ± 14.7		

Bold- significant differences in outcomes at 95% confidence level

Table F150. Effects of hormone therapy on urinary incontinence in females (severity measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	Change % from Control (95% CI)
Vardy, 2003[692] N = 58	Conjugated equine estrogen 0.625mg;	Placebo	Improvement of urinary symptoms; Average change in angle of deflection	0.0 ± 0.0	-0.5 ± 14.7		
	Raloxifene 60mg	Placebo	Improvement of urinary symptoms; Average change in angle of deflection	0.0 ± 0.0	-0.5 ± 14.7		
Cardozo, 1993[706] N = 64	3mg oral oestriol/day	Placebo	Bladder volume at first desire to void. Ml	206.0 ± 142.0	202.0 ± 114.0	0.0 (-0.5; 0.5)	0.0 (-0.2; 0.3)
			Detrusor pressure (cm/H2O)	17.0 ± 15.0	22.0 ± 39.0	-0.2 (-0.7; 0.3)	-0.8 (-3.0; 1.4)
	3mg oral oestriol/day	Placebo	Cystometric capacity, bladder volume, ml	333.0 ± 163.0	365.0 ± 136.0	-0.2 (-0.7; 0.3)	-0.1 (-0.2; 0.1)
			Cystometric Detrusor pressure (cm/H2O)	25.0 ± 20.0	32.0 ± 65.0	-0.1 (-0.6; 0.3)	-0.5 (-2.0; 1.1)
Rufford, 2003[704] N = 40	25mg 17 beta-estradiol implant subcutaneous tissue	Placebo implant	First sensation	200.0 ± 37.5	150.0 ± 25.0	**1.6 (0.9; 2.3)**	1.0 (0.6; 1.5)
	25mg 17 beta-estradiol implant subcutaneous tissue	Placebo implant	Volume P>15cm/H2O	225.0 ± 87.5	250.0 ± 25.0	-0.4 (-1.0; 0.2)	-0.2 (-0.4; 0.1)
	25mg 17 beta-estradiol implant subcutaneous tissue	Placebo implant	Maximum capacity	450.0 ± 13.0	320.0 ± 40.0	**4.4 (3.2; 5.5)**	1.4 (1.0; 1.7)
	25mg 17 beta-estradiol implant subcutaneous tissue	Placebo implant	Volume voided per micturition	177.0 ± 16.0	161.0 ± 19.5	**0.9 (0.2; 1.5)**	0.6 (0.2; 1.0)
	25mg 17 beta-estradiol implant subcutaneous tissue	Placebo implant	Pressure rise of filling	6.0 ± 5.0	10.0 ± 5.0	**-0.8 (-1.4; -0.2)**	-8.0 (-14.5; -1.5)
Ahlstrom, 1990[705] N = 29	Estriol 4mg/day and phenylpropanolamine 50mg twice daily.	Estriol 4mg/day	Change in functional urethral length, mm			0.5 (-9.0; 10.0)	
			Change in mean maximum urethral closure pressure			1.7 (-13.1; 16.5)	
			Change in mean maximum urethral pressure			1.5 (-16.4; 19.4)	

Table F150. Effects of hormone therapy on urinary incontinence in females (severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	Change % from Control (95% CI)
	Estriol 4mg/day and phenylpropanolamine 50mg twice daily.	Estriol 4mg/day	Leakage during the coughing test			-4.2 (-45.4; 37.0)	
	Estriol 4mg/day and phenylpropanolamine 50mg twice daily.	Estriol 4mg/day	Residual urine			-2.1 (-81.3; 77.1)	
	Estriol 4mg/day and phenylpropanolamine 50mg twice daily.	Estriol 4mg/day	Abdominal pressure transmission ratio to the urethra,%			-5.1 (-73.7; 63.5)	
Dessole, 2004[714] N = 88	Intravaginal estriol ovules: 1 ovule (1mg)/day for 2 week and then 2 ovules/week for 6 months.	Placebo vaginal suppositories	Urinary stimulus that cannot be postponed (ml)	355.7 ± 23.3	346.3 ± 23.0	0.4 (0.0; 0.8)	0.1 (0.0; 0.2)
	Intravaginal estriol ovules: 1 ovule (1mg)/day for 2 weeks and then 2 ovules/week for 6 months.	Placebo vaginal suppositories	Bladder capacity (ml)	452.5 ± 47.4	429.0 ± 43.2	**0.5 (0.1; 0.9)**	0.1 (0.0; 0.2)
			Bladder compliance (ml/cm/H2O)	41.1 ± 13.5	43.4 ± 13.9	-0.2 (-0.6; 0.2)	-0.4 (-1.4; 0.6)
			maximum bladder pressure, (cm/H2O)	10.6 ± 2.4	11.7 ± 3.1	-0.4 (-0.8; 0.0)	-3.4 (-7.0; 0.2)
	Intravaginal estriol ovules: 1 ovule (1mg)/day for 2 weeks and then 2 ovules/week for 6 months.	Placebo vaginal suppositories	Maximum urethral closure pressure; (cm/H2O)	56.9 ± 9.2	43.3 ± 6.3	**1.7 (1.2; 2.2)**	4.0 (2.8; 5.1)
	Intravaginal ovule (1mg)/day for 2 weeks and then 2 ovules/week for 6 months.	Placebo vaginal suppositories	Maximum urethral pressure; (cm/H2O)	62.2 ± 8.6	49.4 ± 6.5	**1.7 (1.2; 2.2)**	3.4 (2.4; 4.4)
			Functional urethral length; (mm)	28.0 ± 3.1	26.6 ± 2.5	**0.5 (0.1; 0.9)**	1.9 (0.3; 3.5)
			Pressure transmission ratio, %	88.9 ± 9.7	70.8 ± 9.0	**1.9 (1.4; 2.4)**	2.7 (2.0; 3.4)
			First stimulus (ml)	160.3 ± 23.4	151.6 ± 15.1	0.4 (0.0; 0.9)	0.3 (0.0; 0.6)
			Normal urinary stimulus (ml)	185.9 ± 22.0	172.3 ± 16.6	**0.7 (0.3; 1.1)**	0.4 (0.2; 0.7)
Jackson, 1999[702] N = 67	Change from baseline after oestradiol valerate 2mg/day	Change from baseline after placebo	Maximum voiding flow, ml/second	1.0 ± 2.7	1.0 ± 2.7	0.0 (-0.5; 0.5)	0.0 (-47.9; 47.9)
			Change in median in average void volume, ml	21.0 ± 18.7	-2.0 ± 33.3	**0.8 (0.3; 1.3)**	-42.4 (-17.4; -67.4)

Table F150. Effects of hormone therapy on urinary incontinence in females (severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	Change % from Control (95% CI)
			Change in median in functional capacity, ml	37.0 ± 106.0	30.0 ± 66.0	0.1 (-0.4; 0.6)	0.3 (-1.3; 1.9)
			Change in median in post-Micturition residual, ml	0.0 ± 0.0	0.0 ± 6.0		
			Change in median in Detrusor pressure at maximum flow, cm water	2.0 ± 4.7	0.0 ± 4.7	0.4 (-0.1; 0.9)	
			Change in median in maximum urethral closure pressure, cm water	-1.4 ± 9.8	1.5 ± 10.7	-0.3 (-0.8; 0.2)	-18.8 (-50.9; 13.3)
			Change in median in functional urethral length, mm	2.3 ± 5.4	-0.1 ± 4.6	0.5 (0.0; 1.0)	-479.1 (6.9; -965.0)
	Change from baseline after oestradiol valerate 2mg/day	Change from baseline after placebo	Change in median in volume at first desire to micturate	3.0 ± 78.0	19.0 ± 72.0	-0.2 (-0.7; 0.3)	-1.1 (-3.7; 1.4)
	Change from baseline after oestradiol valerate 2mg/day	Change from baseline after placebo	Change in median in maximum void volume, ml	-10.0 ± 60.0	-30.0 ± 13.3	0.5 (0.0; 0.9)	-1.5 (0.1; -3.2)
Fantl, 1996[701] N = 83	Post conjugated equine estrogens (0.625mg) and medroxyprogesterone (10mg) cyclically	Post placebo	Fluid Loss in ml	101.0 ± 150.0	50.0 ± 68.0	0.4 (0.0; 0.9)	0.9 (0.0; 1.8)
	Pre conjugated equine estrogens (0.625mg) and medroxyprogesterone (10mg) cyclically	Post placebo	Fluid Loss in ml	101.0 ± 150.0	50.0 ± 68.0	0.4 (0.0; 0.9)	0.9 (0.0; 1.8)

Table F150. Effects of hormone therapy on urinary incontinence in females (severity measures) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	Change % from Control (95% CI)
Blom, 1995[719] N = 19	Estradiol transdermal therapeutic system (0.05mg estradiol/day) combined with naproxen 250mg tablets twice daily	Placebo	Volume at first desire to void (ml)	185.6 ± 50.2	155.3 ± 46.6	0.6 (0.0; 1.3)	0.4 (0.0; 0.8)
	Estradiol transdermal therapeutic system (0.05mg estradiol/day)	Placebo	Maximum bladder capacity (ml)	318.1 ± 87.8	290.3 ± 77.4	0.3 (-0.3; 1.0))	0.1 (-0.1; 0.3)
			Volume at first desire to void (ml)	171.9 ± 52.7	155.3 ± 46.6	0.3 (-0.3; 1.0)	0.2 (-0.2; 0.6)
	Estradiol transdermal therapeutic system (0.05mg estradiol/day) combined with naproxen 250mg tablets twice daily	Placebo	Maximum bladder capacity (ml)	315.6 ± 74.4	290.3 ± 77.4	0.3 (-0.3; 1.0)	0.1 (-0.1; 0.3)
Wilson, 1987[708] N = 36	Cyclical treatment with piperazine oestrone sulphate	Placebo	Urine loss (ml/2hours of activity)	6.0 ± 17.3	3.0 ± 15.2	0.2 (-0.5; 0.8)	6.1 (-15.7; 28.0)
			Maximal urethral closure pressure (cm/H2O)	53.0 ± 10.8	50.0 ± 10.8	0.3 (-0.4; 0.9)	0.6 (-0.8; 1.9)

Bold- significant differences in outcomes at 95% confidence level

Evidence Tables—Clinical Interventions to Reduce Risk of Incidence and Progression of Fecal Incontinence in Adults

Table F151. Clinical interventions on fecal incontinence in long-term care settings

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Effects of conservative management of fecal incontinence in the residents of nursing homes				
Schnelle, 1989[457] RCT to examine the effects of prompted voiding treatment of urinary incontinence in nursing home patients Duration: 5-10 days	126 incontinent patients from proprietary nursing homes (bed size 90-150), not affiliated with universities with correct discriminatory responses to the instructions to point shown subjects (pencil or glass). Exclusion criteria: continence, transfer to hospital during run-in period Loss of followup: 60% during the run-in period, 2.4% after randomization.	1. Prompted voiding treatment: check for incontinence, asking for needed toileting assistance, prompted voiding, and socially reinforced for appropriate toileting. 2. Usual care.	Urinary incontinence measured by nurse as wet checks/total checks and daily percent of appropriate toileting equal the number of times the patient voided in any toilet receptacle/total number of appropriate and incontinent voiding.	No intention to treat. Open label. Randomization and allocation concealment unclear. Baseline data not reported. Sample size not justified.
Ouslander, 2005[458] Crossover RCT to examine the effects of functional incidental training on incontinence in nursing homes. Duration 8 weeks	107 patients in the nursing homes, (resided in the facility at least 30 days and not initially admitted for short term care; able to state their name, or in the presence of aphasia, capable of reliably pointing to two objects; required assistance by two or fewer people for transfer from bed to chair; with life expectancy of at least 6 months; not receiving active physical therapy; and ages 60 and older. Exclusion criteria: continence, severe behavioral changes, terminally ill. Loss of followup: 60%	1. Functional Incidental Training: prompted voiding combined with individualized, functionally oriented endurance and strength-training exercises offered 4 times per day, 5 days per week 2. Usual care.	Urinary and fecal incontinence measured as wet checks/total checks of the participant's every 2 hours. Appropriate toileting rate: number of voids or bowel movements that were continent divided by the total number of voids or bowel movements. Change after the treatments in wet stool checks/total checks 0±22%, p<0.001	No intention to treat. Open label. Computer-generated random numbers. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.
Schnelle, 200[459] RCT to examine the effects of integrated incontinence care and exercise on urinary exercise in nursing home residents. Duration 8 months	256 incontinent residents in 4 nursing homes Exclusion criteria: post–acute skilled care units, terminally ill. Loss of followup: 26%	1. Integrated incontinence care and exercise every 2 hours 5 days a week including fluid prompting, prompted toileting, and regular wet checks, arm raise and arm curl exercises. 2. Usual care.	Fecal and urinary incontinence frequency as % of hourly wet checks and the appropriate toileting ratio calculated by dividing the number of times a resident used a toilet or toilet substitute by the total number of voids.	No intention to treat. Single blind. Computerized randomization. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size not justified.

Table F151. Clinical interventions on fecal incontinence in long-term care settings (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Effects of pharmacological intervention on progression of fecal incontinence in residents of long term care units				
Chassagne, 2000[720] RCT to examine the effects of treatment of constipation in elderly patients with fecal incontinence. Duration: 2 months	206 patients older than 65 years, residents of long-term care units, with daily fecal incontinence associated with chronic rectal emptying impairments such as fecal impaction. Exclusion criteria: severe diarrhea, non compliance (missing treatment of followup for >48 hours), refusal to participate. Loss of followup: 30.8%	1.Single osmotic laxative -30g lactulose 2. Osmotic agent 30g lactulose with a rectal stimulant (glycerine suppository) and weekly tap-water enemas	Episodes of fecal incontinence reported by patients and caregivers and associated details of soiled laundry	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Effects of individualized evidence-based conservative management on fecal incontinence in patients after stroke				
Harari, 2004[721] RCT to examine the effect of evidence based treatment program on fecal incontinence in patients after stroke. Duration of followup: 12 months	146 stroke patients with constipation (<2 bowel movements per week or >2 of the following on more than 1 in 4 occasions: straining, hard stools, feeling of incomplete evacuation), rectal outlet delay (need for self-digitation or feeling of anal blockage or prolonged defecation >10 minutes), and fecal incontinence (any degree of bowel leakage). Exclusion criteria: acute diarrhea or colonic disease other than diverticular disease. Loss of followup: 28%	1. RN assessment (history and rectal examination). 2. Patient care provider education with instructions on regular toilet habits, pelvic floor and sphincter-strengthening exercises, suppository insertion, and laxative and loperamide dose titration. 3. Evidence based treatment recommendations to patient's general practitioner 4. Regular care	Self-reported fecal incontinence and bowel movements measured by postal prospective 7-day stool diary. Visual analogue scores for severity rating, quality of life (bowel-related and SF-12).	Intention to treat. Open label. External computer generated randomization. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Effects of dietary interventions on progression of fecal incontinence in adults				
Bliss, 2001[722] Placebo-controlled RCT to examine the effects of fiber supplements in community-living adults who were incontinent loose or liquid stools. Duration 31 days	42 adult volunteers with incontinent loose or liquid stools at least weekly. Exclusion criteria: rectal prolapse, colon cancer, or a rectal fistula Lost of followup: 3 withdrew during the baseline period, 1 subject underwent a hysterectomy; 1 subject required treatment for diverticulitis, and 1 subject had a relapse of clinical depression with suicidal thoughts.	1. Usual diet supplemented with 25g of Metamucil, 7.1g of psyllium/day 2. Usual diet supplemented with 25g of gum arabic/day 3. Usual diet supplemented with 0.25g of pectin/d as a placebo	Self-reported fecal incontinence: involuntary passage of stool from the rectum. Stool composites	No intention to treat. Single blind. Allocation concealment unclear. Baseline data reported for age, BMI, and diet. Sample size not justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Effects of conservative management programs on postnatal fecal incontinence in females				
Glazener, 2001[483] RCT to examine the effect of nurse assessment with reinforcement of pelvic floor muscle training exercises and bladder training among women with persistent postnatal incontinence Duration: 12 months	747 women with urinary incontinence (defined as any involuntary loss of urine) three months postnatally, living within a 50 km radius and who delivered in these units during a 12 month recruitment period. Exclusion criteria: mothers of stillborn or dead neonates. Loss of followup: 25% in active and 35% in the control group.	1. Assessment by nurses of fecal incontinence with conservative advice on pelvic floor exercises (8-10 sessions each day of fast and slow contractions with the aim of 80-100 contractions daily) at five, seven, and nine months after delivery supplemented with bladder training if appropriate at seven and nine months. 2. The control group did not receive any visits from research nurses but received peripartum preparation, which sometimes included pelvic floor exercises, and could seek medical advice.	Self-reported Presence of fecal incontinence: ever lost control of wind or bowel motions from back passage between visits to the toilet	Intention to treat. Single blind. Computer generated randomization stratified by parity (4 versus fewer), method of delivery (caesarean versus other), and frequency of incontinence (at least once a week versus less). Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.
Glazener, 2005[484] Glazener, 2001[483] 6 years followup RCT, 2005 to examine the effect of nurse assessment with reinforcement of pelvic floor muscle training exercises and bladder training among women with persistent postnatal incontinence	747 women with urinary incontinence (defined as any involuntary loss of urine) three months postnatally, living within a 50km radius and who delivered in these units during a 12 month recruitment period. Exclusion criteria: mothers of stillborn or dead neonates. Loss of followup: 29% in active and 31% in the control group.	1. Assessment by nurses of fecal incontinence with conservative advice on pelvic floor exercises (of 8-10 sessions each day of fast and slow contractions with the aim of 80-100 contractions daily) at five, seven, and nine months after delivery supplemented with bladder training if appropriate at seven and nine months. 2. The control group did not receive any visits from research nurses but received peripartum preparation, which sometimes included pelvic floor exercises, and could seek medical advice	Self-reported 6 years after intervention presence of fecal incontinence: ever lost control of wind or bowel motions from back passage between visits to the toilet. Reported use of pelvic floor muscle training.	Intention to treat. Single blind. Computer generated randomization stratified by parity (4 versus fewer), method of delivery (caesarean versus other), and frequency of incontinence (at least once a week versus less). Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Adherence to the intervention was the same in active and control group 6 years at followup. Sample size justified.
Effects of behavioral interventions on incidence and progression of fecal incontinence in females				
Labrecque, 2000[482] RCT to examine the effects of perineal massage performed during	Pregnant women with (n = 493) and without (n = 1,034) previous vaginal birth. Exclusion criteria: high risk of cesarean delivery, including previous cesarean delivery for cephalopelvic disproportion; multiple gestation; placenta previa; severe fetal growth	1. Self administered perineal massage daily from the 34th or 35th week of pregnancy until delivery introducing 1 or 2 fingers 3 to 4 cm deep into the vagina and applying and	Self-reported fecal incontinence as: never, less than once per week, 1 to 6 times a week, once a day, and more than once a	Intention to treat. Single-blind. Central randomization balanced in blocks of 4 or 6 stratified by history of previous vaginal birth, specialty of the attending physician and

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
pregnancy on perineal symptoms after delivery Duration of followup: 3 months	restriction; breech presentation; preeclampsia; nonparticipating physicians; outbreak of genital herpes during the current pregnancy, inability to speak French or English, inability to understand the instructions, and already doing the massage. Loss of followup: 0.3%	maintaining pressure 2. Usual obstetric care	day.	hospital. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified
Fynes, 1999[723] RCT to examine the effects of augmented biofeedback with sensory biofeedback alone on fecal incontinence and anorectal manometry after obstetric trauma. Duration: 12 weeks	40 females with impaired fecal continence after obstetric anal sphincter injury. Exclusion criteria: not reported Loss of followup: 1 woman	1. Sensory biofeedback training with a vaginal perineometer and standard Kegel pelvic floor exercise. 2. Augmented biofeedback training of pelvic floor with audiovisual feedback and electric stimulation of slow and fast twitch fibers.	Fecal continence questionnaire and anorectal manometry outcomes: mean maximum resting pressure, mean maximum squeeze pressure, squeeze increment, vector symmetry index.	No intention to treat. Single blind. Computer generated randomization. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Ilnyckyj, 2005[724] RCT to examine the effects of biofeedback on fecal incontinence in women. Duration: 2 months	23 women over 18 years age with regular and frequent idiopathic fecal incontinence defined as soiling with formed or liquid stool and/or fecal staining or smearing of undergarments for 6 months or more, at least once weekly. Exclusion criteria: complicated diabetes, less than 6 months after postvaginal or Caesarean birth, irritable bowel syndrome, inability to attend weekly sessions for 2 months, and conversational insufficient English. Loss of followup: 22%.	1. Education and explanation and instruction in pelvic floor muscle strengthening exercises with max possible squeeze duration for 5 repetitions spaced by a 20 second pause, 6 times/day. 2. Education and visual and verbal biofeedback therapy using a radial catheter with a latex balloon	Self-reported success in bowel control: at least one weekly episode of any degree of incontinence (frank soiling, liquid seepage, staining or smearing) before the trial and no incontinence whatsoever after the trial.	No Intention to treat. Open label. Randomization and allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Effects of behavioral interventions on fecal incontinence in adults from the community				
Byrne, 2002[725] RCT to examine the effects of biofeedback in patients with neuropathic fecal incontinence. Duration: unclear	118 patients with neuropathic fecal incontinence. Exclusion criteria not reported Loss of followup: 14.2%	1. Pelvic floor exercises and biofeedback 2. Usual care	Direct questioning of objectives quality-of-life measure on a scale of 0 to 10 reported pre and post treatment. Saint Mark and Pescatori scores of quantitative incontinence were calculated.	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Byrne, 2005[726] Nonrandomized controlled CT to examine the effects of telephone-assisted biofeedback treatment for patients living in rural and remote areas with the standard face-to-face protocol for patients with fecal incontinence. Duration: 6 months	239 consecutive patients with fecal incontinence diagnosed by a colorectal surgeon with anal manometry and transanal ultrasound, with no improvement after usual conservative treatment including standard dietary advice, use of fiber supplements, constipating medications, and enemas. Inclusion criteria for telephone-assisted protocol: difficulties attending the clinic regularly, residence in remote areas, spoken English, and access to a telephone. Exclusion criteria: a complete external sphincter defect, a non functioning stoma, inflammatory bowel disease, acute perianal inflammation, a potentially reversible cause of incontinence (such as diarrhea), or untreated full-thickness rectal prolapse. Loss of followup: 44%	1. Initial face-to-face assessment and treatment with transanal manometry and ultrasound biofeedback, followed by three treatments conducted via telephone and a final face-to-face assessment. 2. Standard treatment with 5 face-to-face treatment sessions with manometry and ultrasound	St. Mark's Hospital fecal incontinence score (full continence 0; complete incontinence 13). Pescatori fecal incontinence score (full continence 0; complete incontinence 6). Anal manometry and external sphincter isometric and isotonic fatigue times. Treatment success: the patient's self-assessed continence ranking (from a Visual Analog Scale), and a composite grading scored by independent colorectal surgeons.	Intention to treat. Single blind. Nonrandomized trial. Baseline data were comparable. Sample size not justified.
Solomon, 2003[727] RCT to examine the effects of pelvic floor exercises with biofeedback using anal manometry or transanal ultrasound, and pelvic floor exercises with feedback from digital examination alone. Duration: 4 months	120 patients with mild to moderate fecal incontinence Loss of followup: 15%	1. Biofeedback with anal manometry 2. Biofeedback with transanal ultrasound 3 .Pelvic floor exercises with feedback from digital examination alone. 4. 45 minute sections of sphincter exercises with biofeedback (instrumental or digital examination).	St Mark Hospital Fecal incontinence score (0-13), Pescatori fecal incontinence score (0-6), self-reported fecal continence, physiologic sphincter strength, and compliance	No intention to treat. Single blind. Randomization with a chart of random numbers. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Pager, 2002[728] Solomon, 2003[727] Followup evaluation in the participants of the RCT. Duration of followup: 42 months	83 patients from 120 participants of the RCT with mild to moderate fecal incontinence. Loss of followup: 31%	1. Pelvic floor exercises with feedback from digital examination alone every day or 2-3 times/week. 2. 45 minute sections of sphincter exercises with biofeedback (instrumental or digital examination).	St Mark Hospital Fecal incontinence score (0-13), Pescatori fecal incontinence score (0-6), self-reported fecal continence, physiologic sphincter strength, and compliance	The authors reported followup outcomes from the RCT in subjects who continued treatments. Baseline data confirmed no differences between subjects.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Norton, 2003[729] RCT to examine the effects of biofeedback in patients with fecal incontinence. Duration: 3 months. Duration of followup: 1 year.	171 patients with fecal incontinence. Exclusion criteria: previous course of biofeedback or exercises for fecal incontinence, age less than 18 years, major neurologic disease significant cognitive impairment, active inflammatory bowel disease, unable to consider informed consent issues adequately with insufficient written English skills to complete the questionnaires. Loss of followup: 29%	1. Standard care with 9 40–60-minute sessions to advise on diet, fluids intake, bowel training. 2. Standard care with 9 40–60-minute advice sessions on diet, fluids intake, bowel training plus instruction on sphincter exercises with at least 50 maximal voluntary sustained sphincter contractions and 50 fast-twitch contractions per day. 3. Hospital-based computer-assisted sphincter pressure biofeedback. 4. Hospital biofeedback plus the use of a home electromyelogram biofeedback device once daily for 20 minutes.	Self-reported symptoms of fecal incontinence, fecal continence score, patient's rating of effectiveness of treatment rated as "worse," "same," "improved," or "cured," and rating of that change on an ordinal scale of -5 to +5. Quality of life (disease specific). Anal manometry outcomes.	Intention to treat. Single blind. Randomization with random numbers generated by Excel function. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Jorge, 1994[730] RCT to examine the effects of pelvic floor exercise program on fecal incontinence in patients after ileoanal reservoir procedure. Duration: 5 weeks.	26 patients with ulcerative colitis after total colectomy with double-stapled ileoanal reservoir. Exclusion criteria: one stage double-stapled ileoanal reservoir without temporary ileostomy. Loss of followup: none	1. Pelvic floor exercise program with 10 second contractions for 5 minutes 5 times/day before surgery 2. Regular care before surgery	Self-reported fecal incontinence score from 0 to 20. Anal manometry outcomes	No Intention to treat. Open label. Randomization and allocation concealment not adequate. Baseline data not reported. Sample size not justified.
Miner, 1990[731] Crossover RCT to examine the effects of biofeedback training on fecal incontinence. Duration: 4 weeks Duration: of followup 1 year.	25 consecutive patients with fecal incontinence. Most patients had idiopathic fecal incontinence associated with abnormal perineal descent and many also had features of the irritable bowel syndrome	1. Pelvic floor exercise with active sensory retraining (3 20-minute sessions) to perceive small rectal volumes of air into the rectal balloon. 2. Pelvic floor exercise retraining with no instruction on how to improve performance.	Self-reported fecal incontinence: -Do you believe your continence has improved? -Do you now have more warning before an imminent incontinent episode? -Has your life-style changed? -Are you able to go out more? -Can you travel farther	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed the adequacy of randomization. Sample size not justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
			from the toilet? Anal manometry outcomes.	
Effects of electrical stimulation on fecal incontinence in adults				
Norton, 2006[732] RCT to examine the effects of anal electric stimulation in the absence of any adjunctive exercises or advice on fecal incontinence Duration: 8 weeks	90 patients with fecal incontinence. Exclusion criteria: age under 18 years old; pregnancy; vaginal delivery <6 weeks ago; history of pelvic malignancy; active inflammatory bowel disease; active perianal sepsis or painful hemorrhoids or fissure, previous experience of using an electric stimulator to treat urinary or fecal incontinence. Loss of followup: 22.2%	1. Active anal stimulation at 35Hz/ for 40 minutes a day. 2. Sham anal stimulation at 1Hz.	1 week bowel diary, symptom questionnaire, manometry, and self-reported patients' evaluation of outcome	Intention-to-treat. Single blind. Computer generated randomization with random numbers. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Leroi, 2005[733] Crossover RCT to examine the effects of sacral nerve stimulation on fecal incontinence. Duration: 1 month	34 patients with fecal incontinence to solid or liquid stools or urgency episodes causing patients to remain at home to avoid incontinence accidents, with >1/week incontinence episodes for at least 3 months, with demonstrable unilateral bulbo(clitorido)-cavernosus reflex, and who failed other conservative treatments Exclusion criteria: not reported. Loss of followup: 21%	After permanent implantation of percutaneously placed lead turned ON for 1-3 months, subjects were randomized to: 1. Active sacral nerve continuous stimulation with pulse width of 210 microseconds, frequency 14 pulses/second, and amplitude adapted to the patient's perception of perineal and anal sphincter muscle contraction. The stimulator was left on during defecation and urinary voiding. 2. Sham sacral nerve stimulation with lead turned off.	Self-reported in patient diary number of weekly fecal incontinence and urgency episodes, and mean delay for postponing defecation and manometric outcomes.	No intention to treat. Double-blind. Randomization with a random number table. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Chang, 2003[734] RCT to examine the effects of electrical stimulation therapy in constipated patients with impaired rectal sensation. Duration: 10-14 days	22 patients with functional constipation as defined by Rome II criteria and impaired rectal sensation (rectal desire threshold volume ≥90ml) on an anorectal manometry, not responsive to conventional therapy such as dietary modification or laxatives for at least 6 months. Exclusion criteria: diabetes mellitus, hypothyroidism, psychiatric disturbances, drug abuse, organic diseases that could lead to constipation. Loss of followup: none	1. External electrical stimulation therapy using an anal plug with pulse generator in the anal canal once a day for 20 minutes over 10–12 sessions with pulse width of 360–960 μs, a frequency of 2–110Hz, and an amplitude of 30–35V. 2. Biofeedback therapy using the EMG system. The visual feedback observing changes in pressure activity on a monitor	Self-reported bowel frequency and habit, degree of straining, sensation of incomplete evacuation, and anal obstruction using visual analogue scale. Anorectal manometry outcomes	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
		screen during rise in rectal pressure synchronized with anal relaxation for 60–90 minutes over 10–14 sessions.		
Healy, 2006[735] RCT to examine the effects of chronic low-frequency endo-anal electrical stimulation on fecal incontinence. Duration 3 months	58 patients with fecal incontinence female with a mean age of 55 years (range 40–78). Exclusion criteria: significant anal sphincter disruption that needed early surgical repair. Loss of follow up: 17%	1.Endo-anal pudendal nerve stimulation daily at home with a portable home unit programmed for frequencies of 3, 10, 20, 30, 40 and 10 Hz and with a current train of 4 s on and 4 s off. 2. Endo-anal electrical stimulation under physiotherapeutic supervision: 1-weekly treatment of two 15-min cycles of alternate stimulation followed by a patient contraction with EMG biofeedback unit. The first 15-min cycle used 10 Hz followed by a further 15-min cycle of 40 Hz. The second treatment used electrical stimulation alone using the same frequencies 2 times/weekly without biofeedback	Self reported quality-of-life questionnaire (RAND 36-item general health survey)	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data not compared. Sample size not justified
Effects of electrical stimulation on postpartum fecal incontinence				
Mahony, 2004[736] RCT to compare intra-anal electromyographic biofeedback alone with intra-anal biofeedback with electrical stimulation of the anal sphincter in treatment of postpartum fecal incontinence. Duration: 12 weeks	60 women with fecal continence 12 weeks after obstetric injury. Exclusion criteria: history of diabetes mellitus, inflammatory bowel disease, irritable bowel disease, previous anorectal surgery, or malignancy. Loss of followup: 6 women did not complete the study and were excluded from the analysis.	Standard Kegel exercises daily: 1. Standard intra-anal electromyographic biofeedback training of the pelvic floor 2. Intra-anal electromyographic biofeedback with electrical stimulation of the anal sphincter weekly for 12 weeks by physiotherapists	The structured bowel function questionnaire to report presence of fecal urgency, flatal incontinence, fecal soiling, frank fecal incontinence, and any impact on daily lifestyle scored from 0 (complete continence) to 20 (complete incontinence). Median resting pressure. Median squeeze pressure using anorectal manometry	No Intention to treat. Single blind (investigators) Randomization with computer generated allocations in a ratio of 1:1 in sealed opaque envelopes. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Effects of perineal massage in the second stage of labor on fecal incontinence				
Stamp, 2001[574] RCT to examine effects of perineal massage in the second stage of labor on urinary and fecal incontinence. Duration: 3 months	1340 women at 36 weeks' gestation expecting normal birth of a singleton progressed in labor to full dilatation of the cervix or 8cm or more if nulliparous or 5cm or more if multiparous. Exclusion criteria: caesarean section and instrumental birth Loss of follow up:30%	1. Massage and stretching of the perineum during the second stage of labor with a water soluble lubricant 2. Usual Care	Self reported using postal survey urinary and fecal incontinence 3 months after postpartum	Intention to treat. Open label. Stratified by parity status. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Effects of pharmacological agents on incidence and progression of fecal incontinence in adults				
Ho, 2005[737] RCT to examine the effects of lateral sphincterotomy and tailored sphincterotomy on anal incontinence in patients with chronic anal fissure. Duration of followup: 4 months	132 patients with chronic anal fissure and symptoms of sharp pain on defecation for more than 6 weeks and/or anal bleeding, together with exposure of internal anal sphincter muscle fibers at the base of the fissure, and the presence of a sentinel pile and/or hypertrophied anal papilla. Exclusion criteria: previous anal sphincter surgery, pre-existing fecal incontinence, concomitant hemorrhoids who required, inflammatory bowel disease, use of nitrates or calcium channel blockers for hypertension or cardiac conditions. Loss of followup: none	1. 'Chemical sphincterotomy' with oral nifedipine 20mg twice a day for 6 weeks. 2. Lateral sphincterotomy: internal anal sphincter muscle was identified and the muscle proximal to dentate line was lifted with a small pair of artery forceps. The level of internal anal sphincter division was defined accurately before division using diathermy.	Self-reported fecal incontinence, Wexner incontinence scores. Anal manomtery outcomes	Intention to treat not stated. Open label. Randomization with random numbers table. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization Sample size justified.
De Nardi,2006[738] RCT to examine the effects of "chemical sphincterotomies" for chronic anal fissure. Duration of followup: 12 months	30 consecutive patients with chronic posterior anal fissure defined as symptoms lasting for >3 months and the presence of typical features, such as skin tag, indurations of the edges of the fissure, hypertrophic proximal papilla, and exposure of fibers of internal anal sphincter. Exclusion criteria: acute fissure, low resting tone at digital examination, inflammatory bowel disease, incontinence, previous anal surgery, and treatment with oral or transdermal nitrate. Loss of followup: none	1. 0.2 percent glycerine trinitrate ointment applied three times daily at the anal margin for eight weeks 2. 20 units Botulinum toxin A injection into the internal anal sphincter on each side of the anterior midline	Self-reported fecal incontinence with Wexner incontinence score questionnaire	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.
Ron, 2001[739] RCT to examine the effects of botulinum toxin type-A (Botox)	25 patients older than 18 years with history of constipation and symptoms of outlet obstruction for >1 year, nonrelaxing puborectalis muscle on both modalities, who were unable to expel a rectal balloon and who	1 Local injection of Botox—10 units to each side of the puborectalis 2. Local injection of Botox—20 units to the posterior aspect of	Self-reported fecal incontinence	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
injection to the puborectalis muscle in patients with anismus. Duration of followup: 52 weeks	failed laxatives and enema therapy. Exclusion criteria: concomitant fecal incontinence, pregnancy. Loss of followup: 4%	this muscle.		justified.
Mentes, 2003 [740] RCT to examine effects of lateral internal sphincterotomy and injection of botulinum toxin for the treatment of idiopathic anal fissures. Duration of follow up: 1 year	111 patients with sever chronic anal fissure with the horizontal fibers of the internal anal sphincter visible in its base. Exclusion criteria: concurrent fistula, significant haemorrhoidal diseases, inflammatory bowel disease, anal incontinence, slow transit time constipation, diabetes, alcoholism, drug abuse, ano-receptive intercourse, previous anorectal surgery. Lost of followup: none.	1. 20 to 30 units (~ 0.3U/kg) of type A botulinum toxin (Botox) injection into the internal anal sphincter. The injection was repeated 2 months later if complete healing was not achieved. 2. Lateral internal anal sphincterotomy.	Self-reported incidence of anal incontinence using scoring system by Miller (0-18, 18-complete incontinence)	Intention to treat not stated. Single blind. Randomization with random number table. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Iswariah, 2005[741] RCT to examine effects of lateral internal sphincterotomy and injection of botulinum toxin for treatment of idiopathic anal fissures. Duration of followup: 25 weeks	38 adult patients older than 18 years with chronic idiopathic fissure in and who had failed conservative treatment. Exclusion criteria: prior sphincterotomy or anal dilatation, fissure associated with inflammatory bowel disease, performance of concomitant anal procedure, fecal incontinence, pregnancy or breast-feeding. Loss of followup: 13.6%	1. Botox, 20 units injected on either side of the fissure into the internal anal sphincter. 2. Sphincterotomy by open or closed technique in the left lateral position using Park's anal retractor	Self reported modified Wexner Fecal Continence scoring system	No Intention to treat. Open label. Randomization suing random numbers tables. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Brisinda, 1999[742] RCT to examine effects of botulinum toxin and topical nitroglycerin ointment for treatment of chronic anal fissure. Duration of followup: 2 months, 15 months	50 adults with symptomatic chronic posterior anal fissures. Exclusion criteria: acute fissure, or fissure associated with other conditions (inflammatory bowel diseases, HIV infection, hemorrhoids, fistula in ano, anal abscesses, or anal or perianal cancer), previous surgical procedures in the anal canal. Lost of followup: none	1. 20 units of botulinum toxin injected into the internal anal sphincter on each side of the anterior midline 2. 0.2 percent nitroglycerin ointment applied twice daily	Anal manometry outcomes	Intention to treat not stated. Single blind. Computer-generated random numbers tables. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Siproudhis, 2003[743] Placebo-controlled RCT to examine effects of single injection of botulinum toxin in the internal anal sphincter of patients with chronic anal fissure. Duration of followup: 12 weeks.	44 patients 18-75 years old with chronic anal fissure >1 month, mean value of post-defecation anal pain >30mm on a 100mm visual analogue scale 1 week before inclusion. Exclusion criteria: anal sepsis, inflammatory bowel disease, cancer, trauma, anal stenosis, previous surgery, functional pelvic disorders, use of non steroidal anti-inflammatory and analgesic drugs. Loss of followup: 4.5%.	1. Single injection of botulinum toxin in the internal anal sphincter, 100 units of Dysport toxin, 250.units/ml. Daily laxatives and suppositories. 2. Single injection of isotonic saline. Daily laxatives and suppositories	Self-reported incidence of anal incontinence	No Intention to treat. Double-blind. Stratified by center randomization with permuted block =4. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Hallgren,1994[744] Crossover placebo controlled RCT to examine the effects of Loperamide on fecal continence after restorative proctocolectomy. Duration: 7 days	30 patients operated for ulcerative colitis with endoanal mucosectomy and a hand sewn ileal pouch-anal anastomosis or with abdominal proctocolectomy and stapling of the pouch to the top of the anal canal. Exclusion criteria: not reported. Loss of followup: 6.6%	1. Loperamide hydrochloride (Imodium) 2mg 2 capsules 3 times/day for 7 days 2. Placebo with the same frequency.	Self-reported fecal continence. Anal manometry outcomes	No Intention to treat. Double blind. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Sun, 1997[745] Placebo controlled crossover RCT to examine the effects of loperamide oxide on anorectal function in patients with chronic diarrhea. Duration: 4 weeks with 1 week run-in and wash out	11 patients with chronic diarrhea, fecal incontinence >1 time/month, and severe urgency >3 times/week. Exclusion criteria: positive microbiologic analysis for feces, fat, and blood, large-volume diarrhea >500ml/day, anal seepage, use of anti diarrhea medication. Loss of followup: none	1. Loperamide oxide 4mg twice daily 2. Placebo	Self-reported fecal incontinence as leakage of several ml of fluid, enough to require cloth change. Self-reported fecal urgency as acute desire to defecate which would result in incontinence if not relieved within 30 seconds. Visual analog scale from 0 (absent) to 100 (extreme). Anal manometry outcomes	Intention to treat. Double blind. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.
Kneebone, 2004[746] Placebo-controlled RCT to examine the effects of oral	338 males receiving definitive radiotherapy for prostate cancer with prescribed dose >60Gy and the superior limit of the treatment fields situated below the level of the greater sciatic	1. 3g of oral sucralfate suspension twice daily starting 1 day before RT and continuing every day for 8 weeks	Self-reported patients' symptoms of fecal incontinence using the Radiation Therapy	No Intention to treat. Double-blind. Central computer generated randomization a one-to-one stratified allocation

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
sucralfate to prevent fecal incontinence in prostate cancer patients treated with radiotherapy. Duration: 8 weeks Duration of followup: 2 years	notch to ensure that significant portions of small bowel were not irradiated. Exclusion criteria: active gastro-intestinal conditions including acute diverticulitis, Crohn's disease, or ulcerative colitis, prior colostomy for any reason, significant renal impairment (serum creatinine >0.3 mmol/l). Loss of followup: 11.8%	2. Identical placebo twice daily	Oncology Group Grade 2 or more criteria. Flexible sigmoidoscopy outcomes	within blocks of 8. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Carapeti, 2000[747] Placebo controlled crossover RCT to examine the effects of topical phenylephrine in the treatment of faecal incontinence due to internal sphincter dysfunction. Duration: 4 weeks, washout 1 week	36 patients with fecal incontinence for solid or liquid stool and ultrasonographically structurally normal anal sphincter muscles. Exclusion criteria: pregnancy, ischemic heart disease, hypertension, aortic aneurysm, treatment with monoamine oxidase inhibitors or tricyclic antidepressants, underlying treatable causes for incontinence such as inflammatory bowel disease or surgically repairable external sphincter. Loss of followup: not reported	1. Topical 10% phenylephrine 0.5 ml applied topically to the anus twice daily for 4 weeks. 2. Identical placebo gel 0.5 ml applied topically to the anus twice daily for 4 weeks.	Self-reported fecal incontinence score modified from the Wexner scale: 24-worst incontinence; 0-no incontinence scored to analyze the frequency of incontinence for solid or liquid stool or gas, alteration in lifestyle, need to wear a pad, urgency and use of constipating drugs.	No Intention to treat. Double-blind. Central randomization with computer-generated random numbers. .Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Carapeti, 2000 [748] Placebo controlled crossover RCT to examine the effects of topical phenylephrine gel on fecal incontinence in patients with an ileoanal reservoir pouch. Duration: 4 weeks	12 patients with fecal incontinence, noninflamed pouch for previous ulcerative colitis of normal size and ultrasonographically structurally normal anal sphincter muscles. Exclusion criteria: pregnancy, ischemic heart diseases, hypertension, aortic aneurism, treatment with monoamine oxidase inhibitors or tricyclic antidepressants. Loss of followup: none	1. Alpha1-adrenergic agonist phenylephrine, topical 10% 0.5ml application 2 times/day 2. Placebo gel	Self-reported fecal incontinence symptoms (0-no symptoms to 280) and scores using validated Wexner scale from 0-continence to 24 – complete incontinence. Anorectal manometry outcomes.	Intention to treat not stated. Double-blind. Computer generated random numbers. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Nessim, 1999[749] RCT to examine the effects of medical bowel confinement and regular diet on fecal incontinence after anorectal	54 patients 23-87 years old after anorectal reconstructive surgery including 32 after sphincteroplasty for fecal incontinence. Exclusion criteria: age younger than 18 years, immunosupression, prior pelvic irradiation, active proctitis, inflammatory bowel disease Loss of followup: none	1. Medical bowel confinement: clear liquid diet with loperamide 4mg 3 times/day and codeine phosphate 30mg 4 times/day for 3 days. 2. Regular diet beginning the day of surgery	Self-reported fecal incontinence scores from 1 to 20 in 32 patients treated with sphincteroplasty for fecal incontinence	No Intention to treat. Single blind. Computer generated randomization. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
reconstructive surgery. Duration of followup: 13 months				
Tankova, 2002[750] RCT to examine the effects of topical mononitrate hydrogel for the treatment of anal fissure. Duration: 3 weeks. Duration of followup: 3 months	19 patients with symptomatic chronic anal fissures lasting for >2 months. Exclusion criteria: Anal fissures associated with other conditions (Crohn's disease, human immunodeficiency virus infection, fistula in ano, anal abscess, anal cancer) and previous surgical procedures. Loss of followup: none	1. Rectal administration of hydrogel containing 0.2% isosorbide-5-mononitrate 2 times/day 2. Placebo gel.	Self-reported fecal incontinence. Anal manometry outcomes	Intention to treat not stated. Masking not reported but the authors stated that active gel and placebo look the same. Randomization and allocation concealment not reported. Baseline data confirmed the adequacy of randomization. Sample size not justified.
Effects of surgical interventions on fecal incontinence related to obstetric trauma in females				
Fernando, 2006[751] RCT to examine the effects of primary overlap versus end-to-end repair of the external anal sphincter after acute obstetric trauma. Duration: 12 months	64 women with third-degree (3b = greater than 50% external anal sphincter thickness, 3c = internal sphincter injury) or fourth-degree (including anorectal epithelium) perineal tears Exclusion criteria: 3a tear (<50% thickness of the external anal sphincter torn) or a previous 3rd or 4th degree perineal tear. Loss of followup: 19%, 2 women had left the area and could not be contacted, and 10 declined to complete further questionnaires.	1. End-to-end technique to repair obstetric anal sphincter: torn ends of the external anal sphincter were approximated and repaired with 2-3 mattress sutures using 3-0 PDS sutures. 2. Overlap technique to repair obstetric anal sphincter: the outer surface of the sphincter was mobilized from the surrounding tissue, the first row of sutures was inserted ~1.5 cm from one side of the torn edge of external anal sphincter and overlapped within 0.5 cm of the other edge of the torn external anal sphincter.	Self-reported fecal incontinence, urgency, flatus incontinence, and improvement of anal incontinence symptoms scored with Wexner scale from; 24 – complete incontinence to 0 - complete continence. Questionnaires were sent at 6 weeks, and 3, 6, and 12 months after the repair	Intention to treat. Single-blind (subjects). Customized computer randomization using minimization protocol. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Garcia, 2005[597] RCT to examine the effects of surgical techniques for the primary repair of obstetric anal sphincter lacerations. Duration: 4 months postpartum	51 women with complete third or fourth degree anal sphincter laceration and who underwent primary repair at the time of vaginal delivery. Exclusion criteria: not reported Loss of followup: 35.6%	1. End-to-end technique to repair obstetric anal sphincter lacerations: 4 separate sutures of polyglycolic acid to reapproximate the sphincter ends directly. 2. Overlapping repair of obstetric anal sphincter lacerations used 3 sutures of 2-0 PDS to reapproximate the	Self-reported urinary and anal incontinence graded with the Fecal Incontinence Score (FIS) from 18 - total incontinence >2/week, scores 1-3 incontinence of flatus only. Anal incontinence was	No Intention to treat. Single blind. Computer-generated randomization table. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
		sphincter ends in an overlapping fashion.	defined as a fecal incontinence score of >0	
Williams, 2006[752] RCT to compare two surgical techniques and two types of suture material for anal sphincter repair after obstetric injury. Duration: 3 months	150 women with an anal sphincter injury sustained during childbirth. Exclusion criteria not reported. Loss of followup: 20% at 3 months.	1. End–end repair of the torn anal sphincter with braided polyglactin (Vicryl retains 50% of its strengths at 3weeks, minimal tissue reaction). 2. Overlap repair of the torn anal sphincter with braided polyglactin (Vicryl retains 50% of its strengths at 3 weeks, minimal tissue reaction). 3. End–end repair of the torn anal sphincter with PDS (a monofilament suture with minimal absorption until 90 days, no chronic suture sinuses) 4. Overlap repair of the torn anal sphincter with PDS (amonofilament suture with minimal absorption until 90 days, no chronic suture sinuses).	Self-reported fecal incontinence using St Mark's bowel symptom questionnaire and scoring. Anorectal function using endoanal ultrasound. Anal manometry and pudendal nerve terminal latency tests.	No Intention to treat. Single blind. Randomization sequence was generated using a table of random numbers in varied blocks of 4-8. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.
Tjandra, 2003[753] RCT to examine the effects of two surgical techniques (direct end-to-end vs. overlapping) of delayed repair of a localized anterior defect of external anal sphincter after an obstetric trauma. Duration of followup: 18 months	23 women with localized anterior defect of external anal sphincter after an obstetric trauma, normal pudendal nerve terminal motor latency. Exclusion criteria: prolonged pudental nerve terminal motor latency. Loss of followup: none.	1. Direct end-to-end repair using 2-0 PDS sutures 2. Overlapping sphincter repair with fibro muscular ends using 2-0 PDS sutures	Self-reported fecal continence using the Cleveland Clinic Continence Score (0-20); 0 - perfect continence. Endoanal ultrasound, anorectal manometry, and neurophysiologic exam outcomes.	Intention to treat not stated. Single blind. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Fitzpatrick, 2000[754] RCT to examine the effects of primary anal	112 primiparous women who sustained a third-degree tear defined as any recognized disruption of the external anal sphincter (partial or complete).	1. Primary anal sphincter overlap: the sphincter ends in an overlapping fashion. 2. Approximation repair: the torn	Self-reported fecal incontinence using detailed bowel function questionnaire scored	All subjects included in the analysis. Intention to treat was not stated. Open label. Allocation concealment

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
sphincter overlap or approximation repair of third-degree obstetric tears on postpartum incontinence. Duration: 3 months postpartum	Exclusion criteria: not reported. Loss of followup: 0%	sphincter ends were grasped by means of an Allis forceps and approximated end to end without tension	with a modified Wexner score. anal manometry and anal endosonography outcomes	unclear. Baseline data confirmed adequacy of randomization. Sample size justified.
Effects of clinical interventions to prevent fecal incontinence after obstetric trauma				
Dannecke, 2005[590] Followup RCT to examine the effects of restrictive use of mediolateral episiotomy vs. routine episiotomy. Duration: 18 months	146 primiparous women with an uncomplicated singleton pregnancy >34 weeks of gestation intending a vaginal delivery. Exclusion criteria: previous surgery at the pelvic floor and neurological disorder. Loss of followup: 45% in restrictive policy group, 32% in liberal policy group	1. Restrictive episiotomy - avoidance of episiotomy (for fetal indications only). 2. Liberal – in addition to fetal indications use episiotomy when a tear is judged to be imminent	Self-reported presence of urinary and fecal incontinence with standardized questionnaire. Anorectal manometry and urodynamic outcomes. Pelvic floor muscle strength with a vaginal palpation. The effort to contract the levator ani was graded with the Oxford Score (4 - strongest).	Intention-to-treat. Open label. Simple random sampling. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Sartore, 2004[591] Nonrandomized CT to examine the effect of mediolateral episiotomy on puerperal pelvic floor strength and dysfunction. Duration: 3 months after vaginal delivery	519 consecutive primiparous women with singleton pregnancies and spontaneous vaginal delivery with the fetal head in occiput anterior position, residents of Trieste. Exclusion criteria: Not delivered in the lithotomy position, cesarean delivery, third and fourth-degree perineal lacerations, preterm, breech, and operative delivery, anal and urinary incontinence that pre-existed vaginal delivery, and history of vaginal or anal surgery.	1. Mediolateral episiotomy. 2. No episiotomy	Stress urinary incontinence - observation of involuntary loss of urine synchronous with coughing (+ stress test) with comfortably full bladder. Self-reported urge incontinence - loss of urine associated with strong desire to void. Self-reported anal incontinence – loss of flatus, liquid, or solid stool. Pelvic floor muscle strength scored from 0 to 5. Vaginal manometry:	No intention to treat. Open label. Groups were comparable at baseline except neonatal weight. Crude odds ratios reported.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
			abnormal perineometric values <12 cm of water. Urine stream interruption test: abnormal any urine stream interruption test scores >5 seconds.	
Hannah, 2002[592] Term Breech Trial, RCT to examine the effects of planned cesarean section on incontinence 3 months postpartum. Duration: 3 months	1,159 women with singleton live fetus in a frank or complete breech presentation at term (37 weeks' gestation). Exclusion criteria: Fetopelvic disproportion, fetus weight >4000g, hyperextension of the fetal head, lethal anomaly or a condition that might cause a mechanical problem at delivery, and contraindication to labor or vaginal delivery. Loss of followup: 16.5%	1. Planned vaginal birth group, management was expectant until spontaneous labor began, unless an indication to induce labor (e.g., post term pregnancy) 2. Planned cesarean delivery (e.g., footling breech presentation) scheduled for 38 or more weeks' gestation. If the woman was in labor at the time of randomization, the caesarean section was undertaken as soon as possible. Immediately before caesarean section, the fetal presentation was reassessed and if cephalic, a vaginal birth was planned.	Self-reported stress urinary incontinence and fecal or flatus incontinence within the previous 7 days. Perception of incontinence: no problem at all, a little problem, or a big problem.	Intention to treat. Open label. Centralized randomization stratified by parity with block sizes of two. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Hannah, 2004[593] Followup the Term Breech Trial, RCT to examine the effects of planned cesarean section on incontinence 2 years postpartum. Duration: 2 years	917 of 1,159 women with singleton live fetus in a frank or complete breech presentation at term (37 weeks' gestation). Exclusion criteria: Fetopelvic disproportion, fetus weight >4,000g, hyperextension of the fetal head, lethal anomaly or a condition that might cause a mechanical problem at delivery, and contraindication to labor or vaginal delivery. Loss of followup: 20.9% in planned Cesarean groups and 19.6% in vaginal birth group.	1. Planned vaginal birth group, management was expectant until spontaneous labor began, unless an indication to induce labor (e.g., post term pregnancy) 2. Planned cesarean delivery (e.g., footling breech presentation) scheduled for 38 or more weeks' gestation. If the woman was in labor at the time of randomization, the caesarean section was undertaken as soon as possible. Immediately before caesarean section, the fetal presentation was reassessed and if cephalic, a vaginal birth was planned.	Self-reported stress urinary incontinence and fecal or flatus incontinence within the previous over the previous 3 to 6 months. Perception of incontinence: no problem at all, a little problem, or a big problem.	Intention to treat. Open label. Centralized randomization stratified by parity with block sizes of two. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Fitzpatrick, 2002[755] RCT to examine the effects of delayed vs. immediate pushing in second stage of labor with epidural analgesia on postpartum faecal continence. Duration: 3 months	178 primiparae in either spontaneous or induced labor with a singleton fetus, cephalic presentation between 37 and 42 weeks of gestation with effective epidural analgesia in situ. Exclusion criteria: diabetes, irritable bowel syndrome or other bowel or neurological disorder Loss of followup: none	1. Immediate pushing 2. 60-minute delay, prior to the commencement of active pushing. If delivery was not imminent after 60 minutes pushing, a decision was made regarding the need for instrumental or caesarean delivery.	Self-reported FI using bowel function questionnaire With modified continence score from 0 - complete continence, to 20 – complete incontinence. Anal manometry outcomes. Anal ultrasound to evaluate potential structural damage to the anal sphincters.	All patients were analyzed, Intention to treat not stated. Single blind. Computer-generated randomization, ratio of 1:1 in blocks of 10. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Johanson, 1999[596] Followup RCT to examine the effects of delivery by forceps or vacuum extractor on maternal and child outcomes. Duration: 5 years postpartum.	607 women requiring assisted vaginal delivery. Exclusion criteria: 47% of participants form the original RCT were not contacted for unclear reasons. Loss of followup: 26.2% non responders to the survey 5 years postpartum.	1. Delivery with vacuum extractor. 2. Forceps delivery.	Self-reported fecal and urinary incontinence 5 years postpartum	No intention to treat. Open label. Randomization procedure is not described. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.
Fitzpatrick, 2003[756] RCT to examine the effects of forceps or vacuum assisted vaginal delivery on anal sphincter function in standard-ized management of labor. Duration: 12 weeks	130 primiparous women in either spontaneous or induced labor with a singleton fetus, cephalic presentation, between 37 and 42 weeks of gestation and required instrumental assistance with delivery. Exclusion criteria: diabetes, irritable bowel syndrome or other bowel or neurological disorders Loss of followup: 16 failed vacuum-forceps	1. Vacuum assisted delivery 2. Low-cavity, non-rotational forceps assisted delivery	Self-reported fecal continence scored from 0 - complete contin-ence, to 20 - complete incontinence. Fecal urgency - unable to defer defecation for >5 minutes. Anal manometry outcomes. Endoanal ultrasound outcomes.	Intention to treat. Open label. Computer-generated randomization, ratio of 1:1 in balanced blocks of 10. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.
Sultan, 1999[757] RCT to examine the effect of forceps and vacuum delivery on anal sphincter trauma 5 years postpartum. Duration: 5 years postpartum	44 from 313 contacted participants in Keele University Multicenter Assisted Delivery Trial (607 women were randomized in the original trial) Exclusion criteria: unclear why only 313 from 607 participants were contacted for a survey; 44 only agree to have anal endosonography and manometry 5 years postpartum.	1. Delivery with vacuum extractor 2. Forceps delivery.	Anal endosonography outcomes. Anal manometry outcomes.	Intention to treat. Single blind. Randomization procedure is not described. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Effects of surgical interventions to reduce fecal incontinence in females				
Faltin, 2005[758] RCT to examine whether diagnosis of sphincter tears followed by immediate surgical repair reduces the occurrence of incontinence. Duration: 3 months and 1 year	752 nulliparous women older than 18 years with no scheduled cesarean delivery with second-degree perineal tear (spontaneous or after episiotomy). Exclusion criteria: anal sphincter ruptures (third- or fourth-degree perineal tear, International Classification of Diseases, 10th Revision), Cesarean delivery, intact perineum or minimal perineal tear ruptures (first-degree perineal tear). Loss of followup: 0.8%	1. Clinical and ultrasound examination of the anal sphincter immediately after vaginal delivery 2. Clinical examination alone	Self-reported fecal incontinence, need to wear a pad, and lifestyle alterations caused by fecal incontinence using the Wexner scale grading (0-absent; 4- daily).	Intention-to treat. Single blind. Computer-generated randomization in blocks (4, 6, and 8) arranged in random order. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Deen, 1994[759] RCT to examine the effects of abdominal resection rectopexy or perineal rectosigmoidectomy and pelvic floor repair in elderly female patients with full-thickness rectal prolapse and faecal incontinence. Duration of followup: 17 months	20 elderly female patients with full-thickness rectal prolapse and fecal incontinence. Exclusion criteria: not reported. Loss of followup: none	1. Abdominal resection rectopexy and pelvic floor repair. 2. Perineal rectosigmoidectomy and pelvic floor repair.	Self-reported fecal incontinence graded from A (fully continent) to D. anal manometry outcomes.	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed the adequacy of randomization. Sample size not justified.
Sayfan, 1990[760] Non randomized controlled CT to examine the effects of sutured posterior abdominal rectopexy with sigmoidectomy or Marlex rectopexy on fecal incontinence in patients with rectal prolapse. Duration of followup: 2 weeks	29 women with full-thickness rectal prolapse. Exclusion criteria: not reported. Loss of followup: none.	1. Marlex mesh posterior rectopexy alone. 2. Sigmoidectomy combined with a sutured posterior rectopexy	Self-reported fecal incontinence, anal manomtery outcomes and rectal emptying during proctography.	Intention to treat not stated. Open label. Not randomization. Baseline data not reported. Sample size not justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Yoshioka, 1999[761] RCT to examine the effects of total pelvic floor repair with gluteus maximus transposition for women with post obstetric fecal incontinence. Duration of followup: 18 months	24 women with post obstetric neuropathic fecal incontinence. Exclusion criteria: comorbidity (diabetes), endosonographic sphincter defect, previous anal surgery. Loss of followup: not reported	1. Gluteus maximus transposition (without electrical stimulation). 2. Total pelvic floor postanal repair with anterior levatoroplasty	20 point clinical incontinence score. -failing to achieve full continence -fecal urgency secondary outcome measures: -post-operative complications -adverse functional effects -physiological outcomes	Intention-to-treat. Open label. Permuted block randomization. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Deen, 1993[762] RCT to examine total pelvic floor repair with anterior levatorplasty and sphincter plication alone and postanal repair alone. Duration: 6 months	36 women 28-75 years with neuropathic fecal incontinence confirmed by manometry with >4 incontinent episodes/month. Exclusion criteria: isolated anal sphincter defect, diabetes mellitus. Loss of followup:53%	1. Total pelvic floor repair 2. Anterior levatorplasty and sphincter plication alone 3. Postanal repair alone 4. Control: 18 females undergoing herniorrhaphy and cholecystectomy	Self-reported fecal continence. Manometric and radiologic outcomes.	No Intention to treat. Open label. Computer generated random tables. Allocation concealment not reported. Baseline data not reported. Sample size not justified.
Davis, 2004[763] RCT to examine the effects of adjuvant biofeedback following anal sphincter repair on fecal incontinence. Duration of biofeedback: 6 weeks Duration of followup: 3 months and 1 year	38 females with fecal incontinence who failed other conservative treatments, with persistent leakage of liquid or solid stool over at least the previous 12 months, with external anal sphincter defect identifiable on endoanal ultrasound. Exclusion criteria: Coexistent rectocele, full thickness rectal prolapse, congenital abnormalities, non-obstetric trauma to the sphincter complex, inflammatory bowel disease or significant, women under the age of 18 years, planning pregnancy or who suspected pregnancy. Loss of followup: 5.3%	1. Anterior overlapping sphincter repair using interrupted non-absorbable sutures and levatorplasty using absorbable sutures. 2. Anterior overlapping sphincter repair plus visual or auditory biofeedback with dual-balloon pressure system during pelvic floor exercise 2 times/day. Three types of exercises: 'maximal' -maximal squeeze for as long as possible up to 10 seconds; 'submaximal' - halfway squeeze held for up to 5 seconds; or series of repetitive fast squeeze and relax contractions.	Self-reported fecal incontinence symptoms with 3-point scale of 'improved,' 'remained the same,' or 'got worse,' change in continence score ranging from 0 to 20 (0 - no incontinence to 20 - complete incontinence), and anorectal outcomes.	Intention to treat. Single blind. Randomization with computer generated list of random numbers. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Deen, 1995[764] RCT to examine the effects of	33 women with neuropathic fecal incontinence with a history of prolonged or difficult vaginal delivery, >6 fecal accidents/month, using pad	1. Adjuvant internal anal sphincter plication in pelvic floor repair	Self-reported fecal incontinence scores from 1 - satisfactory to	Intention to treat not stated. Open label. Randomization with random number tables.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
adjuvant internal anal sphincter plication in women with neuropathic fecal incontinence. Duration of followup: 1 year.	for fecal incontinence. Exclusion criteria: external sphincter defect, diabetes mellitus, rectal prolapse. Loss of followup: none	2. Pelvic floor repair alone	7 – poor. Anorectal manometry outcomes	Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.
Davis, 2004[763] RCT to examine the effects of adjuvant biofeedback following sphincter surgery. Duration of followup: 12 months	47 consecutive female patients with defect of external anal sphincter identifiable on endoanal ultrasound and fecal incontinence who failed to control symptoms of persistent leakage of liquid or solid stool over at least the previous 12 months. Exclusion criteria: coexistent rectocele, full thickness rectal prolapse, congenital abnormalities, non-obstetric trauma to the sphincter complex, inflammatory bowel disease or significant neuropathy, women under the age of 18 years, planning pregnancy or who suspected pregnancy. Loss of followup:18%	1. Direct sphincter repair and levatorplasty with pelvic floor muscle exercise training with maximal or submaximal squeeze for 10 seconds 10 times day in different positions. Biofeedback therapy 3 months after surgery using dual-balloon pressure system with color led visual or auditory signals of sphincter pressure as feedback. 2. Direct sphincter repair and levatorplasty	Self-reported fecal continence using fecal incontinence scale with continence score (0 - no incontinence to 20 - complete incontinence). Endoanal ultrasonography outcomes.	No Intention to treat. Open label. Randomization with computer generated list of random numbers. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Van Tets, 1998[765] RCT to examine the effects of postanal and total pelvic floor repair for female neurogenic incontinence. Duration of followup: 12 weeks	Type D incontinence (no control of solid stool by Parks and Browning). Exclusion criteria: sphincter defects. Loss of follow up: not reported	1. Postanal repair with levator ani and plicated of the external anal sphincter. 2. Total pelvic floor repair with a combination of postanal repair, anterior levatorptasty, and anterior sphincter plication	Self-reported fecal incontinence	Intention to treat not stated. Open label. Randomization by drawing lots. Allocation concealment not reported. Baseline data confirmed the adequacy of randomization. Sample size not justified.
Thakar, 2002[599] RCT to examine the effects of total abdominal hysterectomy and subtotal abdominal hysterectomy performed for benign uterine diseases. Duration: 1 year	279 women referred for hysterectomy because of benign disease; most of the women were premenopausal. Exclusion criteria: age >60 years, suspected cancer, a body weight that exceeded 100kg, previous pelvic surgery, known endometriosis, abnormal cervical smears, symptomatic uterine prolapse, and symptomatic urinary incontinence for which the patient might seek expert medical advice. Loss of followup: 16% in total and 12% in subtotal abdominal hysterectomy groups.	1. Subtotal hysterectomy 2. Total hysterectomy	Self-reported urinary incontinence using standardized Questionnaire. Stress incontinence scored from 0 - none to 4 - always. Twin-channel subtracted cystometrography and uroflowmetry outcomes.	No intention to treat for cystometry outcomes. Double blind. Randomization with computer-generated numbers. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Effects of surgical interventions to reduce fecal incontinence in males				
Peeters, 2006[766] RCT to examine the effects of three-dimensional conformal radiotherapy for prostate cancer. Duration of followup: 44 months	641 patients with localized adenocarcinoma of the prostate. Exclusion criteria: not reported Loss of followup: 0.6%.	1. Three-dimensional conformal radiotherapy 68Gy 2. Three-dimensional conformal radiotherapy 78Gy	Fecal incontinence as use of incontinence pads for rectal loss of blood, mucus, or stools (requiring the use of pads more than twice a week) reported using Radiation Therapy Oncology Group/European Organization for the Research and Treatment of Cancer questionnaire.	No Intention to treat. Open label. Randomization stratified by hospital, hormonal therapy, age, and four treatment groups. Allocation concealment not reported. Baseline data did not confirm adequacy of randomization. Sample size not justified
Fransson, 2001[686] RCT to examine the effects of radiotherapy for localized prostate carcinoma. Duration of followup: 30-40 months	166 patients with localized prostate carcinoma cytologically or histologically verified as T1a-T2, G1-G2, pN0, and M0. Exclusion criteria: expected survival <10 years. Loss of followup: 35%.	1. Radiotherapy with a total dose of 4.8Gy (range, 62.3–70.0Gy) given for 5 days a week, 2 grays (Gy) per fraction. 2. Active surveillance	Self-reported urinary and fecal incontinence using validated symptom specific self assessment questionnaire, QUFW94 with values between 0 and 10; 0 - “no problem/very good function” and 10 - “many problems/very bad function.”	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Little, 2003[676] Followup RCT to examine the effects of radiotherapy for prostate cancer on urinary incontinence and bowel function. Duration of followup: 3 years	301 patients: 3 with histologically confirmed adenocarcinoma of the prostate and no metastatic disease treated with a four-field box technique to a dose of 46Gy. Exclusion criteria: not reported Response rate 70%.	1. Radiation with a four-field box technique to a dose of 70Gy arm 2. Radiation with three-dimensional conformal techniques to generate a six-field boost plan of a total dose of 78Gy	Self-reported bladder, bowel and sexual function (Fowler)	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Effects of bowel management in patients with spinal cord injury and symptoms of neurogenic bowel dysfunction				
Christensen, 2006[767] RCT to examine the effects of	87 patients 18 years or older after spinal cord injury at any level at least 3 months after injury and at least one of the following symptoms of neurogenic bowel dysfunction: 1) spending	1. Transanal irrigation with integrated system of coated rectal balloon catheter, control unit including a manual pump,	Cleveland Clinic constipation scoring system (0-30, 30 = severe symptoms). St	Intention to treat. Open label. Computer-generated block-randomized across centers. Allocation concealment not

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
transanal irrigation on fecal incontinence in patients with spinal cord injuries. Duration: 10 weeks	>30 minutes attempting to defecate each day or every second day, 2) episodes of fecal incontinence >1 per month, 3) symptoms reflecting autonomic dysreflexia before or during defecation, and 4) abdominal discomfort before or during defecation. Exclusion criteria: coexisting major unsolved physical problems due to the injury, performance of transanal irrigation on a regular basis, evidence of bowel obstruction or inflammatory bowel disease, history of cerebral palsy or cerebral apoplexy, multiple sclerosis, diabetic polyneuropathy, previous abdominal or perineal surgery (excluding minor surgery such as appendectomy or hemorrhoidectomy), pregnancy or lactation, evidence of spinal shock, mental instability, treatment with more than 5mg/day prednisolone, and implant for sacral nerve stimulation. Loss of followup: 6.8%	and a water container with the volume increased to 1,500ml or reduced gradually to 250ml. 2. Conservative bowel management with scheduled bowel care at least every 2 days, modulated diet, fluids, and regular physical activity and use of laxatives or constipating medicine.	Mark's fecal incontinence grading system (0-24, 24 = severe symptoms) Neurogenic Bowel Dysfunction Score (0-no symptoms, 47 = severe symptoms). The modified American Society of Colorectal Surgeon fecal incontinence scores (0-4, 4 = high quality of life)	adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Effects of surgical interventions on fecal incontinences in adults with hemorrhoid disease				
Hetzer, 2002[768] RCT to examine the effects of stapled hemorrhoidectomy and excision hemorrhoidectomy on fecal incontinence. Duration of followup: 12 months	40 patients with second- and third-degree hemorrhoid disease. Exclusion criteria: not reported Loss of followup: none	1. Stapled hemorrhoidectomy (Longo technique) with circular anal dilatator introduced to reduce the prolapse of the anoderm and parts of the anal mucous membrane. 2. Excision hemorrhoidectomy (Ferguson technique).	Self-reported fecal incontinence	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Konsten, 2000[769] RCT to examine the effects of anal dilation and hemorrhoidectomy for haemorrhoidal disease on fecal incontinence. Duration of followup: 1 year.	138 patients with second-degree and third-degree hemorrhoids. Exclusion criteria : not reported Loss of followup: 14%, 14 patients died.	1. Hemorrhoidectomy with no retractor (Miller method). 2. Hemorrhoidectomy with forced anal dilation and after treatment for 6 months (original Lord's procedure. 3. Hemorrhoidectomy with forced anal dilation.	Self-reported fecal incontinence	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Jayne, 2002[770] RCT to examine the effects of open diathermy haemorrhoidectomy and a new technique of haemorrhoidectomy using the Ligasure device suited to day-case surgery on fecal incontinence. Duration of followup: 3 months	40 patients with grade III or IV hemorrhoids. Exclusion criteria: use of regular anticoagulants, immunosuppressant or analgesics, American Society of Anesthesiologists grade III and IV risk, pregnancy, and the inability to give written informed consent. Loss of followup: none	1. Ligasure haemorrhoidectomy applying repeated diathermy forceps across the hemorrhoid with associated skin tag. Completion of coagulation was signaled by the feedback sensors, and haemorrhoidal tissue was excised along the line of coagulum. 2. Open diathermy haemorrhoidectomy	Self-reported fecal incontinence.	No Intention to treat. Single blind. Randomization with a random numbers table. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Galizia, 2000[771] RCT to examine the effects of adding a lateral internal sphincterotomy to haemorrhoidectomy Duration of followup: 24 months	48 consecutive patients with severe prolapsed piles suitable for surgical haemorrhoidectomy. Exclusion criteria: younger than 30 years or over 50 years, associated anorectal diseases such as anal scars, fissures, fistulas in ano, proctitis, or thrombosed hemorrhoids. Loss of followup: none.	1. Complete excision of three hemorrhoids (Milligan-Morgan technique) and lateral internal sphincterotomy up to the dentate line, in left haemorrhoidectomy wound. 2. Complete excision of three hemorrhoids (Milligan-Morgan technique)	Self-reported fecal incontinence. Anal manometry outcomes.	No Intention to treat. Open label. Randomization using random number table. Allocation concealment not adequate. Baseline data not reported. Sample size not justified.
Lawes, 2004[772] Followup RCT to examine the effects of Ligasure haemorrhoidectomy on fecal incontinence in patients with prolapsing hemorrhoids. Duration of followup: 12months	34 patients with prolapsing hemorrhoids. Exclusion criteria: not reported Loss of followup: 11.7%.	1. Ligasure haemorrhoidectomy with controlled quantity of bipolar diathermy current to tissue ensuring the complete coagulation of blood vessels 2. Standard diathermy haemorrhoidectomy	Self-reported fecal incontinence using validated continence scoring system, the Continence Grading Scale	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.
Filingeri, 2004[773] RCT to examine the effects of submucosal hemorrhoidectomy with radiofrequency	102 patients with fourth-degree hemorrhoids. Exclusion criteria: presence of previous proctologic surgery or associated proctologic diseases, pregnancy, scores III or IV on the ASA score of the American Society of Anesthesiologists. Loss of followup: 7.8%	1. Submucosal hemorrhoidectomy with radiofrequency bistoury. 2. Conventional Parks' hemorrhoidectomy	Self-reported fecal continence	No Intention to treat. Double blind. Randomization using random number table. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization Sample size not

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
bistoury or conventional Parks' haemorrhoidectomy on fecal incontinence. Duration of followup: 6 months				justified.
Johannsson, 2006[774] RCT to examine the effects of open (Milligan-Morgan) and closed (Ferguson) haemorrhoidec-tomy on fecal incontinence. Duration of followup: 1 year	225 patients older than 18 years attended the clinic for haemorrhoidectomy. Exclusion criteria: history of anal incontinence. Loss of followup: 6.2%	1. Open (Milligan-Morgan) haemorrhoidectomy 2. Closed (Ferguson) haemorrhoidectomy with wounds sutures without tension	Self-reported anal incontinence using validated questions and an Miller incontinence scores	No Intention to treat. Open label. Randomization stratified by the center. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Khan, 2001[775] RCT to examine the effects of closed excisional hemorrhoidectomy and the Harmonic Scalpel technique on fecal incontinence. Duration of followup: 6 weeks	30 patients with Grade 2 and 3 symptomatic hemorrhoids. Exclusion criteria: not reported Loss of followup: not reported	1. Excisional Hemorrhoidectomy with the ultrasonically activated scalpel (Harmonic Scalpel). 2. Closed excisional hemorrhoidectomy assisted by electrocautery	Self-reported fecal incontinence, and quality of life using the Short Form-36 survey	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified
van Tets, 1997[776] RCT to examine effects of the Parks' anal retractor on anal sphincter function during closed hemorrhoidectomy Duration of followup: 12 weeks	40 patients with symptomatic third-degree hemorrhoids with normal continence. Exclusion criteria: not reported. Loss of followup: none.	1. Closed hemorrhoidectomy performed intra-anally using the Parks' anal retractor 2. Closed hemorrhoidectomy performed perineally without the use of a retractor	Anal manometry outcomes.	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Ho, 2000[777] RCT to examine effects of stapled or conventional open diathermy hemorrhoidectomy on fecal incontinence in adults. Duration of followup: 3 months	119 consecutive patients with prolapsed irreducible hemorrhoids. Exclusion criteria: previous perianal surgery, acute thrombosis of internal hemorrhoids, bleeding disorders. Loss of followup: not reported	1.Conventional open diathermy hemorrhoidectomy. 2.Stapled hemorrhoidectomy	Self-reported fecal incontinence and quality of life outcomes. Anal manometry outcomes. Endoanal ultrasound outcomes.	Intention to treat not stated. Single blind. Randomization by drawing sealed envelopes. Allocation concealment not adequate. Baseline data confirmed the adequacy of randomization. Sample size not justified.
Effects of the clinical interventions in patients with rectal diseases to reduce risk of fecal incontinence				
Schouten, 1991[778] RCT to examine the effects of fistulectomy in patients with anorectal abscess. Duration of followup: 42 months	70 patients with anorectal abscess. Exclusion criteria: recurrent abscess. Loss of followup: 5.7%	1. Incision, drainage and fistulectomy with primary partial internal sphincterotomy. 2. Incision and drainage alone with secondary partial internal sphincterectomy	Self-reported anal continence	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.
Singer, 2005[779] RCT to examine the effects of Tisseel-VH fibrin sealant in combination with intra-adhesive cefoxitin, surgical closure of primary opening, or both modifications on fecal incontinence in patients with chronic fistula-ano. Duration of followup: 12 months	Patients with fistula-in-ano for at least 3 months. Exclusion criteria: not reported. Loss of followup: none	1. Tisseel-VH fibrin sealant intra-adhesive cefoxitin 100mg. 2. Tisseel-VH fibrin sealant surgical closure of primary opening. 3. Tisseel-VH fibrin sealant intra-adhesive cefoxitin 100mg surgical closure of primary opening	Self-reported fecal incontinence.	No Intention to treat. Open label. Randomization with random numbers table. Allocation concealment adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Libertiny, 2002[780] RCT to examine the effects of glyceryl trinitrate or lateral	70 patients with chronic anal fissure for >2 months, with the presence of ulcerated induration, and the presence of internal sphincter fibers at the base of the fissure, who failed to respond to treatment with stool	1. Glyceryl trinitrate application 0.2% paste to perianal area 3 times/day for 8 weeks. 2. Lateral sphincterotomy	Self-reported fecal incontinence.	Not intention to treat. Open label. Randomization by selection of sealed postcards. Allocation concealment not reported. Baseline data not

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
sphincterotomy on fecal incontinence in patients with chronic anal fissure. Duration of followup: 24 months	softeners and topical ointments. Exclusion criteria: acute fissures, postpartum stage, incontinence, previous history of anorectal surgery Loss of followup: not reported			reported. Sample size justified
Mishra, 2005[781] RCT to examine the effects of glyceryl trinitrate or lateral sphincter-otomy on FI in patients with for chronic anal fissure. Duration of followup: 6 weeks	40 consecutive patients with primary idiopathic chronic anal fissure with symptoms (pain, bleeding) lasting for more than 6 weeks, fibers of internal anal sphincter visible at the floor of the fissure, sentinel pile, and induration of the edges. Exclusion criteria: secondary fissures, systemic diseases (diabetes mellitus, jaundice, collagen diseases), pregnancy, or those being treated with nitrates. Loss of followup: not reported	1. Glyceryl trinitrate application 0.2% paste to perianal area 3 times/day 2. Lateral sphincterotomy	Self-reported fecal incontinence	No intention to treat. Open label. Randomization using randomized block design (balance by age, sex, and weight). Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified
Oettle, 1997[782] RCT to examine the effects of glyceryl trinitrate or lateral sphincter-otomy on FI in patients with chronic anal fissure. Duration of followup: 22 months	24 consecutive patients with chronic anal fissure. Exclusion criteria: Crohn's disease, tuberculosis, AIDS, anal abscess or fistula. Loss of followup: 0%	1. Glyceryl trinitrate application 0.2% paste to perianal area 3 times/day. 2. Lateral sphincterotomy	Self-reported fecal incontinence	Intention to treat. Open label. Randomization with random number tables (odd-even). Allocation concealment not reported. Baseline data not reported. Sample size justified
Richard, 2000[783] RCT to examine the effects of topical nitroglycerin or internal sphincterotomy on fecal incontinence in patients with chronic anal fissure. Duration of followup: 6 months	90 patients with symptomatic chronic anal fissures (fibrosis at the base of fissure, visible internal sphincter, hypertrophied anal papilla proximal to fissure, sentinel pile distal to fissure). Exclusion criteria: refusals of Internal sphincterotomy, healing of fissure before surgery, fissure was not observed at surgery, sepsis, Crohn's disease, AIDS, practicing anal intercourse, contraindication to nitrates. Loss of followup: 8.8%	1. Application of 0.25% nitroglycerin twice per day to perianal area 3 times/day 2. Internal sphincterotomy	Self-reported fecal incontinence using Continence Index by Jorge and Wexner.	No Intention to treat. Open label. Central computer generated randomization with permuted blocks of 2, 4, and 6 stratified by center. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Evans, 2001[784] RCT to examine the effects of glyceryl trinitrate or lateral sphincterotomy on fecal incontinence in patients with chronic anal fissure. Duration 8 weeks. Duration of followup:12 months	65 patients with symptoms of chronic anal fissure (symptoms >2 weeks). Exclusion criteria: inflammatory bowel disease, AIDS, previous fecal incontinence, sphincter injury or surgery, medical conditions that contraindicated general anesthesia, use of nitrates. Loss of followup:7.7 %	1. Glyceryl trinitrate application 0.2% paste to perianal area 3 times/day for 8 weeks. 2. Lateral sphincterotomy	Self-reported minor fecal incontinence.	No intention to treat. Open label. Central randomization. Allocation concealment not adequate. Baseline data not reported. Sample size justified
Zimmerman, 2003[785] RCT to examine the effects of two different types of anal retractors on fecal continence after fistula repair. Duration of followup: 12 weeks	30 patients with perianal fistula. Exclusion criteria: fistulotomy. Loss of followup: none.	1. Parks retractor during fistula repair. 2. Scott retractor during fistula repair	Self-reported fecal continence using Rockwood fecal continence Severity Index. Anal manometry outcomes.	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization Sample size not justified.
Ho, 2005[786] RCT to examine the effects of dermal island flap anoplasty on fecal incontinence in patients with trans-sphincteric fistula-in-ano. Duration of followup: 16 weeks	20 patients with fistula-in-ano confirmed by endoanal ultrasound. Exclusion criteria: not reported. Loss of followup: none.	1. Dermal island flap anoplasty with cutaneous advancement flap into the rectum 2. Conventional treatment: lay open fistulotomy or seton insertion	Self-reported fecal incontinence scores.	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization Sample size not justified.
Clinical interventions in patients with rectal cancer				
Peeters, 2005[674] RCT to examine the effects of preoperative short-term radiotherapy in patients treated with total	1,861 patients with histologically confirmed adenocarcinoma of the rectum with inferior margin of the tumor had <15 cm from the anal verge and below the level of S1 and S2. Exclusion criteria: distant metastases, fixed tumors, locally treated (transanal resected) tumors	1. Radiotherapy with total dose of 25Gy administered in 5 fractions over 5 to 7 days before total mesorectal excision. 2. Total mesorectal excision	Self-reported urinary and fecal incontinence with 4-point scale from “no, never” to “sometimes” (<1/week), “often” (>1/ week but not every	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
mesorectal excision. Duration of followup: 5 years	Loss of followup: 32%, 597responded to questionnaire.		day), and "yes, always" (every day) for time-dependent symptoms and from "no, not at all" to "a little," "pretty much," and "very seriously" for time-independent symptoms.	
Dahlberg, 1998[787] Followup RCT to examine effects of preoperative high-dose radiotherapy on long-term bowel function in patients with rectal cancer. Duration of followup: 5 years	400 patients younger than 80 years with respectable rectal cancer participated in nationwide Swedish Rectal Cancer Trial. 171 patients survived after a minimum of five year responded to the questionnaire. Exclusion criteria: postoperative stomas and dementia. Loss of followup: 57% from the initial trial, 16% among survivors.	1. Preoperative high-dose radiotherapy with 25Gy given in 5 fractions for 5-7 days followed by anterior resection of rectal cancer. 2. Anterior resection of rectal cancer alone	Self-reported defecation frequency, emptying difficulties, urgency, and incontinence	No Intention to treat. Open label. Randomization and allocation concealment not reported in this article. Baseline data confirmed adequacy of randomization. Sample size justified.
Pollack, 2006[675] RCT to examine the effects of rectal cancer surgery with or without preoperative radiotherapy on incontinence. Duration of follow up:15 years	1,406 patients with biopsy-proven adenocarcinoma of the rectum, resectable for cure by an abdominal procedure who participated in the Stockholm I and II trials. 252 alive 15 years after surgery surveyed Exclusion criteria: distant metastases, locally advanced cancer or previous irradiation to the pelvis, local excision; mental or physical condition that did not allow to participate in the survey. Loss of follow up: 90% (139 patients available for follow-up and willing to participate).	1.Abdominal rectal resection with preoperative radiotherapy in a dose of 25 (5 × 5) Gy using a two field technique (The Stockholm I trial) or four-field box technique (The Stockholm I trial II). 2. Abdominal rectal resection without preoperative radiotherapy	Self reported fecal and urinary incontinence using the European Organization for Research and Treatment of Cancer (EORTC) Quality of Life Questionnaire (QLQ)	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data did not confirm adequacy of randomization. Sample size not justified From the original publication: Balanced central randomization lists with a block size of six - 596 were randomized to radiotherapy
Allgayer, 2005[788] Controlled CT to examine the effects of pelvic floor exercise/ biofeedback training combined with irradiation on fecal incontinence after surgery for colorectal cancer. Duration of	90 patients with colorectal cancer, lower anterior resection as the standard surgical procedure; a UICC II/III tumor stage; macroscopically and histologically tumor-free resection margins; normal laboratory tests including carcinoembryonic antigen (CEA) and a normal abdominal ultrasound/CT on admission. Exclusion criteria: impaired general health conditions (Karnofsky index <80), age >75 years, a second malignancy or other relevant adverse clinical conditions such as advanced	1. Intensive daily pelvic floor exercise under the supervision of therapist (30-40 minutes) for 3 weeks in routine rehabilitation programs with biofeedback intra-anal electromyogram electrode device. Postoperative irradiation (total dose 50.4 ± 2.0 Gy) applied in split doses (1.8Gy, 5 /week). 2. Intensive daily pelvic floor exercise under the supervision	Self-reported severity of fecal incontinence using Modified Cleveland Incontinence Score (MCIS) questionnaire 16-point scale: <6.0 total incontinence with complete inability to retain solid stools; 7.0- 12.0- partial incontinence with	No intention to treat. Open label. Not randomized with significant differences at baseline. No adjustment reported.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
followup: 3 weeks and one year.	heart failure (NYHA III/IV), pulmonary diseases, metabolic diseases, poorly controlled diabetes (Hba1c > 7.7%), neurologic diseases and/or language barriers. Loss of followup: 34.7%	of therapist (30-40 minutes) for 3 weeks in routine rehabilitation programs With biofeedback intra-anal electromyogram electrode device.	incontinence for liquid stools; and >14.0 almost normal continence. The major criteria included stool frequency (number of daily evacuations), stool consistence, urgency (time to reach a toilet in minutes, seconds or immediately), discrimination between air, liquid and/or solid stool, spoiling to underwear and concomitant antidiarrheal medication and/or bulk-forming agents. Each item graded from 0 to 3 by the patient and by a trained nurse/ physician and subsequently controlled by an independent observer.	
Lundby, 2005[789] 15933797 RCT to examine the effects of adjuvant postoperative radiotherapy for rectal cancer on fecal incontinence. Duration of follow up: 15-20 years	494 patients with Dukes B or C rectal carcinoma who were surveyed 15-20 years after surgery. Exclusion criteria: not reported Loss of follow up:81%	1.Postoperative radiotherapy after anterior resection. 2.Anterior resection alone	Self-reported fecal incontinence.	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed the adequacy of randomization. Sample size not justified.
Effects of the surgical interventions on fecal incontinence in patients with rectal prolapse				
Luukkonen, 1992[790] RCT to examine effects of	30 consecutive patients with a full-thickness circumferential rectal prolapse. Exclusion criteria: not reported. Loss of followup: 3.3%	1. Posterior sutured abdominal rectopexy combined with sigmoidectomy complete rectal prolapse and end-to-end	Self-reported anal continence graded from 0 to 3: normal (grade 0), incontinent	No intention to treat. Open label. Randomization with random numbers tables. Allocation concealment not

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
abdominal rectopexy and sigmoid resection with polyglycolic acid mesh rectopexy without sigmoidectomy for complete rectal prolapse. Duration of followup: 6 months		anastomosis made with a circular stapler. 2.Polyglycolic acid mesh rectopexy without sigmoidectomy for complete rectal prolapse anterior rectal wall free	for flatus (grade 1), incontinent for liquid stool (grade 2), incontinent for solid stool (grade 3). Anal manometry outcomes	adequate. Baseline data not reported. Sample size not justified.
Racalbuto, 2004[791] RCT to examine the effects of haemorrhoidal stapler prolapsectomy or Milligan-Morgan hemorrhoidectomy on fecal incontinence. Duration of followup: 48 months	100 patients with 3rd and 4th degree hemorrhoids. Exclusion criteria: thrombosed hemorrhoids, partial prolapse (only one nodule), perianal fistulas, presence of chronic associated fissures. Loss of followup: not reported	1. Stapled prolapsectomy using longo circular stapler. 2. Traditional Milligan-Morgan Hemorrhoidectomy with exeresis of the haemorrhoidal piles upon low ligature of each vascular pedicle	Self-reported fecal incontinence using Continence Grading Scale with Wexner scores. Anal manomtery outcomes.	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.
Novell, 1994[792] RCT to examine the effects of Ivalon sponge versus sutured rectopexy for full-thickness rectal prolapse. Duration of followup: 47 months	63 patients with full thickness rectal prolapse and coexistent fecal incontinence. Exclusion criteria: not reported. Loss of followup: 12 died from causes unrelated to surgery - 19%	1. Ivalon sponge with sutured rectangle of sponge placed along the length of the sacrum. 2. Sutured rectopexy with sutured rectangle of sponge or sutures alone placed along the length of the sacrum	Self reported fecal incontinence as fecal soiling or using a pad	No intention to treat. Open label. Randomization with random numbers tables. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Solomon, 2002[793] RCT to examine effects of laparoscopic and open abdominal rectopexy in patients with full thickness rectal	40 patients with full thickness rectal prolapse with or without fecal incontinence. Exclusion criteria: concomitant gynecological procedures, previous rectopexy, large irreducible prolapse. Loss of followup: 2.5%	1. Laparoscopic rectopexy 2. Open abdominal rectopexy	Self-reported fecal incontinence scores with visual analog scale	No intention to treat. Single blind. Randomization not reported. Allocation concealment unclear. Baseline data confirmed adequacy of randomization. Sample size justified

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
prolapse. Duration of followup: 24 months				
Galili, 1997[794] RCT to examine the effects of polyglycolic acid and polypropylene mesh for rectopexy in the treatment of rectal prolapse. Duration of followup: 3.6 years	37 consecutive patients with complete rectal prolapse. Exclusion criteria: not reported. Loss of followup: none	1. Posterior abdominal rectopexy with non-absorbable mesh (Polypropylene, Prolene, Ethicon Ltd). 2. Posterior abdominal rectopexy with absorbable mesh (Polyglycolic acid, Dexon, Davis & Geck)	Self-reported impact on quality of life in scale from 0 to 10. Social activity as 0 - inability to leave home; 1- unrestricted social life. Fecal incontinence as 0 -complete incontinence, 0.5 - incontinence for loose stool only, 1 - complete continence.	Intention-to-treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.
Boccasanta, 2006[795] RCT to examine the effects of Altemeier's procedure with levatorplasty with handwritten and stapled anastomosis in patients with full thickness rectal prolapse and fecal incontinence. Duration of followup: 28 months	40 patients (55 females; mean age, 70.9 ± 11.3 years) with full thickness rectal prolapse, rectal procidentia >5cm; fecal incontinence with score >10. Exclusion criteria: associated colorectal diseases including cancer, rectal procidentia <5cm; fecal incontinence score <10; absolute contraindications to surgery; mental disorders; inflammatory bowel disease; polyps. Loss of followup: none	1. Altemeier's procedure with levatorplasty, monopolar electrocautery and hand sewn anastomosis. 2. Altemeier's procedure with levatorplasty using harmonic scalpel and circular stapler	Self-reported fecal continence using a validated scoring system (Wexner score, ranging from 0 - full continence to 20 – complete incontinence). Anal manometry and electromyogram outcomes.	Intention to treat not stated. Single blind. Computer-generated randomization list, with block size 4-6. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
Boccasanta, 1998[796] RCT to examine the effects of laparoscopic rectopexy and open technique in the treatment of complete rectal prolapse.	21 patients with complete full thickness rectal prolapse with variable degree of fecal incontinence aged between 22-76 years. Exclusion criteria: not reported. Loss of followup: none.	1. Laparoscopic stapled Well's rectopexy, perineal physiotherapy, external electric stimulation, and perineal biofeedback. 2. Well's rectopexy by the open technique without division of lateral rectal ligaments, perineal physiotherapy, external electric stimulation, and perineal	Self-reported fecal incontinence scores from 0 - complete continence to 6 - complete incontinence. Dynamic defecography, anorectal manometry, and anal electromyography	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Duration of followup: 25.7 - 29.5 months.		biofeedback	outcomes.	
Effects of the surgical interventions on anal sphincter to prevent incidence and progression of fecal incontinence in adults				
Wiley, 2004[797] RCT to examine the effects of open and closed internal sphincterotomy on fecal incontinence in patients with chronic anal fissure. Duration of followup: 52 weeks	79 patients with chronic idiopathic fissure-in-ano (defined as fissure-in-ano with >6 weeks symptom duration) in whom conservative treatment had failed, suitable for lateral sphincterotomy. Exclusion criteria: previous sphincterotomy or anal dilation, fissure associated with inflammatory bowel disease, suspicion of malignant fissure or ulcer, concomitant procedure (*i.e.*, hemorrhoidectomy) to be performed at the time of sphincterotomy (excision of skin tags was permitted), and anesthetic requirements, which included spinal or caudal blockade. Loss of followup: 3.7%	1. Closed lateral internal sphincterotomy (Hoffman and Goligher) using a short stab incision and blind division of the internal sphincter guided by the surgeon finger. 2. Open lateral sphincterotomy (Parks) *via* a 1cm radial incision with division of the internal sphincter under direct vision.	Self-reported fecal incontinence with standardized questionnaires (modified Wexner score): score range of 0 to 20, 0 - complete or normal continence	No intention to treat. Open label. Central randomization. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization Sample size justified.
Parellada, 2004[798] RCT to examine the effects of lateral internal sphincterotomy with local 0.2% isosorbide dinitrate on fecal incontinence in patients with chronic anal fissure. Duration of followup: 24 months	63 patients with chronic anal fissure (anal pain at defecation for at least 2 months) on proctologic examination with observation of sphincter fibers at the base of the fissure independent of the presence of the sentinel pile or hypertrophic papilla who failed conservative treatments with a high-fiber diet, bulking agents, and warm sit baths. Exclusion criteria: not reported. Loss of followup: 14%	1. Surgical: open lateral internal spincterotomy and mucose closure with chromic catgut. 2. Chemical: local 0.2% isosorbide dinitrate - pea-size quantity applied manually at the entrance of the anus, 3 times/day immediately after a warm sit bath, for 6 weeks.	Self-reported fecal incontinence. Anal manometry outcomes.	No intention to treat. Open label. Randomization with random numbers: odd for the treatment group and even for the control group. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Wong, 2002[799] Not randomized not controlled multicenter trial to examine the effects of Acticon trade mark artificial bowel sphincter for fecal incontinence.	112 patients older than 18 year, with a fecal incontinence for >6 months and score of 88 or greater (scale, 1-120), who failed surgical treatment, with life expectancy >2 years. Exclusion criteria: adverse comorbities, fecal incontinence scores <88, Crohn's disease, irritable bowel syndrome as only cause of fecal incontinence, active pelvic sepsis, pregnancy, history of pelvic radiation, anal	Implantation of Acticon trade mark artificial bowel sphincter - solid silicone elastomer device.	Self-reported fecal incontinence using Fecal Incontinence Scoring System (FISS), from 0 - complete continence to 120 - complete incontinence.	Not randomized not controlled trial. The authors reported outcomes before and after the treatment.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Duration of followup: 12 months	receptive intercourse. Loss of followup: 2.6%			
Arroyo , 2005[800] RCT to examine the effects of close lateral internal sphincterotomy and botulinum toxin sphincterotomy for chronic anal fissure. Duration of followup: 2 months and 1- 3 years	80 patients with chronic anal fissure (presence of fibrous induration or exposed internal sphincter fibers) after at least 6 weeks of conservative treatments. Exclusion criteria: associated anal diseases (stenosis, abscess, fistula, hemorrhoids), comorbidities (inflammatory bowel disease, AIDS, tuberculosis, sexually transmitted diseases), anticoagulants, and pregnancy. Loss of followup: none	1. Close lateral internal sphincterotomy 2. Chemical sphincterotomy with 25 units botulinum toxin injected into the internal sphincter	Self-reported fecal incontinence using the Cleveland Clinic Scoring System (0 - perfect continence to 20 - complete incontinence)	Intention to treat not stated. Computer generated randomization. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.
Zbar, 2003[801] RCT to examine the effects of conventional cutting vs. internal anal sphincter-preserving seton for high trans-sphincteric fistula. Duration of followup: 12-13 months	34 patients with cryptogenic high trans-sphincteric fistulas. Exclusion criteria: not reported. Loss of followup: none.	1. Modified cutting seton, which repaired the internal anal sphincter muscle and re-routed the seton through the intersphincteric space. 2. Conventional cutting seton	Self-reported fecal continence using Pescatori's continence Scale. Anal manometry outcomes.	Intention to treat not stated. Open label. Randomization with random numbers. Allocation concealment not reported. Baseline data confirmed the adequacy of randomization. Sample size not justified.
Osterberg, 2004[802] RCT to examine the effects of levatorplasty and anal plug electrostimulation of the pelvic floor in idiopathic faecal incontinence. Duration of followup: 12 months	70 patients with disabling fecal incontinence of idiopathic (neurogenic) origin, persistent after dietary advice and a standardized treatment with bulking agents attempted for at least 2 months. Exclusion criteria: endosonographic anal sphincter defect, rectal prolapse or intra-anal intussusception, previous anorectal surgery other than haemorrhoidectomy. Loss of followup: 15.7%	1. Anterior levatorplasty with mobilization of external sphincter. 2. Anal (and vaginal in women) plug electrostimulation of the pelvic floor with stimulation frequency was 25Hz and the duration 1.5 seconds, with a pulse-train interval of 3 seconds.	Self-reported anal incontinence, pad use, stool frequency using standard bowel questionnaire to calculate Miller's incontinence score (0 - total continence to 18 - maximum incontinence). Anorectal manometry outcomes.	No intention to treat. Open label. Permuted block (4) randomization stratified by baseline squeeze and resting pressure. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Tjandra, 2004[803] RCT to examine the effects of injectable silicone biomaterial, PTP to augment the internal anal sphincter. Duration of followup: 3 months	82 patients (64 females; median age, 66 years) with severe fecal incontinence and a low anal resting pressure caused by internal anal sphincter dysfunction, who failed treatment with bulking or constipating agents and pelvic floor physiotherapy. Exclusion criteria: pregnancy, active perianal sepsis, unresected anorectal cancer, and immunosuppression. Loss of followup: 14.6% at 3 months	1. PTP injection into intersphincteric space and internal anal sphincter with guidance by endoanal ultrasound using 25 gauge hypodermic needles inserted to provide guidance to the position of intersphincteric space and the depth of insertion. 2. PTP injection into intersphincteric space and internal anal sphincter without guidance by endoanal ultrasound	Self-reported fecal Wexner continence score (0 - perfect continence; 20 - complete incontinence), visual analog scale (10 being best) for global quality of life, fecal incontinence quality of life scales.	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
O'Brien, 2004[804] RCT to examine the effects of an artificial bowel sphincter (Acticon Neosphincter) on fecal continence in severely incontinent adults. Duration of followup: 6 months	14 patients with severe fecal incontinence (the Cleveland Clinic Scoring System >15), mentally able to consent. Exclusion criteria: history of previous sphincter repair, chronic inflammation in perianal region, use of immunosuppressive drugs, inflammatory bowel disease, high anesthetic risk. Loss of followup: none	1. Placement of the artificial bowel sphincter activated at 6 weeks after surgery. 2. Usual supportive care: physiotherapy, pelvic floor exercise, dietary advice.	Self-reported fecal Incontinence score using the Cleveland Clinic Scoring System (0 - perfect continence to 20 - complete incontinence). American Medical Systems quality of life questionnaire specialized on fecal incontinence	Intention to treat not stated. Open label. Computer generated random numbers. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.
Muscle Transfer Procedures on FI				
Effects of the surgical interventions (diversion) on fecal incontinence in adults with cancer				
Seow-Choen, 1995[805] RCT to examine the effects of ultra-low anterior resection with a J colonic pouch and straight coloanal anastomosis in patients with rectal cancer. Duration of followup after closure of ileostomy: 12 months	40 patients with low rectal cancer and median distance from the lower edge of the tumor to the anal verge of 5cm. Exclusion criteria not reported. Loss of followup: 5%	1. Ultra-low anterior resection with total mesorectal excision and 8cm J colonic pouch-anal anastomosis (median distance of anastomosis from the anal verge 3cm). 2. Ultra-low anterior resection with total mesorectal excision and straight coloanal anastomosis (median distance of anastomosis from the anal verge 3.25cm).	Self-reported bowel urgency, fecal incontinence, pad use for fecal incontinence.	No Intention to treat. Open label. Randomization scheme not reported. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Ho, 2001[806] RCT to examine the effects of colonic J-pouch and straight coloanal anastomosis after ultra-low anterior resection of rectal cancer. Duration of followup: 2 years	40 patients with adenocarcinoma of the mid and lower rectum. Exclusion criteria: extensive local disease, which would preclude ultra-low anterior resection. Loss of followup: 17%	1. Standardized ultra-low anterior resection with straight coloanal anastomosis, the descending colon was anastomosed to the anorectal stump. 2. Standardized ultra-low anterior resection with J pouch anastomosis by folding the descending colon to the form of a `J', 6cm in length	Self-reported fecal incontinence using validated Wexner scale from 0 - continence to 24 - complete incontinence. Anal manometry outcomes.	No Intention to treat. Single blind. Randomization with random number table. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size not justified.
Soliani,1992[807] RCT to examine the effects of Conseal Colostomy Plug, a new device for the regulation of continence in patients with colostomies. Duration 2 weeks	57 patients with left terminal colostomies at least 6 months after neoplastic or inflammatory diseases, trained for self-irrigation. Exclusion criteria: stomal pathology, short transit intestinal syndrome, not self independent, unreliable for correct colostomy handling. Loss of followup: none	1. Conseal Colostomy Plug fit with a two-piece Conseal system. 2. Conseal Colostomy Plug fit with a one-piece Conseal system	Self-reported fecal incontinence as modification in continence time	No Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Hallbook, 1996[808] RCT to examine the effects of a low anterior resection with either straight or colonic J pouch anastomosis in patients with rectal cancer. Duration of followup after closure of ileostomy: 1 year	100 patients with rectal adenocarcinoma, lower margin not more than 12cm from the anal verge with possible curative sphincter-saving resection. Exclusion criteria: not reported. Loss of followup: 3%	1. Low anterior resection with total mesorectal excision with straight anastomosis 6 to 8cm in length. 2. Low anterior resection with total mesorectal excision colonic J pouch anastomosis 6 to 8cm in length.	Anastomotic leakage: abscess on CT scan or ultrasound; discharge of pus either per anum or through a fistula; and necessity of laparotomy or a transanal drainage procedure. Self-reported bowel function using questionnaire: Frequency of bowel movements per night. Degree of urgency: Ability to defer defecation for 30 minutes: always, often, sometimes, never. Composite score of grade and frequency of	No intention to treat. Single blind. Computer generated permuted block (4) randomization stratified for center and gender. Allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
			fecal incontinence (Miller scale). Ability to evacuate the bowel in <15 minutes: always, often, sometimes, never. Sensation of incomplete evacuation: never, sometimes, often, always. Impact on overall well-being: not at all, a little, quite a bit, very much.	
Ho, 2002[809] RCT to examine the effects of J-pouch and coloplasty pouch for low rectal cancer. Duration of followup: 1 year.	88 patients with mid- and low rectal adenocarcinoma. Exclusion criteria: extensive local disease, which would preclude ultralow anterior resection. Lost of followup: 23%, 7 deaths from chest infection and residual cancer	1. Standardized total mesorectal excision with at least 2cm of distal tumor clearance. J-pouch was constructed from descending colon 6cm in length using an Autosuture ILA 75 linear cutting stapler. 2. Standardized total mesorectal excision with at least 2cm of distal tumor clearance. Coloplasty pouch was anastomosed to stapled anorectal stump.	Self-reported fecal continence score with validated Fecal Incontinence Quality of Life Scale, anorectal manometry, and endoanal ultrasound.	Intention to treat. Randomization with a computer-generated code. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.
Machado, 2005[810] RCT to examine the effects of colonic J-pouch or a side-to-end anastomosis after low anterior resection for rectal cancer. Duration of followup: 2 years	71 patients with rectal cancer. Exclusion criteria: not reported. Loss of followup: none.	1. Low anterior resection and total mesorectal excision with a colonic J-pouch anastomosis. 2. Low anterior resection and total mesorectal excision with a colonic J-pouch or a side-to-end anastomosis.	Self-reported fecal incontinence using with scores from 0 to 18 (total incontinence). Bowel rank scores: number of bowel movements, incontinence scores, ability to defer defecation for 30 minutes and empty bowel for 15 minutes. Anorectal manometry outcomes	Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Laurent, 2005[811] RCT to examine the effects of staples or hand	37 patients with rectal adenocarcinoma requiring total mesorectal excision. Exclusion criteria: distant metastases. Loss of followup: 2.7%	1. Total mesorectal excision and hand sewn colonic J-pouch-anal anastomosis (6cm) 2. Total mesorectal excision and	Self-reported continence to gas, liquids, and solid stools Cleveland Clinic	No Intention to treat. Open label. Randomization in the operating room using computerized random number

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
sewn colonic J-pouch-anal anastomosis for rectal cancer. Duration of followup: 2 years		stapled colonic J-pouch-anal anastomosis (6cm) using PI-30 stapling instrument	Fecal Incontinence Score Scale	tables. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Lazorthes, 1997[812] RCT to examine the effects of small and large colonic J-pouch following coloanal anastomosis on fecal incontinence in patients with rectal carcinoma. Duration of followup: 12, and 24 months after colostomy closure.	59 consecutive patients with rectal cancers 4 to 8cm from the anal verge. Exclusion criteria: inadequate bowel length, thickened mesentery. Loss of followup: 34%	1. Complete rectal excision with coloanal anastomosis 6cm J-pouch group 2. Complete rectal excision with coloanal anastomosis 10cm J-pouch group	Self-reported bowel urgency and fecal continence	No Intention to treat. Open label. Randomization and allocation concealment not adequate. Baseline data confirmed adequacy of randomization. Sample size justified.
McKee, 1992[813] RCT to examine the effects of abdominal rectopexy with and without sigmoidectomy in rectal prolapse. Duration of followup: 20 months	18 patients with full thickness prolapse of the rectum. Exclusion criteria: not reported. Loss of followup: not reported	1. Abdominal rectopexy without sigmoidectomy 2. Abdominal rectopexy with sigmoidectomy of redundant sigmoid colon and end-to-end anastomosis of colon and rectum made in pelvic brim	Fecal incontinence using saline solution infusion test	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.
Furst, 2003[814] RCT to examine the effects of Colonic J-pouch and coloplasty in patients with resected distal rectal cancer. Duration of followup after closure of ileostomy: 6 months	40 patients with distal rectal cancer (<12cm from the anal verge) after low rectal resection and coloanal anastomosis. Exclusion criteria: preoperative incontinence, inflammatory bowel diseases, adenocarcinoma of proximal rectum (>12cm above the anocutaneous line). Loss of followup: 25%	1. 5cm colonic J-pouch constructed with a linear stapler 2. 8cm coloplasty pouch sutures horizontally with minimal extension effect.	Self-reported stool frequency. Anorectal manometry outcomes.	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Hasegawa, 2000[815] RCT to examine the effects of fecal diversion after sphincter repair on fecal incontinence. Duration of followup: 13 months	27 patients with fecal incontinence requiring sphincter repair due to localized sphincter damage. Exclusion criteria: not reported. Loss of followup: none	1. Fecal diversion with defunctioning stoma (closed at 4 months after surgery) for sphincter repair with standard overlapping technique 2. Sphincter repair with standard overlapping technique with no stoma	Self-reported fecal Incontinence score using the Cleveland Clinic Scoring System (0 - perfect continence to 20 - complete incontinence). Incontinence episodes as never; rarely if<1/month; sometime if <1/week; usually if >1/week; always if>1/day. Anal manometry outcomes.	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.
Sailer, 2002[816] RCT to examine the effects of straight and pouch coloanal reconstruction. Duration of followup: 3 months, 1 year	64 patients undergo low anterior rectal resection for primary cancer of the lower and middle third of the rectum. Exclusion criteria: manifest or latent fecal incontinence. Loss of followup: 39%, 11 patients died.	1. Total mesorectal excision and straight anastomosis with descending colon anastomosed in end-to-end fashion to the anal canal. 2. Total mesorectal excision and coloanal J pouch anastomosis by folding the descending colon to the form of a `J', 5 ± 6cm in length.	Self-reported fecal incontinence using Gastrointestinal Quality of Life Index (0-4 scale for 36 items with total 144 scores for nest outcome) European Organization for Research and Treatment of Cancer (EORTC) QLQ-C30) (0-100 scores for the best outcome) and disease-specific (EORTC QLQ-CR38) scales: 0-36 (perfect continence)	Intention-to treat. Open label. Randomization with computer-generated random clusters. Allocation concealment adequate. Sample size justified.
Ho, 2002[817] RCT to examine the effects of colonic J-pouch and straight coloanal anastomosis after ultra-low anterior resection of rectal cancer. Duration of followup: 1 year	12 patients with mean age 61.5 years with adenocarcinoma of the mid and lower rectum. Exclusion criteria: not reported. Loss of followup: none	1. Standardized ultra-low anterior resection with straight coloanal anastomosis, the descending colon was anastomosed to the anorectal stump. 2. Standardized ultra-low anterior resection with J pouch anastomosis by folding the descending colon to the form of a `J', 6cm in length	Self-reported fecal incontinence using bowel questionnaire Anal manometry outcomes. Scintigraphy with technetium TC 99m tin-colloid liquid test meal/I-131 microcapsule	No Intention to treat. Single blind. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
Furst, 2002[818] RCT to examine the effects of short colonic J-pouch and straight coloanal anastomosis for low rectal cancer. Duration of followup: 6 months.	74 consecutive patients (55 males) with rectal cancer in the lower and middle third of the rectum (<12cm above anocutaneuous line), local curative resection with preservation of sphincter, normal baseline continence. Exclusion criteria: inflammatory bowel disease, adenocarcinoma of proximal rectum (>12cm above anocutaneuous line). Loss of followup:16%, 6 deaths	1. The standardized total mesorectal excision with preaortal lymph node dissection, autonomic nerve preservation, and short (5cm) colonic J-pouch anastomosis. 2. The standardized total mesorectal excision with preaortal lymph node dissection, autonomic nerve preservation, and straight coloanal anastomosis.	Self report fecal incontinence using standardized questionnaire (European Organization for Research and Treatment of Cancer, EORTC-QLQ-C30). Anorectal manometry outcomes	No Intention to treat. Single blind. Randomization by independent person. Allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Jiang 2005[819] RCT to examine the effects of side-to-end or colonic J-pouch group on fecal incontinence in patients with rectal cancer. Duration of follow up: 2 years	56 consecutive patients with middle-to-low rectal cancer eligible for local curative resection with possible sphincter preservation, and normal continence preoperatively, Exclusion criteria: emergency admission. Loss of follow up: 14.3%	1.Side-to-end anastomosis after low anterior resection. 2.Colonic J-pouch reconstruction after low anterior resection	Self-reported fecal incontinence. Anal manometry outcomes. Continence was recorded as Grade 1 (perfect continence), Grade 2 (incontinence of flatus), Grade 3 (occasional minor soiling), Grade 4 (frequent major soiling), and Grade 5 (total incontinence).	No intention to treat. Randomization using random number table. Allocation concealment not reported. Baseline data confirmed the adequacy of randomization. Sample size not justified.
Surgical interventions in patients with chronic ulcerative colitis				
Reilly, 1997[820] RCT to examine the effects of staples or hand sewn techniques for excision of anal mucosa during ileas pouch-anal anastomosis. Duration of followup: 6 months after closure of the temporary stoma.	41 patients with chronic ulcerative colitis. Exclusion criteria: not reported. Loss of followup: 22%	1. Abdominal colectomy excising anal transition zone and hand sewing the pouch to the anal canal (Ileal Pouch-Anal Anastomosis). 2. Abdominal colectomy preserving anal transition zone and double stapling the pouch to the anal canal (Ileal Pouch-Anal Anastomosis)	Quality of life scores: 1 -severely restricted performance to 5 - improved performance. Anorectal manometry, scintigraphic outcomes and pudendal nerve terminal motor latency	Intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Johnston, 1996[821] RCT to examine the effects of	60 patients with ulcerative colitis. Exclusion criteria: not reported. Loss of followup: 5%	1-2. Duplicated (J) pelvic ileal reservoirs in restorative proctocolectomy constructed	Self-reported faecal leakage, anal soreness, the ability to	No Intention to treat. Single blind. Randomization and allocation concealment not

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
duplicated and quadruplicated pelvic ileal reservoirs in restorative proctocolectomy for ulcerative colitis. Duration of followup after operation or closure of the defunctioning ileostomy: 1 year		with either 30 or 40cm of ileum 3-4.Quadruplicated (W) reservoir pelvic ileal reservoirs in restorative proctocolectomy, constructed with either 30 or 40cm of ileum	defer defecation. Anorectal manometry outcomes.	reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Selvaggi, 2000[822] RCT to examine the effects of J-pouch and W-pouch configurations for ulcerative colitis. Duration of followup after ileostomy closure: 1 year	24 patients with ileal pouch-anal anastomosis for ulcerative colitis. Exclusion criteria: not reported. Loss of followup: none	1. Ileal pouch-anal anastomosis including total colectomy, total rectal excision, and two-limb J reservoir. 2. Ileal pouch-anal anastomosis including total colectomy, total rectal excision, and four-limb W reservoir	Self-reported bowel function and fecal incontinence scores with Wexner scale from 0-continence to 24 - complete incontinence. Anorectal manometry outcomes.	Intention to treat not stated. Single blind. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Oresland,1988[823] RCT to examine the effects of balloon dilatation of the pouch and sphincter biofeedback training in patients with an ileo-pouch anal anastomosis. Duration: 8 weeks Duration of followup after closure of ileostomy: 1 year	40 patients with ulcerative proctocolitis 4 weeks after ileo-pouch anal anastomosis with J pouch extended to pelvis and sutured to pectinate line. Exclusion criteria: not reported. Loss of followup: 5%.	1. Anal balloon dilatation with step-wise increasing pressure (5-80cm H20), distention ~ 60 seconds for 50-60 minutes. 2. Sphincter training with visual feedback for 50-60 minutes/day.	Resting anal pressure, self-reported number of bowel evacuations.	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size not justified.
Hahnloser, 2007[824] Retrospective analysis to analyze	1,885 patients with preoperative diagnosis of chronic ulcerative colitis operated with Ileal pouch-anal anastomosis – 1,824 J pouch, 44	1. Stage: abdominal colectomy, construction of ileal reservoir -J, S, or W pouch. Completion by	Self-reported fecal incontinence during the day and night as never,	Time-to-event and cumulative probability of remaining free from specific outcomes was

F151a. Effects of clinical interventions on fecal incontinence in community dwelling adults (continued)

Study	Participants	Clinical Interventions	Outcomes	Quality Issues
the effects of Ileal pouch-anal anastomosis for ulcerative colitis on fecal incontinence. Duration of followup: 11 years.	S pouch, and 17 W pouch. A diverting ileostomy was performed in 98·4% of patients (30% one-stage procedure). Loss of followup: response rates to the questionnaires by 1, 5, 10, 15, and 20 years were 80, 72, 73, 64, and 54%.	excision of anal transition zone and hand sewing the pouch to the dentate line area, or by preserving anal transition zone and double -stapling the pouch to the dentate line. 2. Stage: closure of the diverting stoma accomplished 2-3 months later.	occasional (1-2 episodes/ week), or frequent (>2 episodes per week).	estimated using the method of Kaplan and Meier, and survival curves were compared with the log rank test. No adjustment reported.
Diversion in patients with rectal prolapse				
McKee, 1992[813] RCT to examine the effects of abdominal rectopexy with and without sigmoidectomy in rectal prolapse. Duration of followup: 20 months	18 patients with full thickness prolapse of the rectum. Exclusion criteria: not reported. Loss of followup: not reported	1. Abdominal rectopexy without sigmoidectomy. 2. Abdominal rectopexy with sigmoidectomy of redundant sigmoid colon and end-to-end anastomosis of colon and rectum made in pelvic brim	Fecal incontinence using saline solution infusion test	No intention to treat. Open label. Randomization and allocation concealment not reported. Baseline data not reported. Sample size not justified.
Diversion in patients with sphincter damage				
Hasegawa, 2000[815] RCT to examine the effects of fecal diversion after sphincter repair on fecal incontinence. Duration of followup: 13 months	27 patients with fecal incontinence requiring sphincter repair due to localized sphincter damage. Exclusion criteria: not reported. Loss of followup: none	1. Fecal diversion with defunctioning stoma (closed at 4 months after surgery) for sphincter repair with standard overlapping technique. 2. Sphincter repair with standard overlapping technique with no stoma	Self-reported fecal Incontinence score using the Cleveland Clinic Scoring System (0 - perfect continence to 20 - complete incontinence). Incontinence episodes as never; rarely if<1/month; sometime if <1/week; usually if >1/week; always if>1/day. Anal manometry outcomes.	Intention to treat not stated. Open label. Randomization and allocation concealment not reported. Baseline data confirmed adequacy of randomization. Sample size justified.

Table F152. Comparative effectiveness of conservative management of fecal incontinence in residents of nursing homes (severity measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference, (95%CI)	% Difference from Control (95%CI)
Schnelle, 2002[459] N = 190 84% female	Integrated incontinence care and exercise every 2 hours 5 days a week including fluid prompting, prompted toileting, and regular wet checks, arm raise and arm curl exercises	Usual care	Fecal incontinence frequency, % of wet checks	3.0 ± 8.0	7.0 ±10.0	**-0.44 (-0.73;-0.15)**	-6.3 (-0.4;-2.2)
Schnelle, 1989[457] N = 126 75% female	Prompted voiding treatment: check for incontinence, asking for needed toileting assistance, prompted voiding, and socially reinforced for appropriate toileting	Usual care	Percent wet checks/total checks	17.8 ± 13.0	34.5 ± 16.8	**-1.1 (-1.5; -0.7)**	-3.2 (-4.3; -2.1)
			Percent appropriate toileting	59.4 ± 26.7	16.8 ± 22.0	**1.7 (1.3; 2.2)**	10.4 (7.9; 12.8)
Ouslander, 2005[458] N = 107 10% female	Functional Incidental Training: prompted voiding combined with individualized, functionally oriented endurance and strength-training exercises offered 4 times per day, 5 days per week	Usual care	Wet checks/total checks	25.0 ± 50.0	50.0 ± 28.0	**-0.6 (-1.0; -0.2)**	-1.2 (-2.0; -0.5)
			Wet stool checks/total checks	0.0 ± 44.7	1.0 ± 22.0	0.0 (-0.4; 0.4)	-2.9 (40.8; 35.0)
			Change after treatments in wet checks/ total checks			17.0 (-83.9; 49.9)	
			Change after treatments in wet stool checks/total checks			0.0 (-46.0; 446.0)	

Bold - significant difference in outcomes at 95%confidence level

Table F153. Comparative effectiveness of pharmacological intervention on progression of fecal incontinence in residents of long-term care unit

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STE After Control Treatment	Mean Difference from Control (95%CI)
Chassagne, 2000[720] N = 178 82% female	Single osmotic laxative -30g lactulose	Osmotic agent 30g lactulose with a rectal stimulant (glycerine suppository) and weekly tap-water enemas	Episodes of fecal incontinence/ patient/day: loss of feces	0.9 ± 0.4	0.8 ± 0.4	0.0 (-0.3; 0.4)
			Episodes of fecal incontinence per patient/day: loss of feces	0.4 ± 0.4	0.4 ± 0.5	0.0 (-0.4; 0.4)
			Number of cloth changes/day due to fecal incontinence	2.9 ± 0.6	2.8 ± 0.7	0.2 (-0.2; 0.5)

Table F154. Comparative effectiveness of individualized evidence-based conservative management on self-reported severity of fecal incontinence in patients after stroke

Author Sample	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment
Harari, 2004[721] N = 146 (Active = 73; Control = 73) 40% female	One or more episodes of FI per week	3	3	4.10	4.10
	Straining on >1 in 4 bowel movements	13	6	17.80	8.20

Table F155. Comparative effectiveness of individualized evidence-based conservative management on quality of life

Author Sample	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference	Standard Error	P Value
Harari, 2004[721] N=146 (Active = 73; Control = 73) 40% female	Visual analog scale (0 = “no problem at all” to 100 = “terrible problem”)	33.60 ± 30.9	32.00 ± 27.60	0.05	0.17	0.88
	Visual analogue scale (0 = “no control” to 100 = “perfect control”)	77.90 ± 24.70	73.90 ± 28.30	0.15	0.17	0.15

Table F156. Relative risk of fecal incontinence outcomes after individualized evidence-based conservative management

Author	Outcome	Relative Risk (95% CI
Harari, 2004[721]	One or more episodes of FI per week	1.13 (0.1; 8.9)
	Straining on >1 in 4 bowel movements	1.51 (0.5; 4.9)

Table F157. Comparative effectiveness of dietary interventions on progression of fecal incontinence in adults (event rate)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)
Bliss, 2001[722] N = 42 80% female	Usual diet supplemented with 25g of Metamucil, 7.1g of psyllium/day	Usual diet supplemented with 0.25g of pectin/d as a placebo	% of incontinent stools	2	7	17.0	50.0	0.3 (0.1; 1.2)

Table F158. Comparative effectiveness of dietary interventions on progression of fecal incontinence in adults (severity measures)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Difference from Control (95%CI)
Bliss, 2001[722] N = 42 80% female	Usual diet supplemented with 25g of Metamucil, 7.1g of psyllium/day	Usual diet supplemented with 0.25g of pectin/d as a placebo	Stool weight, g/day	198.2 ± 6.9	139.0 ± 5.4	**9.59 (6.77; 12.41)**	6.9 (4.9; 8.9)
			Total stool solids, g/day	34.1 ± 11.5	31.6 ± 11.5	0.22 (-0.55; 0.99)	0.7 (-1.8; 3.1)
			% water content	78.8 ± 4.7	77.0 ± 1.9	0.50 (-0.28; 1.28)	0.7 (-0.4; 1.7)
			% water insoluble solids	25.3 ± 7.9	22.9 ± 7.9	0.30 (-0.47; 1.08)	1.3 (-2.1; 4.7)
			WHC/g water insoluble solids	3.0 ± 0.4	2.3 ± 0.4	**1.75 (0.84; 2.66)**	76.1 (36.3; 115.8)
			Total WHC	46.6 ± 9.0	37.6 ± 9.0	**1.00 (0.18; 1.82)**	2.7 (0.5; 4.8)
	Usual diet supplemented with 25g of gum arabic/day		Stool weight, g/day	159.0 ± 5.0	139.0 ± 5.4	**3.83 (2.50; 5.16)**	2.8 (1.8; 3.7)
			Total stool solids, g/day	35.6 ± 11.5	31.6 ± 11.5	0.35 (-0.43; 1.12)	1.1 (-1.4; 3.6)
			% water content	75.8 ± 4.7	77.0 ± 1.1	-0.35 (-1.13; 0.42)	-0.5 (-1.5; 0.6)
			% water insoluble solids	25.1 ± 7.9	22.9 ± 7.9	0.28 (-0.49; 1.05)	1.2 (-2.2; 4.6)
			WHC/g water insoluble solids	2.6 ± 0.4	2.3 ± 0.4	0.75 (-0.05; 1.55)	32.6 (-2.1;67.3)
			Total WHC	43.4 ± 9.0	37.6 ± 9.0	0.64 (-0.15; 1.43)	1.7 (-0.4; 3.8)

WHC = Water holding capacity; Bold- significant difference in outcomes at 95% confidence level

Table F159. Comparative effectiveness of conservative management programs on postnatal fecal incontinence in females

Author Sample	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment
Glazener, 2001[483] N=747 100% female	371	376	Any fecal incontinence (to motions)	12	25	4.40	10.50
			Severe fecal incontinence (sometimes, often, or always)	5	12	1.80	5.10
Glazener, 2005[484] N=747 100% female	371	376	Fecal incontinence six years after index delivery	32	32	12	13
			Severe fecal incontinence six years after index delivery	15	8	6	3

Table F160. Relative risk of fecal incontinence outcomes, number needed to treat to prevent one event, and number of avoided (excessive) events per 1,000 treated after conservative management programs on postnatal fecal incontinence in females

Author	Outcome	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Glazener, 2001[483]	Any fecal incontinence (to motions)	**0.49 (0.25; 0.95)**	16 (13; 206)	61 (5;79)A
	Severe fecal incontinence (sometimes, often, or always)	0.42 (0.15; 1.19)		
Glazener, 2005[484]	Fecal incontinence six years after index delivery	1.0 (0.6; 1.6)		
	Severe fecal incontinence six years after index delivery	1.9 (0.8; 4.4)		

Bold- significant difference in outcomes at 95%confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F161. Comparative effectiveness self administered perineal massage on prevention of fecal incontinence in females

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)
Labrecque, 2000[482] Sample: 1034 Active: 519 Control: 515 Women with previous vaginal birth: 493 Active: 246 Control: 247	Self administered perineal massage	Usual obstetric care	Fecal continence in women with no previous vaginal birth	502	499	96.8	96.9	1.0 (1.0; 1.0)
			Fecal incontinence >1/day in women with no previous vaginal birth	2	4	0.4	0.7	0.5 (0.1; 2.7)
			Fecal continence in women with previous vaginal birth	242	237	98.4	95.8	1.0 (1.0; 1.1)
			Fecal incontinence >1/day in women with previous vaginal birth	4	10	1.6	4.2	0.4 (0.1; 1.3)

Table F162. Comparative effectiveness of behavioral interventions on prevention of fecal incontinence in females (cases of continence reported)

Author Sample	Active Treatment	Control Treatment	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Fynes, 1999[723] N = 40 100% female	Augmented biofeedback training of pelvic floor with audiovisual feedback and electric stimulation of slow and fast twitch fibers	Sensory biofeedback training with a vaginal perineometer and standard Kegel pelvic floor exercise	15	7	75.0	36.8	**2.0 (1.1; 3.9)**	3 (1;37)	382 (27; 1055)E

Bold- significant difference in outcomes at 95%confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient = 1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F163. Comparative effectiveness of behavioral interventions on instrumental outcomes in females

Author Sample	Active Treatment	Control Treatment	Outcomes	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95%CI)	% Difference from Control (95%CI)
Fynes, 1999[723] N = 40 100% female	Augmented biofeedback training of pelvic floor with audiovisual feedback and electric stimulation of slow and fast twitch fibers for 12 weeks	Sensory biofeedback training with a vaginal perineometer and standard Kegel pelvic floor exercise for 12 weeks	Mean maximum resting pressure	54.0 ± 8.0	32.0 ± 16.8	**1.69 (0.95; 2.42)**	5.3 (3.0; 7.6)
			Mean maximum squeeze pressure	86.0 ± 12.0	51.0 ± 29.6	**1.56 (0.84; 2.29)**	3.1 (1.7; 4.5)
			Squeeze increment	30.0 ± 12.0	24.0 ± 4.2	**0.66 (0.01; 1.31)**	2.8 (0.1; 5.4)
			Vector symmetry index	0.5 ± 0.2	0.5 ± 0.2	0.00 (-0.63; 0.63)	0.0 (-125.6; 125.6)

Bold- significant difference in outcomes at 95%confidence level

Table F164. Comparative effectiveness of behavioral interventions to prevent progression of fecal incontinence in females (events rate)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)
Ilnyckyj, 2005[724] N = 23 100% female	Education and explanation and instruction in pelvic floor muscle strengthening exercises with max possible squeeze duration for 5 repetitions spaced by a 20 second pause, 6 times/day.	Education and visual and verbal biofeedback therapy using a radial catheter with a latex balloon	Self-reported success in bowel control: complete continence in bowel control-cured	5	6	45.5	50.0	0.9 (0.4; 2.1)

Table F165. Comparative effectiveness of behavioral intervention on prevention of fecal incontinence in adults (cases of continence reported)

Author Sample	Active Treatment	Control Treatment	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)
Norton, 2003[729] N = 171 92% female	Hospital-based computer-assisted sphincter pressure biofeedback	Standard care with 9 40–60-minute sessions to advise on diet, fluid intake, bowel training	2	0	5.0	0.1	3.8 (0.2; 76.9)
	Standard care with 9 40–60-minute sessions to advise on diet, fluids intake, bowel training plus instruction on sphincter exercises with at least 50 maximal voluntary sustained sphincter contractions and 50 fast-twitch contractions per day				0.1	0.1	
	Hospital biofeedback plus the use of a home electromyelogram biofeedback device once daily for 20 minutes		4	0	10.0	0.1	8.0 (0.4; 143.0)

Table F166. Comparative effectiveness of behavioral interventions to prevent progression of fecal incontinence adults (events rate)

Author Sample	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)
Byrne, 2005[726] N = 239 90% female	Initial face-to-face assessment and treatment with transanal manometry and ultrasound biofeedback, followed by three treatments conducted via telephone and a final face-to-face assessment.	Standard treatment with 5 face-to-face treatment sessions with manometry and ultrasound	% improvement in Pascatori scores for fecal incontinence	14	53	26.0	29.0	0.9 (0.5; 1.5)
			% improvement in St Mark scores for fecal incontinence	21	79	39.0	43.0	0.9 (0.6; 1.3)
			% improvement in resting pressure	2	15	3.0	8.0	0.4 (0.1; 1.9)
			% improvement in maximum pressure	7	28	12.0	15.0	0.8 (0.4; 1.8)
			Marked Improvement in fecal incontinence	12	50	22.0	27.0	0.8 (0.5; 1.4)
			Improved fecal incontinence	21	54	39.0	29.0	1.3 (0.9; 2.0)
			No change in fecal incontinence	19	80	35.0	43.0	0.8 (0.5; 1.2)
			Worse fecal incontinence	2	2	4.0	1.0	3.4 (0.5; 23.3)

Table F166. Comparative effectiveness of behavioral interventions to prevent progression of fecal incontinence adults (events rate (continued))

Author Sample	Active Treatment	Control Treatment	Outcomes	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95%CI)
Norton, 2003[729] N = 171 92% female	Hospital biofeedback plus the use of a home electromyelogram biofeedback device once daily for 20 minutes	Standard care with 9 40–60-minute sessions to advise on diet, fluids intake, bowel training	Self-reported improvement in fecal incontinence	23	20	55.0	55.0	1.0 (0.7; 1.5)
	Hospital-based computer-assisted sphincter pressure biofeedback	Standard care with 9 40–60-minute sessions to advise on diet, fluid intake, bowel training	Self-reported improvement in fecal incontinence	27	20	55.0	55.0	1.0 (0.7; 1.5)
	Standard care with 9 40–60-minute sessions to advise on diet, fluid intake, bowel training plus instruction on sphincter exercises with at least 50 maximal voluntary sustained sphincter contractions and 50 fast-twitch contractions per day			19	20	45.0	55.0	0.8 (0.5; 1.3)

Table F167. Clinical behavioral interventions that resulted in improvement in fecal incontinence in more than 40% of subjects

Author Sample	Treatment	% Improved
Byrne, 2005[726] N = 239 90% female	Standard treatment with 5 face-to-face treatment sessions with manometry and ultrasound	43.0
Norton, 2003[729] N = 171 92% female	Standard care with 9 40–60-minute sessions to advise on diet, fluid intake, bowel training plus instruction on sphincter exercises with at least 50 maximal voluntary sustained sphincter contractions and 50 fast-twitch contractions per day	45.0
	Hospital biofeedback plus the use of a home electromyelogram biofeedback device once daily for 20 minutes	55.0
	Hospital-based computer-assisted sphincter pressure biofeedback	55.0
	40–60-minute sessions to advise on diet, fluid intake, bowel training	55.0
Ilnyckyj, 2005[724] N = 23 100% female	Education and explanation and instruction in pelvic floor muscle strengthening exercises with maximum possible squeeze duration for 5 repetitions spaced by a 20 second pause, 6 times/day	45.5
	Education and visual and verbal biofeedback therapy using a radial catheter with a latex balloon	50.0

Table F168. Comparative effectiveness of behavioral interventions to prevent progression of fecal incontinence in adults (severity score measures and instrumental outcomes)

Author Sample	Active Treatment	Control Treatment	Outcomes	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Difference from Control (95% CI)
Byrne, 2002[725] N = 120 91% female	Pelvic floor exercises and biofeedback	Baseline data	St Mark scores of quantitative fecal incontinence (0-10): socializing, shopping, outdoor activities	6.8 ± 3.8	9.0 ± 2.7	**-0.67 (-0.93; -0.41)**	-7.4 (-10.3; -4.5)
			Pescatori scores of quantitative fecal incontinence (0-10): socializing, shopping, outdoor activities	4.0 ± 1.6	4.9 ± 2.2	**-0.47 (-0.72; -0.21)**	-9.5 (-14.8; -4.3)
			St Mark scores of quantitative fecal incontinence (0-10): personal and psychological	5.7 ± 3.6	7.6 ± 2.6	**-0.61 (-0.86; -0.35)**	-8.0 (-11.4; -4.6)
			Pescatori scores of quantitative fecal incontinence (0-10): personal and psychological	4.0 ± 1.6	4.6 ± 0.9	**-0.46 (-0.72; -0.21)**	-10.0 (-15.6; -4.5)
			St Mark scores of quantitative fecal incontinence (0-10): travel	8.0 ± 3.3	9.2 ± 2.1	**-0.43 (-0.69; -0.18)**	-4.7 (-7.5; -1.9)
			Pescatori scores of quantitative fecal incontinence (0-10): travel	4.6 ± 1.5	6.0 ± 1.5	**-0.93 (-1.20; -0.67)**	-15.6 (-20.0; -11.1)
			St Mark scores of quantitative fecal incontinence (0-10): exercise	7.7 ± 3.4	9.3 ± 2.7	**-0.52 (-0.78; -0.26)**	-5.6 (-8.4; -2.8)
			Pescatori scores of quantitative fecal incontinence (0-10): exercise	4.3 ± 1.5	4.7 ± 1.0	**-0.31 (-0.57; -0.06)**	-6.7 (-12.1; -1.3)

Table F168. Comparative effectiveness of behavioral interventions to prevent progression of fecal incontinence in adults (severity score measures and instrumental outcomes) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Difference from Control (95% CI)
			St Mark scores of quantitative fecal incontinence (0-10): family and relationship	8.0 ± 3.5	9.3 ± 2.2	**-0.44 (-0.70; -0.19)**	-4.8 (-7.5; -2.0)
			Pescatori scores of quantitative fecal incontinence (0-10): family and relationship	4.5 ± 1.2	4.7 ± 0.7	-0.20 (-0.46; 0.05)	-4.3 (-9.7; 1.1)
			St Mark scores of quantitative fecal incontinence (0-10): job and work	6.3 ± 2.8	7.3 ± 2.8	**-0.36 (-0.61; -0.10)**	-4.9 (-8.4; -1.4)
			Pescatori scores of quantitative fecal incontinence (0-10): job and work	4.3 ± 1.1	4.6 ± 0.9	**-0.30 (-0.55; -0.04)**	-6.5 (-12.0; -1.0)
Solomon, 2003[727] N = 120 89% female	Biofeedback with transanal ultrasound	Pelvic floor exercises with feedback from digital examination alone	Pescatori fecal incontinence scores (0-6)	4.0 ± 0.7	4.0 ± 0.7	0.00 (-0.44; 0.44)	0.0 (-10.9; 10.9)
			St Mark fecal incontinence scores (0-13)	7.0 ± 1.3	8.0 ± 1.3	-0.75 (-1.20; -0.30)	-9.4 (-15.0; -3.7)
			Self-rated fecal incontinence (0-10)	3.6 ± 1.1	3.5 ± 1.5	0.08 (-0.36; 0.51)	2.2 (-10.3; 14.6)
			Investigator rated fecal incontinence (0-10)	3.7 ± 2.1	4.5 ± 1.9	-0.41 (-0.85; 0.03)	-9.0 (-18.8; 0.7)
			Rest pressure, mm/Hg	44.0 ± 8.7	48.0 ± 6.0	**-0.54 (-0.98; -0.09)**	-1.1 (-2.0; -0.2)
			Squeeze pressure, mm/Hg	95.0 ± 17.3	90.0 ± 20.0	0.27 (-0.17; 0.70)	0.3 (-0.2; 0.8)
			Isotonic fatigue time sec	27.0 ± 10.0	15.0 ± 10.7	**1.16 (0.69; 1.63)**	7.7 (4.6; 10.9)
			Isometric fatigue contractions (n)	9.0 ± 2.7	8.0 ± 1.3	**0.48 (0.03; 0.92)**	6.0 (0.4; 11.5)
	Biofeedback with anal manometry		Pescatori fecal incontinence scores (0-6)	4.0 ± 0.7	4.0 ± 0.7	0.00 (-0.44; 0.44)	0.0 (-11.0; 11.0)
			St Mark fecal incontinence scores (0-13)	6.0 ± 2.7	8.0 ± 1.3	**-0.96 (-1.42; -0.49)**	-12.0 (-17.7; -6.2)

Table F168. Comparative effectiveness of behavioral interventions to prevent progression of fecal incontinence in adults (severity score measures and instrumental outcomes) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Difference from Control (95% CI)
			Self rated fecal incontinence (0-10)	4.0 ± 1.2	3.5 ± 1.5	0.37 (-0.07; 0.81)	10.6 (-2.0; 23.3)
			Investigator rated fecal incontinence (0-10)	3.7 ± 2.5	4.5 ± 1.9	-0.36 (-0.80; 0.08)	-8.0 (-17.8; 1.8)
			Rest pressure, mm/Hg	45.0 ± 6.7	48.0 ± 6.0	**-0.47 (-0.92; -0.03)**	-1.0 (-1.9; -0.1)
			Squeeze pressure, mm/Hg	78.0 ± 18.7	90.0 ± 20.0	**-0.62 (-1.07; -0.17)**	-0.7 (-1.2; -0.2)
			Isotonic fatigue time sec	21.0 ± 6.7	15.0 ± 10.7	**0.67 (0.22; 1.12)**	4.5 (1.5; 7.5)
			Isometric fatigue contractions (n)	8.0 ± 1.3	8.0 ± 1.3	0.00 (-0.4; 0.44)	0.0 (-5.5; 5.5)
Pager, 2002[728] N = 83 89% female	Pelvic floor exercises with feedback from digital examination alone every day or 2-3 times/week.	45 minute sessions of sphincter exercises with biofeedback (instrumental or digital examination)	Pescatori fecal incontinence score (0 as continent - 6)	3.6 ± 1.8	3.0 ± 1.4	0.34 (-0.26; 0.94)	11.4 (-8.6; 31.4)
			St Mark Hospital Fecal incontinence score (0 as continent - 13)	5.1 ± 3.7	3.8 ± 2.2	0.40 (-0.20; 1.00)	10.6 (-5.2; 26.3)
			Self-reported fecal continence (0 as continent - 10)	3.3 ± 2.6	2.9 ± 2.4	0.18 (-0.42; 0.77)	6.2 (-14.7; 27.2)
Norton, 2003[729] N = 171 92% female	Hospital biofeedback plus the use of a home electromyelogram biofeedback device once daily for 20 minutes	Standard care with 9 40–60-minute sessions to advise on diet, fluid intake, bowel training	Rating of bowel control (0–10 scale)	6.0 ± 2.2	6.0 ± 2.2	0 (-0.44; 0.44)	0 (-7.4; 7.4)
	Hospital-based computer-assisted sphincter pressure biofeedback			6.0 ± 3.7	6.0 ± 2.2	0 (-0.43; 0.43)	0 (-7.1; 7.1)

Table F168. Comparative effectiveness of behavioral interventions to prevent progression of fecal incontinence in adults (severity score measures and instrumental outcomes) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Difference from Control (95% CI)
	Standard care with 9 40–60-minute sessions to advise on diet, fluid intake, bowel training plus instruction on sphincter exercises with at least 50 maximal voluntary sustained sphincter contractions and 50 fast-twitch contractions per day			7.0 ± 1.9	6.0 ± 2.2	**0.49 (0.05; 0.94)**	8.2 (0.8; 15.6)
	Hospital biofeedback plus the use of a home electromyelogram biofeedback device once daily for 20 minutes		Diary fecal accidents per week	0.1 ± 2.2	1.0 ± 1.5	**-0.47 (-0.92; -0.02)**	-47.1 (-91.9; -2.3)
	Hospital-based computer-assisted sphincter pressure biofeedback			0.0 ± 2.2	1.0 ± 1.5	**-0.52 (-0.95; -0.08)**	-51.6 (-94.9; -8.2)
	Standard care with 9 40–60-minute sessions to advise on diet, fluids intake, bowel training plus instruction on sphincter exercises with at least 50 maximal voluntary sustained sphincter contractions and 50 fast-twitch contractions per day			0.1 ± 1.5	1.0 ± 1.5	**-0.61 (-1.06; -0.16)**	-60.8 (-105.7; -15.8)
	Hospital biofeedback plus the use of a home electromyelogram biofeedback device once daily for 20 minutes		Diary pads/week for fecal incontinence	0.1 ± 0.7	1.0 ± 1.5	**-0.78 (-1.24; -0.32)**	-78.4 (-124.3; -32.5)

Table F168. Comparative effectiveness of behavioral interventions to prevent progression of fecal incontinence in adults (severity score measures and instrumental outcomes) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Difference from Control (95% CI)
	Hospital-based computer-assisted sphincter pressure biofeedback			0.1 ± 1.5	1.0 ± 1.5	**-0.61 (-1.04; -0.17)**	-60.8 (-104.4; -17.1)
	Standard care with 9 40–60-minute sessions to advise on diet, fluid intake, bowel training plus instruction on sphincter exercises with at least 50 maximal voluntary sustained sphincter contractions and 50 fast-twitch contractions per day			0.1 ± 0.1	1.0 ± 1.5	**-0.89 (-1.35; -0.43)**	-89.2 (-135.3; -43.1)
	Hospital biofeedback plus the use of a home electromyelogram biofeedback device once daily for 20 minutes		Fecal continence score	14.0 ± 8.1	13.0 ± 4.8	0.15 (-0.30; 0.59)	1.1 (-2.3; 4.5)
	Hospital-based computer-assisted sphincter pressure biofeedback			13.0 ± 5.2	13.0 ± 4.8	0.00 (-0.43; 0.43)	0.0 (-3.3; 3.3)
	Standard care with 9 40–60-minute sessions to advise on diet, fluid intake, bowel training plus instruction on sphincter exercises with at least 50 maximal voluntary sustained sphincter contractions and 50 fast-twitch contractions per day			11.0 ± 4.4	13.0 ± 4.8	-0.43 (-0.88; 0.01)	-3.3 (-6.8; 0.1)

Table F168. Comparative effectiveness of behavioral interventions to prevent progression of fecal incontinence in adults (severity score measures and instrumental outcomes) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Difference from Control (95% CI)
	Hospital biofeedback plus the use of a home electromyelogram biofeedback device once daily for 20 minutes		Resting pressure: cm H2O	54.0 ± 33.3	50.0 ± 13.3	0.15 (-0.29; 0.60)	0.3 (-0.6; 1.2)
	Hospital-based computer-assisted sphincter pressure biofeedback			66.0 ± 26.7	50.0 ± 13.3	**0.73 (0.29; 1.17)**	1.5 (0.6; 2.3)
	Standard care with 9 40–60-minute sessions to advise on diet, fluid intake, bowel training plus instruction on sphincter exercises with at least 50 maximal voluntary sustained sphincter contractions and 50 fast-twitch contractions per day			49.0 ± 31.9	50.0 ± 13.3	-0.04 (-0.48; 0.40)	-0.1 (-1.0; 0.8)
	Hospital biofeedback plus the use of a home electromyelogram biofeedback device once daily for 20 minutes		Squeeze increment: cm H_2O	37.0 ± 29.6	71.0 ± 49.6	**-0.84 (-1.31; -0.38)**	-1.2 (-1.8; -0.5)
	Hospital-based computer-assisted sphincter pressure biofeedback			30.0 ± 31.9	71.0 ± 49.6	**-1.01 (-1.47; -0.56)**	-1.4 (-2.1; -0.8)

Table F168. Comparative effectiveness of behavioral interventions to prevent progression of fecal incontinence in adults (severity score measures and instrumental outcomes) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Difference from Control (95% CI)
	Standard care with 9 40–60-minute sessions to advise on diet, fluid intake, bowel training plus instruction on sphincter exercises with at least 50 maximal voluntary sustained sphincter contractions and 50 fast-twitch contractions per day			60.0 ± 76.3	71.0	-0.17 (-0.61; 0.27)	-0.2 (-0.9; 0.4)
	Hospital biofeedback plus the use of a home electromyelogram biofeedback device once daily for 20 minutes		5-second squeeze increment	35.0 ± 37.0	35.0 ± 51.9	0 (-0.44; 0.44)	0 (-1.3; 1.3)
	Hospital-based computer-assisted sphincter pressure biofeedback			30.0 ± 33.3	35.0 ± 51.9	-0.12 (-0.55; 0.31)	-0.3 (-1.6; 0.9)
	Standard care with 9 40–60-minute sessions to advise on diet, fluid intake, bowel training plus instruction on sphincter exercises with at least 50 maximal voluntary sustained sphincter contractions and 50 fast-twitch contractions per day			37.0 ± 32.6	35.0 ± 51.9	0.05 (-0.39; 0.49)	0.1 (-1.1; 1.4)
Jorge, 1994[730] N = 28 39% female	Pelvic floor exercise program with 10 second contractions for 5 minutes 5 times/day before surgery	Regular care before surgery	Mean resting pressure, mm/Hg	48.0 ± 64.9	44.0 ± 50.5	0.07 (-0.70; 0.84)	0.2 (-1.6; 1.9)
			Highest resting pressure. mm/Hg	69.0 ± 90.1	65.0 ± 64.9	0.05 (-0.72; 0.82)	0.1 (-1.1; 1.3)
			Mean squeezing pressure, mm/Hg	86.0 ± 194.7	110.0 ± 180.3	-0.13 (-0.90; 0.64)	-0.1 (-0.8; 0.6)
			Highest squeezing pressure, mm/Hg	118.0 ± 54.0	145.0 ± 50.0	-0.52 (-1.30; 0.26)	-0.4 (-0.9; 0.2)

Table F168. Comparative effectiveness of behavioral interventions to prevent progression of fecal incontinence in adults (severity score measures and instrumental outcomes) (continued)

Author Sample	Active Treatment	Control Treatment	Outcomes	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Difference from Control (95% CI)
			Incontinence scores	2.0 ± 1.2	2.8 ± 1.6	-0.57 (-1.35; 0.22)	-20.2 (-48.2; 7.8)
Miner, 1990[731] N = 25 68% female	Pelvic floor exercise with active sensory retraining (3 20-minute sessions) to perceive small rectal volumes of air into the rectal balloon	Pelvic floor exercise retraining with no instruction on how to improve performance.	Fecal incontinence episodes/week	0.9 ± 1.1	2.3 ± 2.1	**-0.86 (-1.68; -0.03)**	-37.2 (-73.0; -1.4)
			Urgency episodes/week	2.2 ± 5.0	3.9 ± 4.5	-0.35 (-1.15; 0.44)	-9.1 (-29.4; 11.2)
			Sensory threshold (ml)	6.6 ± 7.6	19.5 ± 24.6	-0.72 (-1.53; 0.09)	-3.7 (-7.9; 0.5)
			Sensory delay (seconds)	0	3.7 ± 1.3		0

Bold- significant difference in outcomes at 95%confidence level

Table F169. Comparative effectiveness of behavioral interventions on objective instrumental outcomes, only significant differences shown

Author	Treatment	Control	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change
Norton, 2003[729]	Hospital-based computer-assisted sphincter pressure biofeedback	Standard care with 9 40–60-minute sessions to advise on diet, fluid intake, bowel training	Squeeze increment: cm H2O	30.0 ± 31.9	71.0 ± 49.6	**-1.01 (-1.47; -0.56)**	-1.4
	Hospital biofeedback plus the use of a home electromyelogram biofeedback device once daily for 20 minutes	Standard care with 9 40–60 minute sessions to advise on diet, fluid intake, bowel training	Squeeze increment: cm H_2O	37.0 ± 29.6	71.0 ± 49.6	**-0.84 (-1.31; -0.38)**	-1.2
Solomon, 2003[727]	Biofeedback with transanal ultrasound	Pelvic floor exercises with feedback from digital examination alone	Rest pressure, mm/Hg	44.0 ± 8.7	48.0 ± 6.0	**-0.54 (-0.98; -0.09)**	-1.1
	Biofeedback with anal manometry	Pelvic floor exercises with feedback from digital examination alone	Rest pressure, mm/Hg	45.0 ± 6.7	48.0 ± 6.0	**-0.47 (-0.92; -0.03)**	-1.0
			Squeeze pressure, mm/Hg	78.0 ± 18.7	90.0 ± 20.0	**-0.62 (-1.07; -0.17)**	-0.7
Norton, 2003[729]	Hospital-based computer-assisted sphincter pressure biofeedback	Standard care with 9 40–60 minute sessions to advise on diet, fluid intake, bowel training	Resting pressure: cm/H_2O	66.0 ± 26.7	50.0 ± 13.3	**0.73 (0.29; 1.17)**	1.5
Fynes, 1999[723]	Augmented biofeedback training of pelvic floor with audiovisual feedback and electric stimulation of slow and fast twitch fibers	Sensory biofeedback training with a vaginal perineometer and standard Kegel pelvic floor exercise for 12 weeks	Squeeze increment	30.0 ± 12.0	24.0 ± 4.2	**0.66 (0.01; 1.31)**	2.8
	Augmented biofeedback training of pelvic floor with audiovisual feedback and electric stimulation of slow and fast twitch fibers for 12 weeks	Sensory biofeedback training with a vaginal perineometer and standard Kegel pelvic floor exercise for 12 weeks	Mean maximum squeeze pressure	86.0 ± 12.0	51.0 ± 29.6	**1.56 (0.84; 2.29)**	3.1

Table F169. Comparative effectiveness of behavioral interventions on objective instrumental outcomes, only significant differences shown (continued)

Author	Treatment	Control	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change
Solomon, 2003[727]	Biofeedback with anal manometry	Pelvic floor exercises with feedback from digital examination alone	Isotonic fatigue time seconds	21.0 ± 6.7	15.0 ± 10.7	**0.67 (0.22; 1.12)**	4.5
Fynes, 1999[723]	Augmented biofeedback training of pelvic floor with audiovisual feedback and electric stimulation of slow and fast twitch fibers for 12 weeks	Sensory biofeedback training with a vaginal perineometer and standard Kegel pelvic floor exercise for 12 weeks	Mean maximum resting pressure	54.0 ± 8.0	32.0 ± 16.8	**1.69 (0.95; 2.42)**	5.3
Solomon, 2003[727]	Biofeedback with transanal ultrasound	Pelvic floor exercises with feedback from digital examination alone	Isometric fatigue contractions (n)	9.0 ± 2.7	8.0 ± 1.3	**0.48 (0.03; 0.92)**	6.0
			Isotonic fatigue time seconds	27.0 ± 10.0	15.0 ± 10.7	**1.16 (0.69; 1.63)**	7.7
Norton, 2003[729]	Standard care with 9 40–60 minute sessions to advise on diet, fluid intake, bowel training plus instruction on sphincter exercises with at least 50 maximal voluntary sustained sphincter contractions and 50 fast-twitch contractions per day	Standard care with 9 40–60 minute sessions to advise on diet, fluid intake, bowel training	Rating of bowel control (0–10 scale)	7.0 ± 1.9	6.0 ± 2.2	**0.49 (0.05; 0.94)**	8.2

Bold- significant difference in outcomes at 95%confidence level

Table F170. Clinical behavioral interventions that resulted in more than 40% difference in outcome levels compared to standard care[729]

Active Treatment	Outcome	Mean ± STD After Active Treatment	% Difference from Control (95% CI)
Standard care with 9 40–60 minute sessions to advise on diet, fluid intake, bowel training, plus instruction on sphincter exercises with at least 50 maximal voluntary sustained sphincter contractions and 50 fast-twitch contractions per day	Diary record of pads per week for fecal incontinence	0.1 ± 0.1	**-89.2 (-135.3; -43.1)**
Hospital biofeedback plus the use of a home electromyelogram biofeedback device once daily for 20 minutes		0.1 ± 0.7	**-78.4 (-124.3; -32.5)**
Standard care with 9 40–60-minute sessions to advise on diet, fluid intake, bowel training, plus instruction on sphincter exercises with at least 50 maximal voluntary sustained sphincter contractions and 50 fast-twitch contractions per day		0.1 ± 1.5	**-60.8 (-105.7; -15.8)**
Hospital-based computer-assisted sphincter pressure biofeedback		0.1 ± 1.5	**-60.8 (-104.4; -17.1)**
Hospital-based computer-assisted sphincter pressure biofeedback	Diary record of fecal accidents per week	0.0 ± 2.2	**-51.6 (-94.9; -8.2)**
Hospital biofeedback plus the use of a home electromyelogram biofeedback device once daily for 20 minutes		0.1 ± 2.2	**-47.1 (-91.9; -2.3)**

Bold- significant difference in outcomes at 95%confidence level

Table F171. Comparative effectiveness of electrical stimulation on fecal incontinence in adults (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment
Norton, 2006[732] N = 90 100% female	Active anal stimulation at 35Hz and 40 minutes per day	Sham anal stimulation at 1Hz	Cured from fecal incontinence	1	0	2.5	0.1
Stamp, 2001[574] N = 1,340 100% female	Massage and stretching of the perineum during the second stage of labor with a water soluble lubricant	Usual care	Fecal incontinence 3 months postpartum	36	35	5.1	5.5
Norton, 2006[732] N = 90 90% female	Active anal stimulation at 35Hz and 40 minutes per day	Sham anal stimulation at 1Hz	Significant improvement in fecal incontinence	5	7	10.0	16.0
			Small improvement in fecal incontinence	17	14	36.0	32.0
Leroi, 2005[733] N = 34 91% female	Active sacral nerve continuous stimulation with pulse width of 210 microseconds, frequency 14 pulses/second, and amplitude adapted to the patient's perception of perineal and anal sphincter muscle contraction.	Sham sacral nerve stimulation with lead turned off	Improvement in fecal incontinence	30	6	89.0	17.0
Healy, 2006[735] N = 58 100% female	Endo-anal electrical stimulation using a home-based unit	Endo-anal hospital-supervised electrical stimulation	Fecal incontinence much better	17	20	60.00	68.00
	Endo-anal electrical stimulation using a home-based unit	Endo-anal hospital-supervised electrical stimulation	Cured fecal incontinence	1	0	5.00	0.01

Table F172. Relative effectiveness and attributable events of electrical stimulation on fecal incontinence in adults

Author Sample	Active Treatment	Control Treatment	Outcome	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Norton, 2006[732] N = 90 100% female	Active anal stimulation at 35Hz and 40 minutes per day	Sham anal stimulation at 1 Hz	Cured from fecal incontinence	2.8 (0.1; 65.8)		
Stamp, 2001[574] N = 1,340 100% female	Massage and stretching of the perineum during the second stage of labour with a water soluble lubricant	Usual care	Fecal incontinence 3 months postpartum	0.9 (0.6; 1.4)		
Norton, 2006[732] N = 90 90% female	Active anal stimulation at 35Hz and 40 minutes per day	Sham anal stimulation at 1Hz	Significant improvement in fecal incontinence	0.7 (0.2; 1.9)		
			Small improvement in fecal incontinence	1.1 (0.6; 2.0)		
Leroi, 2005[733] N = 34 91% female	Active sacral nerve continuous stimulation with pulse width of 210 microseconds, frequency 14 pulses/second, and amplitude adapted to the patient's perception of perineal and anal sphincter muscle contraction.	Sham sacral nerve stimulation with lead turned off	Improvement in fecal incontinence	**5.0 (2.4; 10.4)**	1 (1; 4)	720 (237; 1,605)E
Healy, 2006[735] N = 58 100% female Folloup: 3	Endo-anal electrical stimulation using a home-based unit	Endo-anal hospital-supervised electrical stimulation	Fecal incontinence much better	0.85 (0.57; 1.26)		
	Endo-anal electrical stimulation using a home-based unit	Endo-anal hospital-supervised electrical stimulation	Cured fecal incontinence	3.00 (0.13; 70.74)		

Bold- significant difference in outcomes at 95%confidence level**;** A - Number of avoided; E - number of excessive events per 1000 treated

Table F173. The effect of electrical stimulation on quality of life of fecal incontinence in adults

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Changes from Control (95% CI)
Leroi, 2005[733] N = 34 91% female	Active sacral nerve continuous stimulation with pulse width of 210 microseconds, frequency 14 pulses/second, and amplitude adapted to the patient's perception of perineal and anal sphincter muscle contraction.	Sham sacral nerve stimulation with lead turned off	Bowel movements/week	10.2 ± 10.5	12.7 ± 4.2	-0.3 (-0.8; 0.2)	-2.5 (-6.2; 1.3)
			Fecal Incontinent episodes/week	0.7 ± 2.9	1.7 ± 6.2	-0.2 (-0.7; 0.3)	-12.2 (-40.2; 15.9)
			Fecal urgency episodes/week	1.0 ± 10.0	4.5 ± 3.7	-0.5 (-0.9; 0.0)	-10.3 (-21.0; 0.4)
			Delay to postpone defecation	1.8 ± 0.8	1.0 ± 1.3	**0.7 (0.2; 1.2)**	72.8 (23.6; 121.9)
			Cleveland Clinic score	8.0 ± 4.7	15.0 ± 0.0		0.0 (0.0; 0.0)
Mahony, 2005[736] N = 60 100% female	Intra-anal electromyographic biofeedback with electrical stimulation of the anal sphincter weekly for 12 weeks	Standard intra-anal electromyographic biofeedback training of the pelvic floor	Median scores of fecal incontinence	2.0 ± 6.4	2.0 ± 6.4	0.0 (-0.5; 0.5)	0.0 (-26.7; 26.7)
Chang, 2003[734] N = 22 50% female	External electrical stimulation therapy using an anal plug with pulse generator in the anal canal once a day for 20 minutes over 10–12 sessions with pulse width of 360–960 μs, a frequency of 2–110Hz, and an amplitude of 30–35 V.	Biofeedback therapy using the EMG system. The visual feedback observing changes in pressure activity on a monitor screen during rise in rectal pressure synchronized with anal relaxation for 60–90 mutes in over 10–14 sessions.	Satisfaction with bowel habits	48.3 ± 34.1	59.0 ± 28.8	-0.3 (-1.2; 0.5)	-0.6 (-2.0; 0.9)
			Incomplete evacuation score: 0-10 (0=absent, 10 = very severe)	4.2 ± 3.0	4.5 ± 3.3	-0.1 (-0.9; 0.7)	-2.1 (-20.8; 16.5)

Bold- significant difference in outcomes at 95%confidence level

Table F174. Effects of electrical stimulation on progression of fecal incontinence in adults (anal manometry outcomes)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Changes from Control (95% CI)
Norton,2006[732] N = 90 90% female	Active anal stimulation at 35 Hz and 40 minutes per day	Sham anal stimulation at 1 Hz	Anal manometry: resting pressure	49.0 ± 18.0	38.5 ± 18.0	**0.6 (0.2; 1.0)**	1.5 (0.4; 2.6)
			Anal manometry: squeeze pressure increment	50.0 ± 15.2	36.5 ± 5.1	**1.2 (0.7; 1.6)**	3.2 (2.0; 4.4)
			Cough pressure increment	56.0 ± 22.9	40.5 ± 7.7	**0.9 (0.5; 1.3)**	2.2 (1.1; 3.3)
Leroi, 2005[733] N = 34 91% female	Active sacral nerve continuous stimulation with pulse width of 210 microseconds, frequency 14 pulses/sec, and amplitude adapted to the patient's perception of perineal and anal sphincter muscle contraction	Sham sacral nerve stimulation with lead turned off	Maximum resting pressure (cm/H2O)	50.0 ± 70.0	50.0 ± 32.0	0.0 (-0.5; 0.5)	0.0 (-1.0; 1.0)
			Maximum squeeze pressure increment (cmH2O)	53.0 ± 182.0	54.0 ± 37.3	0.0 (-0.5; 0.5)	0.0 (-0.9; 0.9)
			Squeeze pressure duration (seconds)	18.0 ± 49.3	40.0 ± 0.0		0.0 (0.0; 0.0)
Mahony, 2004[736] N = 60 100% female	Intra-anal electromyographic biofeedback with electrical stimulation of the anal sphincter weekly for 12 weeks	Standard intra-anal electromyographic biofeedback training of the pelvic floor	Median resting pressure (mm/Hg)	30.0 ± 28.8	31.0 ± 26.4	0.0 (-0.6; 0.5)	-0.1 (-1.8; 1.6)
			Median squeeze pressure (mm/Hg)	47.0 ± 35.2	59.0 ± 40.8	-0.3 (-0.9; 0.2)	-0.5 (-1.4; 0.4)
Chang, 2003[734] N = 22 50% female	External electrical stimulation therapy using an anal plug with pulse generator in the anal canal once a day for 20 min over 10–12 sessions with pulse width of 360–960 µs, a frequency of 2–110Hz, and an amplitude of 30–35V	Biofeedback therapy using the EMG system. The visual feedback observing changes in pressure activity on a monitor screen during rise in rectal pressure synchronized with anal relaxation for 60–90 minutes over 10–14 sessions.	Mean anal resting pressure	58.2 ± 16.5	69.5 ± 46.4	-0.3 (-1.2; 0.5)	-0.5 (-1.7; 0.7)
			Maximal anal squeezing pressure	176.4 ± 50.3	177.2 ± 42.7	0.0 (-0.9; 0.8)	0.0 (-0.5; 0.5)
			Anal residual pressure	63.6 ± 45.9	38.0 ± 21.5	0.7 (-0.2; 1.6)	1.8 (-0.5; 4.1)
			Rectal pressure	38.0 ± 21.5	58.5 ± 24.8	-0.9 (-1.8; 0.0)	-1.5 (-3.0; 0.0)
			Rectal sensory threshold volumes (ml): first perception	10.0 ± 0.0	10.0 ± 0.0		0.0 (0.0; 0.0)
			Rectal sensory threshold volumes (ml): desire to defecate	70.0 ± 29.9	99.0 ± 31.7	**-0.9 (-1.8; -0.1)**	-1.0 (-1.9; -0.1)
			Rectal sensory	135. ± 47.9	160.0 ± 44.9	-0.5 (-1.4; 0.3)	-0.3 (-0.9; 0.2)

Table F174. Effects of electrical stimulation on progression of fecal incontinence in adults (anal manometry outcomes) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Changes from Control (95% CI)
			threshold volumes (ml): urge to defecate				
			Rectal sensory threshold volumes (ml): maximal tolerated volume	174.0 ± 58.5	205.0 ± 60.9	-0.5 (-1.4; 0.3)	-0.3 (-0.7; 0.2)

Bold- significant difference in outcomes at 95%confidence level

Table F175. Comparative effectiveness of Botulinum toxin on fecal incontinence (events rate)

Author Sample	Active	Control	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Ratio (%) After Active Treatment	Ratio (%) After Control Treatment	Relative Risk (95% CL)
Mentes, 2003[740] N = 111 68% female	20 to 30 U (~ 0.3 U/kg) of type A botulinum toxin (Botox) injection into the internal anal sphincter. The injection was repeated 2 months later if complete healing was not achieved.	Lateral internal anal sphincterotomy	Self-reported incidence of fecal incontinence	5	0	8	0	9.0 (0.5; 159.8)
Ron, 2001[739] N = 25 60% female	Local injection of Botox-10 units to each side of the puborectalis	Local injection of Botox-20 units to the posterior aspect of this muscle.	Self-reported fecal continence	15	11	100	100	

Table F176. Comparative effectiveness of pharmacological interventions on progression of fecal incontinence (severity measures and instrumental outcomes)

Author Sample	Active Treatments	Control Treatments	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)
Iswariah, 2005[741] N = 44 58% female	Botox, 20 units injected on either side of the fissure into the internal anal sphincter.	Sphincterotomy by open or closed technique in the left lateral position using Park's anal retractor	Self-reported modified Wexner Fecal Continence scoring system	0.2 ± 1.2	0.0 ± 0.0	0.2 (-0.4; 0.9)
Brisinda, 1999[742] N = 50 50% female	20 U of Botulinum toxin injected into the internal anal sphincter on each side of the anterior midline	0.2% nitroglycerin ointment applied twice daily	Resting anal pressure	64.2 ± 14.9	71.9 ± 17.0	-0.5 (-1.0; 0.1)
			Maximal Voluntary pressure	83.3 ± 25.2	86.5 ± 31.3	-0.1 (-0.7; 0.4)
Nessim, 1999[749] N = 54 85% female	Medical bowel confinement: clear liquid diet with loperamide 4mg 3 times/day and codeine phosphate 30 mg 4 times/day for 3 days.	Regular diet beginning the day of surgery	Fecal incontinence scores (1-20)	6.0 ± 9.3	5.0 ± 4.7	0.1 (-0.6; 0.8)
Sun, 1997[745] N = 11 73% female	Loperamide oxide 4mg twice daily	Placebo	Fecal urgency in Visual analog scale from 0 (absent) to 100 (extreme).	40.0 ± 35.0	70.0 ± 25.0	**-1.0 (-1.9; -0.1)**
				26.0 ± 36.0	43.0 ± 37.0	-0.5 (-1.3; 0.4)
			Maximal anal pressure, cm H20	76.0 ± 40.0	69.0 ± 35.0	0.2 (-0.7; 1.0)
			minimum basal pressure, cm H20	58.0 ± 28.0	48.0 ± 28.0	0.4 (-0.5; 1.2)
			Squeeze increment, cm H20	107.0 ± 66.0	104.0 ± 61.0	0.0 (-0.8; 0.9)
			Total squeeze pressure, cm H20	163.0 ± 86.0	155.0 ± 85.0	0.1 (-0.7; 0.9)
Hallgren, 1994[744] N = 30 27% female	Loperamide hydrochloride (Imodium) 2mg 2 capsules 3 times/day for 7 days in hand sewn ileal pouch-anal anastomosis	Placebo with the same frequency in hand sewn ileal pouch-anal anastomosis	Maximal squeeze pressure	240.0 ± 21.9	245.0 ± 24.9	-0.2 (-0.9; 0.5)
	Loperamide hydrochloride (Imodium) 2mg 2 capsules 3 times/day for 7 days after abdominal proctocolectomy and stapling of the pouch to the top of the anal canal	Placebo with the same frequency after abdominal proctocolectomy and stapling of the pouch to the top of the anal canal	Maximal squeeze pressure	210.0 ± 31.7	165.0 ± 56.2	**1.0 (0.2; 1.7)**

Table F176. Comparative effectiveness of pharmacological interventions on progression of fecal incontinence (severity measures and instrumental outcomes) (continued)

Author Sample	Active Treatments	Control Treatments	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)
Ho, 2005[737] N = 89 83% female	Chemical sphincterotomy with oral nifedipine 20mg twice a day for 6 weeks.	Lateral sphincterotomy	Fecal continence scores, Wexner	0.4 ± 2.6	0.2 ± 0.7	0.1 (-0.3; 0.5)
			Mean resting anal pressure, mm/Hg	42.7 ± 43.5	43.4 ± 27.7	0.0 (-0.4; 0.4)
			Mean squeeze pressure, mm/Hg	162.1 ± 123.6	199.8 ± 178.7	-0.2 (-0.7; 0.2)
Tankova, 2002[750] N = 19 58% female	Rectal administration of hydrogel containing 0.2% isosorbide-5-mononitrate 2 times/day	Placebo gel.	Resting anal pressure	27.9 ± 4.0	34.5 ± 6.5	**-1.2 (-2.2; -0.3)**
Carapeti, 2000[748] N = 12 58% female	Alpha1-adrenergic agonist phenylephrine, topical 10 percent 0.5ml application 2 times/day	Placebo gel	Fecal Incontinence score (0-continence to 24 – complete incontinence)	9.0 ± 3.0	20.0 ± 1.0	**-4.6 (-6.9; -2.3)**
			Fecal incontinence symptom score (0-no symptoms to 280)	117.0 ± 36.0	208.0 ± 31.0	**-2.7 (-4.3; -1.0)**
			Max resting pressure mm H20	91.0 ± 7.0	78.0 ± 17.0	1.0 (-0.1; 2.1)
			Max resting pressure mm H20	86.0 ± 27.0	71.0 ± 9.0	0.7 (-0.5; 2.0)
Carapeti, 2000[747] N = 36 61% female	Topical 10 % phenylephrine 0.5ml applied topically to the anus twice daily for 4 weeks	Identical placebo gel 0.5ml applied topically to the anus twice daily for 4 weeks	Self-reported fecal incontinence score Wexner scale: 24-worst incontinence; active-placebo	12.5 ± 3.4	12.6 ± 4.2	0.0 (-0.7; 0.6)
			maximum resting anal pressure, H20; active-placebo	65.0 ± 21.0	54.0 ± 21.0	0.5 (-0.1; 1.2)
			Self-reported fecal incontinence score Wexner scale: 24-worst incontinence; active-placebo	13.0 ± 4.7	13.4 ± 4.7	-0.1 (-0.7; 0.6)
			maximum resting anal pressure, H20; active-placebo	55.0 ± 16.0	61.0 ± 18.0	-0.4 (-1.0; 0.3)

Bold- significant difference in outcomes at 95%confidence level

Table F177. Comparative effectiveness of Loperamide vs. placebo on fecal incontinence (events rate)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CL)
Hallgren, 1994[744] N = 30 27% female	Loperamide hydrochloride (Imodium) 2mg 2 capsules 3 times/day for 7 days in hand sewn ileal pouch-anal anastomosis	Placebo with the same frequency in hand sewn ileal pouch-anal anastomosis	Fecal leak/soiling day time	1	3	7	20	0.3 (0.0; 2.9)
			Fecal leak/soiling night time	1	5	7	34	0.2 (0.0; 1.5)
			Use of pad for fecal incontinence daytime	1	1	7	7	1.0 (0.1; 14.6)
			Use of pad for fecal incontinence night time	1	2	7	14	0.5 (0.1; 4.9)
	Loperamide hydrochloride (Imodium) 2mg 2 capsules 3 times/day for 7 days after abdominal proctocolectomy and stapling of the pouch to the top of the anal canal	Placebo with the same frequency after abdominal proctocolectomy and stapling of the pouch to the top of the anal canal	Fecal leak/soiling day time	2	5	15	31	0.4 (0.1; 1.7)
			Fecal leak/soiling night time	0	7	0	46	0.1 (0.0; 1.1)
			Use of pad for fecal incontinence daytime	0	2	0	15	0.2 (0.0; 3.8)
			Use of pad for fecal incontinence night time	0	5	0	31	0.1 (0.0; 1.5)

Table F178. Comparative effectiveness of pharmacological interventions on fecal incontinence (events rate)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CL)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Tankova, 2002[750] N = 19 58% female	Rectal administration of hydrogel containing 0.2% isosorbide-5-mononitrate 2 times/day	Placebo gel	Anal fissure healing	8	2	80.0	22.0	**4 (1; 13)**	2 (225; 0)	580 (4; 2,575)E
			Self-reported fecal continence	10	9	100.0	100.0			
De Nardi, 2006[738] N = 30 43% female	"Chemical sphincterotomy" with 0.2 percent glycerine trinitrate ointment applied three times daily at the anal margin for 8 weeks	"Chemical sphincterotomy" with 20 units Botulinum toxin A injection into the internal anal sphincter on each side of the anterior midline	Self-reported fecal continence	15	15	100.0	100.0			
Kneebone, 2004[746] N = 338 0% female	3g of oral sucralfate suspension twice daily starting 1 day before RT and continuing every day for 8 weeks	Identical placebo twice daily	Fecal incontinence (Grade 1 or worse)	51	55	33.0	33.0	1 (1; 1)		
			Fecal incontinence (any/3 months)	16	20	10.3	12.1	1 (0; 2)		
			Incidence of any fecal incontinence	17	27	11.0	16.0	1 (0; 1)		
Carapeti, 2000[747] N = 36 61% female	Topical 10% phenylephrine 0.5 ml applied topically to the anus twice daily for 4 weeks	Identical placebo gel 0.5 ml applied topically to the anus twice daily for 4 weeks	Improvement in fecal incontinence symptoms >75%	6	2	33.3	11.1	3 (1; 13)		

Bold- significant differences in outcomes at 95% confidence level; A - Number of avoided; E - number of excessive events per 1000 treated

Table F179. Medications that resulted in fecal continence in more than 50% of subjects

Author Sample	Definition of Continence	Treatment	% Continent
Kneebone, 2004[746] N = 338 0% female	Fecal continence with Grade <1	3g of oral sucralfate suspension twice daily starting 1 day before RT and continuing every day for 8 weeks	67
	Absence of any fecal incontinence at 2 years	3g of oral sucralfate suspension twice daily starting 1 day before RT and continuing every day for 8 weeks	89
	Absence of any fecal incontinence at 3 months	3g of oral sucralfate suspension twice daily starting 1 day before RT and continuing every day for 8 weeks	89.7
Hallgren, 1994 [744] N = 30 27% female	No fecal leak/soiling in day time	Loperamide hydrochloride (Imodium) 2mg 2 capsules 3 times/day for 7 days after abdominal proctocolectomy and stapling of the pouch to the top of the anal canal	85
		Loperamide hydrochloride (Imodium) 2mg 2 capsules 3 times/day for 7 days in hand sewn ileal pouch-anal anastomosis	93
	No fecal leak/soiling night time	Loperamide hydrochloride (Imodium) 2mg 2 capsules 3 times/day for 7 days in hand sewn ileal pouch-anal anastomosis	93
		Loperamide hydrochloride (Imodium) 2mg 2 capsules 3 times/day for 7 days after abdominal proctocolectomy and stapling of the pouch to the top of the anal canal	99.9
Mentes, 2003[740] N = 111 68% female	Fecal continence	20 to 30 units (~0.3 U/kg) of type A Botulinum toxin (Botox) injection into the internal anal sphincter. The injection was repeated 2 months later if complete healing was not achieved	92
De Nardi, 2006[738] N = 30 43% female	Fecal continence	"Chemical sphincterotomy" with 0.2% glycerine trinitrate ointment applied three times daily at the anal margin for 8 weeks	100
		"Chemical sphincterotomy" with 20 units Botulinum toxin A injection into the internal anal sphincter on each side of the anterior midline	100

Table F180. Medications that changed self-reported scores of fecal incontinence by more than 20% compared to the control interventions

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± After Active Treatment	Mean ± After Control Treatment	Mean Difference (95% CI)	% Change from Control
Carapeti, 2000[748] N = 12 58% female	Alpha1-adrenergic agonist phenylephrine, topical 10% 0.5ml application 2 times/day	Placebo gel	Fecal incontinence score (0-continence to 24 – complete incontinence)	9.0 ± 3.0	20.0 ± 1.0	**-4.6 (-6.9; -2.3)**	-22.8
Ho, 2005[737] N = 89 83% female	Chemical sphincterotomy with oral nifedipine 20 mg twice a day for 6 weeks	Lateral sphincterotomy	Fecal continence scores, Wexner	0.4 ± 2.6	0.2 ±0.7	0.1 (-0.3; 0.5)	55.3
Iswariah, 2005[741] N = 44 58% female	Botox, 20 units injected on either side of the fissure into the internal anal sphincter	Sphincterotomy by open or closed technique in the left lateral position using Park's anal retractor	Self-reported modified Wexner fecal continence scoring system	0.2 ± 1.2	0.0 ± 0.0	0.2 (-0.4; 0.9)	2107.3

Bold- significant difference in outcomes at 95%confidence level

Table F181. Comparative effectiveness of end-to-end technique vs. overlapping repair of obstetric anal sphincter lacerations (clinical events)

Author Sample	Outcome	Number of Cases After-Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Garcia, 2005[597] N = 41	Self reported anal incontinence 4 months postpartum	5	6	33.0	55.0	0.7 (0.2; 1.8)		
	Self-reported flatus only incontinence 4 months postpartum	4	3	27.0	27.0	1.0 (0.3;4.1)		
	Self-reported stool incontinence 4 months postpartum	1	3	4.3	16.7	0.3 (0.0; 2.3)		
Williams, 2006[752] N = 150	Defects on Internal sphincter	4	2	7.1	3.6	2.0 (0.4; 10.5)		
	Defects on external sphincter	11	8	19.6	14.3	1.4 (0.6; 3.2)		
Fernando, 2006[751] N = 64	Fecal incontinence at 12 months postpartum	6	0	24.0		13.0 (0.8; 221.5)		
	Fecal urgency at 12 months postpartum	8	1	32.0	3.7	**8.0 (1.1; 60.3)**	4 (0; 443)	283 (2; 2195)E
	Flatus incontinence at 12 months postpartum	4	4	16.0	14.9	1.0 (0.3; 3.7)		
	Fecal incontinence 6 months postpartum	6	0	21.4	0.0	13.0 (0.8; 221.5)		
	Fecal urgency 6 months postpartum	9	2	32.1	7.1	**4.5 (1.1; 19.2)**	4 (2; 262)	250 (4; 1,293)E

Table F181. Comparative effectiveness of end-to-end technique vs. overlapping repair of obstetric anal sphincter lacerations (clinical events) (continued)

Author Sample	Outcome	Number of Cases After-Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
	Flatus incontinence 6 months postpartum	4	7	14.3	25.0	0.6 (0.2; 1.8)	9 (5; -5)	
	Cured of anal Incontinence from 6 weeks to 12 months	4	7	16.0	25.9	0.6 (0.2; 1.8)	10 (5; -5)	
Tjandra, 2003[753] N = 23	Self-reported fecal incontinence "Success"	9	8	75	72.7	1.0 (0.6; 1.7)		

Bold - significant difference in outcomes at 95%confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F182. Comparative effectiveness of different techniques to repair anal sphincter (clinical events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CL)
Fitzpatrick, 2000[754] N = 112	Approximation repair: end to end	Primary anal sphincter overlap	Self-reported symptoms of fecal incontinence	33	27	58.0	49.0	1.2 (0.9; 1.7)
			Continence score >10	5	2	9.0	4.0	2.5 (0.5; 12.4)
			Fecal urgency <5 minutes	17	11	30.0	20.0	1.5 (0.8; 3.0)
			Scar only in endoanal ultrasonography	4	6	7.0	11.0	0.6 (0.2; 2.2)
			Defect ≤1 quadrant, external anal sphincter	50	43	88.0	78.0	1.1 (0.9; 1.3)
			Defect >1 quadrant, external anal sphincter	3	6	5.0	11.0	0.5 (0.1; 1.8)

Table F183. Comparative effectiveness of different techniques to repair anal sphincter (instrumental outcomes)

Author Sample	Active Treatment	Control Treatment	Outcomes	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Fitzpatrick, 2000[754] N = 112	Approximation repair: end to end	Primary anal sphincter overlap	Median continence score	2.0 ± 8.0	0.0 ± 8.7	0.2 (-0.1; 0.6)	
			Resting pressure (mm/Hg)	42.0 ± 30.0	49.0 ± 34.0	-0.2 (-0.6; 0.2)	-0.4 (-1.2; 0.3)
			Squeeze pressure (mm/Hg)	66.0 ± 34.7	74.0 ± 37.3	-0.2 (-0.6; 0.1)	-0.3 (-0.8; 0.2)
			Squeeze increment (mm/Hg)	20.0 ± 44.0	25.0 ± 34.0	-0.1 (-0.5; 0.2)	-0.5 (-2.0; 1.0)
			Vector symmetry index	0.6 ± 0.2	0.7 ± 0.1	-0.4 (-0.7; 0.0)	-52.5 (-107.4; 2.5)

Table F184. Comparative effectiveness of end-to-end technique vs. overlapping repair of obstetric anal sphincter lacerations (severity measures an instrumental outcomes)

Outcomes	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Continence score at 3 months[752]	0.0 ± 9.3	0.0 ± 9.3	0.0 (-0.4; 0.4)	
Resting pressure[752]	44.0 ± 31.3	47.0 ± 28.7	-0.1 (-0.5; 0.3)	-0.2 (-1.0; 0.6)
Increment squeeze pressure[752]	30.0 ± 26.7	29.0 ± 35.3	0.0 (-0.3; 0.4)	0.1 (-1.2; 1.4)
Pudendal nerve motor latency - right[752]	1.9 ± 0.4	1.9 ± 0.3	-0.1 (-0.5; 0.3)	-4.6 (-24.1; 14.9)
Pudendal nerve motor latency - left[752]	2.0 ± 0.5	1.9 ± 0.3	0.1 (-0.3; 0.4)	2.7 (-16.5; 21.9)
Cleveland Clinic Continence Score[753]	3.0 ± 4.7	3.0 ± 4.0	0.0 (-0.8; 0.8)	0.0 (-27.3; 27.3)
Mean Resting pressure - mm/Hg[753]	45.0 ± 23.3	50.0 ± 20.7	-0.2 (-1.0; 0.6)	-0.5 (-2.1; 1.2)
Max squeeze pressure[753]	125.0 ± 40.0	130.0 ± 16.0	-0.2 (-1.0; 0.7)	-0.1 (-0.8; 0.5)

Table F185. Comparative effectiveness of clinical interventions to reduce fecal incontinence after obstetric trauma (clinical events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)
Dannecke, 2005[590] N = 146	Restrictive episiotomy	Liberal episiotomy	Self-reported fecal incontinence 18 months postpartum	6	10	19.0	24.0	0.7 (0.2; 1.7)
Hannah, 2004[593] N = 2,088	Planned cesarean delivery	Planned vaginal birth	Fecal incontinence is not a problem at all 2 years postpartum	3	2	27.3	22.2	1.5 (0.3; 9.0)
			Fecal incontinence is a big problem 2 years postpartum	1	3	9.1	33.3	0.3 (0.0; 3.2)
			Self-reported flatus incontinence 2 years postpartum	60	53	13.1	11.5	1.1 (0.8; 1.6)
Hannah, 2002 [592] N = 2,088	Planned cesarean delivery	Planned vaginal birth	Self-reported fecal incontinence 3 months postpartum	5	9	0.8	1.5	0.6 (0.2; 1.7)
			Self-reported flatus incontinence 3 months postpartum	66	59	10.7	9.7	1.1 (0.8; 1.6)
Fitzpatrick, 2002[755] N = 178	Immediate pushing	60 minute delay prior to the commencement of active pushing.	Self-reported fecal incontinence 3 months postpartum	23	33	26.0	38.0	0.7 (0.4; 1.1)
			% of normal ultrasound	14	19	40.0	49.0	0.7 (0.4; 1.3)

Table F185. Comparative effectiveness of clinical interventions to reduce fecal incontinence after obstetric trauma (clinical events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)
			<1 quad external anal sphincter defect 3 months postpartum ultrasound	19	20	54.0	51.0	0.9 (0.5; 1.6)
			>1 quad EAS defect 3 months postpartum ultrasound	2	0	6.0	0.0	4.9 (0.2; 100.4)
Johanson, 1999[596] N = 607	Delivery with vacuum extractor	Forceps delivery	Self-reported frequent fecal incontinence	1	1	0.3	0.3	1.1 (0.1; 16.7)
			Self-reported fecal incontinence, sometimes	28	16	9.5	5.1	1.8 (1.0; 3.3)
Fitzpatrick, 2003[756] N = 130	Vacuum assisted delivery	Low-cavity, non-rotational forceps assisted delivery	Fecal urgency <5 minutes	21	19	30.4	31.1	1.0 (0.6; 1.6)
			Abnormal endoanal ultrasound	34	34	49.3	55.7	1.0 (0.7; 1.4)
			Abnormal endoanal ultrasound: >1 quadrant defect	2	2	2.9	3.3	0.5 (0.1; 3.7)
Sultan, 1998[757] N = 44	Delivery with vacuum extractor	Forceps delivery.	Anal sphincter defects	13	14	48.0	82.0	1.7 (1.0; 3.1)
			Anal incontinence	7	3	26.0	18.0	3.5 (1.0; 12.2)
Wiilliams, 2006[752] N = 150	Suture material vicryl	Suture material PDS	Defects on Internal sphincter	6	0	10.7	0.0	13.0 (0.7; 225.4)
			Defects on external sphincter	12	7	21.4	12.5	1.7 (0.7; 4.0)

Table F185. Comparative effectiveness of clinical interventions to reduce fecal incontinence after obstetric trauma (clinical events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)
Sartore, 2004[591] N = 519	Mediolateral episiotomy	No episiotomy	% with self-reported anal incontinence	7	5	2.8	1.9	1.47 (0.46; 5)

Table F186. Comparative effectiveness of clinical interventions to reduce fecal incontinence after obstetric trauma (severity measures and instrumental outcomes)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Dannecke, 2005[590] N = 176	Restrictive episiotomy	Liberal episiotomy	Anal canal functional length (rest), mm/Hg	50.0 ± 12.0	50.0 ± 10.0	0.0 (-0.3; 0.3)	0.0 (-0.6; 0.6)
			Anal canal functional length (contraction), mm/Hg)	42.0 ± 12.0	45.0 ± 13.0	-0.2 (-0.6; 0.1)	-0.5 (-1.3; 0.2)
			Anal maximum pressure (rest), mm/Hg	113. 0 ± 35.0	121.0 ± 35.0	-0.2 (-0.6; 0.1)	-0.2 (-0.5; 0.1)
			Anal maximum pressure (contraction), mm/Hg	143.0 ± 43.0	166.0 ± 56.0	**-0.5 (-0.8; -0.1)**	-0.3 (-0.5; -0.1)
Fitzpatrick, 2002[755] N = 178	Immediate pushing	60 minute delay, prior to the commencement of active pushing.	Fecal continence scores (median) 3 months postpartum	3.0 ± 3.3	4.0 ± 3.3	-0.3 (-0.6; 0.0)	-7.5 (-14.9; -0.1)
			Squeeze pressure (mm/Hg)	93.0 ± 84.7	100.0 ± 49.3	-0.1 (-0.4; 0.2)	-0.1 (-0.4; 0.2)
			Resting pressure (mm/Hg)	62.0 ± 50.7	64.0 ± 50.7	0.0 (-0.3; 0.3)	-0.1 (-0.5; 0.4
			Squeeze Increment (mm/Hg)	27.0 ± 69.3	31.0 ± 61.3	-0.1 (-0.4; 0.2)	-0.2 (-1.1; 0.8)
			Vector symmetry index	0.7 ± 0.2	0.7 ± 0.2	-0.1 (-0.4; 0.2)	-17.7 (-60.3; 24.9)
Fitzpatrick, 2003[756] N = 130	Vacuum assisted delivery	Low cavity, non-rotational forceps assisted delivery	Fecal incontinence scores	3.0 ± 6.0	3.0 ± 5.3	0.0 (-0.3; 0.3)	0.0 (-11.5; 11.5)
			Resting pressure (mm/Hg)	63.0 ± 38.7	54.0 ± 41.3	0.2 (-0.1; 0.6)	0.4 (-0.2; 1.1)
			Squeeze pressure (mm/Hg)	96.0 ± 57.3	86.0 ± 44.0	0.2 (-0.2; 0.5)	0.2 (-0.2; 0.6)
			Squeeze increment (mm/Hg)	25.0 ± 77.3	27.0 ± 42.7	0.0 (-0.4; 0.3)	-0.1 (-1.4.; 1.2)
			Vector symmetry index	0.7 ± 0.1	0.7 ± 0.1	0.0 (-0.3; 0.3)	0.0 (-48.5; 48.5)
Sultan, 1998[757] N = 44	Delivery with vacuum extractor	Forceps delivery	Maximum resting pressure (mm/Hg)	55.0 ± 15.0	60.0 ± 15.0	-0.3 (-0.9; 0.3)	-0.6 (-1.6; 0.5)
			Maximum squeeze pressure (mm/Hg)	38.0 ± 14.0	53.0 ± 24.0	**-0.8 (-1.5; -0.2)**	-1.6 (-2.8; -0.3)

Table F186. Comparative effectiveness of clinical interventions to reduce fecal incontinence after obstetric trauma (severity measures and instrumental outcomes) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Williams, 2006[752] N = 150	Suture material vicryl	Suture material PDS	Continence score at 3 months	0.0 ± 9.3	0.0 ± 6.7	0.0 (-0.4; 0.4)	
			Resting pressure	43.0 ± 27.3	48.0 ± 28.7	-0.2 (-0.5; 0.2)	-0.4 (-1.1; 0.4)
			Increment squeeze pressure	23.0 ± 31.3	30.0 ± 34.7	-0.2 (-0.6; 0.2)	-0.7 (-1.9; 0.5)
			Pudendal nerve motor latency, right	1.9 ± 0.4	1.9 ± 0.3	-0.2 (-0.5; 0.2)	-9.0 (-28.5; 10.4)
			Pudendal nerve motor latency, left	1.9 ± 0.4	2.0 ± 0.5	-0.1 (-0.4; 0.3)	-3.6 (-22.6; 15.4)

Bold- significant differences in outcomes at 95% confidence level

Table F187. Comparative effectiveness of surgical interventions on fecal incontinence in females (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)
Faltin, 2005[758] N = 752	Clinical and ultrasound examination of the anal sphincter	Clinical examination alone	Self-reported fecal incontinence 3 months postpartum (Wexner scores >0)	120	114	33.0	32.1	1.1 (0.9; 1.3)
			Self-reported fecal incontinence 1 year postpartum (Wexner scores >0)	86	91	25.1	26.6	0.9 (0.7; 1.2)
			Self-reported daily flatus incontinence 3 months postpartum	7	15	1.9	4.2	0.5 (0.2; 1.1)
			Self-reported daily flatus incontinence 1 year postpartum	2	3	0.6	0.9	0.7 (0.1; 4.0)
			Daily fecal urgency 3 months postpartum	4	3	1.1	0.9	1.3 (0.3; 5.9)
			Daily fecal urgency 1 year postpartum	2	1	0.6	0.3	2.0 (0.2; 22.0)
Thakar, 2002[599] N = 279	Subtotal hysterectomy	Total hysterectomy	Incontinence in flatus 12 months after operation	2	2	1.5	1.4	1.1 (0.2: 7.7)

Table F188. Comparative effectiveness of surgical interventions on fecal continence in females (events)

Author Sample	Active	Control	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)
Deen, 1994[759] N = 20	Abdominal resection rectopexy and pelvic floor repair	Perineal rectosigmoidectomy and pelvic floor repair.	Self-reported fecal continence (cured)	4	4	40.0	40.0	1.0 (0.3; 2.9)
Sayfan, 1990[760] N = 29	Marlex mesh posterior rectopexy alone	Sigmoidectomy combined with a sutured posterior rectopexy	Self-reported restored fecal continence	9	6	56.3	46.2	1.2 (0.6; 2.5)
Deen, 1993[762] N = 36	Postanal repair alone	Anterior levatorplasty and sphincter plication alone	Self-reported fecal continence	4	4	33.3	33.3	1.0 (0.3; 3.1)
	Total pelvic floor repair			9	4	75.0	33.3	2.3 (0.9; 5.3)
Davis, 2004[763] N = 38	Anterior overlapping sphincter repair using interrupted non-absorbable sutures and levatorplasty using absorbable sutures.	Anterior overlapping sphincter repair plus visual or auditory biofeedback with dual-balloon pressure system during pelvic floor exercise 2 times/day	Complete fecal continence at 12 months	1	1	5.0	5.6	0.9 (0.1; 13.4)
			Proportion of patients with composite fecal continence scores >9 with fecal continence score <9 (0 - no incontinence to 20 - complete incontinence)	10	13	47.8	71.4	0.7 (0.4; 1.2)
Van Tets, 1998[765] N=20	Postanal repair with levator ani and plicated of the external anal sphincter	Total pelvic floor repair with a combination of postanal repair, anterior levatorptasty, and anterior sphincter plication	Complete incontinence, continuing fecal leakage	6	6	54.5	66.7	0.8(0.4;1.7)

Table F189. Comparative effectiveness of surgical interventions of progression of fecal incontinence in females (events)

Author Sample	Active	Control	Outcome	Number of Active Cases	Number of Control Cases	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Yoshioka, 1999[761] N = 24	Gluteus maximus transposition (without electrical stimulation)	Total pelvic floor repair	Number of patients with no improvement in fecal urgency	3	5	25.0	41.7	0.6 (0.2; 2.0)		
			Number of patients failing to achieve full continence	4	5	33.3	41.7	0.8 (0.3; 2.3)		
Faltin, 2005[758] N = 752	Clinical and ultrasound examination of the anal sphincter	Clinical examination alone	Self-reported severe fecal incontinence 3 months postpartum (Wexner scores >4)	12	31	3.3	8.7	**0.4 (0.2; 0.7)**	19 (14; 45)	54 (22; 69)A
			Self-reported severe fecal incontinence 1 year postpartum (Wexner scores >4)	11	23	3.2	6.7	**0.5 (0.2; 1.0)**	29 (20; 454)	35 (2; 51)A
			Daily lifestyle alteration due to fecal incontinence 3 months postpartum	2	5	0.5	1.4	0.4 (0.1; 2.0)		
			Daily lifestyle alteration due to fecal incontinence 1 year postpartum	3	6	0.9	1.8	0.5 (0.1; 2.0)		

Table F189. Comparative effectiveness of surgical interventions of progression of fecal incontinence in females (events) continued)

Author Sample	Active	Control	Outcome	Number of Active Cases	Number of Control Cases	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Deen, 1993[762] N = 24	Postanal repair alone	Anterior levatorplasty and sphincter plication alone	Manometry: presence of reactoanal inhibitory reflex	11	10	91.7	83.3	1.1 (0.8; 1.5)		
	Total pelvic floor repair		Manometry: presence of reactoanal inhibitory reflex	12	10	100.0	83.3	1.2 (0.9; 1.6)		
Davis, 2004[763] N = 38	Anterior overlapping sphincter repair using interrupted non-absorbable sutures and levatorplasty using absorbable sutures.	Anterior overlapping sphincter repair plus visual or auditory biofeedback with dual-balloon pressure system during pelvic floor exercise 2 times/day	Symptomatic improvement in fecal incontinence	13	17	64.7	92.8	0.7 (0.5; 1.0)	4 (2; 33)	281 (30; 474)A

Bold- significant difference in outcomes at 95%confidence level; Number needed to treat to have avoided or excessive outcome in 1 patient = 1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control –rate of the outcome in the active group); A - avoided; E - excessive events

Table F190. Comparative effectiveness of surgical interventions on self-reported severity of fecal incontinence in females

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Yoshioka, 1999[761] N = 24	Gluteus maximus transposition (without electrical stimulation)	Total pelvic floor repair	Fecal Incontinence score	7.7 ± 6.1	6.6 ± 4.5	0.2 (-0.6; 1.0)	3.1 (-9.0; 15.3)
Davis, 2004[763] N = 38	Anterior overlapping sphincter repair using interrupted non-absorbable sutures and levatorplasty using absorbable sutures.	Anterior overlapping sphincter repair plus visual or auditory biofeedback with dual-balloon pressure system during pelvic floor exercise 2 times/day	Continence Grading Scale Score (0 - no incontinence to 20 - complete incontinence)	9.7 ± 4.7	8.4 ± 5.1	0.3 (-0.4; 0.9)	3.1 (-4.5; 10.7)
	Direct sphincter repair and levatorplasty with pelvic floor muscle exercise training and biofeedback therapy	Direct sphincter repair and levatorplasty	Continence Grading Scale Score (n)	8.4 ± 5.1	9.7 ± 4.7	-0.3 (-0.9; 0.4)	-2.7 (-9.3; 3.9)
			Patient satisfaction visual analogue score (n)	6.3 ± 3.4	6.4 ± 3.4	0.0 (-0.6; 0.6)	-0.1 (-10.2; 9.9)
			Quality of life scores, lifestyle	3.4 ± 0.8	2.8 ± 0.9	0.7 (0.0; 1.3)	23.4 (0.2; 46.6)
			Fecal continence scores (range: 0-20)	7.4 ± 4.6	9.1 ± 4.9	-0.4 (-1.0; 0.3)	-4.0 (-11.1; 3.0)
			Patient satisfaction visual analogue scores range: 0-10)	8.0 ± 2.5	6.4 ± 2.9	0.6 (-0.1; 1.2)	9.1 (-1.0; 19.3)

Table F191. Comparative effectiveness of surgical interventions on progression of fecal incontinence (instrumental outcomes)

Author	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Deen, 1994[759] N = 20	Abdominal resection rectopexy and pelvic floor repair	Perineal rectosigmoidectomy and pelvic floor repair.	Maximum resting pressure, cm/H20	63.3 ± 28.7	51.2 ± 29.6	0.4 (-0.5; 1.3)	0.8 (-0.9; 2.5)
			Maximum squeeze pressure, cm/H20	97.6 ± 29.1	103.0 ± 49.2	-0.1 (-1.0; 0.7)	-0.1 (-1.0; 0.7)
Sayfan, 1990[760] N = 29	Marlex mesh posterior rectopexy alone	Sigmoidectomy combined with a sutured posterior rectopexy	Resting anal pressure, H20	69.0 ± 23.3	86.0 ± 32.7	-0.6 (-1.4; 0.1)	-0.7 (-1.6; 0.2)
			Maximal squeeze pressure, c/ H2O	134. 0 ± 86.7	137.0 ± 112.0	0.0 (-0.8; 0.7)	0.0 (-0.6; 0.5)
			Rectal emptying	58.0 ± 17.3	41.0 ± 19.3	**0.9 (0.2; 1.7)**	2.3 (0.4; 4.2)
Yoshioka, 1999[761] N = 24	Gluteus maximus transposition (without electrical stimulation)	Total pelvic floor repair	Change from baseline in length of high pressure zone ,cm	-2.6 ± 0.9	-2.0 ± 0.7	-0.7 (-1.6; 0.1)	37.2 (78.7; -4.3)
			Change from baseline in maximum squeeze pressure ,cm/H2O	-92.7 ± 25.8	-94.5 ± 50.3	0.0 (-0.8; 0.8)	0.0 (0.8; -0.9)
			Mucosal electro sensitivity ,mA	10.8 ± 5.8	12.7 ± 5.9	-0.3 (-1.1; 0.5)	-2.6 (-8.9; 3.8)
			Change in maximum resting anal pressure, cm/H2O	-60.3 ± 16.5	-63.4 ± 32.2	0.1 (-0.7; 0.9)	-0.2 (1.1; -1.5)
Deen, 1993[762] N = 24	Total pelvic floor repair	Anterior levatorplasty and sphincter plication alone	Manometry: maximum squeeze pressure, cm/H20	131.0 ± 10.0	141.0 ± 17.0	-0.7 (-1.5; 0.1)	-0.5 (-1.1; 0.1)
Davis, 2004[763] N = 38	Anterior overlapping sphincter repair using interrupted non-absorbable sutures and levatorplasty using absorbable sutures.	Anterior overlapping sphincter repair plus visual or auditory biofeedback with dual-balloon pressure system during pelvic floor exercise 2 times/day	Resting anal pressures mean ,cm H2O	65.9 ± 19.5	77.3 ± 14.8	-0.7 (-1.3; 0.0)	-0.8 (-1.7; 0.0)
			Squeeze anal pressures, mean ,cm/H2O	105.4 ± 34.7	129.5 ± 32.1	**-0.7 (-1.4; -0.1)**	-0.6 (-1.1; 0.0)
Deen, 1995[764] N = 33	Adjuvant internal anal sphincter plication in pelvic floor repair	Pelvic floor repair alone	Maximum resting pressure, cm/H20	63.2 ± 18.5	86.9 ± 31.5	**-0.9 (-1.7; -0.2)**	-1.1 (-1.9; -0.2)
			Maximum squeezing pressure. cm/H20	92.0 ± 72.0	140.0 ± 98.0	-0.6 (-1.3; 0.1)	-0.4 (-0.9; 0.1)
			Improvement in anal mucosal electro sensitivity	2.2 ± 8.7	0.5 ± 6.6	0.2 (-0.5; 0.9)	47.5 (-98.7; 193.8)
			Rectal capacity	189.0 ± 38.7	207.2 ± 60.5	-0.4 (-1.1; 0.3)	-0.2 (-0.5; 0.2)

Table F191. Comparative effectiveness of surgical interventions on progression of fecal incontinence (instrumental outcomes) (continued)

Author	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Davis, 2004[763] N = 38	Direct sphincter repair and levatorplasty with pelvic floor muscle exercise training and biofeedback therapy	Direct sphincter repair and levatorplasty.	Resting anal pressures, mean, cm/H2O	77.3 ± 14.8	65.9 ± 19.5	0.7 (0.0; 1.3)	1.0 (0.0; 2.0)
			Squeeze anal pressures, mean, cm/H2O	129.5 ± 32.1	105.4 ± 34.7	**0.7 (0.1; 1.4)**	0.7 (0.1; 1.3)

Bold- significant difference in outcomes at 95%confidence level

Table F192. Comparative effectiveness of radiotherapy for prostate cancer on fecal incontinence

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Peeters, 2006[766] N = 669	Three-dimensional conformal radiotherapy 68Gy	Three-dimensional conformal radiotherapy 78Gy	Fecal incontinence as use of incontinence pads for rectal loss of blood, mucus, or stools (requiring the use of pads more than twice a week) at 4 years	21	40	6.5	12.2	**0.5 (0.3; 0.9)**	18 (12; 69)	57 (15; 83)A
			Incontinence pad use at 5 years	40	51	12.3	15.5	0.9 (0.7; 1.1)		
Fransson, 2001[686] N = 166	Radiotherapy with a total dose of 4.8 Gy (range, 62.3–70.0 Gy) given for 5 days a week, 2 grays (Gy)/fraction.	Active surveillance	Use of sanitary shields for stool leakage	5	2	8.6	4.1	2.1 (0.4; 10.2)		
Little, 2003[676] N = 301	Radiation with a four-field box technique to a dose of 70Gy arm	Radiation with three-dimensional conformal techniques to generate a six-field boost plan of a total dose of 78Gy	Self-reported fecal continence	89	91	82.4	88.3	0.9 (0.8; 1.0)		

Bold- significant difference in outcomes at 95%confidence level**;** Number needed to treat to have avoided or excessive outcome in 1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group ; A - avoided; E - excessive events

Table F193. The changes in self-reported fecal incontinence after radiotherapy of prostate cancer in 166 males compared to active surveillance

Sample	Active treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Fransson, 2001[686]	Radiotherapy with a total dose of 4.8Gy (range, 62.3–70.0Gy) given for 5 days a week, 2grays (Gy) per fraction.	Self-reported stool leakage 0 - “no problem/ very good function” and 10 - “many problems/very bad function”	0.8 ± 1.5	0.3 ± 1.3	0.3 (0.0; 0.7)	115.9 (-11.4; 243.1)

Table F194. Bowel management in 87 patients with spinal cord injury (29% females) and symptoms of neurogenic bowel dysfunction [767]

Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Cleveland Clinic constipation scoring system	10.3 ± 4.4	13.2 ± 3.4	**-0.7 (-1.2; -0.3)**	-5.6 (-8.9; -2.3)
St Mark's fecal incontinence grading system	5 ± 4.6	7.3 ± 4.0	**-0.5 (-1.0; -0.1)**	-7.3 (-13.2; -1.5)
Neurogenic bowel dysfunction score	10.4 ± 6.8	13.3 ± 6.4	-0.4 (-0.9; 0.0)	-3.3 (-6.5; -0.1)
American Society of Colon and Rectal Surgeons fecal incontinence score	3 ± 0.7	2.8 ± 0.8	0.3 (-0.2; 0.7)	9.5 (-5.6; 24.6)
Influence of fecal incontinence on daily activities	4.5 ± 3.2	4.1 ± 2.8	0.1 (-0.3; 0.6)	3.3 (-7.0; 13.5)
Number of episodes where due to fecal incontinence it was necessary to change clothes	0.3 ± 0.6	0.3 ± 0.7	0.0 (-0.4; 0.4)	0.0 (-140.2; 140.2)

Bold - significant differences in outcomes at 95%confidence level

Table F195. Comparative effectiveness of surgical interventions on fecal incontinence in patients with hemorrhoid disease (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)
Galizia, 2000[771] N = 42 48% female	Complete excision of three hemorrhoids (Milligan-Morgan technique) and lateral internal sphincterotomy up to the dentate line, in left haemorrhoidectomy wound.	Complete excision of three hemorrhoids (Milligan-Morgan technique)	Self-reported fecal incontinence	1	0	4.5	0.1	2.7 (0.1; 63.6)
Konsten, 2000[769] N = 118 42% female	Hemorrhoidectomy with no retractor (Miller method)	Hemorrhoidectomy with forced anal dilation.	Self-reported fecal incontinence to liquid	1	1	2.5	3.0	1.3 (0.1; 19.4)
			Self-reported fecal incontinence to solid stool	4	8	10.0	18.0	0.6 (0.2; 1.9)
	Hemorrhoidectomy with forced anal dilation and after treatment for 6 month original Lord's procedure.	Hemorrhoidectomy with forced anal dilation.	Self-reported fecal incontinence to liquid	4	1	10.0	3.0	4.5 (0.5; 38.7)
			Self-reported fecal incontinence to solid stool	6	8	15.0	18.0	0.8 (0.3; 2.2)
Hetzer, 2002[768] N = 40 28% female	Stapled hemorrhoidectomy (Longo technique) with circular anal dilatator introduced to reduce the prolapse of the anoderm and parts of the anal mucous membrane.	Excision hemorrhoidectomy (Ferguson technique).	Self reported fecal continence	20	20	100.0	100.0	

Table F195. Comparative effectiveness of surgical interventions on fecal incontinence in patients with hemorrhoid disease (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)
Jayne, 2002[770] N = 40 47% female	Ligasure haemorrhoidectomy applying repeated diathermy forceps across the hemorrhoid with associated skin tag. Completion of coagulation was signaled by the feedback sensors, and haemorrhoidal tissue was excised along the line of coagulum.	Open diathermy haemorrhoidectomy	Self-reported fecal incontinence fecal continence	20	20	100.0	100.0	
Filingeri, 2004[773] N = 102 53% female	Submucosal hemorrhoidectomy with radiofrequency bistoury	Conventional Parks' hemorrhoidectomy	Self-reported fecal continence	51	51	100.0	100.0	
Lawes, 2004[772] N = 34 50% female	Ligasure haemorrhoidectomy with controlled quantity of bipolar diathermy current to tissue ensuring the complete coagulation of blood vessels	Standard diathermy haemorrhoidectomy	Self-reported fecal continence	12	11	66.7	68.8	1.0 (0.6; 1.5)
			Self-reported incontinence to liquid	0	1	0.0	6.3	0.3 (0.0; 6.8)
Johannsson, 2006[774] N = 250 54% female	Open (Milligan-Morgan) haemorrhoidectomy	Closed (Ferguson) haemorrhoidectomy with wounds sutures without tension	Fecal incontinence-loose feces	8	1	7.0	0.9	7.7 (1.0; 60.2)
			Fecal incontinence-solid feces	1	0	0.9	0.0	2.9 (0.1; 69.7)
Khan, 2001[775] N = 30 37% female	Excisional Hemorrhoidectomy with the ultrasonically activated scalpel (Harmonic Scalpel)	Closed excisional hemorrhoidectomy assisted by electrocautery	Self-reported fecal continence	14	16	100	100	
Ho, 2000[777] N=119 52% female	Conventional open diathermy hemorrhoidectomy	Stapled hemorrhoidectomy	Incontinence to liquids and gas	2	0	3.2	0.1	4.6 (0.2; 93.9)

Table F196. Comparative effectiveness of surgical interventions on progression of fecal incontinence in patients with hemorrhoid disease (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)
Galizia, 2000[771] N = 42 48% female	Complete excision of three hemorrhoids (Milligan-Morgan technique) and lateral internal sphincterotomy up to the dentate line, in left haemorrhoidectomy wound.	Complete excision of three hemorrhoids (Milligan-Morgan technique)	Rectoanal inhibitory reflex, presence	22	20	100.0	100.0	
Jayne, 2002[770] N = 40 47% female	Ligasure haemorrhoidectomy applying repeated diathermy forceps across the hemorrhoid with associated skin tag. Completion of coagulation was signaled by the feedback sensors, and haemorrhoidal tissue was excised along the line of coagulum.	Open diathermy haemorrhoidectomy	Self-reported increase in fecal incontinence	3	5	15.0	25.0	0.6 (0.2; 2.2)
Johannsson, 2006[774] N = 250 54% female	Open (Milligan-Morgan) haemorrhoidectomy	Closed (Ferguson) haemorrhoidectomy with wounds sutures without tension	Self-reported improvement in anal continence	29	26	25.2	23.6	1.1 (0.7; 1.7)

Table F197. Comparative effectiveness of surgical interventions on fecal incontinence in patients with hemorrhoid disease (self-reported severity scores and instrumental outcomes)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Khan, 2001[775] N = 30 37% female	Excisional hemorrhoidectomy with the ultrasonically activated scalpel (Harmonic Scalpel)	Closed excisional hemorrhoidectomy assisted by electrocautery	Self-reported general health (SF-36)	79.0 ± 18.7	74.0 ± 16.0	0.3 (-0.4; 1.0)	0.4 (-0.6; 1.4)
Galizia, 2000[771] N = 42 48% female	Complete excision of three hemorrhoids (Milligan-Morgan technique) and lateral internal sphincterotomy up to the dentate line, in left haemorrhoidectomy wound.	Complete excision of three hemorrhoids (Milligan-Morgan technique)	Resting pressures (mm/Hg): maximal	89.0 ± 11.3	139.4 ± 19.7	**-3.2 (-4.1; -2.3)**	-2.3 (-2.9; -1.6)
			Resting pressures (mm/Hg): mean	46.1 ± 8.0	71.1 ± 10.3	**-2.7 (-3.6; -1.9)**	-3.8 (-5.0; -2.6)
			Squeeze pressures (mm/Hg): maximal	217.5 ± 50.7	267.0 ± 55.5	**-0.9 (-1.6; -0.3)**	-0.3 (-0.6; -0.1)
			Squeeze pressures (mm/Hg): mean	96.2 ± 29.1	120.8 ± 37.1	**-0.7 (-1.4; -0.1)**	-0.6 (-1.1; -0.1)
van Tets, 1997[776] N = 40 50% female	Closed hemorrhoidectomy performed intra-anally using the Parks' anal retractor	Closed hemorrhoidectomy performed perineally without the use of a retractor	Resting anal pressure	84.0 ± 30.0	93.0 ± 36.2	-0.3 (-0.9; 0.4)	-0.3 (-1.0; 0.4)
			Squeeze pressure	90.0 ± 54.1	102.0 ± 67.5	-0.2 (-0.8; 0.4)	-0.2 (-0.8; 0.4)
Johannsson, 2006[774] N = 250 54% female	Open (Milligan-Morgan) haemorrhoidectomy	Closed (Ferguson) haemorrhoidectomy with wounds sutures without tension	Miller scores	1.6 ± 8.3	1.0 ± 7.3	0.1 (-0.2; 0.3)	8.1 (-18.6; 34.8)
Ho, 2000[777] N=119 52% females	Conventional open diathermy hemorrhoidectomy	Stapled hemorrhoidectomy	Mean anal resting pressure (mm/Hg)	52.7±63.0	59.9 ± 36.2	-0.1(-0.5 0.2)	-0.2(-0.8; 0.4)
			Max anal resting pressure, mm/Hg	181.2±246.5	222.9 ±1 67.6	-0.2(-0.6 ;0.2)	-0.1(-0.2; 0.1)
			Internal sphincter thickness, mm	2.2 ± 1.6	2.6 ± 2.3	-0.2(-0.6; 0.2)	-7.9(-21.8; 5.9)
			External sphincter thickness, mm	10.7 ± 4.7	11.0 ± 3.0	-0.1(-0.4; 0.3)	-0.7(-4.0; 2.6)

Bold- significant difference in outcomes at 95%confidence level

Table F198. Comparative effectiveness of clinical interventions in patients with colo-rectal diseases to reduce risk of fecal incontinence (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/ 1,000 Treated
Schouten, 1991[778] N = 70 83% female	Incision, drainage and fistulectomy with primary partial internal sphincterectomy	Incision and drainage alone with secondary partial internal sphincterectomy	Recurrence or persistence rate of fistula	1	14	2.9	40.6	**0.1 (0.0; 0.5)**	3 (2; 5)	377A
			Anal function disturbances: control of flatus and soiling at 1 year	14	7	39.4	21.4	1.9 (0.9; 4.1)		
Singer, 2005[779] N = 75 32% female	Tisseel-VH fibrin sealant intra-adhesive cefoxitin 100mg surgical closure of primary opening	Tisseel-VH fibrin sealant intra-adhesive cefoxitin 100mg	Self-reported fecal continence	24	26	100.0	100.0			
	Tisseel-VH fibrin sealant surgical closure of primary opening			25	26	100.0	100.0			
Libertiny, 2002[780] N = 82 48% female	Glyceryl trinitrate application 0.2% paste to perianal area 3 times/day for 8 weeks.	Lateral sphincterotomy	Self-reported flatus incontinence	0	1	0.1	2.8	0.3 (0.0; 7.9)		

Table F198. Comparative effectiveness of clinical interventions in patients with colo-rectal diseases to reduce risk of fecal incontinence (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/ 1,000 Treated
Mishra, 2005[781] N = 40 50% female	Glyceryl trinitrate application 0.2% paste to perianal area 3 times/day	Lateral sphincterotomy	Self-reported flatus incontinence	0	3	0.1	15.0	0.1 (0.0; 2.6)		
Oettle, 1997[782] N = 24 50% female	Glyceryl trinitrate application 0.2% paste to perianal area 3 times/day	Lateral sphincterotomy	Self-reported fecal continence	12	12	100.0	100.0			
Richard, 2000[783] N = 82 55% female	Application of 0.25 percent nitroglycerin tid to perianal area	Internal sphincterotomy	Self-reported minor fecal incontinence	7	3	15.9	7.9	2.0 (0.6; 7.3)		
	Application of 0.25 percent nitroglycerin tid to perianal area 3 times/day	Internal sphincterotomy	Self-reported fecal continence	27	30	61.4	78.9	0.8 (0.6; 1.0)		
Evans, 2001[784] N = 65 65% female	Glyceryl trinitrate application 0.2% paste to perianal area 3 times/day for 8 weeks.	Lateral sphincterotomy next available operating list	Self-reported minor FI	0	2	0.1	6.5	0.2 (0.0; 3.7)		
Peeters, 2005[674] N = 597 38% female	Radiotherapy with total dose of 25Gy administered in 5 fractions over 5 to 7 days before total mesorectal excision	Total mesorectal excision	FI during a day	190	111	62.0	38.0	**1.6 (1.4; 1.9)**	4 (7; 3)	240E
			FI during a night	98	49	32.0	17.0	**1.9 (1.4; 2.6)**	7 (15; 4)	150E
			Use of pads for Fecal Incontinence	171	96	56.0	33.0	**1.7 (1.4; 2.1)**	4 (8; 3)	230E
			Complete fecal continent (FI at baseline)	116	180	38.0	62.0	**0.6 (0.5; 0.7)**	4 (3; 6)	240A

Table F198. Comparative effectiveness of clinical interventions in patients with colo-rectal diseases to reduce risk of fecal incontinence (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/ 1,000 Treated
			Always fecal continent (FI at baseline)	43	15	14.0	5.0	**2.7 (1.5; 4.8)**	11 (5; 36)	90E
Peeters, 2005[674] N = 64 50% female	Radiotherapy with total dose of 25Gy was administered with 5Gy fractions to rectum, perirectal tissues, anal sphincters, and regional lymph nodes before low anterior resection of rectal cancer	Low anterior resection of rectal cancer without pre operative radiotherapy.	Self-reported fecal incontinence	12	11	57.0	26.0	**2.2 (1.2; 4.2)**	3 (1; 20)	310E
			Self-reported gas incontinence	15	20	71.0	46.0	**1.5 (1.0; 2.3)**	4 (2; 226)	250E
			Self-reported soiling	8	7	38.0	16.0	2.3 (1.0; 5.6)		
			Rectoanal inhibitory reflex.	17	36	81.0	83.7	1.0 (0.8; 1.2)		
Dahlberg, 1998[787] N = 171 51% female	Preoperative high-dose radiotherapy with 25Gy given in 5 fractions for 5-7 days followed by anterior resection of rectal cancer	Anterior resection of rectal cancer alone	Fecal urgency, toilet dependence	25	5	30.0	6.0	**5.2 (2.1; 12.9)**	4 (1; 15)	240E
			Bowel empting difficulties	44	31	52.0	36.0	**1.5 (1.0; 2.1)**	6 (3; 74)	160E
			Incontinence of gas	57	44	68.0	51.0	**1.3 (1.0; 1.7)**	6 (3; 49)	170
			Incontinence of loose stool	42	21	50.0	24.0	**2.1 (1.3; 3.2)**	4 (2; 12)	260E
			Incontinence of solid stool	12	3	14.0	3.0	**4.1 (1.2; 14.2)**	9 (3; 157)	110E
			Fecal nocturnal leakage	12	7	14.0	8.0	1.8 (0.7; 4.3)		
			Use of pad for FI	41	19	49.0	22.0	**2.2 (1.4; 3.5)**	4 (2; 11)	270E

Table F198. Comparative effectiveness of clinical interventions in patients with colo-rectal diseases to reduce risk of fecal incontinence (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/ 1,000 Treated
			Ability to release flatus without stool	73	82	87.0	94.0	0.9 (0.8; 1.0)		
			Excellent operation with respect to bowel function	12	28	14.0	32.0	**0.4 (0.2; 0.8)**	6 (4; 17)	180A
			Restriction in social life because of fecal incontinence	25	9	30.0	10.0	**2.9 (1.4; 5.8)**	5 (2; 23)	200E
Lundby, 2005[789] N=494	Postoperative radiotherapy after anterior resection	Anterior resection alone	Loose or liquid stool	9	3	3.7	1.2	3.1 (0.8; 11.2)		
			Fecal incontinence	9	1	3.7	0.4	**9.2 (1.2; 72.2)**	30(4; 1411)	33E
			Use of pad for fecal incontinence	7	0	2.9	0.0	15.4 (0.9; 267.6)		
Pollack, 2006[675] N = 1,406 56% female Followup 180	Abdominal rectal resection with preoperative radiotherapy	Abdominal rectal resection without preoperative radiotherapy	Fecal incontinence	12	11	2.01	1.36	1.48 (0.66, 3.34)		

Bold- significant difference in outcomes at 95% confidence leve**l;** Number needed to treat to have avoided or excessive outcome inn1 patient = 1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F199. Comparative effectiveness of clinical interventions in patients with rectal diseases to reduce risk of fecal incontinence (self-reported severity scores and instrumental outcomes)

Author Sample	Active	Control	Outcome	Mean ± STD After Active Treatment	Mean STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Zimmerman, 2003[785] N = 30 30% female	Parks retractor during fistula repair	Scott retractor during fistula repair	Mean anal resting pressure	52.4 ± 26.4	65.5 ± 18.6	-0.6 (-1.3; 0.2)	-0.9 (-2.0; 0.2)
			Maximal anal squeeze pressure	172.9 ± 67.9	144.5 ± 57.6	0.5 (-0.3; 1.2)	0.3 (-0.2; 0.8)
			Rockwood fecal continence severity index.	12.7 ± 12.9	7.5 ± 9.6	0.5 (-0.3; 1.2)	6.1 (-3.6; 15.7)
Ho, 2005[786] N = 20 96% female	Dermal island flap anoplasty with cutaneous advancement flap into the rectum	Conventional treatment: lay open fistulotomy or seton insertion	Self-reported fecal incontinence scores	1.3 ± 4.1	1.3 ± 3.2	0.0 (-0.9; 0.9)	0.0 (-67.4; 67.4)
Richard, 2000[783] N = 82 59% female	Application of 0.25% nitroglycerin tid to perianal area 3 times/day	Internal sphincterotomy	Fecal incontinence Wexner scores	0.5 ± 1.3	0.2 ± 0.6	0.3 (-0.1; 0.7)	144.7 (-73.5; 362.9)
Comparative effectiveness of clinical interventions in patients with rectal cancer (self-reported severity scores)							
Allgayer, 2005[788] N = 95 42% female	Postoperative irradiation (total dose 50.4±/2.0Gy) applied in split doses (1.8Gy, 5/week). Intensive daily pelvic floor exercise with biofeedback intra-anal electromyogram electrode device	Intensive daily pelvic floor exercise with biofeedback intra-anal electromyogram electrode device	Modified Cleveland Incontinence Score at 3 weeks	9.3 ± 2.5	11.5 ± 2.6	**-0.9 (-1.3; -0.4)**	-7.5 (-11.2; -3.8)
			Modified Cleveland Incontinence Score at 1 year	8.1 ± 3.6	10.5 ± 4.4	**-0.6 (-1.0; -0.2)**	-5.6 (-9.6; -1.7)
Dahlberg, 1998[787] N = 171 51% female	Preoperative high-dose radiotherapy with 25Gy given in 5 fractions for 5-7 days followed by anterior resection of rectal cancer	Anterior resection of rectal cancer alone	Fecal urgency, deferring time, minutes	5.0 ± 76.7	10.0 ± 193.3	0.0 (-0.3; 0.3)	-0.3 (-3.3; 2.7)

Bold- significant difference in outcomes at 95%confidence level

Table F200. Comparative effectiveness of surgical interventions on fecal incontinence in patients with rectal prolapse (events)

Author Sample	Active	Control	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95% CI)	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated
Luukkonen, 1992[790] N = 30 33% female	Posterior sutured abdominal rectopexy combined with sigmoidectomy complete rectal prolapse and end-to-end anastomosis made with a circular stapler	Polyglycolic acid mesh rectopexy without sigmoidectomy for complete rectal prolapse anterior rectal wall free	Complete anal continence	9	11	27.3	73.3	**0.4 (0.2; 0.7)**	2 (2; 5)	219A
			Self-reported incontinence for solid stool (grade 3)	1	1	6.7	6.7	1.0 (0.1; 14.6)		
			Self-reported incontinence for liquid stool (grade 2)	1	0	6.6	0.1	3.0 (0.1; 68.3)		
Racalbuto, 2004[791] N = 100 44% female	Stapled prolapsectomy using Longo circular stapler.	Traditional Milligan-Morgan Hemorrhoidectomy with exeresis of the haemorrhoidal piles upon low ligature of each vascular pedicle	Fecal urgency with occasional incontinence to gas and liquid stool (Wexner score 4)	3	3	6.0	6.0	1.0 (0.2; 4.7)		
Novell, 1994[792] N = 63 99% female	Ivalon sponge with sutured rectangle of sponge placed along the length of the sacrum	Sutured rectopexy with sutured rectangle of sponge or sutures alone placed along the length of the sacrum	Self-reported fecal incontinence as fecal soiling or using a pad	6	2	19.4	6.3	3.1 (0.7; 14.2)		

Bold- significant differences in outcomes at 95% confidence level; A - Number of avoided; E - number of excessive events per 1000 treated

Table F201. Effect of surgical procedures on severity of fecal incontinence

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Luukkonen, 1992[790] N = 30 33% female	Posterior sutured abdominal rectopexy combined with sigmoidectomy complete rectal prolapse and end-to-end anastomosis made with a circular stapler	Polyglycolic acid mesh rectopexy without sigmoidectomy for complete rectal prolapse anterior rectal wall free	Resting anal pressure (mean), cm/H20	34.5 ± 11.7	30.7 ± 11.5	0.3 (-0.4; 1.0)	1.1 (-1.3; 3.4)
			Maximal squeeze pressure, cm/H20	53.0 ± 20.7	49.3 ± 15.1	0.2 (-0.5; 0.9)	0.4 (-1.0; 1.9)
Racalbuto, 2004[791] N = 100 44% female	Stapled prolapsectomy using Longo circular stapler.	Traditional Milligan-Morgan Hemorrhoidectomy with exeresis of the haemorrhoidal piles upon low ligature of each vascular pedicle	Mean basal pressure	82.1 ± 11.5	76.1 ± 13.3	**0.5 (0.1; 0.9)**	0.6 (0.1; 1.2)
			Mean maximal squeeze pressure	101.0 ± 16.7	95.0 ± 17.3	0.4 (0.0; 0.7)	0.4 (0.0; 0.8)
Solomon, 2002[793] N = 40 50% female	Laparoscopic rectopexy	Open abdominal rectopexy	Self-reported fecal incontinence scores with visual analog scale	1.6 ± 6.3	2.0 ± 4.7	-0.1 (-0.7; 0.6)	-3.6 (-35.0; 27.8)
Galili, 1997[794] N = 37 87% female	Posterior abdominal rectopexy with non-absorbable mesh (Polypropylene, Prolene, Ethicon Ltd)	Posterior abdominal rectopexy with absorbable mesh (Polyglycolic acid, Dexon, Davis & Geck)	Impact on social life (1 - unrestricted social life)	0.9 ± 0.3	0.9 ± 0.4	0.1 (-0.6; 0.7)	6.8 (-65.8; 79.5)
			Fecal continence scores (as 0 - complete incontinence, 0.5 - incontinence for loose stool only, 1- complete continence)	0.7 ± 0.3	0.8 ± 0.4	-0.3 (-1.0; 0.3)	-42.2 (-126.8; 42.3)
Boccasanta, 2006[795] N = 40 99% female	Altemeier's procedure with levatorplasty using harmonic scalpel and circular stapler	Altemeier's procedure with levatorplasty, monopolar electrocautery and hand sewn anastomosis	Fecal Continence score (Wexner score, ranging from 0 - full continence to 20 - complete incontinence).	7.9 ± 1.9	8.1 ± 1.8	-0.1 (-0.7; 0.5)	-1.3 (-9.0; 6.3)

Table F201. Effect of surgical procedures on severity of fecal incontinence (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
			Resting pressure (mm/Hg)	34.4 ± 5.5	34.2 ± 5.4	0.0 (-0.6; 0.7)	0.1 (-1.7; 1.9)
			Squeeze pressure (mm/Hg)	64.8 ± 12.9	65.4 ± 12.3	0.0 (-0.7; 0.6)	-0.1 (-1.0; 0.9)
			Threshold volume (ml): Distention	41.9 ± 7.6	41.5 ± 7.0	0.1 (-0.6; 0.7)	0.1 (-1.4; 1.6)
			Threshold volume (ml): desire to defecate	64.8 ± 9.9	65.1 ± 10.5	0.0 (-0.6; 0.6)	0.0 (-1.0; 0.9)
			Sacral reflex latency (millisecond)	62.9 ± 6.4	63.0 ± 6.7	0.0 (-0.6; 0.6)	0.0 (-1.0; 1.0)
Boccasanta, 1998[796] N = 21 95% female	Laparoscopic stapled Well's rectopexy, perineal physiotherapy, external electric stimulation, and perineal biofeedback	Well's rectopexy by the open technique without division of lateral rectal ligaments, perineal physiotherapy, external electric stimulation, and perineal biofeedback	Self-reported fecal incontinence scores from 0 - complete continence to 6 - complete incontinence.	9.0 ± 2.0	10.0 ± 2.0	-0.5 (-1.4; 0.4)	-5.0 (-13.9; 3.9)
			Basal pressure, mm/Hg	47.2 ± 22.3	47.2 ± 46.1	0.0 (-0.9; 0.9)	0.0 (-1.9; 1.9)
			Squeezing pressure, mm/Hg	97.4 ± 9.7	98.4 ± 42.2	0.0 (-0.9;0.8)	0.0 (-0.9; 0.9)
			Rectal capacity, ml	170.4 ± 10..1	171.4 ± 43.0	0.0 (-0.9; 0.8)	0.0 (-0.5; 0.5)
			Rectoanal inhibitory reflex, ml	17.3 ± 3.2	15.3 ± 21.2	0.2 (-0.7; 1.0)	1.0 (-4.8; 6.8)
			Threshold volume, ml	14.9 ± 2.5	15.1 ± 9.6	0.0 (-0.9; 0.8)	-0.2 (-6.0; 5.6)
			Painful reflex to rectal stretching, ml	30.9 ± 3.6	31.9 ± 13.9	-0.1 (-1.0; 0.8)	-0.4 (-3.1; 2.4)

Bold- significant difference in outcomes at 95%confidence level

Table F202. Comparative effectiveness of surgical interventions on anal sphincter to prevent incidence of fecal incontinence in adults (events)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95 %C)I	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Parallada, 2004[798] N = 63 96% female	Surgical: open lateral internal sphincterotomy and mucose closure with chromic catgut.	Chemical: local 0.2 percent isosorbide dinitrate - pea-size quantity applied manually at the entrance of the anus, 3 times/day immediately after a warm sitz bath, for 6 weeks.	Self-reported fecal continence	30	33	100.0	100.0			
			Self-reported absence of fecal soiling	30	33	100.0	100.0			
			Self-reported gas incontinence and fecal soiling	9	0	30.0	0.1	**20.8 (1.3; 343.3)**		
Zbar, 2003[801] N = 34 26% female	Modified cutting seton, which repaired the internal anal sphincter muscle and re-routed the seton through the intersphincteric space.	Conventional cutting seton	Self-reported fecal continence	18	15	100.0	94.0	1.1 (0.9; 1.3)		
Wiley, 2004[797] N = 79 54% female	Closed lateral internal sphincterotomy (Hoffman and Goligher) using a short stab incision and blind division of the internal sphincter guided by the surgeon finger.	Open lateral sphincterotomy (Parks) via a 1cm radial incision with division of the internal sphincter under direct vision.	Self-reported major fecal incontinence	1	2	2.6	4.9	0.5 (0.1; 5.7)		

Table F202. Comparative effectiveness of surgical interventions on anal sphincter to prevent incidence of fecal incontinence in adults (events) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Number of Cases After Active Treatment	Number of Cases After Control Treatment	Rate (%) After Active Treatment	Rate (%) After Control Treatment	Relative Risk (95 %C)I	Number Needed to Treat (95% CI)	Number of attributable Events/1,000 Treated (95% CI)
Wong, 2002[799] N = 112 75% female	Implantation of Acticon trade mark artificial bowel sphincter - solid silicone elastomer device.	Baseline condition	Urge fecal incontinence	22	100	20.0	89.0	**0.2 (0.2; 0.3)**	1 (1; 2)	690 (604; 756)A
Arroyo, 2005[800] N = 80 35% female	Close lateral internal sphincterotomy	Chemical sphincterotomy with 25 units botulinum toxin injected into the internal sphincter	Self-reported fecal incontinence (<4 in Cleveland Clinic Scoring System) at 2 months	2	2	5.0	5.0	1.0 (0.1; 6.8)		
			Self-reported fecal incontinence (<4 in Cleveland Clinic Scoring System) at 1-3 years	1	0	2.5	0.1	3.0 (0.1; 71.5)		

Bold- significant difference in outcomes at 95%confidence level**;** Number needed to treat to have avoided or excessive outcome inn1 patient =1/(rate of the outcome in the control – rate of the outcome in the active group); Number of attributable events = 1000*(rate of the outcome in the control – rate of the outcome in the active group); A - avoided; E - excessive events

Table F203. Comparative effectiveness of surgical interventions on anal sphincter to prevent progression of fecal incontinence in adults (self-reported severity scores)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Wiley, 2004[797] N = 79 54% female	Closed lateral internal sphincterotomy (Hoffman and Goligher) using a short stab incision and blind division of the internal sphincter guided by the surgeon finger.	Open lateral sphincterotomy (Parks) via a 1cm radial incision with division of the internal sphincter under direct vision.	Self-reported fecal continence scores (0 - continence, 20 - complete incontinence)	1.0 ± 1.1	1.0 ± 1.8	0.0 (-0.4; 0.4)	0.0 (-46.5; 46.5)
Wong, 2002[799] N = 112 75% female	Implantation of Acticon trade mark artificial bowel sphincter - solid silicone elastomer device.	Baseline condition	Self-reported fecal incontinence using Fecal Incontinence Scoring System (FISS), from 0 - complete continence to 120 - complete incontinence.	48.0 ± 48.0	106.0 ± 9.3	**-1.7 (-2.0; -1.4)**	-1.6 (-1.9; -1.3)
Osterberg, 2004[802] N = 70 90% female	Anterior levatorplasty with mobilization of external sphincter	Anal (and vaginal in women) plug electrostimulation of the pelvic floor with stimulation frequency was 25Hz and the duration 1.5 seconds, with a pulse-train interval of 3 seconds.	Self-reported loose stool at 3 months (0 - total continence to 18 - maximum incontinence).	15.0 ± 13.3	11.0 ± 29.3	0.2 (-0.3; 0.6)	1.6 (-2.7; 5.9)
			Self-reported loose stool at 1 year (0 - total continence to 18 - maximum incontinence).	14.0 ± 14.7	10.0 ± 29.3	0.2 (-0.3; 0.6)	1.7 (-3.0; 6.4)
			Self-reported solid fecal incontinence stool at 3 months (0 - total continence to 18 - maximum incontinence).	32.0 ± 27.3	25.0 ± 50.0	0.2 (-0.3; 0.6)	0.7 (-1.2; 2.6)

Table F203. Comparative effectiveness of surgical interventions on anal sphincter to prevent progression of fecal incontinence in adults (self-reported severity scores) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
			Self-reported solid fecal incontinence stool at 1 year (0 - total continence to 18 - maximum incontinence).	30.0 ± 12.7	27.0 ± 40.7	0.1 (-0.4; 0.6)	0.4 (-1.4; 2.1)
			Fecal Incontinence score (0–18) at 1 year	6.0 ± 5.3	8.0 ± 4.0	-0.4 (-0.9; 0.0)	-5.3 (-11.2; 0.6)
Tjandra, 2004[803] N = 82 78% female	PTP injection into intersphincteric space and internal anal sphincter with guidance by endoanal ultrasound	PTP injection into intersphincteric space and internal anal sphincter without guidance by endoanal ultrasound	Wexner's continence score at 3 months	7.0 ± 3.3	9.5 ± 3.0	**-0.8 (-1.2; -0.3)**	-8.3 (-13.0; -3.6)
			Visual analog quality of life scale at 3 months	9.0 ± 0.7	9.0 ± 0.7	0.0 (-0.4; 0.4)	0.0 (-4.8; 4.8)
			Fecal incontinence quality of life index at 6 months	3.7 ± 0.4	3.1 ± 0.8	**0.9 (0.5; 1.4)**	29.3 (14.7; 44.0)
O'Brien, 2004[804] N = 14 93% female	Placement of the artificial bowel sphincter activated at 6 weeks after surgery.	Usual supportive care: physiotherapy, pelvic floor exercise, dietary advice.	Cleveland Clinic Scoring for fecal incontinence	4.8 ± 4.0	14.3 ± 4.6	**-2.2 (-3.6; -0.8)**	-15.4 (-25.0; -5.8)
			American Medical Systems quality of life questionnaire specialized on Fecal incontinence	82.7 ± 14.0	54.7 ± 26.0	**1.3 (0.2; 2.5)**	2.5 (0.3; 4.6)

Bold- significant difference in outcomes at 95%confidence level

Table F204. Comparative effectiveness of surgical interventions on anal sphincter to prevent perceived progression of fecal incontinence in adults (self-reported severity scores and instrumental outcomes)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Parellada, 2004[798] N = 63 96% female	Surgical: open lateral internal sphincterotomy and mucose closure with chromic catgut.	Chemical: local 0.2% isosorbide dinitrate - pea-size quantity applied manually at the entrance of the anus, 3 times/day immediately after a warm sitz bath, for 6 weeks.	Maximum resting pressure (cm/H2O)	48.0 ± 16.0	56.0 ± 48.0	-0.2 (-0.7; 0.3)	-0.4 (-1.3; 0.5)
			Maximum squeezing pressure (cm/H2O)	136.0 ± 149.3	120.0 ± 160.0	0.1 (-0.4; 0.6)	0.1 (-0.3; 0.5)
			Rectal capacity and first sensation: Functional capacity (cm 3 air)	140.0 ± 213.3	120.0 ± 253.3	0.1 (-0.4; 0.6)	0.1 (-0.3; 0.5)
			Rectal capacity (cm 3 air)	230.0 ± 220.0	280.0 ± 280.0	-0.2 (-0.7; 0.3)	-0.1 (-0.2; 0.1)
			Rectal capacity and first sensation: slow waves,%	160.0 ± 0.0	14.0 ± 52.0		0.0 (0.0; 0.0)
			Rectal capacity and first sensation: ultra-slow waves, %	30.0 ± 0.0	3.0 ± 11.0		0.0 (0.0; 0.0)
Osterberg, 2004[802] N = 70 90% female	Anterior levatorplasty with mobilization of external sphincter	Anal (and vaginal in women) plug electrostimulation of the pelvic floor with stimulation frequency was 25Hz and the duration 1.5 seconds, with a pulse-train interval of 3 seconds.	Maximum resting pressure (cm/H2O) at 1 year	40.0 ± 32.7	49.5 ± 38.7	-0.3 (-0.7; 0.2)	-0.5 (-1.5; 0.4)
			Maximum squeeze pressure (cm/H2O) at 1 year	59.0 ± 60.7	75.5 ± 62.0	-0.3 (-0.7; 0.2)	-0.4 (-1.0; 0.3)
			Resting pressure (cm/H2O) at 1 year	44.0 ± 44.0	35.0 ± 32.7	0.2 (-0.2; 0.7)	0.7 (-0.7; 2.0)
			Squeeze pressure (cmH2O)	90.0 ± 60.0	89.0 ± 66.7	0.0 (-0.5; 0.5)	0.0 (-0.5; 0.5)
			High-pressure zone (cm) at 1 year	3.0 ± 0.7	3.0 ± 0.7	0.0 (-0.5; 0.5)	0.0 (-15.6; 15.6)
			Rectoanal inhibitory reflex (cm/H2O)	20.0 ± 20.0	25.0 ± 6.7	-0.3 (-0.8; 0.1)	-1.3 (-3.2; 0.5)
			Rectal compliance (ml per 40 cm/H2O) at 1 year	160.0 ± 56.7	159.5 ± 74.0	0.0 (-0.5; 0.5)	0.0 (-0.3; 0.3)

Table F204. Comparative effectiveness of surgical interventions on anal sphincter to prevent perceived progression of fecal incontinence in adults (self-reported severity scores and instrumental outcomes) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Tjandra, 2004[803] N = 82 78% female	PTP injection into intersphincteric space and internal anal sphincter with guidance by endoanal ultrasound	PTP injection into intersphincteric space and internal anal sphincter without guidance by endoanal ultrasound	Maximum resting pressure (mm/Hg) at 6 months	38.0 ± 12.4	35.0 ± 6.5	0.3 (-0.1; 0.7)	0.9 (-0.4; 2.1)
			Maximum squeeze pressure (mm/Hg) at 6 months	116.0 ± 21.7	121.0 ± 21.2	-0.2 (-0.7; 0.2)	-0.2 (-0.6; 0.2)
Zbar, 2003[801] N = 34 26% female	Modified cutting seton, which repaired the internal anal sphincter muscle and re-routed the seton through the intersphincteric space.	Conventional cutting seton	Mean resting anal pressure, mm/Hg	106.1 ± 3.8	80.0 ± 16.1	**2.3 (1.4; 3.2)**	2.9 (1.8; 4.0)
		Conventional cutting seton	high pressure zone, length, mm	21.1 ± 6.0	17.0 ± 5.0	0.7 (0.0; 1.4)	4.3 (0.2; 8.4)
			Asymmetry, %	29.9 ± 1.0	39.0 ± 7.1	**-1.9 (-2.7;-1.0)**	-4.7 (-6.8; -2.7)
			Mean resting vector volume	37,800.7 ± 8,010.0	25,099.9 ± 8,112.9	**1.6 (0.8; 2.4)**	0.0 (0.0; 0.0)
			Mean squeeze pressure, mm/Hg	120.7 ± 20.0	104.0 ± 9.1	**1.1 (0.3; 1.8)**	1.0 (0.3; 1.7)
			Squeeze manometric parameters: high pressure zone length, mm	26.1 ± 11.0	21.3 ± 5.0	0.6 (-0.1; 1.2)	2.6 (-0.6; 5.8)
			Squeeze manometric parameters: asymmetry, %	31.1 ± 5.0	34.0 ± 11.1	-0.3 (-1.0; 0.3)	-1.0 (-3.0; 1.0)
			Squeeze manometric parameters: mean squeeze vector volume	50,224.2 ± 17,001.4	53,806.7 ± 9,108.8	-0.3 (-0.9; 0.4)	0.0 (0.0; 0.0)

Bold- significant difference in outcomes at 95%confidence level

Table F205. Fecal continence and pad use of 1,85 patients operated on for chronic ulcerative colitis at 1, 5, 10, 15,and 20 years of followup[824]

Years of followup	1 Year	5 Years	10 Years	15 Years	20 Years
Fecal continence daytime, %	71	70	60	59	59
Fecal continence night time, %	43	40	33	25	32
Pad use, %	34	29	31	43	50

Table F206.Functional outcome of 1,885 patients operated on for chronic ulcerative colitis by time period of operation[824]

	1981-1985	1986-1990	1991-1995	1996-2000
Number of patients	431	557	470	427
Mean age at surgery (years)	31·2	33·7	35·4	36·3
Mean followup (years)	16·8	13·1	8·8	5·0
Mean stool frequency after ileal pouch-anal anastomosis				
Per day	6·4	6·1	6·2	6·4
Per night	2·1	2·0	2·0	2·1
Incontinence during day (%)				
Never	57	54	64	70
Occasional	31	35	26	21
Frequent	11	11	10	9
Incontinence during night (%)				
Never	30	29	34	37
Occasional	48	48	48	41
Frequent	21	23	18	22
Stool consistency (% of patients)				
Liquid	12	11	12	12
Semi liquid	70	72	70	69
Solid	18	17	17	19
Can distinguish gas from stool (%)	77	74	67	67
Pad use (%)	46	44	39	44
Medication use (%)	50	45	43	51

Table F207. Comparative effectiveness of surgical interventions (diversion) on fecal incontinence in adults (self-reported severity scores)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95%)CI)	% Change from Control (95% CI)
Furst, 2003[814] N = 40 32% female	5cm colonic J-pouch constructed with a linear stapler	8cm coloplasty pouch sutures horizontally with minimal extension effect.	Number of fecal urgency episodes	3.5 ± 2.3	2.0 ± 2.8	0.6 (0.0; 1.2)	29.3 (-2.4; 61.0)
			Self-reported number of straining episodes	4.5 ± 2.8	5.0 ± 1.5	-0.2 (-0.8; 0.4)	-4.5 (-16.9; 8.0)
Hallbook, 1996[808] N = 100 45% female	Low anterior resection with total mesorectal excision with straight anastomosis 6 to 8cm in length.	Low anterior resection with total mesorectal excision colonic J pouch anastomosis 6 to 8cm in length.	Composite score of incontinence, 0-18	5.0 ± 2.7	2.0 ± 2.2	**1.2 (0.8; 1.7)**	60.9 (39.2; 82.7)
Sailer, 2002[816] N = 64 38% female	Total mesorectal excision and coloanal J pouch anastomosis by folding the descending colon to the form of a `J', 5 ± 6cm in length.	Total mesorectal excision and straight anastomosis with descending colon anastomosed in end-to-end fashion to the anal canal.	European Organization for Research and Treatment of Cancer, Defecation or stoma scores, 100-poor quality	23.0 ± 21.0	26.0 ± 19.0	-0.1 (-0.6; 0.3)	-0.6 (-2.5; 1.3)
			Disease-specific scale (EORTC QLQ-CR38) scales: 0-36 (perfect continence)	32.0 ± 6.0	32.0 ± 3.0	0.0 (-0.5; 0.5)	0.0 (-1.5; 1.5)
			Urge to defecate, 0-36 (perfect continence)	1.9 ± 0.2	2.0 ± 0.1	**-0.6 (-1.1; -0.1)**	-31.6 (-56.7; -6.5)
			Fecal incontinence, 0-36 (perfect continence)	4.8 ± 1.9	4.8 ± 1.5	0.0 (-0.5; 0.5)	0.0 (-10.2; 10.2)
			Anal incontinence to gas, 0-36 (perfect continence)	5.3 ± 1.7	5.2 ± 1.4	0.1 (-0.4; 0.6)	1.2 (-8.2; 10.7)

Table F207. Comparative effectiveness of surgical interventions (diversion) on fecal incontinence in adults (self-reported severity scores) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95%)CI)	% Change from Control (95% CI)
Ho, 2001[806] N = 42 60% female	Standardized ultra-low anterior resection with J pouch anastomosis by folding the descending colon to the form of a `J', 6cm in length	Standardized ultra-low anterior resection with straight coloanal anastomosis, the descending colon was anastomosed to the anorectal stump	Fecal continence Wexner scale from 0 - continence to 24 – complete incontinence.	0.4 ± 0.3	0.1 ± 0.1	**1.3 (0.5; 2.0)**	912.5 (389.0; 1,436.1)
Ho, 2002[809] N = 88 40% female	Standardized total mesorectal excision with at least 2 cm of distal tumor clearance. J-pouch was constructed from descending colon 6cm in length using an Autosuture ILA 75 linear cutting stapler.	Standardized total mesorectal excision with at least 2cm of distal tumor clearance. Coloplasty pouch was anastomosed to stapled anorectal stump.	Self-reported fecal continence scores	1.3 ± 2.7	3.2 ± 8.0	-0.3 (-0.7; 0.1)	-10.0 (-23.2; 3.1)
			Fecal incontinence specific quality of life scoring: lifestyle	3.5 ± 1.3	3.0 ± 2.0	0.3 (-0.1; 0.7)	9.9 (-4.1; 23.9)
Furst, 2002[818] N = 74 26% female	The standardized total mesorectal excision with preaortal lymph node dissection, autonomic nerve preservation, and short (5cm) colonic J-pouch anastomosis.	The standardized total mesorectal excision with preaortal lymph node dissection, autonomic nerve preservation, and straight coloanal anastomosis.	Number of fecal urgency episodes	2.6 ± 1.7	3.6 ± 1.2	**-0.7 (-1.2; -0.2)**	-19.2 (-32.3; -6.2)
			Number of incomplete evacuations	4.3 ± 1.3	5.0 ± 1.2	**-0.6 (-1.1; -0.1)**	-12.2 (-21.6; -2.9)
			Number of straining episodes	4.8 ± 1.5	3.0 ± 1.4	**1.3 (0.8; 1.8)**	41.8 (25.1; 58.5)
Park, 2005[825] N = 50 22% female	Ultralow anterior resection including upper sphincter excision colonic J-pouch anastomosis with a temporary diverting-loop ileostomy	Ultralow anterior resection including upper sphincter excision with a straight anastomosis and temporary diverting-loop ileostomy.	Fecal Incontinence Severity Index (FISI)	18.6 ± 2.0	27.7 ± 2.0	**-4.6 (-5.6; -3.5)**	-16.4 (-20.3; -12.6)
			Fecal Incontinence Quality of Life (FIQL) scale, lifestyle	3.4 ± 1.0	2.7 ± 1.0	**0.7 (0.1; 1.3)**	26.2 (4.8; 47.6)
Machado, 2005[810] N = 71 22% female	Low anterior resection and total mesorectal excision with a colonic J-pouch anastomosis	Low anterior resection and total mesorectal excision with a colonic J-pouch or a side-to-end anastomosis.	Combined functional bowel rank scores	33.0 ± 6.0	37.6 ± 9.6	**-0.6 (-1.1; -0.1)**	-1.5 (-2.8; -0.3)
			Fecal incontinence scores (0-18)	5.0 ± 1.3	6.0 ± 1.3	**-0.8 (-1.2; -0.3)**	-12.5 (-20.5; -4.5)

Table F207. Comparative effectiveness of surgical interventions (diversion) on fecal incontinence in adults (self-reported severity scores) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± STD After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95%)CI)	% Change from Control (95% CI)
Laurent, 2005[811] N = 37 19% female	Total mesorectal excision and hand sewn colonic J-pouch-anal anastomosis (6cm)	Total mesorectal excision and stapled colonic J-pouch-anal anastomosis (6cm) using PI-30 stapling instrument	Number of stools/night	0.0 ± 0.0	0.3 ± 0.1		0.0 (0.0; 0.0)
			Fecal continence				
			Cleveland Clinic Fecal Incontinence Score	0.6 ± 3.6	1.0 ± 5.3	-0.1 (-0.7; 0.6)	-8.6 (-74.4; 57.1)
Patients with ulcerative colitis							
Reilly, 1997[820] N = 41 34% female	Abdominal colectomy excising anal transition zone and hand sewing the pouch to the anal canal (Ileal Pouch-Anal Anastomosis)	Abdominal colectomy preserving anal transition zone and double stapling the pouch to the anal canal (Ileal Pouch-Anal Anastomosis)	Number of stools at night	1.0 ± 1.0	2.0 ± 2.0	-0.6 (-1.3; 0.1)	-31.0 (-66.6; 4.6)
			Quality of life scores: 1-severely restricted performance to 5-improved performance.	3.6 ± 1.3	3.2 ± 1.6	0.3 (-0.4; 1.0)	8.5 (-13.3; 30.3)
Oresland, 1988[823] N = 40 50% female	Anal balloon dilatation with step-wise increasing pressure (5-80cm/H20), distention ~60 seconds for 50-60 minutes.	Sphincter training with visual feedback for 50-60 minutes daily.	Self-reported number of bowel evacuations at 1 month	7.1 ± 1.7	7.0 ± 2.3	0.0 (-0.6; 0.7)	0.7 (-8.4; 9.8)
			Self-reported number of bowel evacuations at 6 months	4.9 ± 1.6	5.4 ± 1.8	-0.3 (-0.9; 0.3)	-5.4 (-17.3; 6.4)
Patients with sphincteric trauma							
Hasegawa, 2000[815] N = 27 96% female	Fecal diversion with defunctioning stoma (closed at 4 months after surgery) for sphincter repair with standard overlapping technique	Sphincter repair with standard overlapping technique with no stoma	Cleveland Clinic Scoring System (0 - perfect continence to 20 - complete incontinence).	7.8 ± 5.5	9.6 ± 6.8	-0.3 (-1.0; 0.5)	-3.0 (-10.9; 4.9)

Bold- significant difference in outcomes at 95%confidence level

Table F208. Comparative effectiveness of surgical interventions (diversion) on fecal incontinence in adults (instrumental outcomes)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Furst, 2003[814] N = 40 32% female	5cm colonic J-pouch constructed with a linear stapler	8cm coloplasty pouch sutures horizontally with minimal extension effect.	Resting pressure, mm/Hg	45.0 ± 9.0	46.0 ± 15.0	-0.1 (-0.7; 0.5)	-0.2 (-1.5; 1.2)
			Squeeze pressure, mm/Hg	219.0 ± 100.0	216.0 ± 86.0	0.0 (-0.6; 0.7)	0.0 (-0.3; 0.3)
			Rectal threshold volume, ml	46.0 ± 13.0	36.0 ± 28.0	0.5 (-0.2; 1.1)	1.3 (-0.5; 3.0)
			Maximum rectal volume, ml	89.0 ± 18.0	77.0 ± 21.0	0.6 (0.0; 1.2)	0.8 (0.0; 1.6)
Johnston, 1996[821] N = 60 57% female	Duplicated (J) pelvic ileal reservoirs in restorative proctocolectomy constructed with 30cm of ileum	Quadruplicated (W) reservoir pelvic ileal reservoirs in restorative proctocolectomy, constructed with 30cm of ileum	Maximum resting anal pressures	58.0 ± 21.3	57.0 ± 4.7	0.1 (-0.4; 0.6)	0.1 (-0.8; 1.0)
	Duplicated (J) pelvic ileal reservoirs in restorative proctocolectomy constructed with 40cm of ileum	Quadruplicated (W) reservoir pelvic ileal reservoirs in restorative proctocolectomy, constructed with 40cm of ileum	Maximum resting anal pressure, mmH20	71.0 ± 11.3	73.0 ± 5.3	-0.2 (-0.7; 0.3)	-0.3 (-1.0; 0.4)
Selvaggi, 2000[822] N = 24 58% female	Ileal pouch-anal anastomosis including total colectomy, total rectal excision, and two-limb J reservoir	Ileal pouch-anal anastomosis including total colectomy, total rectal excision, and four-limb W reservoir	Maximum tolerated anal volume, ml	292.3 ± 68.8	334.2 ± 79.7	-0.6 (-1.4; 0.3)	-0.2 (-0.4; 0.1)
			Maximum anal resting pressure, mm/Hg	64.7 ± 16.5	64.8 ± 16.4	0.0 (-0.8; 0.8)	0.0 (-1.2; 1.2)
			Maximum voluntary contraction, mm/Hg	159.1 ± 37.3	159.6 ± 29.8	0.0 (-0.8; 0.8)	0.0 (-0.5; 0.5)

Table F208. Comparative effectiveness of surgical interventions (diversion) on fecal incontinence in adults (instrumental outcomes) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
Hasegawa, 2000[815] N = 27 96% female	Fecal diversion with defunctioning stoma (closed at 4 months after surgery) for sphincter repair with standard overlapping technique	Sphincter repair with standard overlapping technique with no stoma	Maximum resting pressure, H20	67.3 ± 28.9	71.3 ± 12.1	-0.2 (-0.9; 0.6)	-0.3 (-1.3; 0.8)
			Maximum squeezing pressure, H20	106.4 ± 29.9	100.7 ± 24.1	0.2 (-0.5; 1.0)	0.2 (-0.5; 1.0)
Sailer, 2002[816] N = 64 38% female	Total mesorectal excision and coloanal J pouch anastomosis by folding the descending colon to the form of a `J', 5 ± 6cm in length.	Total mesorectal excision and straight anastomosis with descending colon anastomosed in end-to-end fashion to the anal canal.	Resting anal pressure anal pressure (mm/Hg)	55.0 ± 23.0	68.0 ± 36.0	-0.4 (-0.9; 0.1)	-0.6 (-1.4; 0.1)
			Squeeze pressure (mm/Hg)	116.0 ± 47.0	109.0 ± 74.0	0.1 (-0.4; 0.6)	0.1 (-0.3; 0.6)
			Rectal compliance (ml/mm/Hg)	3.1 ± 1.4	3.1 ± 1.8	0.0 (-0.5; 0.5)	0.0 (-15.8; 15.8)
Ho, 2001[806] N = 42 60% female	Standardized ultra-low anterior resection with J pouch anastomosis by folding the descending colon to the form of a `J', 6cm in length	Standardized ultra-low anterior resection with straight coloanal anastomosis, the descending colon was anastomosed to the anorectal stump	Change from baseline in mean resting anal pressure (mm/Hg)	23.7 ± 7.8	16.5 ± 8.3	**0.9 (0.2; 1.6)**	5.4 (1.2; 9.6)
			Change from baseline in maximum anal squeeze pressure (mm/Hg)	80.7 ± 35.0	102.4 ± 31.7	-0.7 (-1.3; 0.0)	-0.6 (-1.3; 0.0)
			Change from baseline in rectal volume of initial sensation: barostat phasic program (ml)	24.8 ± 14.8	13.5 ± 23.8	0.6 (-0.1; 1.2)	4.1 (-0.9; 9.2)
			Change from baseline in rectal compliance: barostat (ml/mm/Hg)	-7.1 ± 5.9	-14.0 ± 6.2	**1.1 (0.4; 1.9)**	-8.1 (-3.0; -13.3)

Table F208. Comparative effectiveness of surgical interventions (diversion) on fecal incontinence in adults (instrumental outcomes) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
			Change from baseline in rectosphincteric inhibitory reflex, %	50.0	52.6		0.0 (0.0; 0.0)
Ho, 2002[817] N = 12 17% female	Standardized ultra-low anterior resection with J pouch anastomosis by folding the descending colon to the form of a `J', 6cm in length	Standardized ultra-low anterior resection with straight coloanal anastomosis. Descending colon was anastomosed to the anorectal stump	Mean resting anal pressure, mm/Hg	31.1 ± 15.2	32.3 ± 9.8	-0.1 (-1.2; 1.0)	-0.3 (-3.8; 3.2)
			Maximum anal squeeze pressure, mm/Hg	182.0 ± 87.0	159.0 ± 73.7	0.3 (-0.9; 1.4)	0.2 (-0.5; 0.9)
			Volume of initial rectal urge, ml	42.7 ± 76.9	30.3 ± 56.6	0.2 (-1.0; 1.3)	0.6 (-3.1; 4.4)
			Maximum tolerable rectal volume, ml	51.3 ± 118.3	43.0 ± 46.3	0.1 (-1.0; 1.2)	0.2 (-2.4; 2.8)
			Rectal compliance, ml/mm/Hg	1.8 ± 1.7	1.2 ± 2.2	0.3 (-0.8; 1.4)	25.3 (-69.6; 120.3)
Ho, 2002[809] N = 88 40% female	Standardized total mesorectal excision with at least 2cm of distal tumor clearance. J-pouch was constructed from descending colon 6cm in length using an Autosuture ILA 75 linear cutting stapler.	Standardized total mesorectal excision with at least 2cm of distal tumor clearance. Coloplasty pouch was anastomosed to stapled anorectal stump.	Fecal urge: stool deferment time (minutes)	16.1 ± 17.2	16.3 ± 23.2	0.0 (-0.4; 0.4)	-0.1 (-2.6; 2.5)
			Mean resting anal pressure (mm/Hg)	50.4 ± 29.8	46.0 ± 33.8	0.1 (-0.3; 0.6)	0.3 (-0.6; 1.2)
			Maximum anal squeeze pressure (mm Hg)	119.5 ± 58.3	122.2 ± 85.5	0.0 (-0.5; 0.4)	0.0 (-0.4; 0.3)
			Rectal volume of initial sensation (ml)	59.7 ± 72.9	32.6 ± 75.6	0.4 (-0.1; 0.8)	1.1 (-0.2; 2.4)
			Maximum tolerable rectal volume (ml)	108.3 ± 87.5	123.1 ± 214.8	-0.1 (-0.5; 0.3)	-0.1 (-0.4; 0.3)
			Rectal compliance	1.7 ± 2.7	3.1 ± 8.0	-0.2 (-0.7; 0.2)	-7.6 (-21.1; 5.9)

Table F208. Comparative effectiveness of surgical interventions (diversion) on fecal incontinence in adults (instrumental outcomes) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
			Internal anal sphincter thickness (mm)	2.6 ± 11.9	2.3 ± 1.3	0.0 (-0.4; 0.5)	1.5 (-16.6; 19.7)
			External anal sphincter thickness (mm)	7.7 ± 5.3	9.8 ± 6.6	-0.3 (-0.8; 0.1)	-3.6 (-7.9; 0.7)
Furst, 2002[818] N = 74 26% female	The standardized total mesorectal excision with preaortal lymph node dissection, autonomic nerve preservation, and short (5cm) colonic J-pouch anastomosis.	The standardized total mesorectal excision with preaortal lymph node dissection, autonomic nerve preservation, and straight coloanal anastomosis.	Resting anal pressure, mm/Hg	57.0 ± 23.0	57.0 ± 17.0	0.0 (-0.5; 0.5)	0.0 (-0.8; 0.8)
			Squeeze pressure, mm/Hg	181.0 ± 65.0	215.0 ± 71.0	-0.5 (-1.0; 0.0)	-0.2 (-0.4; 0.0)
			Neorectal sensation, ml	40.0 ± 20.0	33.0 ± 20.0	0.4 (-0.1; 0.8)	1.1 (-0.3; 2.5)
			Maximal neorectal volume, ml	107.0 ± 42.0	120.0 ± 60.0	-0.3 (-0.7; 0.2)	-0.2 (-0.6; 0.2)
Machado, 2005[810] N = 71 22% female	Low anterior resection and total mesorectal excision with a colonic J-pouch anastomosis	Low anterior resection and total mesorectal excision with a colonic J-pouch or a side-to-end anastomosis.	Anal resting pressure, mm/Hg	42.0 ± 15.3	47.0 ± 10.7	-0.4 (-0.8; 0.1)	-0.8 (-1.8; 0.2)
			Resting pressure volume, mm Hg2cm	12,722.0 ± 8,110.7	11,342.0 ± 8,508.7	0.2 (-0.3; 0.6)	0.0 (0.0; 0.0)
			Anal squeeze pressure, mm/Hg	106.0 ± 16.7	106.0 ± 14.0	0.0 (-0.5; 0.5)	0.0 (-0.4; 0.4)
			Squeeze pressure volume, mm Hg2cm	48,765.0 ± 43,961.3	55,650.0 ± 26,946.0	-0.2 (-0.7; 0.3)	0.0 (0.0; 0.0)
			Maximum neorectal volume, ml	178.0 ± 32.0	126.0 ± 16.0	**2.0 (1.5; 2.6)**	1.6 (1.2; 2.1)
			Neorectal compliance	4.2 ± 0.8	3.2 ± 0.7	**1.4 (0.8; 1.9)**	42.4 (26.2; 58.6)
			Neorectal mobility	8.0 ± 4.7	13.0 ± 4.0	**-1.1 (-1.7; -0.6)**	-8.8 (-12.7; -5.0)

Table F208. Comparative effectiveness of surgical interventions (diversion) on fecal incontinence in adults (instrumental outcomes) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
			Neorectal sensitivity, mm/Hg, initial sensation	10.0 ± 0.8	10.0 ± 3.3	0.0 (-0.5; 0.5)	0.0 (-4.7; 4.7)
			Neorectal sensitivity, mm/Hg, urge	15.0 ± 3.3	20.0 ± 0.0		0.0 (0.0; 0.0)
Jiang, 2005[819] N=44 48% female	Side-to-end anastomosis after low anterior resection	Colonic J-pouch reconstruction after low anterior resection	maximal resting pressure	63.3±23.0	54.0±24.5	0.4(-0.2;1.0)	0.7(-0.3;1.8)
	Side-to-end anastomosis after low anterior resection	Colonic J-pouch reconstruction after low anterior resection	maximal contraction pressure	207.1±104.3	148.5±66.6	**0.7(0.1;1.3)**	0.5(0.1;0.8)
	Side-to-end anastomosis after low anterior resection	Colonic J-pouch reconstruction after low anterior resection	squeeze pressure	143.8±95.0	94.4±58.8	0.6(0.0;1.2)	0.7(0.0;1.3)
	Side-to-end anastomosis after low anterior resection	Colonic J-pouch reconstruction after low anterior resection	Continence	1.3±1.0	1.3±1.0	0.0(-0.6;0.6)	0.0(-43.5;43.5)
Patients with ulcerative colitis							
Reilly, 1997[820] N = 41 34% female	Abdominal colectomy excising anal transition zone and hand sewing the pouch to the anal canal (Ileal Pouch-Anal Anastomosis)	Abdominal colectomy preserving anal transition zone and double stapling the pouch to the anal canal (Ileal Pouch-Anal Anastomosis)	Maximum resting pressure (mm/Hg)	49.4 ± 18.5	78.3 ± 24.5	**-1.3 (-2.1; -0.5)**	-1.7 (-2.7; -0.7)
			Maximum average squeeze pressure (mm/Hg)	144.0 ± 44.1	195.0 ± 63.5	**-0.9 (-1.7; -0.2)**	-0.5 (-0.8; -0.1)
			Scintigraphic outcome: rest	116.0 ± 14.3	119.0 ± 21.7	-0.2 (-0.9; 0.5)	-0.1 (-0.7; 0.4)
			Scintigraphic outcome: squeeze	130.0 ± 14.0	135.0 ± 19.3	-0.3 (-1.0; 0.4)	-0.2 (-0.7; 0.3)

Table F208. Comparative effectiveness of surgical interventions (diversion) on fecal incontinence in adults (instrumental outcomes) (continued)

Author Sample	Active Treatment	Control Treatment	Outcome	Mean ± After Active Treatment	Mean ± STD After Control Treatment	Mean Difference (95% CI)	% Change from Control (95% CI)
			Scintigraphic outcome: perineal descent (cm)	60.0 ± 19.8	56.1 ± 18.0	0.2 (-0.5; 0.9)	0.4 (-0.9; 1.6)
			Pudendal nerve terminal motor latency (ms), right	1.9 ± 0.4	2.1 ± 1.2	-0.2 (-0.9; 0.5)	-11.7 (-45.2; 21.8)
			Pudendal nerve terminal motor latency (ms), left	1.9 ± 0.3	1.5 ± 0.6	0.7 (0.0; 1.4)	44.7 (-1.8; 91.1)
McKee, 1992[813] N = 18 50% female	Abdominal rectopexy without zigmoidectomy	Abdominal rectopexy with zigmoidectomy of redundant sigmoid colon and end-to-end anastomosis of colon and rectum made in pelvic brim	Maximum resting anal pressure, mm/Hg	56.0 ± 13.0	40.0 ± 6.0	**1.6 (0.5; 2.7)**	4.0 (1.3; 6.6)
			Volume to first sensation, ml	115.0 ± 32.0	143.0 ± 23.0	-1.0 (-2.0; 0.0)	-0.7 (-1.4; 0.0)
			Volume at first leak, ml	467.0 ± 187.0	383.0 ± 185.0	0.5 (-0.5; 1.4)	0.1 (-0.1; 0.4)
			Rectal compliance, mm/Hg	0.2 ± 0.0	0.1 ± 0.0	**7.0 (4.4; 9.6)**	7,000.0 (4,404.6; 9,595.4)
Oresland, 1988[823] N = 40 50% female	Anal balloon dilatation with step-wise increasing pressure (5-80cm/H20), distention ~60 seconds for 50-60 minutes.	Sphincter training with visual feedback for 50-60 minutes daily.	Resting anal pressure at 1 year, mm/Hg	56.0 ± 17.0	50.0 ± 15.0	0.4 (-0.3; 1.0)	0.8 (-0.5; 2.0)

Bold- significant difference in outcomes at 95%confidence level

Table F209 Evidence tables of diagnostic values of the tests to identify UI and FI in adults .

Author, Year, Study Design Level of Evidence Settings	Purpose/Aim of Study	Population: Subject Age, Gender, Race, Ethnicity, Residency	Urodynamic Criteria of UI Definition of Incontinence,
De Muylder, 1992[826] Prospective Observational II-2 Community	To evaluate diagnostic value of careful history taking compared to urodynamic evaluation in the diagnosis of female patients with micturition disorders	408 women with symptoms of UI, 18-78 years old; 202 postmenopausal	ICS. A UD diagnosis of detrusor instability was made if urethrocystometry demonstrated a rise in true detrusor pressure of 15cm water or more. A diagnosis of detrusor instability was also made if a true detrusor rise of more than 5cm water was associated with urethral relaxation and incontinence. Genuine stress incontinence was diagnosed when UI occurred in the absence of a detrusor contraction associated with a rise in intra-abdominal pressure.
Cundiff, 1997[827] Retrospective Observational II-2 Community	To characterize historic and clinical parameters in incontinent women to determine the predictive value for urodynamic diagnoses	535 Women Mean age: 55.7 Range:21-95 SD:13.5 USA	Occurrence of UI coincident with coughing, sneezing, lifting, and walking was recorded as symptoms of stress urinary incontinence. UI occurring with symptoms of urgency was documented as urge urinary incontinence. ICS
Holtedahl, 2000[828] RCT I Community	To test the usefulness of urodynamic examination in female urinary incontinence	698 Women Age range: 50-74 Norway	ICS. Leakage was objectively demonstrated in at least one of three ways: visible leakage on coughing during the gynecological examination; a positive 48 hour pad test; or recording of “wet” on a 48 hour frequency/volume chart. UD diagnoses were based on both symptoms and signs: USI when there was a positive stress test with pad weight increase and/or negative maximal urethral closure pressure on coughing; UUI when there was leakage together with motor urgency in the form of detrusor contractions associated with strong desire to void during the filling phase (definite urge), or when there were signs of sensory urgency (such as a subjective maximal capacity <400ml and/or >7 voids/24 hours as shown in the frequency/volume chart brought along by each woman) associated with a history of involuntary leakage together with a strong desire to void (presumed urge); Mixed incontinence if criteria of stress as well as urge were fulfilled. A maximal urethral closing pressure of <25cm/H2O when the patient was resting was interpreted as a sign of urethral insufficiency, although there is no precise cut-off for this condition.
Yalcin, 2004[829] RCT I Community	To assess the accuracy with which a clinical diagnostic algorithm for SUI based on symptoms and signs without including urodynamics predicted the observation of	1,455 women Mean age: 51.3 Range: 28-81.7 SD: 11.2 USA	Subjects must have reported a predominant symptom of SUI with a weekly incontinent episode frequency ≥4 in the Phase 2 study and an incontinent episode frequency of ≥7 in 2 Phase 3 studies, in which an episode was defined as easily noticeable urine leakage that wet a pad or clothing and occurred with

Table F209 Evidence tables of diagnostic values of the tests to identify UI and FI in adults (clinical history vs. multi channel urodynamics) (continued)

Author, Year, Study Design Level of Evidence Settings	Purpose/Aim of Study	Population: Subject Age, Gender, Race, Ethnicity, Residency	Urodynamic Criteria of UI Definition of Incontinence,
	urodynamic SUI and the condition of SUI		physical stress such as coughing, sneezing or exercising. ICS
Diokno, 1987[830] Prospective Observational II-2 Community	To characterize urinary incontinence observed in elderly women and to assess the importance of various parameters used to evaluate urinary incontinence	200 women Mean: 68.5 Range age: 55-90 SD:8.6 USA	A clinical diagnosis of SUI was made when patient described loss of urine while straining, coughing, bending over, and/or provided objective evidence of stress loss during the physical exam. The loss of urine was clinically considered UUI when it followed an immediate toilet need and nocturia of three or more times was reported. ICS
Diokno, 1990[831] RCTI Community	To determine the value of various tests used to evaluate UI	456 women Age range:60-86 USA	SUI when urine loss was associated with physical exertion. UUI when urine loss was preceded by an urge to void. A UD diagnosis of incompetent urethral sphincter was made when 1 of the 3 findings was observed: Positive stress test, positive urine loss on stress cystography, positive findings on dynamic urethral profilometry. A diagnosis of competent urethral sphincter made if none of the criteria was satisfied,
Fitzgerald, 2002[832] CT II-1 Community	To determine whether scores on two validated urinary incontinence symptom scales predicted eventual urodynamic diagnoses.	293 women Mean age: 57 Range: 15-87 USA	ICS
Ishiko, 2000[833] CT II-1 Community	Purpose was to determine whether the urinary incontinence (UI) score is significantly useful in evaluating the clinical status of UI	198 women Mean age: 59.1 Range: 27-73 SD: 12.2 Japan	Gaudenz questionnaire partially modified to make it more suitable for a Japanese population was used in this study. It consisted of 15 questions. The answers to each question were assigned a certain number of points, and depending on the answer, included in the stress-score s-s or urge-score u-s. The total s-s and u-s points were added up separately, and a diagnosis was made based on the zones into which each of the scores fell. ICS
Korda, 1987[834] CT II-1 Community	To evaluate the diagnostic potential of careful history taking	566 women Mean age: 49 Australia	ICS
Kujansuu, 1982[835] Prospective Observational II-2	To evaluate the diagnostic accuracy of a scored urological questionnaire in the differential diagnosis of female urinary incontinence	121 women	

Table F209 Evidence tables of diagnostic values of the tests to identify UI and FI in adults (clinical history vs. multi channel urodynamics) (continued)

Author, Year, Study Design Level of Evidence Settings	Purpose/Aim of Study	Population: Subject Age, Gender, Race, Ethnicity, Residency	Urodynamic Criteria of UI Definition of Incontinence,
Lagro-janssen, 1991[836] CT II-1 Community	To assess the diagnostic potential of the patient's medical history in distinguishing between genuine USI, detrusor instability and mixed incontinence in primary care.	103 women Age range: 20-65 Netherlands	Incontinence was defined as the involuntary loss of urine twice or more times a month. SUI is the loss of urine during coughing and /or sneezing. UUI is the involuntary loss of urine associated with a strong desire to void. ICS
Niecestro, 1992[837] Prospective Observational II-2 Community	To evaluate the ability of stresscath to detect bladder neck incompetence in patients referred for urodynamics	66 women USA	
Ouslander, 1987[838](Prospect ive Observational II-2 Community	To compare the clinical presentation of incontinence to diagnoses based on urological and urodynamic evaluation	135 women Age >65years USA	ICS
Ramsay, 1993[839] Retrospective Observational II-2 Community	To define the symptomatology of those patients with detrusor instability, and those with genuine stress incontinence, looking particularly at the severity of urinary incontinence; and to devise a model to more accurately predict the diagnosis from the history alone.	200 women Mean age: 50.3 SD: 11.15 UK	Assessment of the severity made by asking 4 questions: 1. The frequency of urinary leakage (from 0 = never, 1 = <1/monthly, to 6 = ≥6/day) 2. The severity of urinary leakage was assessed by degree of protection required (ranging from 0 = none, 1 = minimal to 5 = continuous sanitary protection) 3. The number of pads used per day 4. The social restriction their incontinence caused (this was graded 0 = none, 1 = restricted, and 2 = housebound)
Sand, 1988[840] CT II-1 Community	To assess the value of history in assessing in establishing the etiology of UI.	218 women Mean age: 51.8 Range: 18-80 USA	ICS
Sandvik, 1995[841] CT II-1 Community	To validate simple diagnostic questions concerning female urinary incontinence, for the subsequent implementation in an epidemiological survey.	785 women Norway	A positive answer to the following question was presumed to be an indication of SUI: “Do you lose urine during sudden physical exertion, lifting, coughing or sneezing?’ UUI was presumed to be indicated by a positive answer to the question: “Do you experience such a strong and sudden urge to void that you leak before reaching the toilet?” A positive answer to both questions was registered as mixed incontinence. ICS
Sunshine[842]	Clinical correlation of urodynamic testing in patients with UI	109	

Table F209 Evidence tables of diagnostic values of the tests to identify UI and FI in adults (clinical history vs. multi channel urodynamics) (continued)

Author, Year, Study Design Level of Evidence Settings	Purpose/Aim of Study	Population: Subject Age, Gender, Race, Ethnicity, Residency	Urodynamic Criteria of UI Definition of Incontinence,
Cantor, 1980[843] Prospective Observational II-2		214 women	
Weidner, 2001[844] Prospective Observational II-2 Community	To determine the predictive value of the symptom of stress urinary incontinence and to evaluate the ability of other factors suggested by a published Agency for Health Care Policy and Research guideline for the discrimination of patients unlikely to require urodynamic testing before surgical management	950 women Mean age: 55.8 SD: 13.3 USA	The diagnosis of genuine SUI was made if the subject had the symptom of stress incontinence and had observable leakage produced by stress without concurrently demonstrable detrusor activity during urethrocystometry or urethral profilometry or had a positive result of a direct visualization test immediately after the catheters were removed in the total absence of detrusor instability during previous urethrocystometry. The diagnosis of detrusor instability was made if the subject had a detrusor contraction in association with urgency and leakage. The diagnosis of intrinsic sphincteric deficiency was made on the basis of combined historical, physical, urodynamic, and endoscopic parameters. 16. ICS
Bergman, 1990[845] Prospective Observational II-2 Community	To evaluate prospectively the reliability of the history in the evaluation of female UI	154 women Mean age: 48.7 France	Genuine SUI was urodynamically diagnosed when there was visible loss of urine during coughing with pressure equalization between bladder and urethra and in the absence of bladder contraction. ICS
Le Coutour, 1990[846] Prospective Observational II-2 Community	To assess the diagnostic value of history and UD investigation in female urinary incontinence	113 women Mean age: 50 Sweden	
Petros, 1992[847] Retrospective Observational II-2 Community	To test the proposition that the history of urge UI was accurate, by direct observation of events occurring during a provocative hand washing test.	Age range: 35-71	ICS
van Waalwijk van Doorn, 1997[848] Prospective Observational II-2 Community	To investigate the usefulness of ambulatory UD to quantify detrusor activity, and develop a parameter to quantify the grade of detrusor over-activity.	228 women Mean age:44.4 Range: 9-75 Netherlands	ICS

Table F209 Evidence tables of diagnostic values of the tests to identify UI and FI in adults (clinical history vs. multi channel urodynamics) (continued)

Author, Year, Study Design Level of Evidence Settings	Purpose/Aim of Study	Population: Subject Age, Gender, Race, Ethnicity, Residency	Urodynamic Criteria of UI Definition of Incontinence,
Ficazzola, 1998[849] Prospective/Observational II-2 Community	To determine the incidence of intrinsic sphincter deficiency and bladder dysfunction, and the contribution of each to incontinence.	60 men Mean age: 64.8 Range: 48-73 USA	Detrusor instability was defined as any involuntary bladder contraction of 15 cm. water, according to the International Continence Society, or involuntary contraction of any magnitude associated with urge. ICS
Ding, 1997[850] Prospective/Observational II-2	To study the usefulness of lower urinary tract symptoms and postvoid residual urine volume in the diagnosis of voiding dysfunction in elderly men	126 men	
Porru, 1994[851] Prospective/Observational II-2 Community	To evaluate bladder behavior in patients with DI correlated incontinence and micturition disorders by performing both a conventional UD investigation and extramural ambulatory monitoring during normal daily activity.	46 Men and women Mean age: 48.4 Range: 22-80 Italy	ICS
Digesu, 2003[852] CT I	To determine whether the urodynamic diagnosis is useful in the management of women with symptoms of an overactive bladder (OAB).	4,500 women Mean age: 55.4 Range: 22-73 UK	Genuine stress incontinence was classified as mild, moderate, and severe if leakage of urine occurred following five, three or one coughs, respectively. Detrusor instability was diagnosed when detrusor contractions were seen in the presence of urgency or urinary leakage while attempting to inhibit micturition. ICS
Clarke, 1997[853]	To characterize historic and clinical parameters in incontinent women to determine the predictive value for urodynamic diagnoses	1,000 women Mean age: 53 Australia	
Kong, 1990[854] Retrospective/Observational II-2		269 women Mean age: 77 Range: 59-94 UK	

Table F210. Recommended questionnaires for UI and lower urinary tract symptoms/overactive bladder (adapted from the Symptom and Quality of Life Committee of the International Consultation on Incontinence)[855]

Combined symptoms and quality of life impact of UI	
Men and women	International Consultation on Incontinence Questionnaire[856]
Women	Bristol Female Lower Urinary Tract Symptoms Questionnaire-Short Form[857]
	Stress and Urge Incontinence and Quality of Life Questionnaire (SUIQQ)[858]
Men	International Continence Society male questionnaire, short form[859]
Combined symptoms and quality of life of overactive bladder	
Men and women	Overactive Bladder Questionnaire [860]
UI symptoms	
Women	Urogenital Distress Inventory[861]
	Urogenital Distress Inventory-6[862]
	Incontinence Severity Index[863]
	Bristol Female Lower Urinary Tract Symptoms Questionnaire[864]
Men	International Continence Society male, lower urinary tract symptoms primarily[865]
	Danish Prostatic Symptom Score, lower urinary tract symptoms primarily[866]
Quality of life impact of UI	
Men and women	Quality of Life in Persons with UI Questionnaire[867]
	Incontinence Classification System[868]
Women	King's Health Questionnaire[869]
	Incontinence Impact Questionnaire[870] Incontinence Impact Questionnaire -7[862]
	UI Severity Score (UISS)[871,872]
	CONTILIFE—Urinary Incontinence-specific Measure of Quality of Life[873]
Men	None

Table F211. Questionnaires with rigorous validity, reliability and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence[855]

International Consultation on Incontinence Questionnaire[856]

Consists of four questions and numeric scales:

1. How often do you leak urine? (0-5); never - all the time
2. How much urine do you usually leak? (0-6); none - large amount
3. Overall, how much does leaking urine interfere with your everyday life? (0-10); not at all - a great deal
4. When does urine leak? Multiple choices.

ICIQ score is the sum of questions 1-3.

Bristol Female Lower Urinary Tract Symptoms Questionnaire-short form[857]

BFLUTS questionnaire symptom items: numbers, labels, and response categories

Question	Symptom	Response Categories
1 +P	Frequency (times daily)	1-6, 7-8, 9-10, 11-12, 13+
2 +P	Nocturia	0, 1, 2, 3, 4+
3 +P	Urgency	Never, occasionally, sometimes, most of the time, all of the time
4 +P	Urge incontinence	Never, occasionally, sometimes, most of the time, all of the time
5 +P	Bladder pain	Never, occasionally, sometimes, most of the time, all of the time
6 +P	Frequency incontinence	Never, ≤1/week, 2-3/week, 1/day, several times a day
7 +P	Stress incontinence	Never, occasionally, sometimes, most of the time, all of the time
8 +P	Unpredictable miscellaneous incontinence	Never, occasionally, sometimes, most of the time, all of the time
9	Volume of leakage	No leakage, drops/pants damp, dribble/pants wet, floods: soaking through to outer clothing, floods: running down
12 +P	Hesitancy	Never, occasionally, sometimes, most of the time, all of the time
13 +P	Strain to start	Never, occasionally, sometimes, most of the time, all of the time
14 +P	Intermittency	Never, occasionally, sometimes, most of the time, all of the time
15 +P	Nocturnal incontinence	Never, occasionally, sometimes, most of the time, all of the time
16 +P	Reduced stream	Not reduced, reduced a little, quite reduced, reduced a great deal, no stream
17	Acute retention	No, yes once, yes twice, yes more than twice
18 +P	Burning	Never, occasionally, sometimes, most of the time, all of the time
19 +P	Incomplete emptying	Never, occasionally, sometimes, most of the time, all of the time
20	Stopping flow	Yes easily, yes with difficulty, no cannot stop the flowing
25 +P	Frequency (hours between voiding)	Every 4 hours or more, every 3 hours, every 2 hours, hourly
Sexual functioning		
21 +P	Pain due to dry vagina	Not at all, a little, somewhat, a lot
22 +P	Sex life spoiled	Not at all, a little, somewhat, a lot
23 +P	Pain during intercourse	Not at all, a little, somewhat, a lot
24 +P	Leakage during intercourse	Not at all, a little, somewhat, a lot
Quality of life		
10a	Change underclothes/wear protection	No, change underclothes, panty liners/mini pads, maxi/super sanitary towels, nappies/incontinence products
10b	Number of changes	No change, 1, 2-3, 4-5, more than 5 times
11	Change outer clothing	Never, occasionally, sometimes, most of the time, all of the time
26 +P	Cut down fluid	Never, occasionally, sometimes, most of the time, all of the time
27 +P	Affect daily tasks	Never, occasionally, sometimes, most of the time, all of the time
28 +P	Avoidance of situations where no toilet	Never, occasionally, sometimes, most of the time, all of the time
29 +P	Interfere with physical activity	Never, occasionally, sometimes, most of the time, all of the time
30 +P	Interfere with social life	Never, occasionally, sometimes, most of the time, all of the time
31	Overall interference with life	Never, occasionally, sometimes, most of the time, all of the time
32	How long symptoms bothered	<1 year, 1-2 years, 2-3 years, more than 3 years
33	Spend rest of life with no change	Perfectly happy, pleased, mostly satisfied, mixed feelings, mostly dissatisfied, very unhappy, desperate

+P indicates a linked question on the degree of the problem caused.

Table F211. Questionnaires with rigorous validity, reliability and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence (continued)

Confidential BFLUTS-SF Questionnaire

We would like to find out about your urinary symptoms and we are very grateful that you can help us by filling in this questionnaire. Please answer each question, thinking about the symptoms you have experienced in the last month. You will see that some questions ask how often you have a symptom:
Occasionally = less than one third of the time
Sometimes = between one and two thirds of the time
Most of the time = more than two thirds of the time
Please put a tick in one box for each question ✔ □

F1 During the night, how many times do you have to get up to urinate, on average?
- None - 0
- 1 - 1
- 2 - 2
- 3 - 3
- 4 or more - 4

F2 Do you have to rush to the toilet to urinate?
- Never - 0
- Occasionally - 1
- Sometimes - 2
- Most of the time - 3
- All of the time - 4

F3 Do you have pain in your bladder?
- Never - 0
- Occasionally - 1
- Sometimes - 2
- Most of the time - 3
- All of the time - 4

F4 How often do you pass urine during the day?
- Every 4 hours or more - 0
- Every 3 hours - 1
- Every 2 hours - 2
- Hourly - 3

BFLUTS-FS: sum scores F1-F4 - -

V1 Is there a delay before you can start to urinate?
- Never - 0
- Occasionally - 1
- Sometimes - 2
- Most of the time - 3
- All of the time - 4

V2 Do you have to strain to urinate?
- Never - 0
- Occasionally - 1
- Sometimes - 2
- Most of the time - 3
- All of the time - 4

V3 Do you stop and start more than once while you urinate?
- Never - 0
- Occasionally - 1
- Sometimes - 2
- Most of the time - 3
- All of the time - 4

BFLUTS-VS: sum scores V1-V3 - -

I1 Does urine leak before you can get to the toilet?
- Never - 0
- Occasionally - 1
- Sometimes - 2
- Most of the time - 3
- All of the time - 4

Table F211. Questionnaires with rigorous validity, reliability and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence (continued)

I2 How often do you leak urine?
- Never - 0
- Once or less per week - 1
- 2-3 times per week - 2
- Once per day - 3
- Several times per day - 4

I3 Does urine leak when you are physically active, exert yourself, cough, or sneeze?
- Never - 0
- Occasionally - 1
- Sometimes - 2
- Most of the time - 3
- All of the time - 4

I4 Do you ever leak for no obvious reason and without feeling that you want to go?
- Never - 0
- Occasionally - 1
- Sometimes - 2
- Most of the time - 3
- All of the time - 4

I5 Do you leak urine when you are asleep?
- Never - 0
- Occasionally - 1
- Sometimes - 2
- Most of the time - 3
- All of the time - 4

BFLUTS-IS: sum scores 11-15 - -

S1 To what extent do you feel that your sex life has been spoiled by your urinary symptoms?
- Not at all - 0
- A little - 1
- Somewhat - 2
- A lot - 3

S2 Do you leak urine when you have sexual intercourse?
- Not at all - 0
- A little - 1
- Somewhat - 2
- A lot - 3

BFLUTS-sex: sum scores S1 & S2 - -

QoL1 Do you need to change your outer clothing during the day because of urine leakage?
- Never - 0
- Occasionally - 1
- Sometimes - 2
- Most of the time - 3
- All of the time - 4

QoL2 Do you cut down on the amount of fluid you drink so that your urinary symptoms improve, and you can do the things that you want to do?
- Never - 0
- Occasionally - 1
- Sometimes - 2
- Most of the time - 3
- All of the time - 4

QoL3 To what extent have your urinary symptoms affected your ability to perform daily tasks (eg, cleaning, DIY, lifting objects)?
- Not at all - 0
- A little - 1
- Somewhat - 2
- A lot - 3

QoL4 Do you avoid places and situations where you know a toilet is not nearby (eg, shopping, traveling, theater, church)?
- Never - 0
- Occasionally - 1
- Sometimes - 2
- Most of the time - 3
- All of the time - 4

Table F211. Questionnaires with rigorous validity, reliability and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence (continued)

QoL5 Overall, how much do your urinary symptoms interfere with your life?
Not at all - 0
A little - 1
Somewhat - 2
A lot - 3
BFLUTS-QoL: Sum scores QoL1-QoL5 - -

Stress and Urge Incontinence and Quality of Life Questionnaire (SUIQQ)[858]

The Stress Incontinence Index consists of 9 questions on activities that cause leakage (when the woman coughs, sneezes, laughs, walks up or down stairs, rises from the bed, lifts heavy objects and during physical activity, sports and intercourse).
- Frequency of stress incontinence episodes: never, 1-4 times a month, 1-6 times a week, once a day, and more than once daily)
- Amount of leakage: nothing, drops/moist underwear, dripping/wet underwear, running/passes through all clothes, and running down the legs or down to the floor).

The Urge Incontinence Index consists of two questions: how often and to what extent urge incontinence is experienced.
The Quality of Life Index: (1) the number of incontinence diapers used (none, 1-3 per week, 4-6 per week, 1-4 per day, and more than 4 per day), (2) how often activities are avoided due to fear of leakage (never, seldom, sometimes, often, always), (3) how often places or situations are avoided due to fear of leakage (never, seldom, sometimes, often, always), and (4) how leakage influences holidays, family life, social life and sleep during the night. These last four questions are marked 'yes', 'no' or 'not relevant'. Except for the first stress incontinence item, therefore, all items are expressed in a scale of five categories, with scores of 0-4. The nine questions from the first stress item have possible choices 'yes', 'no' and 'not relevant'. The sum score from the nine stress incontinence questions are recalculated into five categories (0, 1-3, 4-5, 6-7 and 8-9) to give this item the same relative weight as the others.

The International Continence Society male questionnaire, short form[859]

We would like to find out about your urinary symptoms and we are very grateful that you can help us by filling in this questionnaire. Please answer each question, thinking about the symptoms you have experienced in the last month.
You will see that some questions ask how often you have a symptom:
Occasionally - less than one-third of the time
Sometimes - between one and two-thirds of the time
Most of the time - more than two-thirds of the time
Is there a delay before you can start to urinate?
Do you have to strain to continue urinating?
Would you say that the strength of your urinary stream is. . .
normal
occasionally reduced
sometimes reduced
reduced most of the time
reduced all of the time
Do you stop and start more than once while you urinate?
How often do you feel that your bladder has not emptied properly after you have urinated?
ICS male VS: sum scores V1–V5
Do you have to rush to the toilet to urinate?
Does urine leak before you can get to the toilet?
Does urine leak when you cough or sneeze?
Do you ever leak for no obvious reason and without feeling that you want to go?
Do you leak urine when you are asleep?
How often have you had a slight wetting of your pants a few minutes after you had finished urinating and had dressed yourself?
ICS male IS: sum scores I1-I6
Frequency
How often do you pass urine during the day?
hourly
every 2 hours
every 3 hours
every 4 hours or more

Table F211. Questionnaires with rigorous validity, reliability and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence (continued)

Nocturia During the night, how many times do you have to get up to urinate, on average?
- none
- one
- two
- three
- four or more

QoL Overall, how much do your urinary symptoms interfere with your life?
- not at all
- a little
- somewhat
- a lot

The International Continence Society male questionnaire, short form[859]

1 1P	Frequency (times daily)	1-6, 7-8, 9-10, 11-12 1 131
2 1P	Nocturia	0, 1, 2, 3 1 41
3 1P	Urgency	Never, occasionally, sometimes, most of time, all of time
4 1P	Urge incontinence	Never, occasionally, sometimes, most of time, all of time
5 1P	Bladder pain	Never, occasionally, sometimes, most of time, all of time
6 1P	Stress incontinence	Never, occasionally, sometimes, most of time, all of time
7 1P	Unpredictable miscellaneous incontinence	Never, occasionally, sometimes, most of time, all of time
8 1P	Hesitancy	Never, occasionally, sometimes, most of time, all of time
9 1P	Starting strain	Never, occasionally, sometimes, most of time, all of time
10 1P	Continuing strain	Never, occasionally, sometimes, most of time, all of time
11 1P	Urination seated	Standing, seated
12 1P	Decreased stream (words)	Normal, decreased, never, occasionally, sometimes, most of time, all of time
13	Weak stream always	Yes, no
14	Decreased stream (picture)	4 Distances
15 1P	Intermittency	Never, occasionally, sometimes, most of time, all of time
16 1P	Dysuria	Never, occasionally, sometimes, most of time, all of time
17 1P	Incomplete emptying	Never, occasionally, sometimes, most of time, all of time
18 1P	Terminal dribbling	Never, occasionally, sometimes, most of time, all of time
19 1P	Post-void dribbling	Never, occasionally, sometimes, most of time, all of time
20 1P	Nocturnal incontinence	Never, occasionally, sometimes, most of time, all of time
22 1P	Repeat urination	Never, occasionally, sometimes, most of time, all of time
23	Acute retention	No, 1, 2, more than 2
28 1P	Frequency (hrs. between voidings)	4, 3, 2 hours., hourly

Possible responses for the following questions:
- Occasionally - less than one third of the time
- Sometimes - between one and two thirds of the time
- Most of the time - more than two thirds of the time

-Is there a delay before you can start to urinate?
- Do you have to strain to continue urinating?
- Would you say that the strength of your urinary stream is
  - normal
  - occasionally reduced
  - sometimes reduced
  - reduced most of the time
  - reduced all of the time.

-Do you stop and start more than once while you urinate?
-How often do you feel that your bladder has not emptied properly after you have urinated?
-Do you have to rush to the toilet to urinate?
-Does urine leak before you can get to the toilet?
-Does urine leak when you cough or sneeze?
-Do you ever leak for no obvious reason and without feeling that you want to go?
-Do you leak urine when you are asleep?
-How often have you had a slight wetting of your pants a few minutes after you had finished urinating and had dressed yourself?

Table F211. Questionnaires with rigorous validity, reliability and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence (continued)

Frequency
-How often do you pass urine during the day?
  hourly
  every 2 hours
  every 3 hours
  every 4 hours or more
-During the night, how many times do you have to get up to urinate, on average?
  none
  one
  two
  three
  four or more
-Overall, how much do your urinary symptoms interfere with
  your life?
  not at all
  a little
  somewhat
  a lot

Overactive bladder symptom and health-related quality of life questionnaire[860]

This questionnaire asks about how much you have been bothered by selected bladder symptoms during the past 4 weeks. Please circle the number that best describes the extent to which you were bothered by each symptom during the past 4 weeks. There are no right or wrong answers. Please be sure to answer every question using possible responses: not at all, a little bit, somewhat, quite a bit, a great deal, a very great deal

During the past 4 weeks, how bothered were you by:
1. Frequent urination during the daytime hours
2. An uncomfortable urge to urinate
3. A sudden urge to urinate with little or no warning
4. Accidental loss of small amounts of urine
5. Nighttime urination
6. Waking up at night because you had to urinate
7. An uncontrollable urge to urinate
8. Urine loss associated with a strong desire to urinate

During the past 4 weeks, how often have your bladder symptoms: none of the time, a little of the time, some of the time, a good bit of the time, most of the time, all of the time
9. Made you carefully plan your commute?
10. Caused you to feel drowsy or sleepy during the day?
11. Caused you to plan 'escape routes' to restrooms in public places?
12. Caused you distress?
13. Frustrated you?
14. Made you feel like there is something wrong with you?
15. Interfered with your ability to get a good night's rest?
16. Caused you to decrease your physical activities (exercising, sports, etc.)?
17. Prevented you from feeling rested upon waking in the morning?
18. Frustrated your family and friends?
19. Caused you anxiety or worry?
20. Caused you to stay home more often than you would prefer?
21. Caused you to adjust your travel plans so that you are always near a restroom?
22. Made you avoid activities away from restrooms (i.e., walks, running, hiking)?
23. Made you frustrated or annoyed about the amount of time you spend in the restroom?
24. Awakened you during sleep?
25. Made you worry about odor or hygiene?
26. Made you uncomfortable while traveling with others because of needing to stop for a restroom?
27. Affected your relationships with family and friends?
28. Caused you to decrease participating in social gatherings, such as parties or visits with family or friends?
29. Caused you embarrassment?
30. Interfered with getting the amount of sleep you needed?
31. Caused you to have problems with your partner or spouse?
32. Caused you to plan activities more carefully?
33. Caused you to locate the closest restroom as soon as you arrive at a place you have never been?

Table F211. Questionnaires with rigorous validity, reliability and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence (continued)

Urogenital Distress Inventory[861]

Please indicate which symptoms you are now experiencing, and how bothersome they are for you. Be sure to answer all items.

Do you experience frequent urination? If yes, how much does it bother you? not at all; slightly; moderately; greatly
Do you experience a strong feeling of urgency to empty your bladder?
Do you experience urine leakage related to the feeling of urgency?
Do you experience urine leakage related to physical activity, coughing or sneezing?
Do you experience general urine leakage not related to urgency or activity?
Do you experience small amounts of urine leakage (that is, drops)?
Do you experience large amounts of urine leakage?
Do you experience nighttime urination?
Do you experience bedwetting?
Do you experience difficulty emptying your bladder?
Do you experience a feeling of incomplete bladder emptying?
Do you experience lower abdominal pressure?
Do you experience pain when urinating?
Do you experience pain in the lower abdominal or genital area?
Do you experience heaviness or dullness in the pelvic area?
Do you experience a feeling of bulging or protrusion in the vaginal area?
Do you experience bulging or protrusion you can see in the vaginal area?
Do you experience pelvic discomfort when standing or physically exerting yourself?
Do you have to push on the vaginal walls to have a bowel movement?
Other symptoms

Incontinence impact questionnaire

Some women find that accidental urine loss and/or prolapse may affect their activities, relationships, and feelings. The questions below refer to areas in your life which may have been influenced or changed by your problem. For each question, check the response that best describes how much your activities, relationships, and feelings are being affected by urine leakage and/or prolapse. Responses: not at all; slightly; moderately; greatly

Has urine leakage and/or prolapse affected your:
Ability to do household chores (cooking, housecleaning, laundry)
Ability to do usual maintenance or repair work done in home or yard
Shopping activities
Hobbies and pastime activities
Physical recreational activities such as walking, swimming, or other exercise
Entertainment activities such as going to a movie or concert
Ability to travel by car or bus for distances less than 20 minutes away from home
Ability to travel by car or bus for distances greater than 20 minutes away from home
Going to places if you are not sure about available restrooms
Going on vacation
Church or temple attendance
Volunteer activities
Employment (work) outside the home
Having friends visit you in your home
Participating in social activities outside your home
Relationship with friends
Relationship with family excluding husband/companion
Ability to have sexual relations
Way you dress
Emotional health
Physical health
Sleep
Does fear of odor restrict your activities?
Does fear of embarrassment restrict your activities?

In addition, does your problem cause you to experience any of the following feelings?
Nervousness or anxiety
Fear
Frustration
Anger
Depression
Embarrassment

Table F211. Questionnaires with rigorous validity, reliability and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence (continued)

Incontinence Severity Index[863]

How often do you experience urinary leakage?
- Less than once a month
- One or several times a month
- Every day and/or night

How much urine do you lose each time?
- Drops
- Small splashes
- More

The severity index is created by multiplying the results of questions 1 and 2:
- 1-2 = slight
- 3-4 = moderate
- 6-8- = severe

In the three-level severity index, responses to the second question are first aggregated into drops (1) and more (2), and then multiplied with the frequency, resulting in the following index values (1–8):
- 1–2 = slight
- 3–4 = moderate
- 6–8 = severe

The four-level severity index is based on the following index values (1–12):
- 1–2 = slight
- 3–6 = moderate
- 8–9 = severe
- 12 = very severe

International Continence Society male, lower urinary tract symptoms primarily[865]

During the day, how many times do you urinate, on average?
- 1 to 6 times
- 7 to 8 times
- 9 to 10 times
- 11 to 12 times
- 13 or more times

How much of a problem is this for you?
- Not a problem
- A bit of a problem
- Quite a problem
- A serious problem

During the night, how many times do you have to get up to urinate, on average?
- None
- One
- Two
- Three
- Four or more

How much of a problem is this for you?

Would you say that the strength of your urinary stream is....
- Normal
- Occasionally reduced
- Sometimes reduced
- Reduced most of the time
- Reduced all of the time

How much of a problem is this for you?

Please ring the number that corresponds with the strength of your urinary stream over the past month.

How often do you pass urine during the day?
- Hourly
- Every 2 hours
- Every 3 hours
- Every 4 hours or more

How much of a problem is this for you?

Table F211. Questionnaires with rigorous validity, reliability and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence (continued)

Incontinence Quality of Life (in persons with UI) questionnaire[867]

I worry about not being able to get to the toilet on time.
I worry about coughing and sneezing.
I have to be careful about standing up after sitting down.
I worry where the toilets are in new places.
I feel depressed.
I don't feel free to leave my home for long periods of time.
I feel frustrated because my UI prevents me from doing what I want.
I worry about others smelling urine on me.
Incontinence is always on my mind.
It's important for me to make frequent trips to the toilet.
Because of my incontinence, it is important to plan every detail in advance.
I worry about my incontinence getting worse as I grow older.
I have a hard time getting a good night's sleep.
I worry about being embarrassed or humiliated be cause of my incontinence.
My incontinence makes me feel like I'm not a healthy person.
My UI makes me feel helpless.
I get less enjoyment out of life because of my UI.
I worry about wetting myself.
I feel like I have no control over my bladder.
I have to watch what I drink.
My UI limits my choice of clothing.
I worry about having sex.

All items use the following response scale:

1 = Extremely
2 = Quite a bit
3 = Moderately
4 = A little
5 = Not at all

Subscale structure:

Avoidance and limiting behavior: items 1, 2, 3, 4, 10, 11, 13, and 20
Psychosocial impacts: items 5, 6, 7, 9, 15, 16, 17, 21, and 22
Social embarrassment: items 8, 12, 14, 18, and 19

Incontinence Classification System[868]

Domain	Nature of the Questions
Social interactions	Relationships with friends Relationships with spouse/companions Difficulty establishing new relationships
Personal strain	Interference with the ability to perform usual daily tasks Ability to engage in physical recreation Ability to engage in non strenuous recreation Nervousness or anxiety related to incontinence
Global health and quality of life	Effect on overall health Effect on overall level of energy Feelings of being less useful Overall quality of life Impact on quality of life if there was no incontinence
Satisfaction	Overall satisfaction with life
Financial	Effect on financial situation
Sexuality	Interference with sexual activity

Table F211. Questionnaires with rigorous validity, reliability and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence (continued)

King's Health Questionnaire[869]

How would you describe your health at present? very good; good; fair; poor; very poor
How much do you think your bladder problem affects your life? not at all; a little; moderately; a lot

What are your bladder problems and how much do they affect you?
- Frequency: (going to the toilet very often)
- Nocturia: (getting up at night to pass urine)
- Urgency: (a strong and difficult to control desire to pass urine)
- Urge Incontinence: (urinary leakage associated with a strong desire to pass urine)
- Stress Incontinence: (urinary leakage with physical activity e.g. coughing, sneezing or running)
- Nocturnal Enuresis: (wetting the bed at night)
- Intercourse Incontinence: (urinary leakage with sexual intercourse)
- Frequent waterworks infections
- Bladder pain
- Difficulty passing urine

Below are some daily activities that can be affected by bladder problems. How much does your bladder problem affect you?
- a. To what extent does your bladder problem affect your household tasks (e.g. cleaning, shopping)
- b. Does your bladder problem affect your job or your normal activities outside the home

Physical Limitations (Tick the box that applies to you)
- a. Does your bladder problem affect your physical activities (e.g. going for a walk, run, sport, gym etc.)?
- b. Does your bladder problem limit your ability to travel?

Social Limitations
- a. Does your bladder problem affect your social life?
- b. Does your bladder problem affect your ability to see/visit friends?

Personal Relationships
- a. Does your bladder problem affect your relationship with your partner?
- b. Does your bladder problem affect your sex life?
- c. Does your bladder problem affect your family life?

Emotions
- a. Does your bladder problem make you feel depressed?
- b. Does your bladder problem make you feel anxious or nervous?
- c. Does your bladder problem make you feel bad about yourself?

Sleep/ Energy
- a. Does your bladder problem affect your sleep?
- b. Do you feel worn out/tired?

Do you do any of the following? If so how much?
- a. Wear pads to keep dry?
- b. Be careful how much fluid you drink?
- c. Change you underclothes when they get wet?
- d. Worry in case you smell?
- e. Get embarrassed because of your bladder problem?

Incontinence Impact Questionnaire-7[862]

Some people find that accidental urine loss may affect their activities, relationships, and feelings. The questions below refer to areas in your life that may have been influenced or changed by your problem. For each question, circle the response that best describes how much your activities, relationships, and feelings are being affected by urine leakage.

Has urine leakage affected your: not at all=1; slightly=1; moderately=2; greatly=3
- Ability to do household chores (cooking, housecleaning, laundry)?
- Physical recreation such as walking, swimming, or other exercise?
- Entertainment activities (movies, concerts, etc.)?
- Ability to travel by car or bus more than 30 minutes from home?
- Participation in social activities outside your home?
- Emotional health (nervousness, depression, etc.)?
- Feeling frustrated?

Items 1 and 2 = physical activity
Items 3 and 4 = travel
Item 5 = social/relationships
Items 6 and 7 = emotional health

Table F211. Questionnaires with rigorous validity, reliability and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence (continued)

Scoring. Item responses are assigned values of 0 for "not at all," 1 for "slightly," 2 for "moderately," and 3 for "greatly." The average score of items responded to is calculated. The average, which ranges from 0 to 3, is multiplied by 33 1/3 to put scores on a scale of 0 to 100.

UI Severity Score (UISS)[871 872]

The UISS questionnaire consists of 10 questions designed to quantify the amount of leakage, the degree to which UI affects aspects of a woman's daily life, and need to use pads. The responses are scored from 0 to 2, yielding a total score between 0 and 20. The lower scores reflect better quality of life. Marking the most appropriate alternative: not at all=0; sometimes=1; often=2.

1. Do you experience urine leakage not related to effort or position (for example lying down)?
2. Do you experience urine leakage related to minor physical activity (e.g. walking or rising)?
3. Do you experience urine leakage related to sudden, strong physical activity or even coughing or sneezing?
4. Has urine leakage disturbed your daily chores (shopping, cooking, housecleaning etc.)?
5. Has urine leakage disturbed your employment (client service, work performance etc)?
6. Are you afraid that others will notice your problem (fear of your odour or wetness etc.)?
7. Do you have to restrict or give up social activities (such as visiting friends, physical activity, theatre, church etc.)?
8. Do your incontinence symptoms disturb your sex life?
9. Does incontinence cause irritation of your external genital organs?
10. How often must you use a protective nappy or pad?

CONTILIFE- Urinary Incontinence-Specific Measure of Quality of Life[873]

The following questions are about your health over the last 4 weeks. Choose the answer which best describes what you feel or have felt over the last 4 weeks giving only one answer per line. If certain activities do not apply (e.g. embarrassment when using public transport because you do not use public transport), put a tick in the "not applicable" box. Please answer this questionnaire on your own, without help. To answer, tick the box which applies to you: not at all; a little; moderately; a lot; extremely

DAILY ACTIVITIES

Over the last 4 weeks, how much have your urinary problems bothered you:

1. When you were away from your home?
2. When you were driving or being a passenger?
3. When going up or down stairs?
4. When shopping?
5. When queuing (bus stop, cinema, supermarket)?

Over the last 4 weeks, because of your urinary problems: none; a few; some; many; very many

6. Have you had to take frequent breaks during your work or daily activities?

Over the last 4 weeks, because of your urinary problems, how often: never; rarely; sometimes; often; all the time

7. Have you woken up having wet yourself?

EFFORT

Over the last 4 weeks, how much have your urinary problems bothered you: not at all; a little; moderately; a lot; extremely

8. When lifting or carrying heavy objects?
9. When doing sport (running, dancing, keep-fit)?
10. When blowing your nose, sneezing or coughing?
11. After a fit of laughter?

SELF IMAGE

Over the last 4 weeks, because of your urinary problems, how often: never; rarely; sometimes; often; all the time

12. Have you felt less attractive?
13. Were you afraid of giving off unwanted odors?
14. Were you afraid that other people might become aware of your problems?
15. Were you afraid of leaving stains at other people's homes or at work?
16. Did you have to change your clothes?

Over the last 4 weeks, in spite of your urinary problems, how often: never; rarely; sometimes; often; all the time

17. Have you felt at ease with yourself?

Over the last 4 weeks, because of your urinary problems: I never wear pads; not at all; a little; moderately; a lot; extremely

18. Have you been bothered by having to wear pads?

Table F211. Questionnaires with rigorous validity, reliability and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence (continued)

EMOTIONAL CONSEQUENCES

Over the last 4 weeks, because of your urinary problems, how often: never; rarely; sometimes; often; all the time

19. Have you felt discouraged?
20. Have you lost patience?
21. Have you been worried that you might have a urinary “accident”?
22. Have you felt that you are losing self-control?
23. Have you felt obsessed by your urinary problems?
24. Did you need to think about taking pads with you before going out?

SEXUALITY

Over the last 4 weeks, because of your urinary problems, how much: not at all; a little; moderately; a lot; extremely

25. Have you felt anxious at the thought of having sexual intercourse?
26. Have you changed your sexual practices?
27. Have you been afraid of having urine leaks during sexual intercourse?

OVERALL QUALITY OF LIFE

28. Taking your urinary problems into account, how would you currently assess your quality of life? From Poor to Excellent (5 scores)

Table F212. Association between sample size of studies and diagnostic values of tests

Questionnaires and Scales	Intercept	Slope	R2, %
Sensitivity, %	75.1	0.01	2.4
Specificity, %	68.9	0.02	1.1
Positive predictive likelihood	12.4	-0.02	4.1
Clinical history for stress UI			
Sensitivity	93.6	-0.02	19.5
Specificity	57.8	0.00	0.3
Positive predictive likelihood	70.9	0.03	21.7
Positive likelihood ratio	4.0	0.00	4.9
Clinical history for urge UI			
Sensitivity, %	55.3	-0.01	7.2
Specificity	77.3	0.00	0.1
PPV+	66.5	0.00	0.1
LR+	7.0	0.00	1.7
Ultrasound			
Sensitivity, %	85.9	-0.05	10.2
Specificity, %	89.6	-0.04	8.2
Positive predictive likelihood	1.0	0.00	52.2
Positive likelihood ratio	7.8	0.03	2.3

Table F213. Scales that provided the largest positive likelihood ratio to detect UI

Author, positive likelihood ratio	Questions
Sandvik, 1995[841] LR+ 14	A positive answer to the following question was presumed to be an indication of stress incontinence: "Do you lose urine during sudden physical exertion, lifting, coughing or sneezing?' Urge incontinence was presumed to be indicated by a positive answer to the question: "Do you experience such a strong and sudden urge to void that you leak before reaching the toilet?" A positive answer to both questions was registered as mixed incontinence.
Kirschner-Hermanns, 1998[874] LR+ 15	How long can you usually hold urine once you feel an urge to urinate? More than 5 minutes 1 to 5 minutes Less than 1 minute, or I have an urge but I can't hold it I have no urge or warning Do you ever lose urine when you laugh, cough, sneeze or bend over? Is the only time that you lose urine when you laugh, cough, sneeze or bend over? When you are awake, can you usually go for half an hour without leaking urine? When you lose urine, how much usually leaks? A few drops Enough to wet your underwear Enough to wet your outer clothes, or enough to wet the floor
Diokno, 1999[875] LR+ 62	The Medical, Epidemiologic and Social Aspects of Aging Urinary Incontinence Questionnaire Please check the appropriate box 1. Over the past 12 months, have you had urine loss beyond your control? [ ] Yes [ ] No 2. How long ago did your urine loss start? years, months, days 3. When does the urine loss usually occur: [ ] Daytime only [ ] Nighttime only [ ] Both daytime and nighttime Questions for Urge Incontinence symptoms: Please check the appropriate box: [ ] Often (3); [ ] Sometimes (2); [ ] Rarely (1); [ ] Never (0) 1. Some people receive very little warning and suddenly find that they are losing, or about to lose, urine beyond their control. How often does this happen to you? 2. If you can't find a toilet or find that the toilet is occupied, and you have an urge to urinate, how often do you end up losing urine and wetting yourself? PREDICTING TYPE II STRESS INCONTINENCE Please check the appropriate box: [ ] Often (3); [ ] Sometimes (2); [ ] Rarely (1); [ ] Never (0) 3. Do you lose urine when you suddenly have the feeling that your bladder is very full? 4. Does washing your hands cause you to lose urine? 5. Does cold weather cause you to lose urine? 6. Does drinking cold beverages cause you to lose urine? Total urge score: Urge score ratio: Questions for Stress Incontinence symptoms: 1. Does coughing gently cause you to lose urine? 2. Does coughing hard cause you to lose urine? 3. Does sneezing cause you to lose urine? 4. Does lifting things cause you to lose urine? 5. Does bending over cause you to lose urine? 6. Does laughing cause you to lose urine? 7. Does walking briskly or jogging cause you to lose urine? 8. Does straining, if you are constipated, cause you to lose urine? 9. Does getting up from a sitting to standing position cause you to lose urine? Total stress score: Stress score ratio:
Moore, 1996[876] LR+ 17.8	Screening Measure (2 parts) Ask: "In the last year, have you ever lost your urine gotten wet? If yes, then ask: "Have you lost urine on at least 6 separate days?

Figure F2. Association between sample size and sensitivity (%) of clinical history versus multichannel urodynamics to detect stress UI

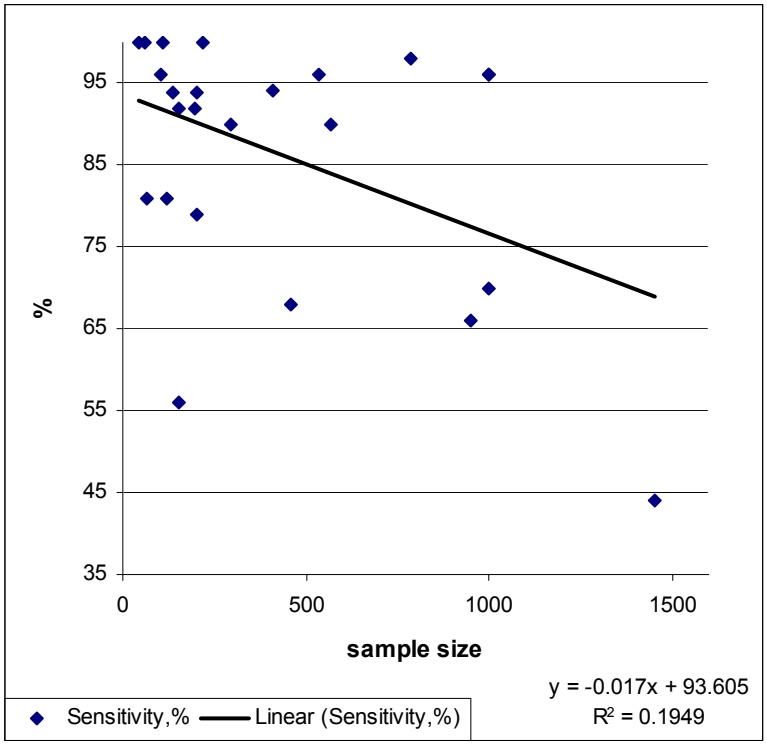

Figure F3. Association between sample size and positive predictive value (%) of clinical history versus multichannel urodynamics to detect stress UI

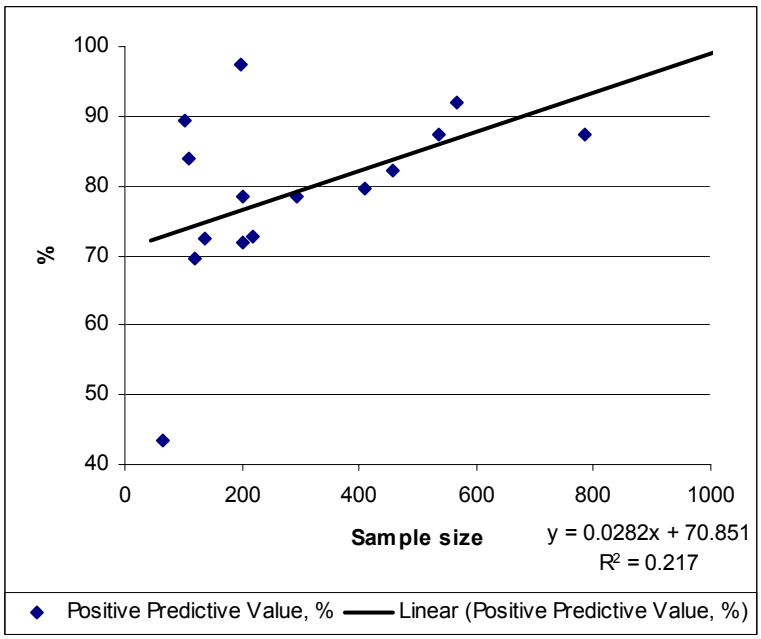

Table F214. Diagnostic value of different tests to detect persons at risk and patients with UI

Author Sample	UI Type	Index Method vs. "Gold Standard"	Sensitivity (%)	Specificity (%)	Positive Predictive Likelihood
Richardson, 1986[877] N = 144	Stress	Urethral pressure profile vs. urodynamics	86	58	2.05
		Urethral pressure profile vs. multichannel UD, supine	32	93	4.57
		Urethral pressure profile vs. multichannel UD, standing	41	92	5.13
Schick, 2004[878] N = 369	Stress	Urethral pressure profile vs. urodynamics	53.8	75.9	2.23
Romanzi, 1999[879] N = 57	Pelvic muscle strength	Pelvic scale scores vs. clinical history	68	71	2.34
Fischer-Rasmusen, 1986[880] N = 212	Stress	Pelvic scale scores vs. clinical history	72	46	1.33
		Cystoscopy, cystometry, stress test for urine loss, uroflowmetry, and colpo-cysto-urethrography vs. clinical history	52	85	3.47
Resnick, 1996[881] N = 102	Urge	Minimum data sgorithm vs. urodynamics	76	71	2.62
	Stress	Minimum data sgorithm vs. urodynamics	76	97	**25.33**
Summit, 1992[882] N = 90	Stress	Cough stress test and single-channel medium-fill cystometry vs. urodynamics	94	84	5.88
	Urge		71	96	**17.75**
	Mixed		94	84	5.88
Creighton, 1991[883] N = 133	Mixed	Urethral electrical conductance vs. urodynamics	64	86	4.57
Davis, 1998[884] N = 60	Stress	Ambulatory urodynamic monitoring vs. multichannel UD	78	7	0.84
Rosario, 1999[885] N = 63	Bladder outlet obstruction	Ambulatory urodynamic monitoring vs. multichannel UD	25	88	2.08
Mclnerney, 1991[886] N = 20	Urge	Ambulatory urodynamic monitoring vs. multichannel UD	100	58	2.38
Bhatia, 1982[887] N = 26	Urge	Ambulatory urodynamic monitoring vs. multichannel UD	43	58	1.02
Swift, 1995[888] N = 108	Stress	Urethral pressure profile vs. multichannel UD	49	98	**24.50**
Versi, 1990[889] N = 172	Stress	Urethral pressure profile vs. multichannel UD	77	79	3.67
Pajoncini,1999[890] N = 119	Stress	Urethral pressure profile vs. multichannel UD, VLPP	84	60	2.10
	Stress	Urethral pressure profile vs. multichannel UD, MUCP	63	52	1.31
Versi, 1991[891] N = 303	Stress	Urethral pressure profile vs. multichannel UD	48	84	3.00
Cucchi, 1990[892] N = 40	Urge	Flow rate acceleration vs. multichannel UD	75	75	3.00
Swift, 1997[893] N = 66	Urge	Cystometry by fetal monitor vs. multichannel UD	91	86	6.50

Table F214. Diagnostic value of different tests to detect persons at risk and patients with UI (continued)

Author Sample	UI Type	Index Method vs. "Gold Standard"	Sensitivity (%)	Specificity (%)	Positive Predictive Likelihood
Bergman, 1988[894] N = 35	Urge	Cystometry by fetal monitor vs. multichannel UD	100	96	**25.00**
Petersen, 1997[895] N = 130	Urge	Ice water test vs. multichannel UD	85	65	2.43
Sutherst, 1981[896] N = 126	Stress	Fluid bridge test to detect the entry of urine into the proximal urethra during cough vs. standing cystometry, supine	86	42	1.48
	Stress	Fluid bridge test to detect the entry of urine into the proximal urethra during cough vs. standing cystometry, standing	100	24	1.32
Hanzal, 1991[897] N = 981	Stress	Urethral pressure profile vs. clinical stress test	93	83	5.47
Frigerio, 1981[898] N = 112	Urge	Voiding stop tests vs. single channel cystometry	95	66	2.79

Table F215. Diagnostic value of different tests compared to multichannel urodynamics to detect UI in adults

Author Sample	Sensitivity (%)	Specificity (%)	Positive Predictive Likelihood
X-ray			
Pelsang, 1996[899] N = 159 100% female	61	70	2.03
Scotti, 1990[900] N = 204 100% female	60	79	2.86
Grischke, 1991[901] N = 84 100% female	59	60	1.48
Bergman. 1988[902] N = 59 100% female	100	44	1.79
Rose, 1983[903] N = 1,584 69% female	91	91	**10.11**
Digesu, 2004[904] N = 4,500 100% female	45	83	2.65
Full bladder clinical test			
Hsu, 1999[905] N = 41 100% female	94	90	9.40
Kadar, 1988[906] N = 37 100% female	78	74	3.00
Scotti, 1993[907] N = 145 100% female	84	84	5.25
Resnik, 1996 [908] N = 97 100% female	67	98	**33.50**
Lobel, 1996[909] N = 304 100% female	49	95	9.80
Single channel urodynamics for stress UI			
Swift, 1997[893] N = 66 100% female	49	98	**24.50**
Ouslander,1988[910] N =164 78% female	73	61	1.87
Resnick, 1996[908] N = 97 100% female	86	86	6.14
Scotti, 1993[907] N = 145 100% female	49	95	9.80
Single channel urodynamics for urge UI			
Swift, 1997[893] N = 66 100% female	49	98	**24.50**
Ouslander, 1988[910] N =164 78% female	73	61	1.87

Table F215. Diagnostic value of different tests compared to multichannel urodynamics to detect UI in adults (continued)

Author Sample	Sensitivity (%)	Specificity (%)	Positive Predictive Likelihood
Resnick, 1996[908] N = 97 100% female	86	86	6.14
Scotti, 1993[907] N = 145 100% female	49	95	9.80
Q-tip test			
Bergman, 1987[911] N =105 100% female	75	58	1.79
Montz, 1986[912] N = 100 100% female	53	53	1.13
Thomakos, 2005[913] N = 539 100% female	91	35	1.40
Noblett, 2005[914]	94	91	**10.44**
N = 134 100% female	96	84	6.00

Table F216. Number needed to screen and number of tests to detect 1 case of UI in men [915,916]

Prevalence of Undiagnosed UI		Clinical History to Diagnose Detrusor Overactivity		Scale to Diagnose Detrusor Overactivity	
Population Categories		Number Needed to Screen	Number of Tests	Number Needed to Screen	Number of Tests
All	0.782	24	5	8	6
Race/ethnicity					
Black	0.73	20	4	9	7
Hispanic	0.868	33	6	8	6
White	0.788	26	5	8	6
Age group					
30–39	0.962	16	4	7	5
40–49	0.822	29	5	8	6
50–59	0.904	31	6	7	6
60–79	0.621	27	5	11	8
Socioeconomic status					
Low	0.614	30	6	11	8
Middle	0.782	24	5	8	6
High	0.828	24	5	8	6
Medical insurance					
Any private	0.797	24	5	8	6
Public only	0.717	26	5	9	7
None	0.916	24	5	7	6

Table F217. Recommended questionnaires for symptoms and quality of life impact of anal incontinence (adapted from the Symptom and Quality of Life Committee of the International Consultation on Incontinence)[855]

Grade	Questionnaire
Grade A (highly recommended): validity, reliability and responsiveness established with rigor	None
Grade B (recommended): validity and reliability established with rigor or validity, reliability and responsiveness indicated	Fecal Incontinence QOL Scale[917]
	Manchester Health Questionnaire[918]
	Birmingham Bowel and Urinary Symptoms Questionnaire[919]

Table F218 . Questionnaires with rigorous validity, reliability, and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence for anal incontinence[855]

Fecal Incontinence QOL Scale[917]

In general, would you say your health is: excellent; very good; good; fair; poor

For each item, please indicate how much of the time the issue is a concern for you due to accidental bowel leakage. (If it is a concern for you for reasons other than accidental bowel leakage, then check the box under Not Apply, (N/A).) Most of the time; Some of the time; A little of the time; None of the time

Q1. Due to accidental bowel leakage

a. I am afraid to go out
b. I avoid visiting friends
c I avoid staying overnight away from home
d. It is difficult for me to get out and do things like going to a movie or to church
e. I cut down on how much I eat before I go out
f. Whenever I am away from home, I try to stay near a restroom as much as possible
g. It is important to plan my schedule (daily activities) around my bowel pattern
h. I avoid traveling
i. I worry about not being able to get to the toilet in time
j. I feel I have no control over my bowels
k. I can't hold my bowel movement long enough to get to the bathroom
1. I leak stool without even knowing it
m. I try to prevent bowel accidents by staying very near a bathroom

Q2: Due to accidental bowel leakage, indicate the extent to which you AGREE or DISAGREE with each of the following items. (If it is a concern for you for reasons other than accidental bowel leakage then check the box under Not Apply, N/A). Strongly agree; Somewhat agree; Somewhat disagree; Strongly disagree

Q3. Due to accidental bowel leakage:

a. I feel ashamed
b. I can not do many of things I want to do
c. I worry about bowel accidents
d. I feel depressed
e. I worry about others smelling stool on me
f. I feel like I am not a healthy person
g. I enjoy life less
h. I have sex less often than I would like to
i. I feel different from other people
j. The possibility of bowel accidents is always on my mind
k. I am afraid to have sex
1. I avoid traveling by plane or train
m. I avoid going out to eat
n. Whenever I go someplace new, I specifically locate where the bathrooms are

Q4: During the past month, have you felt so sad, discouraged, hopeless, or had so many problems that you wondered if anything was worthwhile? Extremely so - to the point that I have just about given up; Very much so; Quite a bit; Some - enough to bother me; A little bit; Not at all

Table F218 . Questionnaires with rigorous validity, reliability, and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence for anal incontinence (continued)

Manchester Health Questionnaire[918]

1. How do you describe you health at the present? Very good; Good; Fair; Poor; Very poor
2. How much you think your bowel problem affects your life? Not at all; A little bit; Moderately; Quite a bit; Extremely

We would like to know what your bowel problems are and how much they affect you.
Responses: Never; Occasionally; Sometimes; Most of the time; All of the time

3. How often do you have a strong desire to move your bowels which makes you rush to the toilet?
4. How often your bowels leak when coughing or sneezing?
5. How often your bowels leak when walking?
6. Do your bowels leak during the rest of the day or at night?
7. Do you have difficulties wiping clean after you have opened your bowels?
8. Do you have difficulties controlling wind?
9. Is the leakage from your bowels loose?
10. Is the leakage from your bowels solid?
11. How often do you move your bowels every day?
12. Do your bowels leak during or after sexual intercourse?

How much does the bowel problem you described in the previous page affect you?
Role limitation

13. Does your bowel problem affect you doing your jobs within the home?
14. Does your bowel problem affect your job or your normal daily activities outside the home?

Physical limitations

15. Does your bowel problem affect your ability to travel?
16. Does your bowel problem affect your physical activities (going for a walk, running, sport, gym, etc.?
17. Does your bowel problem limit your social life?
18. Does your bowel problem limit your ability to see and visit friends?

Personal relationships

19. Does you bowel problem affect your relationship with your partner?
20. Does you bowel problem affect your sex life?
21. Does you bowel problem affect your family life?

Emotions

22. Does you bowel problem make you feel depressed?
23. Does you bowel problem make you feel anxious or nervous?
24. Does your bowel problem make you feel bad about yourself?

Sleep/energy

25. Does your bowel problem affect your sleep?
26. Does your bowel problem make you feel worn out and tired?

Do you do any of following ? If so how much?

27. Wear pads to keep clean?
28. Be careful how much food you eat?
29. Change your underclothes because they get dirty?
30. Worry in case you smell?
31. Get embarrassed because of you bowel problem?

Table F218 . Questionnaires with rigorous validity, reliability, and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence for anal incontinence (continued)

Modified Manchester Health Questionnaire

SECTION A Responses: Never, Occasionally, Sometimes, Most of the time, All of the time

A1. How often do you have a strong desire to move your bowels that makes you rush to the toilet?
A2. How often in the past month have you experienced any amount of accidental bowel leakage that consisted of solid stool?
B1. Do you lose any solid stool when coughing or sneezing?
B2. Do you lose any solid stool when walking?
B3. Besides coughing, sneezing, and walking, do you lose any solid stool during the rest of the day or night?
A3. How often in the past month have you experienced any amount of accidental bowel leakage that consisted of liquid stool?
B4. When you leak stool, how often is it liquid or watery?
B5. Do you lose any liquid stool when coughing or sneezing?
B6. Do you lose any liquid stool when walking?
B7. Besides coughing, sneezing, and walking, do you lose any liquid stool during the rest of the day or night?
A4. How often in the past month have you experienced any amount of accidental bowel leakage that consisted of mucus?
A5. How often in the past month have you experienced any amount of accidental bowel leakage that consisted of gas?
B8. Do you lose any gas when coughing or sneezing?
B9. Do you lose any gas when walking?

SECTION C: If the answers to A1, A2, A3, A4, and A5 are all “Never,” skip this section.

C1. How much do you think your bowel problem affects your life?
C2. How often do you move your bowels each day?
C3. Do you have difficulty wiping clean after you have moved your bowels?
C4. What percent of your bowel movements are hard or little balls?
C5. What percent of your bowel movements are loose or watery?

Role limitations

C6. Do you have a problem with your bowels that affects doing jobs within the home?
C6a. If so, how often does it affect you?
C7. Do you have a problem with your bowels that affects your job, or your normal daily activities outside the home?
C7a. If so, how often does it affect you?

Physical/social limitations

C8. Do you have a problem with your bowels that affects your ability to travel?
C8a. If so, how often does it affect you?
C9. Do you have a problem with your bowels that affects your physical activities (such as going for a walk, running, sport, gym, etc.)?
C9a. If so, how often does it affect you?
C10. Do you have a problem with your bowels that limits your social life?
C10a. If so, how often, does it affect you?
C11. Do you have a problem with your bowels that limits your ability to see and visit friends?
C11a. If so, how often does it affect you?

Personal relationships

C12. Do you have a problem with your bowels that affects your relationship with your partner?
C12a. If yes, how often does it affect your relationship?
C13. Do you have a problem with your bowels that affects your family life?
C13a. If so, how often does it affect your family life?

Emotions

C14. Do you have a problem with your bowels that makes you feel depressed?
C14a. If yes, how often does it affect you?

Table F218 . Questionnaires with rigorous validity, reliability, and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence for anal incontinence (continued)

C15. Do you have a problem with your bowels that makes you feel anxious or nervous?
C15a. If yes, how often does it affect you?
C16. Do you have a problem with your bowels that makes you feel bad about yourself?
C16a. If yes, how often does it affect you?
Sleep/energy
C17. Do you have a problem with your bowels that affects your sleep?
C17a. If so, how often does it affect your sleep?
C18. Do you have a problem with your bowels that makes you feel worn out and tired?
C18a. If yes, how often does it affect you?
Sexual Activity
For general audience, skip questions C19a to C19b.
C19. Have you resumed sexual activity since delivery?
C19a. If “Yes,” when did you resume sexual activity? __ __ weeks after delivery
C19b. If “No,” why have you not resumed sexual activity?
C20. Do you have a problem with your bowels that affects your sex life?
C20a. If so, how often does it affect your sex life?
C21. Do you lose any gas during or after sexual activity?
C22. Do you lose any stool during or after sexual activity?
C23. Do you lose any urine during or after sexual activity?
Lifestyle Adaptation
C24. Do you wear pads to keep clean because of a problem with your bowels?
C24a. If yes, how often do you wear pads?
C25. Are you careful about how much food you eat because of a problem with your bowels?
C25a. If yes, how often are you careful about how much food you eat?
C26. Do you change your underclothes because they get dirty due to a problem with your bowels?
C26a. If yes, how often do you change your underclothes for this reason?
C27. Do you worry about odor because of a problem with your bowels?
C27a. If yes, how often do you worry about it?
C28. Do you get embarrassed because of a problem with your bowels?
C28a. If yes, how often do you get embarrassed?
Medical
C29. Did you bring any of your bowel symptoms to the attention of your clinician?
C30. Have you received treatment for your bowel symptoms?
C30a. If “Yes,” please specify:

Table F218 . Questionnaires with rigorous validity, reliability, and responsiveness highly recommended by the Symptom and Quality of Life Committee of the International Consultation on Incontinence for anal incontinence (continued)

Birmingham Bowel and Urinary Symptoms Questionnaire[919]

1. How often do you open your bowels?
2. What form are your motions usually?
3. Can you hold onto your motions for more than five minutes?
4. Do you ever have to rush to the toilet to open your bowels?
5. Does stool leak before you can get to the toilet?
6. Do you leak stool for no obvious reason and without feeling that you want to go to the toilet?
7. Do you have to strain to open your bowels?
8. How long do you spend on the toilet, on average, for each bowel action?
9. Do you feel that you cannot completely empty your bowels?
10. Do you use a finger or pressure to help open your bowels?
11. Do you use a finger in your vagina to help open your bowels?
12. Do you have the urge to open your bowels but are unable to pass a motion?
13. Do you find it painful to have your bowels open?
15. Do you use laxatives?
16. During the day, how many times do you urinate, on average?
17. During the night, how many times do you have to get up to urinate, on average?
18. Do you have to rush to the toilet to urinate?
19. Do you have difficulty completely emptying your bladder?
20. Does urine leak before you can get to the toilet?
21. Does urine leak when you are active, exert yourself, cough, or sneeze?
22. Does urine leak for no obvious reason and without feeling that you want to go to the toilet?

References for Appendix F

(Note that there is a separate set of references for the appendixes than for the report; therefore reference numbers are different)

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