

# Urinary Incontinence in Women

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## INTRODUCTION

Urinary incontinence affects from 15% to 50% of community-dwelling women of all ages. It is one of the most prevalent chronic diseases, although it is often not recognized by the US healthcare system. The direct cost of urinary incontinence for women in the United States was \$12.4 billion in 1995 dollars (1). Approximately one in ten women in the United States undergoes surgery for urinary incontinence or pelvic organ prolapse, and a sizable minority of women bear the cost of pads, medications, and nonsurgical therapies.

Population-based studies estimate that a large proportion of adult women report the symptom of urinary incontinence. As many as three-fourths of US women report at least some urinary leakage and studies consistently find that 20 to 50% report more-frequent leakage. While some authors have interpreted this to mean that nearly half of American women “suffer” from incontinence, others point out that many women with occasional incontinence are not sufficiently bothered by it to seek care. Of greater clinical relevance is an improved understanding of the number of women with severe or more-frequent leakage, estimated fairly uniformly at 7% to 10% by various researchers. Currently, there is little understanding of the number of women whose lives are truly impacted by urinary incontinence or of its true burden on American women. Indeed, the demarcation between incontinence as a symptom and incontinence as a disease is far from clear. For example, 25% of female college varsity athletes lose

urine when doing provocative exercise, and most do not consider it a problem; indeed, most experts would agree that these young women do not have a major health problem. Conversely, most experts would agree that middle-aged women who lose urine throughout the day, wear pads, curtail desired activities because of leakage, and truly suffer have a disease and would benefit from treatment.

Studies that inquire about the presence of “any” or “occasional” incontinence may overestimate the actual burden of incontinence on the healthcare system, but available data on incontinence treatment underestimate the actual burden, given that many women with bothersome leakage do not seek care. While readily available information about incontinence treatment in adult women in the United States indicates only the lowest possible burden urinary incontinence presents to the healthcare system, it does provide a foundation on which to base future studies and to project future care. This chapter uses data from various sources to begin defining not only the prevalence of incontinence, but also its impact on the US healthcare system. At this time, equally important information about the burden of disease on women who are not seeking treatment is not available. The impact of incontinence on the women themselves, their families, their work, and society is also not yet well defined in the literature.

## DEFINITION AND DIAGNOSIS

Urinary incontinence is defined by the International Continence Society as “the complaint of

**Table 1. Codes used in the diagnosis and management of female urinary incontinence**

*Females 18 years or older, with one of the following ICD-9 diagnosis codes, but not a coexisting 952.XX or 953.XX code:*

596.51	Hypertonicity of bladder
596.52	Low bladder compliance
596.59	Other functional disorder of bladder
599.8	Other specified disorders of urethra and urinary tract
599.81	Urethral hypermobility
599.82	Intrinsic (urethral) sphincter deficiency (ISD)
599.83	Urethral instability
599.84	Other specified disorders of urethra
625.6	Stress incontinence, female
788.3	Urinary incontinence
788.30	Urinary incontinence unspecified
788.31	Urge incontinence
788.33	Mixed incontinence, male, female
788.34	Incontinence without sensory awareness
788.37	Continuous leakage

**Fistulae**

596.1	Intestinovesical fistula
596.2	Vesical fistula not elsewhere classified
619.1	Digestive-genital tract fistula, female
619.0	Urinary-genital tract fistula, female

**Spinal cord injury-related incontinence**

*(When associated with other ICD-9 diagnosis codes for spinal cord injury 952.XX or 953.XX)*

344.61	Cauda equina syndrome with neurogenic bladder
596.51	Hypertonicity of bladder (specified as overactive bladder in 2001; included if associated with diagnosis code 952.XX)
596.52	Low compliance bladder
596.54	Neurogenic bladder, NOS
596.55	Detrusor sphincter dyssynergia
596.59	Other functional disorder of bladder
599.8	Other specified disorders of urethra and urinary tract
599.84	Other specified disorders of urethra
625.6	Stress incontinence female
788.3	Urinary incontinence
788.30	Urinary incontinence, unspecified
788.31	Urge incontinence
788.32	Stress incontinence male
788.33	Mixed incontinence, male and female
788.34	Incontinence without sensory awareness
788.37	Continuous leakage
788.39	Other urinary incontinence

any involuntary leakage of urine" (2). This supplants the group's previous long-held definition, in which the diagnosis of incontinence required that the leakage be a social or hygienic problem. The less restrictive definition is likely to capture more individuals who experience incontinence, including the many women who may leak daily but do not describe leakage as a social or hygienic problem. A diagnosis of urinary incontinence can be based on the patient's symptoms, the sign of incontinence noted during physical examination, or diagnostic urodynamic testing. Table 1 lists ICD-9 codes commonly used to identify urinary incontinence.

The International Continence Society further categorizes types of incontinence, as well as other bladder symptoms. *Stress urinary incontinence* is the complaint of involuntary leakage on effort or exertion or on sneezing or coughing. Stress urinary incontinence also describes the sign, or observation, of leakage from the urethra synchronous with coughing or exertion. When stress incontinence is confirmed during urodynamic testing by identifying leakage from the urethra coincident with increased abdominal pressure (for example, during a cough or sneeze) but in the absence of a bladder contraction, the diagnosis of *urodynamic stress incontinence* is made.

*Urge urinary incontinence* is the complaint of involuntary leakage accompanied by or immediately preceded by an urge to urinate and may be further defined with urodynamic investigation. Conventional urodynamic studies take place in a laboratory and involve filling the bladder with a liquid, then assessing bladder function during filling and emptying. If during urodynamic testing the patient demonstrates either spontaneous or provoked involuntary detrusor contractions while filling, she is said to have *detrusor overactivity*. If a relevant neurologic condition exists, the detrusor overactivity is further categorized as *neurogenic*; when no such condition is identified, the overactivity is termed *idiopathic*. These terms replace the previously used *detrusor hyperreflexia* and *detrusor instability*. Many women with urge incontinence do not manifest detrusor overactivity on urodynamic testing. This may be due in part to the fact that such testing, which lasts approximately an hour, is merely a snapshot of the patient's overall bladder function. Ambulatory urodynamic studies can also be performed to document the patient's leakage during everyday

activities; such studies identify more detrusor contractions during filling than do conventional ones. Nonetheless, treatment for urge incontinence is often based on implicit clinical assessment because of the low predictive value of a negative test.

Other diagnostic tests may be used to help characterize incontinence and its severity. A pad test quantifies the volume of urine lost by weighing a perineal pad before and after some type of leakage provocation. This type of test has also been used in attempts to distinguish continent from incontinent women. Pad tests can be divided into short-term tests, usually performed under standardized office conditions, and long-term tests, usually performed at home for 24 to 48 hours. Short-term pad tests are generally performed with a symptomatically full bladder or with a certain volume of saline instilled into the bladder before the patient begins a series of exercises.

A voiding diary, or bladder chart, is a record maintained by the patient of her urinary frequency and leakage, voided volumes, and fluid intake over a 3- to 7-day period. This noninvasive test provides useful information about bladder capacity, type of incontinence symptoms, diurnal versus nocturnal voiding patterns, and appropriateness of fluid intake.

## PREVALENCE AND INCIDENCE

As noted above, a wide range in the prevalence of urinary incontinence has been reported. One compilation of such studies (3) indicates that approximately 50% of adults report "any" incontinence, while 5% to 25% note leakage at least weekly, and 5 to 15% note it daily or most of the time (Table 2). Rates of incontinence severity patterns are depicted in Figure 1. The rate of urge incontinence tends to rise with age, while the rate of stress incontinence decreases somewhat in the oldest age groups, possibly due to lower activity levels (Figure 2). In a large population of Norwegian women, the rate of stress incontinence peaked at approximately 60% in women 40 to 49 years of age; urge incontinence began to rise in women 50 to 59 years of age and peaked at roughly 20% in women between 80 and 89 years of age (4). Reasons for the divergence of estimates include variations in definitions, sampling methodologies, response rates, and question formats (5).

**Table 2. Prevalence of urinary incontinence by frequency and gender in older adults, proportion (counts)**

Study	Age	Frequency	Prevalence			F/M Ratio	
			Women	Men			
Thomas, 1980	65 +	“ever”	25.80%	(403/1562)	15.30%	(169/1102)	1.7
Rekers, 1992	65–79	“ever”	19.70%	(50/254)			
Hellstrom, 1990	85 +	“ever”	34.70%	(191/551)	18.40%	(49/266)	1.9
Milsom, 1993	66 +	“ever”	22.70%	(962/4238)			
Brockelhurst, 1993	60 +	“ever”	16.80%	(141/840)	12.80%	(90/701)	1.3
Lara, 1994	50 +	“ever”	50.70%	(71/140)			
Sommer, 1990	60–79	“ever”	44.90%	(62/138)			
Sandvik, 1993 & Saim, 1995	60 +	“ever”	31.5%*	(NR)			
Wetle, 1995	65 +	“ever difficulty”	44.40%	(1045/2360)	34.10%	(494/1449)	1.3
Nygaard, 1996	65 +	“ever difficulty”	55.10%	(1116/2025)			
Diokno, 1986	60+	1+ / 12 months	37.70%	(434/1150)	18.90%	(152/805)	2.0
Yarnell, 1979	65 +	1+ / 12 months	16.90%	(37/219)	10.70%	(18/169)	1.6
Yarnell, 1981	65 +	1+ / 12 months	49.60%	(89/180)			
Holst, 1988	65 +	1+/12 months	36.50%	(66/181)			
Milne, 1972 & Milne, 1971	62 +	“current”	41.50%	(114/272)	25.10%	(54/215)	1.7
Campbell, 1985	80 +	“current”	22.10%	(64/290)	21.60%	(29/134)	1.0
Hunter, 1996	50 +	“current”			6.00%	(120/2002)	
Nakanishi, 1997	65 +	“occasionally or more often”	9.70%	(82/842)	9.80%	(55/563)	1.0
Brockelhurst, 1993	60 +	1+ / 2 months	10.20%	(86/840)	5.30%	(37/701)	1.9
Diokno, 1986	60 +	1+ / month	21.70%	(250/1150)	10.40%	(84/805)	2.0
Brown, 1996	65 +	1+ / month	41.30%	(3285/7949)			
Thomas, 1980	65 +	2+ / month	11.40%	(178/1562)	6.90%	(76/1102)	1.7
Brockelhurst, 1993	60 +	2+ / month	10.20%	(86/840)	5.30%	(37/701)	1.9
Holst, 1988	65 +	2+ / month	21.50%	(39/181)			
Diokno, 1986	60 +	1+ / week	12.60%	(145/1150)	5.50%	(44/805)	2.4
Brockelhurst, 1993	60 +	1+ / week	8.30%	(70/840)	3.70%	(26/701)	2.2
Hellstrom, 1990	85 +	1+ / week	27.00%	(149/551)	15.00%	(40/266)	1.8
Rekers, 1992	65–79	1+ / week	6.30%	(16/254)			
Kok, 1992	60 +	2+ / week	22.90%	(164/715)			
Campbell, 1986	80 +	3+ / week	5.10%	(15/290)	3.70%	(5/134)	1.4
Wetle, 1995	65 +	“most or all of the time”	8.80%	(208/2360)	5.80%	(84/1449)	1.5
Sommer, 1990	60–79	“often or always”	8.70%	(12/138)			
Nygaard, 1996	65 +	“most or all of the time”	8.30%	(168/2025)			
Diokno, 1986	60 +	1+ / day	5.20%	(60/1150)	1.70%	(14/805)	3.1
Hellstrom, 1990	85 +	1+ / day	16.70%	(92/551)	10.50%	(28/266)	1.5
Kok, 1992	60 +	1+ / day	14.00%	(NR)			
Brown, 1996	65 +	1+ / day	14.20%	(1130/7949)			
Nakanishi, 1997	65 +	1+ / day	2.50%	(21/842)	2.10%	(12/563)	1.2

NR, not reported; F, female; M, male.

\*Mean of prevalence by 10-year age groups.

SOURCE: Adapted from Thom D, Variation in estimates of urinary incontinence prevalence in the community: effects of differences in definition, population characteristics, and study type, *Journal of the American Geriatrics Society*, 46, 473–4801, Copyright 1998, with permission from the American Geriatrics Society.

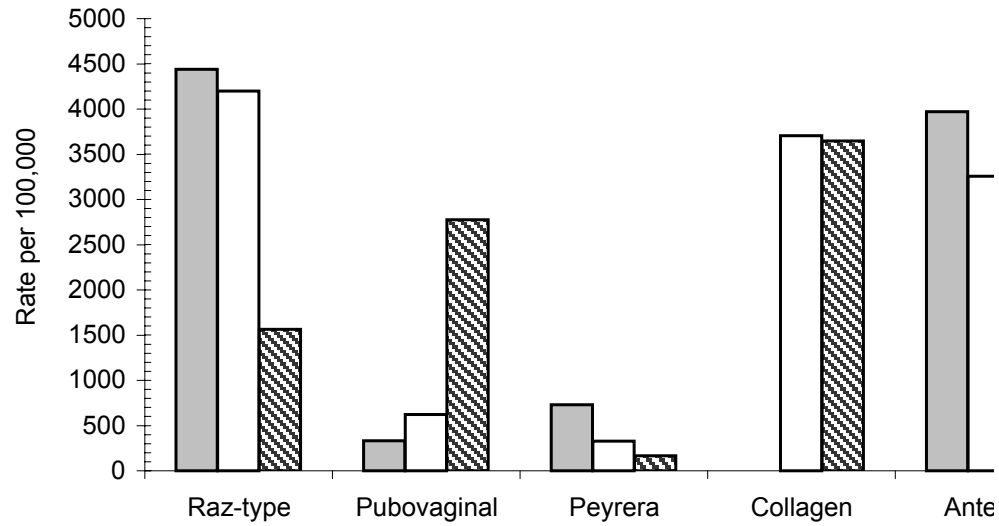


Figure 1. Estimated urge incontinence prevalence rates by age and interview.

Follow-ups III and IV include responses 3 and 6 years after baseline, respectively.

SOURCE: Adapted from Nygaard IE, Lemke JH, Urinary incontinence in rural older women: prevalence, incidence, and remission, Journal of American Geriatrics Society, 44, 1,049–1,054, Copyright 1996, with permission from the American Geriatrics Society.

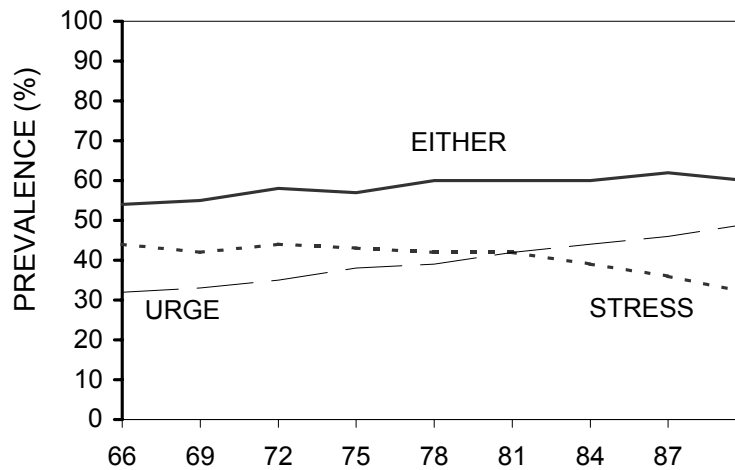


Figure 2. Prevalence of incontinence by age groups at baseline.

Each age represents the midpoint of a 3-year age range. Because of the small number of women above age 90, the graph ends with age range 86-88. “Urge” and “stress” refer to women who answered affirmatively to the urge and stress incontinence questions, respectively. “Either” refers to women who reported any incontinence (either urge or stress).

SOURCE: Adapted from Nygaard IE, Lemke JH, Urinary incontinence in rural older women: prevalence, incidence, and remission, Journal of American Geriatrics Society, 44, 1,049–1,054, Copyright 1996, with permission from the American Geriatrics Society.

**Table 3. Prevalence of difficulty controlling bladder among adult women**

	Difficulty Controlling Bladder			
	Total	Yes	No	Refused to Answer or Don't Know
Total	23,477,726	8,929,543 (38%)	14,449,905 (62%)	98,278 (0%)
Age at screening				
60–64	5,699,785	2,168,863 (38%)	3,530,922 (62%)	0 (0%)
65–69	4,895,878	1,785,380 (36%)	3,110,498 (64%)	0 (0%)
70–74	4,505,164	1,683,804 (37%)	2,818,651 (63%)	2,709 (0%)
75–79	3,453,472	1,515,900 (44%)	1,873,616 (54%)	63,956 (2%)
80–84	2,981,558	989,003 (33%)	1,967,390 (66%)	25,165 (1%)
85+	1,941,869	786,593 (41%)	1,148,828 (59%)	6,448 (0%)
Race/ethnicity				
Non-Hispanic white	18,729,539	7,662,444 (41%)	11,041,930 (59%)	25,165 (0%)
Non-Hispanic black	1,941,269	386,480 (20%)	1,554,789 (80%)	0 (0%)
Mexican American	649,003	230,567 (36%)	409,279 (63%)	9,157 (1%)
Other Hispanic	1,576,419	468,823 (30%)	1,107,596 (70%)	0 (0%)
Other race	581,496	181,229 (31%)	336,311 (58%)	63,956 (11%)
Education				
Less than high school	8,374,762	2,692,649 (32%)	5,682,113 (68%)	0 (0%)
High school	7,692,149	3,484,970 (45%)	4,207,179 (55%)	0 (0%)
High school+	7,212,158	2,725,611 (38%)	4,461,382 (62%)	25,165 (0%)
Refused	103,678	26,313 (25%)	13,409 (13%)	63,956 (62%)
Don't know	87,647	0 (0%)	85,822 (98%)	1,825 (2%)
Missing	7,332	0 (0%)	0 (0%)	7,332 (100%)
Poverty income ratio <sup>a</sup>				
PIR=0	111,440	31,876 (29%)	79,564 (71%)	0 (0%)
PIR<1	3,145,548	1,116,508 (35%)	2,026,331 (64%)	2,709 (0%)
1.00<=PIR<=1.84	5,520,548	2,193,641 (40%)	3,326,907 (60%)	0 (0%)
PIR>1.84	9,649,331	3,538,606 (37%)	6,085,560 (63%)	25,165 (0%)
Refused	2,090,410	759,112 (36%)	1,331,298 (64%)	0 (0%)
Don't know	1,560,474	741,618 (48%)	817,031 (52%)	1,825 (0%)
Missing	1,399,975	548,182 (39%)	783,214 (56%)	68,579 (5%)

<sup>a</sup>See glossary for definition of poverty income ratio.

The data in this table are based on question KIQ.040: "In the past 12 months, have you had difficulty controlling your bladder, including leaking small amounts of urine when you cough or sneeze?" (Do not include bladder control difficulties during pregnancy or recovery from childbirth.)

SOURCE: National Health and Nutrition Examination Survey, 1999–2000.



**Table 4. Frequency of bladder control problems among those who responded “yes” to difficulty controlling bladder**

	Frequency of Bladder Control Problems						Don't Know
	Total	Every Day	Few per Week	Few per Month	Few per Year		
Total	8,929,543	3,255,587 (36%)	2,408,421 (27%)	2,016,715 (23%)	1,082,624 (12%)	166,196 (2%)	
Age at screening							
60–64	2,168,863	686,213 (32%)	429,351 (20%)	563,017 (26%)	490,282 (23%)	0 (0%)	
65–69	1,785,380	475,030 (27%)	511,356 (29%)	479,229 (27%)	172,781 (10%)	146,984 (8%)	
70–79	1,683,804	663,681 (39%)	536,511 (32%)	338,233 (20%)	145,379 (9%)	0 (0%)	
75–79	1,515,900	575,823 (38%)	448,955 (30%)	286,739 (19%)	204,383 (13%)	0 (0%)	
80–84	989,003	456,355 (46%)	233,503 (24%)	258,379 (26%)	21,554 (2%)	19,212 (2%)	
85+	786,593	398,485 (51%)	248,745 (32%)	91,118 (12%)	48,245 (6%)	0 (0%)	
Race/ethnicity							
Non-Hispanic white	7,662,444	2,759,807 (36%)	1,914,582 (25%)	1,909,818 (25%)	912,041 (12%)	166,196 (2%)	
Non-Hispanic black	386,480	212,544 (55%)	74,408 (19%)	45,752 (12%)	53,776 (14%)	0 (0%)	
Mexican American	230,567	89,173 (39%)	73,734 (32%)	26,952 (12%)	40,708 (18%)	0 (0%)	
Other Hispanic	468,823	77,927 (17%)	315,040 (67%)	7,880 (2%)	67,976 (14%)	0 (0%)	
Other Race	181,229	116,136 (64%)	30,657 (17%)	26,313 (15%)	8,123 (4%)	0 (0%)	
Education							
Less than high school	2,692,649	1,381,281 (51%)	566,047 (21%)	463,584 (17%)	281,737 (10%)	0 (0%)	
High school	3,484,970	1,104,097 (32%)	730,106 (21%)	1,040,720 (30%)	510,224 (15%)	99,823 (3%)	
High school+	2,725,611	770,209 (28%)	1,112,268 (41%)	486,098 (18%)	290,663 (11%)	66,373 (2%)	
Refused	26,313	0 (0%)	0 (0%)	26,313 (100%)	0 (0%)	0 (0%)	
Poverty income ratio <sup>a</sup>							
PIR=0	31,876	0 (0%)	0 (0%)	31,876 (100%)	0 (0%)	0 (0%)	
PIR<1	1,116,508	541,675 (49%)	182,029 (16%)	241,012 (22%)	151,792 (14%)	0 (0%)	
1.00<=PIR<=1.84	2,193,641	810,902 (37%)	668,567 (30%)	394,473 (18%)	265,876 (12%)	53,823 (2%)	
PIR>1.84	3,538,606	988,094 (28%)	1,110,863 (31%)	952,372 (27%)	374,904 (11%)	112,373 (3%)	
Refused	759,112	274,391 (36%)	150,098 (20%)	143,238 (19%)	191,385 (25%)	0 (0%)	
Don't know	741,618	325,985 (44%)	140,318 (19%)	186,751 (25%)	88,564 (12%)	0 (0%)	
Missing	548,182	314,540 (57%)	156,546 (29%)	66,993 (12%)	10,103 (2%)	0 (0%)	

<sup>a</sup>See glossary for definition of poverty income ratio. The data in this table are based on question KIQ.060: “How frequently does this (referring to KIQ.040) occur? Would you say this occurs... every day, a few times a week, a few times a month, or a few times a year?” SOURCE: National Health and Nutrition Examination Survey, 1999–2000.

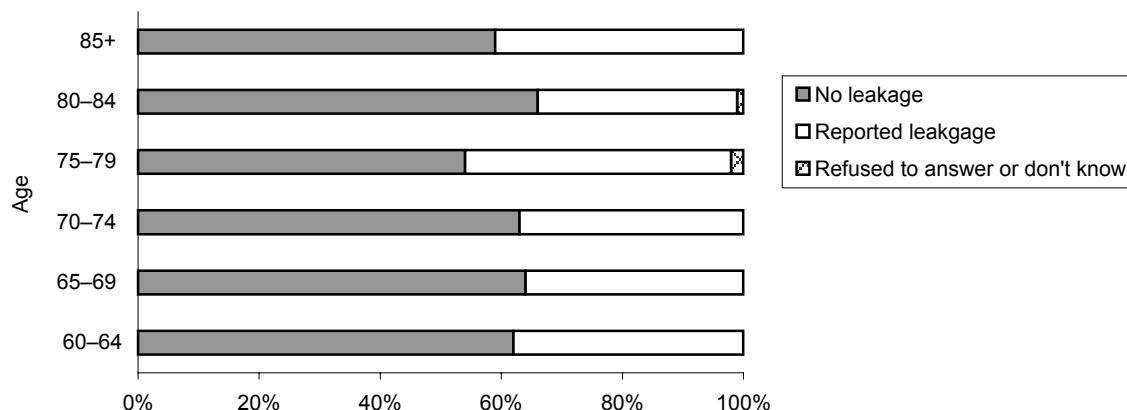


Figure 3a. Difficulty controlling bladder among female responders.

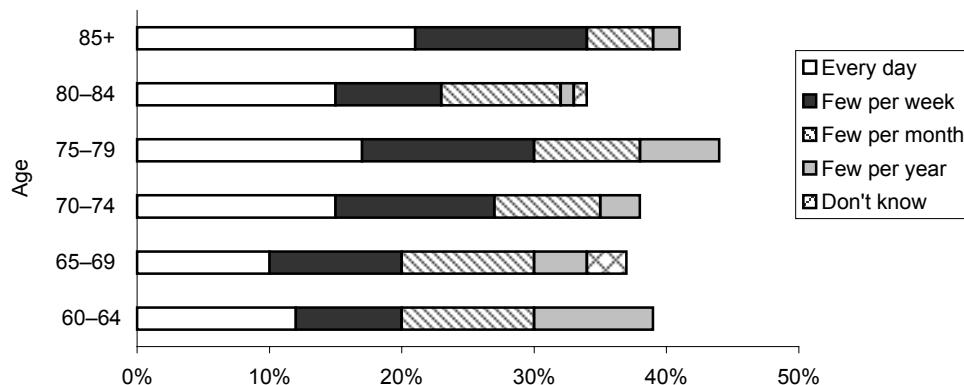


Figure 3b. Frequency of bladder control problems among female responders who answered "yes" to difficulty controlling bladder.

SOURCE: National Health and Nutrition Examination Survey, 1999–2001.

Consistent with the Norwegian study, the National Health and Nutrition Examination Survey (NHANES) asked a national sample of community-dwelling adults, "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)?" NHANES found the overall prevalence of urinary incontinence in women, as defined in this question, to be 38% in 1999–2000 (Table 3). When broken down by frequency of episodes, 13.7% of all women in NHANES reported daily incontinence, and an additional 10.3% reported weekly incontinence

(Table 4). Prevalence was higher in non-Hispanic whites (41%) than in non-Hispanic blacks (20%) or Mexican Americans (36%). The prevalence of daily incontinence increased with age, ranging from 12.2% in all women 60 to 64 years of age to 20.9% in those 85 years of age and over (Figure 3). Women with less than a high school education reported incontinence less often than did those with at least a high school education.

Other large population-based studies have also reported higher rates of urinary incontinence among non-Hispanic whites than in other ethnic or racial groups. In a large cohort of 50- to 69- year-

**Table 5. Racial differences in urodynamic diagnoses and measures**

	African American (n = 183)	Caucasian (n = 132)	P-value
<b>Diagnosis</b>			
GSI (%)	41 (22)	60 (46)	0.001
Detrusor instability (%)	54 (30)	17 (13)	0.001
Mixed incontinence (%)	29 (16)	14 (11)	0.244
Other (%)	59 (32)	41 (31)	0.902
<b>Measures (mean ± SE)</b>			
Full volume (mL)	279 ± 11	326 ± 14	0.009
MCC (mL)	458 ± 14	536 ± 17	0.001
MUCP (cm H <sub>2</sub> O)	68 ± 3	55 ± 3	0.001
MUCP <20 cm H <sub>2</sub> O (%)	15 (8)	30 (23)	0.001

GSI, genuine stress incontinence; full volume, volume noted at fullness during filling cystometry; MCC, maximum cystometric capacity; MUCP, maximum urethral closure pressure. Racial comparison of diagnoses by  $\chi^2$  or Fisher exact test.

Racial comparison of measures by student t test.

SOURCE: Reprinted from American Journal of Obstetrics and Gynecology, 185, Graham CA, Mallet VT, Race as a predictor of urinary incontinence and pelvic organ prolapse, 116–120, Copyright 2001, with permission from Elsevier.

old women enrolled in the Health and Retirement Survey, non-Hispanic blacks and Hispanics were both 60% less likely to have severe incontinence than were non-Hispanic whites, after adjusting for various comorbidities (6). Similarly, baseline data from the Heart and Estrogen/Progestin Replacement Study showed that non-Hispanic whites were 2.8 times more likely to have weekly stress incontinence than were non-Hispanic blacks, after adjusting for relevant factors (7). This epidemiologic trend appears consistent with laboratory findings as well. Graham and colleagues noted that among women presenting for incontinence treatment, stress incontinence was diagnosed more frequently in Caucasian women, and detrusor overactivity was seen more often in African American women (8). These diagnoses were also consistent with the study's finding that Caucasian women had lower urethral closure pressures than did African American women, while African American women had a lower bladder capacity than Caucasian women (Table 5). A recent analysis of data from the Study of Women's Health Across the Nation (SWAN), which included 3,302 women 42 to 52 years

of age provided a closer look at nuances related to race/ethnicity and urinary incontinence (9). African American women with leiomyomata had a 1.81-fold higher risk of urinary incontinence than did Caucasian women, while African American women without fibroids had a decreased risk of urinary incontinence (OR 0.31). Hispanic and Japanese women had a lower risk than did Caucasian women (OR 0.44 and 0.58, respectively). In Chinese women, the risk of incontinence was modified by educational status; the OR of those with less than a college education was 0.35 relative to that of Caucasian women, and 2.53 for those with at least a college education.

Data from the Veterans Health Affairs (VA) were used to estimate the utilization of outpatient care for urinary incontinence among female veterans accessing VA health services. Of all women who received outpatient care in the VA system, urinary incontinence as a percentage of any diagnosis was 2.7% in 1999, 3.6% in 2000, and 3.8% in 2001 (Table 6). These proportions are substantially lower than the rates of daily incontinence reported in population-based surveys, suggesting that the majority of women with incontinence do not seek medical care for it. As expected, the prevalence of medically recognized urinary incontinence increased with age, with the most marked increase occurring between the 25- to 34-year-olds and the 45- to 54-year-olds. Incontinence was more than twice as common among non-Hispanic whites as it was among African Americans and approximately 50% more common among non-Hispanic whites than among Hispanics. Incontinence was most common in the Western region of the United States and least common in the Eastern region, except in 2001, although these differences were not adjusted for differences in age or race/ethnicity.

Less is known about incontinence incidence, remission, and natural history. In prospective cohort studies using a survey design, 10% to 20% of women report remission or recurrence of incontinence over a 1- to 2-year-period (10). Whether this reflects the natural history of incontinence, active intervention, or decreased physical activity (relevant to stress incontinence) is not clear.

**Table 6. Frequency of urinary incontinence<sup>a</sup> listed as any diagnosis in female VA patients seeking outpatient care, count<sup>b</sup>, rate<sup>c</sup>**

	1999		2000		2001	
	Count	Rate	Count	Rate	Count	Rate
Total	3,780	2,679	5,426	3,597	6,196	3,757
Age						
18–24	23	387	20	348	22	378
25–34	213	796	223	839	237	888
35–44	777	1,882	1,020	2,449	1,052	2,489
45–54	968	3,262	1,531	4,374	1,817	4,440
55–64	469	4,194	697	5,506	827	5,600
65–74	401	4,405	543	5,858	637	5,744
75–84	849	5,412	1,261	6,927	1,440	6,828
85+	80	5,416	131	7,503	164	7,257
Race/ethnicity						
White	2,378	4,212	3,343	5,496	3,665	5,565
Black	406	2,152	511	2,491	562	2,518
Hispanic	83	3,257	102	3,608	117	3,767
Other	31	4,010	42	4,953	45	4,950
Unknown	882	1,412	1,428	2,169	1,807	2,485
Region						
Midwest	715	2,574	1,084	3,713	1,169	3,808
Northeast	672	2,338	862	2,842	1,036	3,162
South	1,354	2,584	2,083	3,682	2,294	3,606
West	1,039	3,228	1,397	4,020	1,697	3,162
Insurance status						
No insurance/self-pay	2,186	2,204	2,978	2,902	3,345	3,084
Medicare/Medicare supplemental	849	5,425	1,467	7,347	1,715	6,819
Medicaid	8	2,614	14	3,070	20	3,697
Private insurance/HMO/PPO	662	2,806	875	3,490	998	3,675
Other insurance	69	3,064	89	3,427	112	3,512
Unknown	6	4,196	3	2,239	6	1,435

HMO, health maintenance organization; PPO, preferred provider organization.

<sup>a</sup>Represents diagnosis codes for female urinary incontinence (including stress incontinence and fistulae).

<sup>b</sup>The term count is used to be consistent with other UDA tables; however, the VA tables represent the population of VA users and thus are not weighted to represent national population estimates.

<sup>c</sup>Rate is defined as the number of unique patients with each condition divided by the base population in the same fiscal year x 100,000 to calculate the rate per 100,000 unique outpatients.

NOTE: Race/ethnicity data from clinical observation only, not self-report; note large number of unknown values.

SOURCE: Outpatient Clinic File (OPC), VA Austin Automation Center, 1999–2001.

**RISK FACTORS**

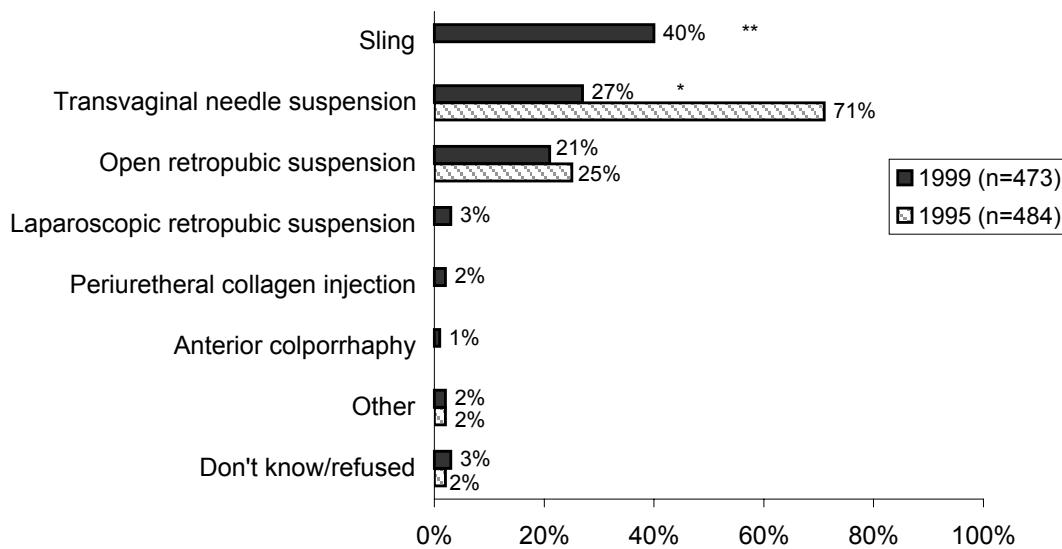
Most data on risk factors for urinary incontinence come from clinical trials or cross-sectional studies using survey designs. Some risk factors have been more rigorously studied than others. Hence, the available information has limited generalizability and causality cannot be inferred from it. Bearing these limitations in mind, the literature does suggest that age, pregnancy, childbirth, obesity, functional impairment, and cognitive impairment are associated with increased rates of incontinence or incontinence severity. Some factors pertain more to certain age groups than to others. For example, in older women, childbirth disappears as a significant risk factor, possibly due to increased comorbidities and other intervening factors, such as diabetes, stroke, and spinal cord injury. Other factors about which less is known or findings are contradictory include hysterectomy,

constipation, occupational stressors, smoking, and genetics.

**TREATMENT**

Fewer than half of the women with urinary incontinence report seeking medical care (11). Johnson and colleagues (12) found that the incontinent people most likely to contact a medical doctor are those who use pads, those who have large volume accidents, those who have impairment in activities of daily living; also, men are more likely to seek medical care than women are (Table 7). Many incontinent people practice behavioral modifications such as limiting trips, fluids, and routine activities. These restrictions are particularly striking in women with concomitant fecal incontinence (Table 8).

Most treatment for urge incontinence is nonsurgical. Common therapeutic modalities include pharmacologic treatment, physiotherapy, biofeedback,



**Figure 4. Most common surgical treatments in women with stress urinary incontinence associated with hypermobility, as indicated by practitioners treating females with urinary incontinence.**

\*Significantly lower than 1995 (p < 0.05)

\*\*Significantly higher than any other treatment and 1995 (p < 0.05)

SOURCE: Adapted from O’Leary MP, Gee WF, Holtgrewe HL, Blute ML, Cooper TP, Miles BJ, Nellans RE, Thomas R, Painter MR, Meyer JJ, Naslund MJ, Gormley EA, Blizzard R, Fenninger RB, 1999 American Urological Association Gallup Survey: changes in physician practice patterns, treatment of incontinence and bladder cancer, and impact of managed care, *Journal of Urology*, 164, 1,311–1,316, Copyright 2000, with permission from Lippincott Williams & Wilkins.

**Table 7. Relationship between disposable pad use and contacting an MD among subjects reporting urinary incontinence**

Factor	Contacting MD	
	Bivariate Odds Ratio (95% CI)	Multivariate Odds Ratio (95% CI)
Disposable Pad Usage		
Non-user	1.0	1.0
User	2.81 (2.05–3.85)	3.02 (1.87–4.87)
Gender		
Female	1.0	1.0
Male	1.73 (1.28–2.36)	2.51 (1.58–4.01)
Age group		
70–79	1.0	1.0
80–89	1.12 (0.84–3.28)	1.12 (0.71–1.78)
90+	1.50 (1.00–2.24)	0.83 (0.46–1.51)
Severity of urinary incontinence		
Mild-Mod	1.0	
Severe	2.77 (2.00–3.86)	NS
How often have difficulty holding		
Less than 1/wk	1.0	
More than 1/wk	1.60 (1.42–1.81)	NS
Ever leak/lose urine with cough/laugh		
No	1.0	
Yes	1.05 (0.76–1.44)	NS
How often lose urine completely		
Never	1.0	1.0
Sometimes	1.99 (1.42–2.80)	1.90 (1.18–3.07)
Often	3.53 (2.01–6.19)	2.45 (1.00–6.00)
Mobility ADL		
No impairment	1.0	
Impairment	3.48 (2.28–5.29)	NS
Instrumental ADL		
Not impaired	1.0	1.0
Impairment	3.07 (2.08–4.54)	3.22 (1.83–5.68)
Basic ADL		
Not impaired	1.0	1.0
Impairment	1.48 (1.00–2.18)	0.38 (0.19–0.78)
Bowel incontinence		
None	1.0	
Weekly	2.77 (2.00–3.86)	NS

NS, not significant; ADL, activity of daily living.

95% confidence intervals for age and gender may include 1.0 for odds ratio. In the case of bivariate analysis, the criterion was to include variables significant at  $\alpha = 0.10$ .

For multivariate analysis, age and gender variables were forced into all final models because they were the stratification variables of the sample.

SOURCE: Reprinted from Johnson TM, Kincade JE, Bernard SL, Busby-Whitehead J, DeFries GH, Self-care practices used by older men and women to manage urinary incontinence: Results from the national follow-up survey on self-care and aging, *Journal of the American Geriatrics Society*, 48, 894–902, Copyright 2000, with permission from the American Geriatrics Society.

**Table 8. Estimates of self-care practice for those with urinary incontinence, by presence of fecal incontinence, severity of urinary incontinence, and gender**

	All UI (95% CI)	UI without Fecal Incontinence <sup>a</sup> (95% CI)	UI with Fecal Incontinence (95% CI)	Mild or Moderate UI (95% CI)	Severe UI (95% CI)	Women with UI (95% CI)	Men with UI (95% CI)
In the last 12 months have you used:							
Disposable pads	36.8% (31.0–42.7)	33.6% (28.2–38.9)	45.2% (19.6–70.9)	27.7% (22.4–32.9)	60.1% (45.9–74.3)	44.5% (36.9–52.1)	15.1% (8.1–22.1)
Laundry service	2.3% (0.8–3.8)	2.5% (0.7–4.1)	1.7% (0–4.4)	1.7% (0.4–3.1)	3.9% (0–8.5)	1.6% (0.4–2.8)	4.2% (0–8.8)
Plastic sheets	11.2% (7.3–15.1)	9.5% (6.1–12.8)	39.6% (19.3–59.9)	7.1% (3.0–11.2)	20.6% (10.4–30.8)	11.3% (7.1–15.4)	11.0% (5.0–17.0)
Changed day-to-day routine activities:							
Limited trips	27.6% (19.6–35.5)	21.4% (16.7–26.0)	56.2% (37.5–74.9)	15.2% (10.6–19.9)	55.8% (40.4–71.2)	25.6% (17.0–34.2)	33.0% (22.4–43.7)
Limited fluids	36.6% (30.3–43.0)	32.6% (27.9–37.2)	57.6% (40.3–74.9)	29.3% (24.2–34.4)	55.3% (39.6–71.0)	39.4% (31.7–47.0)	28.5% (19.5–37.6)
Bladder exercise	11.7% (7.8–15.5)	12.5% (8.7–16.3)	8.1% (0–20.0)	10.4% (7.0–13.9)	15.9% (6.1–25.8)	14.2% (9.7–18.9)	4.3% (1.0–7.7)
Contacted an MD	39.8% (32.2–47.4)	34.5% (29.0–40.2)	62.9% (43.6–82.2)	31.2% (25.3–37.0)	59.2% (44.8–73.6)	37.1% (28.9–45.6)	47.4% (35.8–59.0)
Has someone helped you manage by:							
Changing disposable pads	15.3% (8.3–22.3)	11.3% (5.0–17.7)	60.1% (26.2–93.9)	12.9% (5.0–20.8)	16.4% (3.1–29.7)	11.4% (4.8–18.0)	47.6% (20.8–74.3)
Any assistance <sup>b</sup>	23.2% (18.4–28.0)	21.2% (17.1–25.4)	63.8% (43.6–84.2)	18.8% (13.7–24.0)	34.3% (20.6–47.9)	21.1% (15.6–26.7)	31.7% (22.7–40.6)

<sup>a</sup>Excludes all subjects reporting fecal incontinence. All other categories may include those with dual incontinence (maximum of 8% of total sample).

<sup>b</sup>Any assistance includes receiving diet and exercise advice, help with changing bedding, help with doing laundry, assistance in using the bathroom, help with a bedpan or urinal.

SOURCE: Reprinted from Johnson TM, Kincade JE, Bernard SL, Busby-Whitehead J, DeFries GH. Self-care practices used by older men and women to manage urinary incontinence: Results from the national follow-up survey on self-care and aging. Journal of the American Geriatrics Society, 48, 894–902, Copyright 2000, with permission from the American Geriatrics Society.

**Table 9. Age-specific incidence<sup>a</sup> (annual procedure rate) of surgically managed prolapse and incontinence per 1000 woman-years**

Age Group (y)	Population of Women at Risk	All Cases (n = 384)	POP Only (n = 152)	UI Only (n = 138)	POP + UI (n = 82)
20–29	23,770	0.08	0.04	0.04	
30–39	30,358	0.96	0.30	0.43	0.23
40–49	35,828	2.68	0.87	1.23	0.59
50–59	24,242	3.30	1.24	1.24	0.83
60–69	16,231	5.24	2.28	1.60	1.36
70–79	12,236	6.62	3.43	1.72	1.47
≥ 80	6,889	1.60	0.73	0.44	0.44
Total	149,554	2.63			

POP, pelvic organ prolapse; UI, urinary incontinence.

<sup>a</sup>Includes primary and repeat procedures.

SOURCE: Reprinted with permission from the American College of Obstetricians and Gynecologists (Obstetrics and Gynecology, 1997, 89, 501–506).

bladder retraining, and electrical stimulation. For women with intractable, severe urge incontinence, direct neuromodulation of the sacral spinal cord is an increasingly popular option. Surgical therapy designed to increase bladder capacity and decrease contractility is rarely used.

In contrast, surgery is a mainstay of therapy for stress urinary incontinence. Surgeries performed frequently for stress incontinence in the past—anterior colporrhaphies and needle suspension procedures—have more recently been supplanted by retropubic urethropexies, pubovaginal slings (using various types of sling materials), and collagen injections. Based on available evidence that the long-term (3 to 5 years) success rate of anterior colporrhaphy and needle suspension procedures is significantly lower than that of the other two procedures, the Agency for Healthcare Research and Quality (AHRQ), (13) and the American Urological Association (14) have both taken the position that retropubic urethropexies and pubovaginal slings are the procedures of choice for stress incontinence. This trend is seen clearly in a study describing the trends in surgical management by American urologists between 1995 and 1999 (15) (Figure 4).

Nonsurgical therapies are also prominent in the treatment of women with stress urinary incontinence. The primary modality used is pelvic muscle rehabilitation (“Kegel exercises”). Vaginal and

urethral devices, bladder training, and biofeedback are also frequently used. In the near future, new pharmacologic agents will be available as well.

While nonsurgical therapies for urge and stress urinary incontinence render only a minority of women completely dry, more than half of the women who participate in trials that assess such therapies report at least a 50% improvement in incontinence episodes. There is Level 1 evidence to support the use of pelvic muscle rehabilitation, bladder training, and anticholinergic therapy in women with some types of urinary incontinence. However, the literature on large, well-designed trials that are generalizable to the population seeking care is limited. Data are lacking on the long-term follow-up of nonsurgical treatment.

## TRENDS IN HEALTHCARE RESOURCE UTILIZATION

### Inpatient Care

#### *Surgical Treatment*

Surgical treatment for urinary incontinence can be more easily tracked in existing databases than can non-surgical management. Surgical therapy accounts for a considerable proportion of the cost related to incontinence. Although only a small fraction of all women with urinary incontinence seek surgical intervention, the number of women treated with surgery is substantial. Using a large managed-care database, Olsen and colleagues (1997) reported an 11.1% lifetime risk of undergoing a single operation for urinary incontinence or pelvic organ prolapse by age 80 (Table 9) (16). Using data from the 1998 National Hospital Discharge Survey and the 1998 National Census, Waetjen and colleagues (2003) calculated that approximately 135,000 women in the United States had inpatient surgery for stress urinary incontinence in 1998 (17).

Data from the Healthcare Cost and Utilization Project (HCUP) indicate that the annual rate of hospitalizations for a primary diagnosis of urinary incontinence remained stable at 51 to 54 per 100,000 between 1994 and 1998, then dropped to 44 per 100,000 in 2000 (Table 10). It is unclear whether this drop reflects an actual trend, potentially attributable to newer ambulatory surgical techniques. The annual rate of hospitalizations was higher for women 45 to 84 years of age, peaking in the 65 to 74 age group at 108



**Table 10. Inpatient hospital stays<sup>a</sup> by adult females with urinary incontinence listed as primary diagnosis, count, rate<sup>b</sup> (95% CI)**

	1994		1996		1998		2000	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate
Total <sup>c,d</sup>	49,338	51 (48–54)	54,527	54 (51–58)	53,226	52 (48–56)	46,470	44 (41–47)
Age								
18–24	211	1.7 (1.1–2.3)	*	*	*	*	*	*
25–34	2,312	11 (10–13)	2,112	10 (8.9–12)	2,176	11 (10–12)	1,770	9.2 (8.0–10)
35–44	8,828	43 (39–47)	9,442	43 (40–47)	9,104	41 (37–44)	8,480	37 (34–41)
45–54	12,880	88 (81–94)	15,481	95 (89–102)	14,589	84 (77–90)	12,365	66 (61–71)
55–64	10,187	96 (88–104)	10,952	100 (92–107)	11,975	103 (95–112)	10,213	83 (76–90)
65–74	10,665	108 (99–117)	11,328	113 (104–121)	10,419	105 (97–114)	8,735	90 (81–98)
75–84	3,908	67 (60–73)	4,585	72 (64–79)	4,322	64 (58–70)	4,360	63 (56–71)
85+	347	18 (14–23)	518	27 (19–34)	486	25 (20–31)	444	21 (16–26)
Race/ethnicity								
White	34,245	47 (44–50)	37,576	50 (47–53)	35,716	47 (44–51)	30,434	40 (37–43)
Black	1,266	11 (8.4–14)	1,426	12 (9–14)	1,483	12 (9.4–14)	1,119	8.7 (7.3–10)
Asian/Pacific Islander	260	9.5 (6.6–12)	220	6.5 (4.4–8.5)	307	8.1 (5.5–11)	276	6.8 (4.7–9.0)
Hispanic	1,965	24 (20–28)	2,510	28 (22–34)	2,262	23 (19–27)	2,869	27 (23–31)
Region								
Midwest	12,123	53 (46–59)	11,916	51 (45–57)	11,999	50 (44–57)	10,420	44 (37–50)
Northeast	6,809	34 (29–38)	8,839	44 (38–50)	8,380	41 (34–49)	8,051	39 (32–46)
South	18,024	55 (49–61)	22,237	62 (56–69)	21,300	59 (52–65)	17,741	48 (43–53)
West	12,381	61 (53–69)	11,535	55 (47–62)	11,547	53 (45–60)	10,258	44 (37–51)
MSA								
Rural	8,272	34 (29–40)	9,356	41 (36–47)	9,961	43 (37–50)	7,307	32 (27–37)
Urban	40,810	57 (53–61)	44,881	58 (54–62)	42,906	54 (50–58)	39,095	48 (44–52)
Discharge Status								
Routine	46,483	48 (45–51)	51,370	51 (48–55)	50,372	49 (46–53)	44,518	42 (39–46)
Short-term	*	*	*	*	*	*	*	*
Skilled nursing facility	255	0.3 (0.2–0.4)	294	0.3 (0.2–0.4)	...	...	...	...
Intermediate care	*	*	*	*	...	...	...	...
Other facility	*	*	*	*	579	0.6 (0.4–0.7)	347	0.3 (0.2–0.4)
Home healthcare	2,202	2.3 (1.9–2.6)	2,571	2.6 (2.2–3.0)	2,184	2.1 (1.8–2.5)	1,518	1.4 (1.2–1.7)
Against medical advice	*	*	*	*	*	*	*	*
Died	*	*	*	*	*	*	*	*

... data not available.

\*Figure does not meet standard of reliability or precision.

MSA, metropolitan statistical area.

<sup>a</sup>Excludes hospitalizations associated with a primary gynecological diagnosis (e.g., pelvic organ prolapse).

<sup>b</sup>Rate per 100,000 based on 1994, 1996, 1998, 2000 population estimates from Current Population Survey (CPS), CPS Utilities, Unicon Research Corporation, for relevant demographic categories of US female adult civilian non-institutionalized population.

<sup>c</sup>Counts may not add to totals because of rounding.

<sup>d</sup>Persons of other races, missing or unavailable race and ethnicity, and missing MSA are included in the totals.

NOTE: Counts may not sum to totals due to rounding.

SOURCE: Healthcare Cost and Utilization Project Nationwide Inpatient Sample, 1994, 1996, 1998, 2000.

**Table 11. Inpatient stays by female Medicare beneficiaries with urinary incontinence listed as primary diagnosis, count<sup>a</sup>, rate<sup>b</sup> (95% CI)**

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total <sup>c</sup>	16,160	82 (80–83)	19,840	98 (97–100)	17,700	93 (92–94)
Total < 65	1,240	52 (49–55)	2,520	94 (90–97)	2,520	91 (87–94)
Total 65+	14,920	86 (84–87)	17,320	99 (98–100)	15,180	93 (92–95)
Age						
65–74	9,780	106 (104–109)	11,300	126 (123–128)	9,320	118 (116–120)
75–84	4,380	74 (72–76)	5,220	87 (85–90)	5,100	87 (85–90)
85–94	760	37 (34–39)	740	33 (31–36)	700	31 (29–34)
95+	0	0	60	21 (16–26)	60	19 (15–24)
Race/ethnicity						
White	14,820	88 (87–90)	18,520	107 (105–108)	16,540	102 (101–104)
Black	460	27 (25–30)	640	35 (32–38)	600	34 (31–37)
Asian	...	...	20	21 (12–31)	120	68 (56–80)
Hispanic	...	...	160	80 (67–92)	260	71 (62–79)
N. American Native	...	...	20	124 (68–179)	40	153 (107–199)
Region						
Midwest	4,940	98 (96–101)	5,200	101 (98–104)	4,780	97 (94–100)
Northeast	2,020	45 (43–47)	2,640	59 (57–61)	2,340	60 (57–62)
South	5,840	84 (81–86)	7,880	109 (107–111)	7,540	107 (105–110)
West	3,300	116 (112–120)	3,880	136 (131–140)	2,980	110 (106–114)

... data not available.

<sup>a</sup>Unweighted counts multiplied by 20 to arrive at values in the table.

<sup>b</sup>Rate per 100,000 Medicare beneficiaries in the same demographic stratum.

<sup>c</sup>Persons of other races, unknown race and ethnicity, and other region are included in the totals.

NOTE: Counts less than 600 should be interpreted with caution.

SOURCE: Centers for Medicare and Medicaid Services, MedPAR and 5% Carrier File, 1992, 1995, 1998.

per 100,000 (Figure 5). Hospitalizations were most common in women residing in the South and West and least common in women living in the Northeast. Women living in urban areas had a higher rate of hospitalizations than did those in rural areas. Most of the hospitalizations for urinary incontinence were probably for surgical treatments.

The number of hospitalizations in Table 10 represents roughly one-half of the number of incontinence procedures reported by Waetjen, et. al. This is most likely due to the fact that Waetjen included inpatient stays in which the primary diagnosis was gynecological (such as pelvis organ prolapse) and in whom an incontinence procedure was done in concert with other procedures to repair the primary gynecological problem. Future analyses will address this issue.

Similar trends for older women were found in Medicare (Table 11) and HCUP (Table 10). The rate of inpatient stays for urinary incontinence for older women enrolled in Medicare (those 65+) ranged from 86 to 99 per 100,000 annually, with women between 65 and 74 more likely than the other age groups to be hospitalized. Geographic and racial/ethnic distributions were similar to those found in HCUP and significant differences among racial/ethnic groups were also noted.

Among women with commercial health insurance, the rate of inpatient hospitalizations for incontinence procedures (primary or any procedure) ranged from 123 per 100,000 women in 1994 to 114 per 100,000 in 2000 (Table 12). Most of these procedures were performed in conjunction with other surgical procedures and are thus listed as any procedure.

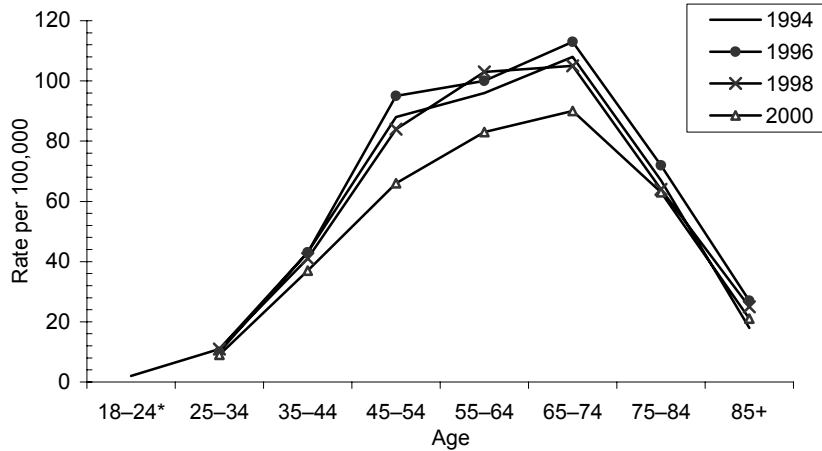


Figure 5. Inpatient hospital stays by females with urinary incontinence listed as primary diagnosis, by age and year.

\*Figure does not meet standard for reliability or precision.

SOURCE: Healthcare Cost and Utilization Project, 1994, 1996, 1998, 2000.

Table 12. Inpatient procedures for females with urinary incontinence having commercial health insurance, count<sup>a</sup>, rate<sup>b</sup>

	1994		1996		1998		2000	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate
<b>As Primary Procedure</b>								
Total	230	59	307	53	355	40	334	33
Age								
18-24	0	*	2	*	0	*	0	*
25-34	18	*	16	*	14	*	25	*
35-44	62	54	66	39	100	39	77	27
45-54	97	120	134	106	136	66	116	47
55-64	42	112	79	138	94	95	96	79
65-74	9	*	9	*	10	*	18	*
75-84	1	*	1	*	1	*	2	*
85+	1	*	0	*	0	*	0	*
<b>As Any Procedure</b>								
Total	483	123	749	130	1,034	115	1,167	114
Age								
18-24	0	*	3	*	2	*	0	*
25-34	38	38	48	34	72	35	74	33
35-44	170	147	253	151	319	125	348	124
45-54	187	232	301	238	407	197	443	180
55-64	72	191	123	214	203	205	249	204
65-74	14	*	18	*	26	*	49	264
75-84	1	*	3	*	5	*	3	*
85+	1	*	0	*	0	*	1	*

\*Figure does not meet standard for reliability or precision.

<sup>a</sup>Counts less than 30 should be interpreted with caution.

<sup>b</sup>Rate per 100,000 based on member months of enrollment in calendar years for females in the same demographic stratum.

SOURCE: Center for Health Care Policy and Evaluation, 1994, 1996, 1998, 2000.

**Table 13. Trends in mean inpatient length of stay (days) for adult females hospitalized with urinary incontinence listed as primary diagnosis**

	Length of Stay			
	1994	1996	1998	2000
Total	3.1	2.6	2.4	2.1
Age				
18–24	2.7	*	*	*
25–34	2.9	2.5	2.2	2.1
35–44	3.0	2.4	2.3	2.1
45–54	3.1	2.5	2.3	2.1
55–64	3.0	2.5	2.3	2.1
65–74	3.3	2.7	2.5	2.1
75–84	3.7	2.9	2.7	2.7
85+	3.9	3.5	2.7	2.9
Race/ethnicity				
White	3.2	2.6	2.3	2.1
Black	3.2	2.7	2.5	2.3
Asian/Pacific Islander	2.7	2.7	2.1	2.2
Hispanic	3.1	2.6	2.5	2.4
Other	3.3	2.5	2.5	2.1
Region				
Midwest	3.1	2.6	2.4	2.1
Northeast	3.7	2.8	2.3	2.0
South	3.2	2.6	2.4	2.2
West	2.7	2.3	2.4	2.2
MSA				
Rural	3.4	2.6	2.3	2.4
Urban	3.1	2.5	2.4	2.1
Discharge status				
Routine	3.1	2.5	2.3	2.1
Short-term	*	*	*	*
Skilled nursing facility	5.0	4.5	...	...
Immediate care	*	*	...	...
Other facility	*	*	5.4	6.6
Home healthcare	3.9	3.3	3.0	2.8
Against medical advice	*	*	*	*
Died	*	*	*	*

....data not available.

\*Figure does not meet standard for reliability or precision.

MSA, metropolitan statistical area.

SOURCE: Healthcare Cost and Utilization Project Nationwide Inpatient Sample, 1994, 1996, 1998, 2000.

Hospitalizations for incontinence surgeries as primary procedures ranged from 59 per 100,000 women in 1994 to 33 per 100,000 in 2000. These data suggest a trend toward decreasing numbers of inpatient surgeries for incontinence; if this trend is substantiated in future years, it may reflect either the increased emphasis on nonsurgical treatment for urinary incontinence that followed the dissemination of the AHRQ guidelines or increased utilization of ambulatory incontinence surgeries.

Consistent with decreasing lengths of inpatient stay for other conditions during the past decade, length of stay for women with urinary incontinence as their primary discharge diagnosis decreased steadily, from 3.1 days in 1994 to 2.1 days in 2000 (Table 13). Women in the oldest age groups were hospitalized longer than were those younger than 75. For example, in 2000, length of stay remained stable at 2.1 days in women between 18 and 74 years of age, and varied from 2.7 to 2.9 days in women older than 75. Length of stay was similar across racial/ethnic groups and regions of the country.

### Surgical Procedures

In 1998, the most commonly performed surgical procedures for female urinary incontinence were collagen injections, pubovaginal slings, and anterior urethropexies (Table 14). Because anterior colporrhaphies may be performed for either urinary incontinence (a condition for which they are not a currently recommended treatment) or anterior pelvic organ prolapse (cystocele), rates for this procedure are not described. A striking decrease was seen in both Raz and Peyrera needle suspension procedures between 1992 and 1998: Raz procedures decreased from 4,364 per 100,000 women in 1992 to 1,564 per 100,000 in 1998, while Peyrera procedures were done too infrequently by 1998 to be detected in the data. Concomitantly, pubovaginal slings increased from 621 per 100,000 women in 1995 to 2,776 per 100,000 in 1998. The number of women undergoing anterior urethropexy decreased, though less dramatically, from 3,941 per 100,000 women in 1992 to 2,364 per 100,000 in 1998.

Despite an increase in cesarean deliveries and complex laparoscopic pelvic surgeries (two major sources of urogenital fistulae) during the time frame studied, national hospitalization data showed no

**Table 14. Surgical procedures used to treat urinary incontinence among female adult Medicare beneficiaries, count<sup>a</sup>, rate<sup>b</sup>**

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total	18,820	10,475	32,880	13,096	36,400	11,033
Anterior urethropexy, (e.g., MMK)	7,080	3,941	8,180	3,258	7,800	2,364
Ambulatory surgery center	160	89	360	143	580	176
Inpatient	6,720	3,740	7,740	3,082	7,200	2,182
Hospital outpatient	60	33	0	0	0	0
Physician office	140	78	80	32	20	6
Raz-type suspension	7,840	4,364	10,540	4,198	5,160	1,564
Ambulatory surgery center	360	200	600	239	720	218
Inpatient	7,400	4,119	9,780	3,895	4,400	1,333
Hospital outpatient	20	11	0	0	0	0
Physician office	60	33	160	64	40	12
Laparoscopic repair	0	0	0	0	0	0
Ambulatory surgery center	0	0	0	0	0	0
Inpatient	0	0	0	0	0	0
Hospital outpatient	0	0	0	0	0	0
Physician office	0	0	0	0	0	0
Collagen injection	0	0	9,300	3,704	12,040	3,649
Ambulatory surgery center	0	0	7,900	3,146	9,120	2,764
Inpatient	0	0	220	88	140	42
Hospital outpatient	0	0	300	119	360	109
Physician office	0	0	880	350	2,420	733
Hysterectomy with colpo-urethropexy	1,920	1,069	2,220	884	1,480	449
Ambulatory surgery center	0	0	0	0	0	0
Inpatient	1,920	1,069	2,220	884	1,480	449
Hospital outpatient	0	0	0	0	0	0
Physician office	0	0	0	0	0	0
Pubovaginal sling	640	356	1,560	621	9,160	2,776
Ambulatory surgery center	80	45	140	56	1,240	376
Inpatient	540	301	1,400	558	7,800	2,364
Hospital outpatient	0	0	0	0	0	0
Physician office	20	11	20	8	120	36
Peyrera procedure	1,280	712	820	327	540	164
Ambulatory surgery center	0	0	20	8	60	18
Inpatient	1,280	712	800	319	480	145
Hospital outpatient	0	0	0	0	0	0
Physician office	0	0	0	0	0	0
Kelly plication	60	33	260	104	220	67
Ambulatory surgery center	0	0	0	0	0	0
Inpatient	60	33	260	104	220	67
Hospital outpatient	0	0	0	0	0	0
Physician office	0	0	0	0	0	0

<sup>a</sup>Unweighted counts multiplied by 20 to arrive at values in the table.

<sup>b</sup>Rate per 100,000 female adult Medicare beneficiaries with a diagnosis of urinary incontinence.

NOTE: Confidence intervals could not be calculated because of multiple data sources.

SOURCE: Centers for Medicare and Medicaid Services, 5% Carrier and Outpatient File, 1992, 1995, 1998.

Table 15. Inpatient hospital stays for adult females with urinary incontinence caused by urinary fistulae listed as primary diagnosis, count, rate<sup>a</sup> (95% CI)

	1994			1996			1998			2000		
	Count	Rate		Count	Rate		Count	Rate		Count	Rate	
Total <sup>b</sup>	6,689	6.9 (6.4-7.5)		7,589	7.6 (7.0-8.1)		6,813	6.7 (6.2-7.2)		7,031	6.7 (6.2-7.2)	
Age												
18-24	294	2.4 (1.6-3.1)		217	1.7 (1.2-2.3)		186	1.5 (0.9-2.0)		*	*	
25-34	1,133	5.5 (4.7-6.4)		1,037	5.1 (4.2-5.9)		787	4.0 (3.2-4.7)		791	4.1 (3.4-4.8)	
35-44	1,054	5.2 (4.1-6.2)		1,278	5.9 (4.9-6.8)		1,186	5.3 (4.5-6.1)		1,268	5.6 (4.9-6.3)	
45-54	732	5.0 (4.0-6.0)		894	5.5 (4.5-6.6)		922	5.3 (4.4-6.2)		1,216	6.5 (5.5-7.5)	
55-64	828	7.8 (6.5-9.1)		948	8.6 (7.2-10)		852	7.4 (6.1-8.6)		895	7.3 (6.1-8.5)	
65-74	1,257	13 (11-14)		1,424	14 (12-16)		1,204	12 (10-14)		1,133	12 (10-13)	
75-84	1,021	17 (15-20)		1,366	21 (18-24)		1,194	18 (15-20)		1,131	16 (14-19)	
85+	370	20 (15-24)		425	22 (17-27)		483	25 (19-31)		452	22 (17-26)	
Race/ethnicity												
White	4,312	5.9 (5.4-6.4)		4,932	6.6 (6.0-7.1)		4,048	5.4 (4.8-5.9)		4,071	5.3 (4.8-5.8)	
Black	482	4.2 (3.2-5.1)		675	5.6 (4.3-6.9)		533	4.3 (3.3-5.3)		565	4.4 (3.5-5.3)	
Asian/Pacific Islander	*	*		*	*		*	*		*	*	
Hispanic	253	3.1 (2.1-4.0)		331	3.7 (2.3-5.0)		331	3.4 (2.2-4.6)		361	3.4 (2.5-4.3)	
Region												
Midwest	1,861	8.1 (6.9-9.3)		2,038	8.7 (7.2-10)		1,701	7.2 (5.8-8.6)		1,676	7.0 (6.1-8.0)	
Northeast	1,380	6.8 (5.8-7.8)		1,500	7.5 (6.4-8.6)		1,177	5.8 (4.9-6.7)		1,488	7.2 (6.1-8.3)	
South	2,246	6.8 (6.0-7.7)		2,842	8.0 (7.0-8.9)		2,768	7.6 (6.8-8.4)		2,617	7.0 (6.2-7.9)	
West	1,202	5.9 (4.8-7.0)		1,208	5.7 (4.8-6.7)		1,167	5.3 (4.4-6.2)		1,250	5.4 (4.6-6.2)	

\*Figure does not meet standard of reliability or precision.

<sup>a</sup>Rate per 100,000 based on 1994, 1996, 1998, 2000 population estimates from Current Population Survey (CPS), CPS Utilities, Unicon Research Corporation, for relevant demographic categories of US female adult civilian non-institutionalized population.

<sup>b</sup>Persons of other races and missing or unavailable race and ethnicity are included in the totals.

NOTE: Counts may not sum to totals due to rounding.

SOURCE: Healthcare Cost and Utilization Project Nationwide Inpatient Sample, 1994, 1996, 1998, 2000.

**Table 16. Total physician office visits by adult females with urinary incontinence, count, rate<sup>a</sup> (95% CI)**

Year	Primary Diagnosis		Any Diagnosis	
	Count	Rate	Count	Rate
1992	451,704	468 (252–683)	815,832	845 (480–1,210)
1994	549,827	571 (388–753)	1,048,115	1,088 (791–1,384)
1996	937,275	934 (600–1,267)	1,402,830	1,398 (992–1,803)
1998	1,332,053	1,302 (899–1,705)	2,004,851	1,960 (1,424–2,495)
2000	1,159,877	1,107 (722–1,490)	1,932,768	1,845 (1,313–2,375)

<sup>a</sup>Rate per 100,000 based on 1994, 1996, 1998, 2000 population estimates from Current Population Survey (CPS), CPS Utilities, Unicon Research Corporation, for relevant demographic categories of US female adult civilian non-institutionalized population.

SOURCE: National Ambulatory Medical Care Survey, 1992, 1994, 1996, 1998, 2000.

increase in hospitalizations for urinary incontinence due to fistulae (Table 15). This rate remained steady at 6.7 to 7.6 per 100,000 women between 1994 and 2000. However, although the rate is low, 7,000 hospitalizations for incontinence due to fistulae are estimated to occur each year nationwide, suggesting that further attention should be paid to prevention.

### Outpatient Care

#### *Outpatient and Emergency Room Visits*

While the rate of hospitalizations for incontinence surgeries decreased, outpatient visits for urinary incontinence more than doubled between 1992 and 2000 for women both with and without Medicare. Physician visits with urinary incontinence listed as any reason for the visit climbed from 845 per 100,000 women in 1992 to 1,845 per 100,000 in 2000, according to National Ambulatory Medical Care Survey (NAMCS) data (Table 16). Similarly, visits for which incontinence was the primary reason rose from 468 per 100,000 in 1992 to 1,107 per 100,000 in 2000. Office visits for incontinence by women ages 65 and over enrolled in Medicare rose from 1,371 per 100,000 in 1992 to 2,937 per 100,000 in 1998 (Table 17). While the reason for this increase is unknown, at least two potentially related events occurred. AHRQ published its first clinical practice guidelines on urinary incontinence in 1992; these were widely promulgated and may have led to more visits. Second, several new anticholinergic medications for urge incontinence were approved during the late 1990s. The releases of the first new medications for incontinence in several decades were accompanied by major direct-to-consumer advertising campaigns. Thus visits may

also have increased because more women became aware that treatment existed. However, this illustrates the difficulty in comparing rates across data sets. Table 3 shows that 38% of elderly women report having UI. Table 8 suggests that 40% of women with UI report seeing a physician. However, in 1998, only 3% of Medicare female beneficiaries had a physician visit for UI. Thus it would appear that people over-report seeing a doctor, UI is under-reported on billing data, or some combination of the two.

Not surprisingly, given the nonemergent nature of urinary incontinence, few women seek emergency room care for it. Only 11 per 100,000 women ages 65 and older enrolled in Medicare were evaluated in emergency room settings for this disorder in 1998.

#### *Ambulatory Surgery*

Ambulatory surgical center visits for female urinary incontinence also increased, particularly in women younger than 65. Among those with commercial health insurance, the rate of such visits increased from 15 per 100,000 in 1994 to 34 per 100,000 in 2000 (Table 18). A steady increase was seen in middle-aged women; the rate of ambulatory surgical visits by women 55 to 64 years of age increased from 61 per 100,000 in 1996 to 69 per 100,000 in 1998 and 77 per 100,000 in 2000. Older women also had more ambulatory surgical visits; the rate of such visits by women 65 and older enrolled in Medicare in 1998 was 142 per 100,000 (Table 19). The increased rate of ambulatory surgery is probably due to the wider use of endoscopic injections such as collagen to treat urinary incontinence in women. Collagen for this purpose was not available in 1992, but by 1995

**Table 17. Physician office visits by female Medicare beneficiaries with urinary incontinence listed as primary diagnosis, count<sup>a</sup>, rate<sup>b</sup> (95% CI)**

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total <sup>c</sup>	257,740	1,301 (1,296–1,306)	393,680	1,951 (1,945–1,957)	522,240	2,741 (2,733–2,748)
Total < 65	18,780	786 (775–797)	32,280	1,201 (1,188–1,214)	44,200	1,591 (1,577–1,606)
Total 65+	238,960	1,371 (1,366–1,377)	361,400	2,066 (2,059–2,073)	478,040	2,937 (2,928–2,945)
Age						
65–74	118,140	1,285 (1,278–1,293)	177,840	1,976 (1,967–1,985)	214,960	2,720 (2,709–2,732)
75–84	93,340	1,583 (1,572–1,593)	139,240	2,326 (2,314–2,338)	200,720	3,436 (3,421–3,451)
85–94	26,640	1,283 (1,268–1,299)	42,260	1,901 (1,883–1,918)	59,820	2,689 (2,668–2,710)
95+	840	326 (304–348)	2,060	728 (696–759)	2,540	819 (787–850)
Race/ethnicity						
White	236,320	1,408 (1,402–1,414)	363,440	2,094 (2,088–2,101)	480,900	2,972 (2,964–2,981)
Black	11,020	654 (641–666)	16,520	898 (884–912)	23,040	1,306 (1,289–1,323)
Asian	...	...	1,260	1,335 (1,262–1,408)	2,660	1,503 (1,447–1,560)
Hispanic	...	...	3,120	1,553 (1,499–1,607)	7,160	1,948 (1,903–1,993)
N. American Native	...	...	320	1,980 (1,764–2,197)	300	1,150 (1,020–1,281)
Region						
Midwest	66,100	1,317 (1,307–1,327)	99,840	1,936 (1,924–1,948)	134,480	2,726 (2,712–2,740)
Northeast	50,440	1,113 (1,103–1,123)	74,920	1,667 (1,655–1,679)	89,600	2,287 (2,272–2,302)
South	94,740	1,356 (1,347–1,364)	149,500	2,069 (2,059–2,080)	206,340	2,940 (2,928–2,953)
West	45,000	1,578 (1,564–1,593)	66,900	2,336 (2,319–2,354)	88,700	3,264 (3,243–3,285)

... data not available.

<sup>a</sup>Unweighted counts multiplied by 20 to arrive at values in the table.

<sup>b</sup>Rate per 100,000 Medicare beneficiaries in the same demographic stratum.

<sup>c</sup>Persons of other races, unknown race and ethnicity, and other region are included in the totals.

NOTE: Counts less than 600 should be interpreted with caution.

SOURCE: Centers for Medicare and Medicaid Services, 5% Carrier and Outpatient Files, 1992, 1995, 1998.

**Table 18. Visits to ambulatory surgery centers for urinary incontinence procedures listed as any procedure by adult females having commercial health insurance, count<sup>a</sup>, rate<sup>b</sup> (95% CI)**

	1994		1996		1998		2000	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate
Total	60	15	185	32	278	31	351	34
Age								
18–24	0	*	1	*	1	*	0	*
25–34	3	*	7	*	15	*	19	*
35–44	17	*	45	27	71	28	91	32
45–54	25	*	80	63	103	50	128	52
55–64	11	*	35	61	68	69	94	77
65–74	3	*	11	*	17	*	14	*
75–84	0	*	2	*	3	*	4	*
85+	1	*	4	*	0	*	1	*

\*Figure does not meet standard for reliability or precision.

<sup>a</sup>Counts less than 30 should be interpreted with caution.

<sup>b</sup>Rate per 100,000 based on member months of enrollment in calendar year for adult females in the same demographic stratum.

SOURCE: Center for Health Care Policy and Evaluation, 1994, 1996, 1998, 2000.



**Table 19. Visits to ambulatory surgery centers by female Medicare beneficiaries with urinary incontinence listed as primary diagnosis, count<sup>a</sup>, rate<sup>b</sup> (95% CI)**

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total <sup>c</sup>	11,580	58 (57–60)	24,680	122 (121–124)	25,820	135 (134–137)
Total < 65	1,140	48 (45–50)	2,260	84 (81–88)	2,740	99 (95–102)
Total 65+	10,440	60 (59–61)	22,420	128 (126–130)	23,080	142 (140–144)
Age						
65–74	5,900	64 (63–66)	11,880	132 (130–134)	10,780	136 (134–139)
75–84	3,800	64 (62–66)	8,420	141 (138–144)	9,680	166 (162–169)
85–94	720	35 (32–37)	2,080	94 (90–98)	2,500	112 (108–117)
95+	20	7.8 (4.3–11)	40	14 (9.9–18)	120	39 (32–45)
Race/ethnicity						
White	10,460	62 (61–64)	23,120	133 (132–135)	24,480	151 (149–153)
Black	600	36 (33–38)	900	49 (46–52)	860	49 (46–52)
Asian	...	...	60	64 (48–79)	80	45 (35–55)
Hispanic	...	...	60	30 (22–37)	240	65 (57–73)
N. American Native	...	...	40	248 (173–322)	...	...
Region						
Midwest	4,100	82 (79–84)	8,620	167 (164–171)	8,360	169 (166–173)
Northeast	2,400	53 (51–55)	4,500	100 (97–103)	4,820	123 (120–126)
South	4,120	59 (57–61)	9,580	133 (130–135)	10,160	145 (142–148)
West	960	34 (32–36)	1,960	68 (65–71)	2,480	91 (88–95)

... data not available.

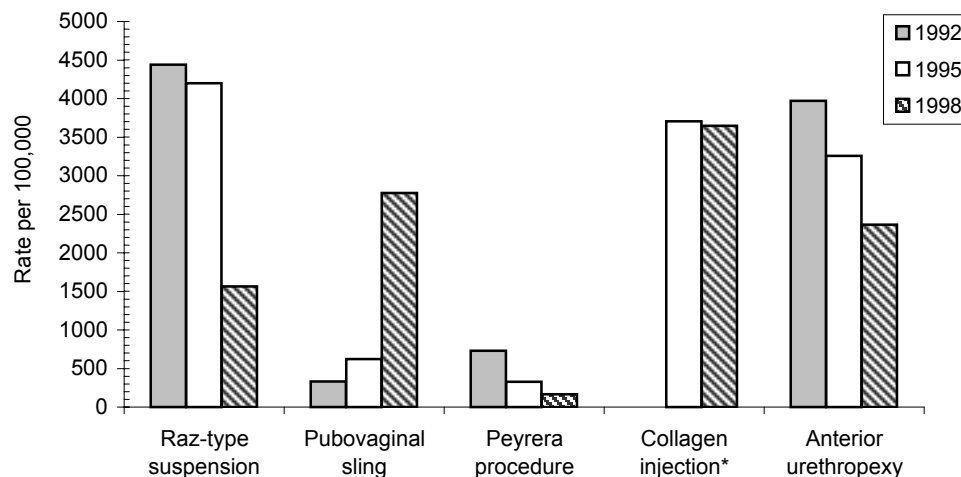
<sup>a</sup>Unweighted counts multiplied by 20 to arrive at values in the table.

<sup>b</sup>Rate per 100,000 Medicare beneficiaries in the same demographic stratum.

<sup>c</sup>Persons of other races, unknown race and ethnicity, and other region are included in the totals.

NOTE: Counts less than 600 should be interpreted with caution.

SOURCE: Centers for Medicare and Medicaid Services, 5% Carrier and Outpatient Files, 1992, 1995, 1998.



**Figure 6. Rate of surgical procedures used to treat urinary incontinence among female Medicare beneficiaries.**

\*Collagen injection introduced in 1993.

SOURCE: Centers for Medicare and Medicaid Services, 1992, 1995, 1998.

3,704 per 100,000 women enrolled in Medicare were undergoing this therapy. This rate has since plateaued (Table 14 and Figure 6).

### Nursing Home Care

Incontinence is particularly a problem in the frail elderly and is exacerbated by dementia, functional limitations, and comorbid conditions. In the United States, identification of incontinence by the Minimum Data Set (developed by the US Health Care Financing Administration) within 14 days of nursing home admission is mandated (18).

According to data collected by the National Nursing Home Survey (NNHS), the rate of women in nursing homes with an admitting or current diagnosis of urinary incontinence has remained fairly stable; the most recent estimate (for 1999) is 1,366 per 100,000. The rate is very similar across age groups of nursing home residents (Table 20). Few female nursing home residents with urinary incontinence have indwelling urethral catheters or ostomies (9,495 per 100,000 in 1999) (Table 21); however, fully half require another person's assistance when using the toilet.

Urinary incontinence is regarded as an important risk factor for nursing home admission. Research has indicated that a significant proportion of those admitted to nursing homes are incontinent of urine at the time of their admission (19, 20). After adjustment for age, cohort factors, and comorbid conditions, Thom found that the relative risk of admission to a

nursing home is two times greater for incontinent women (21).

The sharp divergence of the NNHS data from published studies on the prevalence of incontinence in nursing homes compels us to pay particular attention to the method of collecting information on incontinence in nursing home residents. According to NNHS data, only 1% to 2% of nursing home patients have an admitting or current diagnosis of urinary incontinence, a finding that highlights the limitations of using administrative data to study the prevalence of incontinence. When queries about bladder function are expanded to include assistance needed from nursing home staff, a high prevalence of bladder dysfunction becomes apparent. Over half of all female nursing home residents are reported to have "difficulty controlling urine," and over half need assistance in using the toilet (Table 22). Thus, when interpreting incontinence prevalence rates, great care must be taken to clarify the definition of incontinence used.

### ECONOMIC IMPACT

Medical expenditures for urinary incontinence among female Medicare beneficiaries (65 years of age and older) nearly doubled between 1992 and 1998 from \$128.1 million to \$234.4 million, primarily due to increased aggregate costs for physician office visits and ambulatory surgery (Table 23). At the same time, inpatient costs increased only modestly between 1992

**Table 20. Female nursing home residents with an admitting or current diagnosis of urinary incontinence, count, rate<sup>a</sup> (95% CI)**

	1995		1997		1999	
	Count	Rate	Count	Rate	Count	Rate
Total	13,915	1,237 (949–1,524)	20,679	1,789 (1,435–2,143)	15,979	1,366 (1,050–1,681)
Age						
≤74	2,443	1,435 (605–2,265)	2,408	1,334 (610–2,058)	2,627	1,389 (588–2,190)
75–84	4,159	1,131 (662–1,601)	9,029	2,428 (1,679–3,176)	5,668	1,540 (972–2,107)
85+	7,313	1,245 (846–1,644)	9,242	1,531 (1,085–1,978)	7,685	1,254 (823–1,685)
Race						
White	13,397	1,340 (1,022–1,658)	17,962	1,779 (1,403–2,155)	15,075	1,509 (1,148–1,869)
Other	518	421 (0–905)	2,717	1,969 (858–3,080)	904	554 (58–1,051)

<sup>a</sup>Rate per 100,000 nursing home residents in the same demographic stratum.

SOURCE: National Nursing Home Survey, 1995, 1997, 1999.

Table 21. Special needs of female nursing home residents with urinary incontinence, count, rate<sup>a</sup> (95% CI)

Category	1995		1997		1999	
	Count	Rate	Count	Rate	Count	Rate
Has an indwelling foley catheter or ostomy						
Yes	1,435	10,316 (2,864–17,768)	2,423	11,718 (5,311–18,125)	1,517	9,495 (2,892–16,099)
No	12,479	89,684 (82,232–97,136)	18,256	88,282 (81,875–94,689)	14,462	90,505 (83,901–97,108)
Requires assistance using the toilet						
Yes	9,847	70,766 (59,831–81,702)	14,237	68,846 (59,267–78,424)	8,898	55,684 (43,783–67,586)
No	2,475	17,789 (8,437–27,141)	2,794	13,511 (6,777–20,245)	3,234	20,238 (10,842–29,634)
Question skipped for allowed reason	1,592	11,444 (3,978–18,910)	3,405	16,464 (8,416–24,513)	3,847	24,077 (13,340–34,814)
Question left blank	0	0	244	1,179 (0–3,513)	0	0
Requires assistance from equipment when using the toilet						
Yes	3,214	23,095 (12,895–33,295)	4,464	21,587 (13,465–29,709)	2,821	17,653 (9,041–26,266)
No	6,472	46,513 (34,604–58,422)	9,056	43,793 (33,744–53,842)	5,876	36,771 (25,354–48,188)
Question skipped for allowed reason	4,068	29,234 (18,298–40,169)	6,199	29,976 (20,499–39,452)	7,081	44,316 (32,414–56,217)
Question left blank	161	1,159 (0–3,472)	960	4,644 (134–9,154)	201	1,260 (0–3,771)
Requires assistance from another person when using the toilet						
Yes	9,619	69,132 (58,007–80,256)	14,000	67,698 (58,032–77,365)	8,675	54,292 (42,379–66,205)
No	227	1,635 (0–4,884)	0	0	223	1,393 (0–4,164)
Question skipped for allowed reason	4,068	29,234 (18,298–40,169)	6,199	29,976 (20,499–39,452)	7,081	44,316 (32,414–56,217)
Question left blank	0	0	481	2,326 (0–5,563)	0	0
Has difficulty controlling urine						
Yes	10,695	76,859 (66,543–87,176)	15,255	73,772 (64,947–82,597)	13,648	85,412 (77,364–93,460)
No	2,266	16,287 (7,085–25,489)	3,966	19,176 (11,322–27,031)	1,786	11,180 (3,928–18,432)
Question skipped for allowed reason	954	6,854 (895–12,812)	1,458	7,052 (1,886–12,217)	545	3,408 (0–7,333)

<sup>a</sup>Rate per 100,000 adult female nursing home residents with urinary incontinence in the NNHS for that year.

SOURCE: National Nursing Home Survey, 1995, 1997, 1999.

Table 22. Special needs of female nursing home residents regardless of continence status, count, rate<sup>a</sup> (95% CI)

Category	1995		1997		1999	
	Count	Rate	Count	Rate	Count	Rate
Has indwelling foley catheter or ostomy						
Yes	101,827	9,050 (8,281–9,819)	90,855	7,859 (7,151–8,566)	96,151	8,218 (7,484–8,951)
No	1,020,886	90,732 (89,954–91,510)	1,061,282	91,796 (91,072–92,520)	1,064,024	90,937 (90,162–91,712)
Question left blank	2,450	218 (89–347)	3,997	346 (182–510)	9,890	845 (571–1,120)
Requires assistance using the toilet						
Yes	659,035	58,572 (57,256–59,888)	652,615	56,448 (55,131–57,765)	670,006	57,262 (55,935–58,590)
No	286,946	25,503 (24,334–26,671)	280,242	24,240 (23,104–25,375)	273,104	23,341 (22,202–24,480)
Question skipped for allowed reason	173,839	15,450 (14,484–16,417)	216,408	18,718 (17,680–19,756)	218,971	18,714 (17,670–19,759)
Question left blank	5,343	475 (297–652)	6,870	594 (394–794)	7,983	682 (430–935)
Requires assistance from equipment when using the toilet						
Yes	182,812	16,248 (15,274–17,221)	180,518	15,614 (14,659–16,569)	178,305	15,239 (14,293–16,185)
No	460,230	40,903 (39,592–42,215)	433,640	37,508 (36,220–38,795)	467,351	39,942 (38,631–41,254)
Question skipped for allowed reason	460,785	40,953 (39,639–42,267)	496,649	42,958 (41,643–44,272)	492,075	42,055 (40,732–43,379)
Question left blank	21,336	1,896 (1,536–2,257)	45,327	3,921 (3,391–4,450)	32,334	2,763 (2,303–3,224)
Requires assistance from another person when using the toilet						
Yes	652,088	57,955 (56,636–59,274)	640,137	55,369 (54,048–56,689)	661,927	56,572 (55,242–57,901)
No	6,109	543 (345–741)	8,603	744 (511–977)	6,800	581 (384–779)
Question skipped for allowed reason	460,785	40,953 (39,639–42,267)	496,649	42,958 (41,643–44,272)	492,075	42,055 (40,732–43,379)
Question left blank	6,180	549 (357–741)	10,745	929 (681–1,178)	9,263	792 (527–1,056)
Has difficulty controlling urine						
Yes	633,123	56,269 (54,943–57,596)	672,699	58,185 (56,875–59,496)	685,747	58,608 (57,288–59,927)
No	424,287	37,709 (36,411–39,006)	422,839	36,574 (35,293–37,854)	422,162	36,080 (34,793–37,367)
Question skipped for allowed reason	64,822	5,761 (5,124–6,398)	57,080	4,937 (4,370–5,504)	55,713	4,761 (4,201–5,322)
Question left blank	2,931	260 (114–407)	3,517	304 (154–454)	6,444	551 (323–778)

<sup>a</sup>Rate per 100,000 adult female nursing home residents in the NNHS for that year.

SOURCE: National Nursing Home Survey, 1995, 1997, 1999.

and 1995, then decreased slightly in 1998 (Figure 7). Table 24 illustrates that, as with Medicare, during the 1990s expenditures in the general population shifted to the outpatient setting. This change in venue probably reflects the general shift of surgical procedures to the outpatient setting, as well as the advent of new procedures, such as periurethral collagen injections, which do not require hospital admission. In addition, the increase in awareness of incontinence and the marketing of new drugs for its treatment may have increased the number of office visits.

While claims-based costs are substantial, others have projected the aggregate cost of UI to be even

higher. In one estimation model that included women and men, the aggregate cost of urinary incontinence in the United States in 1995—including diagnostic testing, medical and surgical therapy, medications, routine care, hospitalization, skin irritation, related infections and falls, and other factors—was estimated to be \$26.3 billion, almost one-fourth of which was borne by patients themselves as part of routine care (22) (Table 25).

Using diagnostic algorithms, disease prevalence data, reimbursement costs, and sensitivity analyses, Wilson et al. (1) estimated the annual direct cost of urinary incontinence in women to be \$12.4 billion in

**Table 23. Expenditures for female Medicare beneficiaries age 65 and over for treatment of urinary incontinence, by site of service (% of total)**

	Year		
	1992	1995	1998
Total	\$128,100,000	\$198,700,000	\$234,400,000
Inpatient	\$90,500,000 (70.6%)	\$110,900,000 (55.8%)	\$110,100,000 (47.0%)
Outpatient			
Physician Office	\$25,700,000 (20.1%)	\$46,400,000 (23.4%)	\$75,900,000 (32.4%)
Hospital Outpatient	\$2,200,000 (1.7%)	\$3,500,000 (1.8%)	\$5,000,000 (2.1%)
Ambulatory Surgery	\$9,300,000 (7.2%)	\$36,800,000 (18.5%)	\$42,800,000 (18.2%)
Emergency room	\$400,000 (0.3%)	\$1,100,000 (0.6%)	\$600,000 (0.2%)

NOTE: Percentages may not add to 100% because of rounding.

SOURCE: Centers for Medicare and Medicaid Services Claims, 1992, 1995, 1998.

**Table 24. Expenditures for female urinary incontinence and share of costs, by site of service (% of total)**

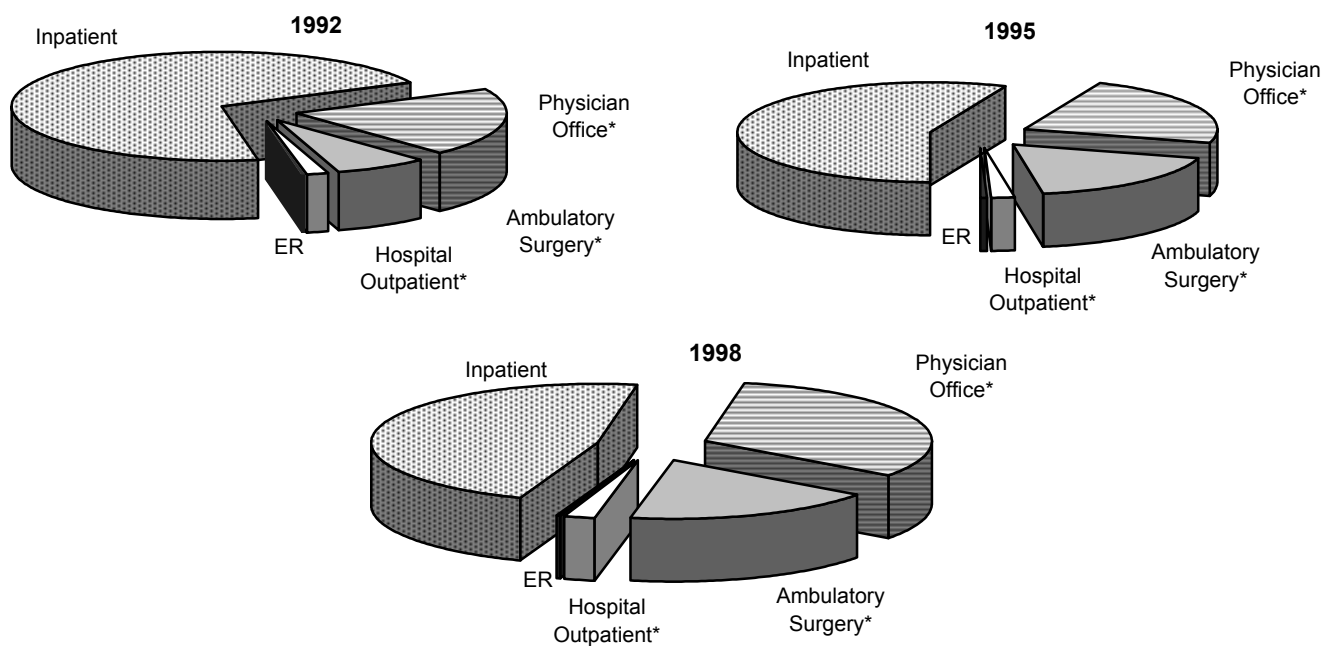
	Year			
	1994	1996	1998	2000
Total <sup>a</sup>	\$324,600,000	\$426,700,000	\$485,700,000	\$452,800,000
Inpatient	\$295,100,000 (90.9%)	\$346,000,000 (81.1%)	\$357,500,000 (73.6%)	\$329,200,000 (72.7%)
Physician Office	\$29,500,000 (9.1%)	\$80,600,000 (18.9%)	\$128,200,000 (26.4%)	\$123,600,000 (27.3%)
Hospital Outpatient	*	*	*	*
Emergency Room	*	*	*	*

\*Unweighted counts too low to yield reliable estimates.

<sup>a</sup>Total unadjusted expenditures exclude spending on outpatient prescription drugs for the treatment of urinary incontinence. Average drug spending for incontinence-related conditions (both male and female) is estimated at \$82 million to \$102 million annually for the period 1996 to 1998.

NOTE: Percentages may not add to 100% because of rounding.

SOURCES: National Ambulatory and Medical Care Survey, National Hospital Ambulatory Medical Care Survey, Healthcare Cost and Utilization Project, Medical Expenditure Panel Survey, 1994, 1996, 1998, 2000.



**Figure 7. Expenditures for female Medicare beneficiaries age 65 and over for the treatment of urinary incontinence (in millions of \$).**

\*Constitute outpatient services.

SOURCE: Centers for Medicare and Medicaid Services, 1992, 1995, 1998.

1995 (Table 26). The largest cost category was routine care, which accounted for 70% of all costs.

In a multivariate analysis controlling for age, gender, work status, median household income, urban vs rural residence, medical and drug plan characteristics, and comorbid conditions, the presence of urinary incontinence was associated with more than twice the annual expenditures per person per year compared to those without this condition (Table 27).

The indirect costs for urinary incontinence are estimated by measurements of work lost (Tables 28 and 29). Among all workers with urinary incontinence, 23% of women missed work, while only 8% of men did so. Average annual work absence for women totaled 28.7 hours for both inpatient (7.1 hours) and outpatient (21.6 hours) services. Although women and men had similar numbers of outpatient visits for urinary incontinence, average work loss associated with outpatient care was greater for women (Table

29), probably because of the availability of outpatient procedures for women.

## RECOMMENDATIONS

### Classification and Coding

Existing databases allow researchers to describe trends in incontinence surgery and hospitalization more accurately than trends in outpatient visits or treatment in nursing homes. Urinary incontinence may be coded as stress incontinence, urge incontinence, mixed incontinence, intrinsic sphincter deficiency, frequency, nocturia, or other terms. Visits during which patients return for follow-up after treatment are also often coded as visits for incontinence, even if the symptom has resolved. While providers can be urged to code more diligently, administrative databases alone will never yield the degree of clinical accuracy needed to create a comprehensive picture of urinary incontinence and its impact on women

**Table 25. Costs of urinary incontinence in 1995 (in millions of \$)**

<b>Cost Factor</b>	
Diagnostic costs	
Community <sup>a</sup>	380.7
Institution <sup>b</sup>	12.8
Treatment Costs	
Behavioral	
Community	60.0
Institution	4.0
Pharmacologic	
Community	8.5
Institution	0.8
Surgical	
Community	613.8
Institution	41.2
Routine care costs	
Community	7,146.2
Institution	4,259.7
Incontinence consequences costs	
Skin irritation	
Community	282.8
Institution	136.3
Urinary tract infections	
Community	346.1
Institution	3,835.5
Falls	
Community	56.7
Institution	1.7
Additional admissions to institutions	2,172.1
Longer hospitalization periods	6,229.1
Total direct costs	25,588.0
Indirect costs (value of home care services)	704.4
Total costs of urinary incontinence	26,292.4
<b>Cost per person with urinary incontinence</b>	<b>3,565.1</b>

<sup>a</sup>Non-institutionalized older adults.<sup>b</sup>Older adults living in an institution.SOURCE: Reprinted from *Urology*, 51, Wagner TH, Hu T, Economic costs of urinary incontinence in 1995, 355–361, Copyright 1998, with permission from Elsevier Science.

in the United States. Although hospitalizations are more rigorously coded, there is often a substantial lag between the adoption of new surgical procedures and the establishment of new reimbursement codes, making tracking of trends difficult. Further, surgical codes are often not specific enough for use in health services or clinical research. For example, many types of pubovaginal slings are represented by one code. Despite these limitations, administrative databases do allow investigators to paint broad-brush pictures of the overall picture of urinary incontinence in American women. More specific cohort studies are essential to provide the details.

### Future Studies

Given the large number of women affected by urinary incontinence, future studies focusing on both prevention and treatment are vital. Longitudinal studies are needed to delineate the risk factors for urinary incontinence and fistulae in women in different age groups. Such long-term prospective cohort studies, as well as randomized trials, can help determine which factors are amenable to intervention and whether such intervention can change continence status. Well-designed studies are needed to evaluate the effect of child-bearing practices on urinary incontinence and other pelvic floor disorders, particularly in younger women. Many studies of urinary incontinence treatment have very narrow inclusion criteria and do not reflect the general population of incontinent women. More population-based studies are needed. In addition, the inclusion criteria should be broadened in future randomized trials, particularly those of pharmacologic agents, to make the trial results more relevant. Long-term follow-up studies are needed to improve understanding of the longevity of therapeutic effectiveness for incontinence, particularly in patients who have had surgery.

**Table 26. Costs of urinary incontinence by age group, residence, and gender<sup>a</sup>**

Variable	Elderly <sup>b</sup>		Middle-Age <sup>b</sup>	Younger <sup>b</sup>	Total Cost
	Community Dwelling	Institutionalized	Community Dwelling	Community Dwelling	
Total cost	5,269 (32)	5,500 (34)	2,518 (15)	2,964 (18)	16,252 (100)
Women	3,734 (30)	3,851 (31)	2,245 (18)	2,598 (21)	12,428 (76)
Men	1,535 (40)	1,650 (43)	273 (7)	366 (10)	3,824 (24)
Cost by category <sup>c</sup>					
Routine care	4,174 (79)	2,830 (51)	1,799 (71)	2,533 (85)	11,336 (70)
Women	2,922 (70)	1,981 (70)	1,576 (88)	2,199 (87)	8,678 (77)
Men	1,252 (30)	849 (30)	223 (12)	334 (13)	2,658 (23)
Nursing home admissions	0 (0)	2,410 (44)	0 (0)	0 (0)	2,410 (15)
Women	0 (0)	1,687 (70)	0 (0)	0 (0)	1,687 (70)
Men	0 (0)	723 (30)	0 (0)	0 (0)	723 (30)
Treatment	312 (6)	126 (2)	530 (21)	324 (11)	1,292 (8)
Women	274 (88)	88 (70)	503 (95)	306 (94)	1,171 (91)
Behavioral therapy	8 (3)	88 (100)	4 (1)	6 (2)	106 (9)
Surgery	224 (82)	0 (0)	476 (95)	268 (88)	968 (83)
Pharmacologic therapy	42 (15)	0 (0)	23 (4)	32 (10)	97 (8)
Men	38 (12)	38 (30)	27 (5)	19 (6)	122 (9)
Behavioral therapy	2 (5)	38 (100)	0.4 (1)	0.6 (3)	41 (34)
Surgery	24 (63)	0 (0)	25 (92)	15 (79)	64 (52)
Pharmacologic therapy	12 (32)	0 (0)	2 (7)	3 (16)	17 (14)
Complications	699 (13)	132 (4)	152 (4)	56 (1)	1,039 (7)
Women	479 (69)	93 (70)	134 (89)	49 (88)	755 (73)
Skin irritation	238 (50)	56 (60)	64 (47)	0 (0)	358 (47)
UTI	113 (23)	26 (28)	35 (26)	49 (100)	223 (30)
Falls	128 (27)	11 (12)	34 (25)	0 (0)	173 (23)
Men	220 (31)	39 (30)	19 (11)	7 (13)	285 (27)
Skin irritation	102 (46)	24 (62)	9 (47)	0 (0)	135 (47)
UTI	63 (28)	10 (26)	5 (26)	7 (13)	85 (30)
Falls	55 (25)	5 (13)	5 (26)	0 (0)	65 (23)
Diagnoses and evaluation	84 (2)	3 (0.1)	36 (1)	51 (1)	174 (1)
Women	59 (70)	2 (70)	32 (89)	44 (86)	137 (79)
Men	25 (30)	1 (30)	4 (11)	7 (14)	37 (21)

UTI, urinary tract infection.

<sup>a</sup>Costs presented in millions 1995 US dollars. Percents may not add to 100% because of rounding.<sup>b</sup>Elderly includes people ≥ 65 years old; middle-age includes people 40-64 years old; younger includes people 15-39 years old.<sup>c</sup>Results shown indicate costs and % of total cost by age group in major cost categories. Cost and % of major cost category are shown for gender, complication type, and/or treatment type.

SOURCE: Reprinted with permission from the American College of Obstetricians and Gynecologists (Obstetrics and Gynecology, 2001, 98, 398-406).



**Table 27. Estimated annual expenditures of privately insured employees with and without a medical claim for urinary incontinence (UI) in 1999<sup>a</sup>**

	Annual Expenditures (per person)			
	Persons without UI (N=277,803)	Persons with UI (N=1,147)		
	Total	Total	Medical	Rx Drugs
Total	\$3,204	\$7,702	\$6,099	\$1,604
Age				
18–44	\$2,836	\$7,361	\$5,993	\$1,369
45–54	\$3,305	\$8,442	\$6,695	\$1,747
55–64	\$3,288	\$7,247	\$5,623	\$1,623
Gender				
Male	\$2,813	*	*	*
Female	\$3,933	*	*	*
Region				
Midwest	\$3,086	\$8,500	\$6,861	\$1,639
Northeast	\$3,085	\$7,236	\$5,502	\$1,734
South	\$3,416	\$8,329	\$6,851	\$1,477
West	\$3,237	\$8,082	\$7,118	\$964

Rx, prescription.

<sup>a</sup>Figure does not meet standard for reliability or precision.<sup>a</sup>The sample consists of primary beneficiaries aged 18 to 64 with employer-provided insurance, who were continuously enrolled in 1999. Estimated annual expenditures were derived from multivariate models that control for age, gender, work status (active/retired), median household income (based on zip code), urban/rural residence, medical and drug plan characteristics (managed care, deductible, co-insurance/co-payments), and 26 disease conditions.

SOURCE: Ingenix, 1999.

**Table 28. Average annual work loss of persons treated for urinary incontinence (95% CI)**

Gender	Number of Workers <sup>a</sup>	% Missing Work	Average Work Absence (hrs)		
			Inpatient <sup>b</sup>	Outpatient <sup>b</sup>	Total
Male	51	8%	0	2.3 (0–5.0)	2.3 (0–5.0)
Female	319	23%	7.1 (1.7–12.6)	21.6 (11.3–31.9)	28.7 (14.9–42.5)

<sup>a</sup>Individuals with an inpatient or outpatient claim for urinary incontinence and for whom absence data were collected. Work loss is based on reported absences contiguous to the admission and discharge dates of each hospitalization or the date of the outpatient visit.<sup>b</sup>Inpatient and outpatient include absences that start or stop the day before or after a visit.

SOURCE: MarketScan, 1999.

**Table 29. Average work loss associated with a hospitalization or an ambulatory care visit for treatment of urinary incontinence (95% CI)**

Gender	Inpatient Care		Outpatient Care	
	Number of Hospitalizations <sup>a</sup>	Average Work Absence (hrs)	Number of Outpatient Visits	Average Work Absence (hrs)
Male	*	*	82	1.4 (0.1–2.7)
Female	*	*	625	11.0 (7.5–14.6)

\*Figure does not meet standard for reliability or precision.

<sup>a</sup>Unit of observation is an episode of treatment. Work loss is based on reported absences contiguous to the admission and discharge dates of each hospitalization or the date of the outpatient visit.

SOURCE: MarketScan, 1999.

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