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URINARY INCONTINENCE

Urinary incontinence is recognized as a significant health problem with serious physical, psychological, and social consequences. Although many older adults suffer with this condition, incontinence can affect individuals in all age groups. Until recently, surprisingly little was known about urinary incontinence assessment and management. In the early 1980's, health care literature began to give increased attention to incontinence. The National Institute on Aging (NIA) made urinary incontinence a research priority; the NIA sponsored several workshops, funded individual research projects, and initiated an inpatient and outpatient incontinence research program. From 1984-89, the NIA and the Division of Nursing, later the National Center for Nursing Research (NCNR), sponsored a multisite clinical trial on the behavioral management of urinary incontinence.

These developments led to a National Institutes of Health (NIH) Consensus Development Conference on Urinary Incontinence held in October 1988 sponsored by the NIA and the Office of Medical Applications of Research of the NIH, in conjunction with the National Institute of Diabetes and Digestive and Kidney Diseases, NCNR, the National Institute of Neurological and Communicative Disorders and Stroke, and the Veterans Administration. The conference developed a written statement summarizing the current knowledge of prevalence, costs, consequences, etiology, pathophysiology, diagnostic evaluation, therapeutic modalities, and strategies for improving public and professional knowledge about urinary incontinence; one outcome of the Consensus Conference was reflected in Healthy People 2000: National Health Promotion and Disease Prevention Objectives, (1990). A specific objective stated in this document is to increase to at least 60 percent the proportion of providers of primary care for older adults who routinely evaluate people aged 65 and older for urinary incontinence.

Urinary incontinence is a condition that may begin in young to middle adulthood, and research priorities need to be directed to the entire population who suffer with this problem. The literature on urinary incontinence is vast and often conflicting. Interpretation is complicated by the lack of both a universally accepted classification scheme and a standard nomenclature for the types of incontinence. The International Continence Society (ICS) has attempted to standardize the terminology of lower urinary tract function; although these ICS definitions are used widely, they are not uniformly accepted. Urinary incontinence is defined by the ICS as a "condition in which involuntary urine loss is a social or hygienic problem and is objectively demonstrable" (Blaivas, Stanton, & Jensen, 1988). Incontinence rarely is determined solely by physiological or psychosocial factors; it is more often the result of a complex interaction of physiological, social, behavioral, and environmental factors.

Generally, two types of incontinence are recognized: transient (acute) and established (chronic). Transient incontinence has a sudden onset, usually in association with an acute medical or surgical

condition, and often will resolve itself with the resolution of the precipitating condition. Established incontinence may have either a sudden onset with an acute condition or gradual onset with no known precipitating cause and often increases in severity over time. Classification schemes for established incontinence have been based on pre-senting symptomatology (e.g., stress, urge, mixed, overflow, functional), underlying pathophysiological abnormality (e.g., detrusor instability, incompetent urethral sphincteric mechanism), or functional impair-ment (e.g., storage/filling phase vs. emptying phase problem). It is important to note that the different types of urinary incontinence are not necessarily mutually exclusive; several types of incontinence may coexist in an individual, with each having several possible causes. In addition to the complex etiology of the condition and the differences within various incontinence classification schemes, there is variability in the frequency, severity, and duration of the symptoms as well as in the temporal and situational circumstances of the incontinent episodes. It is important to recognize the heterogeneity of response to urinary incontinence as well as the social and environmental contexts in which it occurs.

State of the Science

Research on urinary incontinence has been conducted in the following areas: 1) the mechanism of continence and incontinence; 2) epidemiology of urinary incontinence including risk factor identi-fication and physiological sequelae; 3) psychosocial factors and consequences for incontinent individuals and their caregivers; 4) diagnostic evaluation including the characterization of the type of incontinence, assessment techniques, and outcome measurement; 5) intervention studies including behavioral, drug, electrical stimulation, surgical, and palliative/supportive treatments; and 6) economic studies including the cost of incontinence and the cost-effectiveness of different treatment modalities.

Mechanism of Continence and Incontinence

Basic research in urinary incontinence has focused on the embryology, histology, morphology, anatomy, neuroanatomy, and physiology of mictur-ition in animals and humans. Pharmacologic and neuropharmacologic influences on lower urinary tract function also have been studied.

Epidemiology of Urinary Incontinence

The majority of epidemiological research on urinary incontinence has been conducted in older white populations that are predominantly female. Little is known about the prevalence of incontinence in nonwhite, male, and younger populations. The majority of prevalence studies were conducted in the 1970's in Europe; the population group sampled usually comprised older adults (defined as 60 or 65 and over) drawn from medical practice registries. More recent studies in the United States included large-scale community-based surveys of older adults. The exact prevalence of urinary incontinence is unknown. Prevalence rates vary from 8 to 51 percent in community-dwelling populations to 38 to 55 percent in long-term care institutionalized pop-ulations (Diokno, Brock, & Herzog, 1986; Mohide, 1986). The estimate for prevalence of incontinence in older persons admitted to an acute-care hospital is approximately 19 percent (Sullivan & Lindsay, 1984). The varying prevalence rates reflect differences in the definitions of incontinence, the populations studied, and the survey methodologies. In several of the large-scale health surveys, under-reporting may have been a factor when questions on incontinence were mixed in with other questions (Herzog & Fultz, 1990). In general, studies indicate prevalence in women is twice as high as in men. Although there is a trend for increasing prevalence of incontinence with advancing age, findings are not consistent. Most studies indicate a relationship between incontinence and impaired cognitive and/or mobility function (Ouslander, Morishita, Blaustein, Orzeck, Dunn, & Sayre, 1987; Velter, Jones, & Victor, 1981; Campbell, Reinken, & McCosh, 1985; Ekelund & Rundgren, 1987). The clinical type of urinary incontinence reported most often is characterized by

a mixed symptomatology with both stress and urge symptoms present; stress symptoms alone are reported less often and urge symptoms alone least often (Herzog & Fultz, 1990).

Psychosocial Factors Associated with Urinary Incontinence

Urinary incontinence can be a devastating experience with serious psychosocial consequences for both the affected individual (Yu, 1987) and the caregiver (Sanford, 1975; Yu & Kaltreider, 1987; Noelker, 1987). A useful framework for classifying the psychosocial factors associated with urinary incontinence identifies four research areas: 1) perception of and response to urinary incontinence; 2) development and/or exacerbation of incontinence symptoms; 3) psychosocial consequences for individuals, families, and caregivers; and 4) role of psychosocial factors in treatment (Ory, Wyman, & Yu, 1986). Unfortunately, there have been few well-designed studies in any of these areas. Previous research has been limited by methodological problems including small and non-representative samples, poorly-defined diagnostic criteria, and inattention to specification of relevant symptom characteristics. A major limitation is the lack of standardized instruments for assessing psychosocial effects associated with incontinence.

Diagnostic Evaluation of Urinary Incontinence

The majority of research efforts in urinary incontinence have focused on diagnostic evaluation. Studies have concentrated on the description, classification, and techniques associated with studying lower urinary tract dysfunction. The ICS has made significant progress in standardizing the terminology and assessment methodology related to urinary incontinence. However, because of increasing knowledge and new technology, there are wide variations within investigatory protocols, and continued controversy regarding description, classification, and assessment techniques. Although several studies have focused on the objective quantification of the severity of urinary incontinence, standardized measurements of urinary incontinence that are accurate, reliable, and valid have not been firmly established. Frequency of incontinent episodes is used as a primary outcome in most intervention studies, yet few studies have evaluated the reliability of different methods (e.g., self-report diary and electronic monitoring) in assessing this variable (Wyman, Choi, Harkins, Wilson & Fantl, 1988; O'Donnell, Sutton, Beck, & Finkbeiner, 1987). Most studies have investigated the reliability of a variety of pad-testing techniques in quantifying the amount of urine lost (Fantl, Harkins, Wyman, Choi & Taylor, 1987; Kromann-Anderson, Jakobsen & Andersen, 1989). In addition to the research on objective quantification of urinary incontinence, several studies have attempted to standardize instruments that assess other variables associated with continence status, such as pelvic muscle strength, through clinical rating scales (Worth, Dougherty & McKey, 1986; Brink, Sampselle, Wells, Diokno & Gillis, 1989) and pressure devices (Dougherty, Abrams & McKey, 1986), or pelvic muscle activity through electromyography readings (Perry & Whipple, 1982). Standardization is of particular concern in establishing reliable and valid outcome measures needed in intervention studies. Work in this area is still preliminary. Several researchers have identified clinical algorithms in the assessment of incontinence (Hilton & Stanton, 1981; Ouslander et. al., 1989). These warrant large-scale clinical testing. However, a potential difficulty in applying an algorithm approach to incontinence assessment and management is the large number of patients with mixed symptomatology.

Intervention Studies

Treatment for urinary incontinence can be grouped into the following categories: behavioral, drug, electrical stimulation, surgery, and palliative and/or supportive. Each category, with the exception of palliative/supportive treatment, has demonstrated effectiveness ranging in cure rates from six to 100 percent. The cure or improvement rates for behavioral, drug, and electrical stimulation are quite variable. However, in a majority of cases, these therapies have been found to provide significant improvement to individuals with mild to moderate incontinence. Several studies have

indicated that behavioral therapy may be as beneficial as drug therapy in improving incontinence status (Fantl et al., 1981; Ouslander et al., 1988; Wells, Brink, Diokno, Wolfe & Gills 1991). Generally, surgery is particularly effective in the treatment of genuine stress incontinence. Drug and surgical therapies are not addressed here because these modalities are not under the control of nursing.

Intervention studies reported in the literature often have methodological problems that make generalization of findings difficult. These problems include: 1) use of small sample sizes; 2) poorly-defined diagnostic criteria; 3) lack of appropriate control groups; 4) use of multiple interventions within the same protocol; 5) unclear definition of outcome variables; 6) failure to use reliable instruments to measure treatment outcomes; 7) lack of explicit criteria for judging cure or improvement; and 8) different followup periods after onset of treatment. The contribution of concomitant interventions to efficacy is unclear because empirical evidence on basic interventions is lacking. Long-term followup data, that is, past three to six months, generally is missing.

Courtesy, School of Nursing, University of Washington; photo taken at Ida Culver House, Broadway, Seattle, WA

Behavioral Interventions.

Research on behavioral interventions can be grouped into two categories: 1) self-management strategies for cognitively-intact, ambulatory adults who usually reside independently; and 2) external or environmental management strategies for cognitively- or physically-impaired adults who usually reside in institutional settings. Several types of behavioral interventions can be used singly or in combination; these include scheduling regimens, pelvic muscle exercises, and biofeedback approaches. Self-management strategies use all three types of interventions. Environmental management strategies are predominantly scheduling regimens with or without the use of contingency management. Five types of scheduling regimens have been identified: bladder training, habit retraining, timed voiding, prompted voiding, and patterned-urge response toileting. Although these regimens share similar elements, each differs based on the adjustment to the voiding schedule during the training period. In addition to a scheduling pattern, these regimens may include specific techniques taught to help patients control urgency, reinforcements for successful responses to training, and therapeutic interaction between the patient and the health care provider.

Bladder training involves a schedule of voidings with progressive increases in intervoiding intervals. Success rates are reported at 12 to 97 percent in community-dwelling populations (Fantl, Wyman, Harkins & Hadley, 1990; Fantl et al., 1991). Bladder training is used predominantly in urge incontinence but recently was found equally effective in the management of both stress and urge incontinence (Fantl et al., 1991). Habit retraining also involves the assignment of a toileting schedule but differs from bladder training in that the voiding interval may be increased or decreased based on the individual's voiding pattern. Improvement rates have ranged from 28 to 85

percent in community and nursing home populations (Clay, 1978; King, 1980; Rooney, 1982). Timed voiding consists of the fixed assignment of a voiding schedule that remains unchanged during the course of the training program. This is the most commonly used technique in acute-care hospitals and nursing homes. A success rate of 85 percent was reported in hospitalized geriatric patients (Sogbein & Awad, 1982). Prompted voiding, similar to timed voiding, involves asking patients at regular intervals whether they need to void and then assisting them to the toilet if the response is positive. Contingency management techniques of social approval and disapproval are used based on whether the patient is found wet at the time of prompting and whether successful toileting is achieved. Forty-two percent of nursing home patients responded to prompted voiding with a reduction in wet episodes to less than once in a 12-hour period (Schnelle, 1990). A relatively new intervention, patterned-urge response toileting, is similar to habit retraining. It involves determining the individual's voiding pattern based on a special electronic device and then tailoring a toileting schedule based on that pattern. The improvement rate in 51 nursing home patients was 86 percent with the largest individual improvement being 56 percent (Colling, Hadley, Ouslander, Campbell & Eisch, 1989).

Pelvic muscle exercises have been used primarily in the management of mild to moderate stress incontinence in women but may also be beneficial for male stress incontinence secondary to prostatectomy. Improvement rates vary from 31 to 91 percent (Wells, 1990). These exercises are aimed at restoring the tone and function of the perineal muscles, thus hypothetically increasing the urethral closure pressure. However, the mechanism governing how these exercises improve continence status is poorly understood. Studies examining the mechanism of improvement show conflicting findings (Burns, 1988; Benvenuti et al., 1987; Tchou, Adams, Varner & Denton, 1988). There is no common agreement regarding the best training regimen to achieve improvement in continence status, that is, the number and type of pelvic muscle contractions, frequency and duration of practice, and whether biofeedback and passive resistive devices increase the benefit of exercise. It is important to note that not all individuals can correctly learn a pelvic muscle contraction despite the best teaching efforts.

Biofeedback is a learning technique to help the individual exert better voluntary control over urine storage. Biofeedback approaches incorporating visual or auditory instrumentation give continuous information on the physiological responses. Physiological responses used in biofeedback include sphincter, detrusor, vaginal, and/or abdominal pressures, or vaginal, anal, or abdominal electromyography readings. Usually biofeedback is used in conjunction with one of the other behavioral interventions. For example, it is used to help patients correctly isolate and contract the pelvic muscles in stress incontinence (Kegel, 1948) and learn to inhibit bladder contractions in urge incontinence (Cardozo, Abrams, Stanton & Feneley, 1978; O'Donnell, Blaustein, Connor & Pitt, 1988). Few studies have investigated the increased efficacy of behavioral training when incorporating biofeedback approaches. A relatively recent technique developed in Eastern Europe incorporates both pelvic muscle exercise and biofeedback through the use of weighted vaginal cones. The cones, which gradually increase in weight, are worn during daily activities for a specified length of time. A success rate of 67 percent was noted in a four-week trial period (Peattie, Plevnik, & Stanton, 1988).

Electrical Stimulation. Electrical stimulation of the pelvic floor has been tested over the past 25 years, primarily in Europe, as a treatment for urinary incontinence. It has only recently been introduced into the United States. Electrical stimulation has been beneficial in treatment of incontinence due to sphincteric incompetence (Fall, 1984; Eriksen & Eik-Nes, 1989) and detrusor instability (Merrill, 1979) and may also reestablish detrusor contractions in patients with atonic bladders (Sotiropoulos, 1975). Current electrical stimulation treatment uses either an external anal or vaginal electrode that delivers an intermittent tetanizing current adjustable to the individual's tolerance. The success rate of chronic electrical stimulation in stress incontinence varies from six to 92 percent (Eriksen & Eik-Nes, 1989; Leach & Bavendam, 1989). It has been suggested,

although not proven, that electrical stimulation may be particularly beneficial in stress incontinence therapy when teaching pelvic muscle contraction to patients who have weak muscles or are unable to contract their perineum voluntarily.

Palliative/Supportive Interventions. Palliative and/or support interventions are implemented when other therapies fail to adequately control urine loss. These interventions include catheterization, both indwelling and intermittent; prostheses such as condom catheters; vaginal pessaries; incontinence pads or garments; and environmental and fluid manipulations. Indwelling catheter use is generally not recommended for long-term management of the incontinent patient. Virtually all patients will develop bacteriuria despite all hygienic efforts (Warren, 1986). Other long-term management strategies include intermittent catheterization for those with overflow incontinence and condom catheters for men. A variety of incontinence pads and garments are commercially available. Approximately 30 studies in the literature have evaluated the advantages and disadvantages of these products for predominantly institutionalized populations. The majority were conducted in Europe using products that are not available in the United States. Although both environmental and fluid manipulations have been suggested as beneficial in the management of urinary incontinence, no studies have evaluated their effectiveness in reducing incontinence severity. Several studies report voluntary fluid restrictions by individuals to control their incontinence (Brink, Wells, & Diokno, 1987; Mitteness, 1987; Herzog et. al., 1989). However, a recent study suggests that fluid intake in community-dwelling incontinent women had little or no relationship to the frequency of incontinent episodes (Wyman, Elswick, Wilson & Fantl, 1991).

Economic Studies on Cost of Incontinence and Incontinence Interventions

Hu (1990) estimates the total economic cost of urinary incontinence at $10.3 billion in 1987, including $3.3 billion for nursing home patients, $4.8 billion for elderly persons in the community, and $2.2 billion for female adults between the ages of 25 and 64. Based on Hu's research, the cost of routine incontinence care in nursing homes is $6 per day and community care is $2.50. These costs are substantial and support the need for more nursing research and intervention in urinary incontinence.

Research Needs and Opportunities

Urinary incontinence is a complex disorder arising from physical, psychological, social, and environmental factors. Ideally, incontinence research needs to be multidisciplinary in nature incorporating the unique perspectives of numerous disciplines into a collaborative project. Because of the large number of older people afflicted by urinary incontinence, the NIA has a strong interest in incontinence as a research priority. Several other Institutes within the NIH, as evidenced by their participation in the NIH Consensus Conference, also have an interest in urinary incontinence research. It would be beneficial to identify unique as well as overlapping concerns within and among NIH Institutes and Centers with a view toward developing research partnerships.

Mechanism of Continence and Incontinence

Micturition and continence are complex functions requiring central and peripheral nervous system coordination. Although there is basic understanding of these functions, there are still significant areas of disagreement. Research on the physiology of the lower urinary tract has been limited by the lack of instrumentation that can measure various physiological parameters. Relatively little is understood about aging effects on lower urinary tract function and their contributions to the development of urinary incontinence. There appear to be cross-cultural differences in the development of urinary incontinence with few documented reasons. In addition, the role of pharmacologic influences such as estrogen and certain drugs (e.g., diuretics) is poorly understood.

Epidemiology of Urinary Incontinence

There is a lack of information on risk factors for the development of incontinence as well as its longitudinal course with respect to progression of pathophysiology, severity, and remission of symptoms. The natural history of incontinence in community, acute, and chronic institutionalized populations is unknown. There are few established risk factors for urinary incontinence. Findings on the most frequently studied risk factors of age, gender, parity, and body weight have been inconsistent. Other risk factors such as menopause, medication use, comorbidity of chronic illness, and urinary tract infection have not been explored systematically in continent and incontinent populations.

Pychosocial Factors Associated with Urinary Incontinence

Relatively little is known about the large percentage of incontinent individuals (approximately 50%) who do not seek help. The reasons for not seeking evaluation and treatment are poorly understood and may vary by cultural and ethnic group. Most commonly cited reasons for not seeking help include the view that incontinence is seen as normal and an inevitable consequence of aging, the fear of surgery, and the low expectation from treatment (Holst & Wilson, 1988). Research in women suggests that the effect of incontinence in daily activities and social life may vary by the type of incontinence and may be independent of the severity of urinary incontinence (e.g., frequency or amount of urine loss) (Wyman, Harkins, & Fantl, 1990). Little is known about age, gender, and ethnic differences regarding the perceived impact of urinary incontinence. Studies comparing the psychosocial effects of urinary incontinence with those of other chronic health conditions would be important. Future research must also address whether intervention can reduce the psychosocial consequences of incontinence for affected individuals and their caregivers.

Diagnostic Evaluation of Urinary Incontinence

The assessment of urinary incontinence as described in the Consensus Conference Statement (1989) outlines core evaluation and specialized studies. However, the evaluation of the incontinent individual with severe cognitive and mobility impairments is more complex and may require a different strategy. Newer noninvasive technology such as ultrasound must be developed and refined to aid in the evaluation of lower urinary tract function in these patients. It is important to note that research subjects may need to follow an extensive assessment protocol to accurately characterize their type of incontinence. This is critical in the determination of mechanism of action for various interventions as well as in the prediction of response.

Interventions

Behavioral interventions such as scheduling regimens, pelvic exercises, and biofeedback are poorly understood in terms of mechanism of action; further research is needed to elucidate these mechanisms. It is also unclear which individual characteristics predict success or failure with a particular intervention. Generalizability of the results of most behavioral intervention studies is limited by the unique population that volunteers to participate in research protocols. In addition, most studies have been conducted in women and reflect the higher prevalence rate of incontinence in females. There is a need to test these interventions in more heterogenous populations that include men. However, the lower prevalence rate of incontinence in men, along with the difference in underlying pathophysiology, make it difficult to recruit an adequate sample size for controlled clinical trials in a male population. Several studies indicate there is a group of patients who do not benefit from traditional behavioral therapies (Schnelle, 1990; Fantl et al., 1991; Hu, et al., 1989). Novel treatment strategies must be developed and tested for these incontinent patients. Research using interventions such as prompted voiding and patterned-urge response toileting indicates that they are beneficial for nursing home patients. However, both interventions require a high degree of

staff motivation, commitment, and compliance to be effective. Future studies are needed to evaluate different strategies for promoting optimal staff compliance with incontinence management.

In addition to behavioral intervention research needs, carefully controlled studies comparing electrical stimulation with traditional forms of therapy for urinary incontinence are needed. Also, little is known about the natural history of condom catheters and intermittent catheterization. Research is needed in the following areas: bladder retraining technique after long-term indwelling catheterization and the development of an external device capable of effectively collecting urine in incontinent women. Few studies have examined the type of absorbent pads and garments used and their benefits in community-dwelling populations. Randomized controlled clinical trials are needed to study these products and their effect on cost, quality of life, and care in both institutionalized and community populations. In addition, future research should explore the type, timing, and volume of fluid intake in incontinence management.

In general, large-scale testing of the most promising interventions should be carried out in multiple sites. In addition, research is needed that develops and tests management algorithms using a "stepped-approach" to incontinence management similar to that developed in hypertension therapy.

Economic Studies on Cost of Incontinence and Incontinence Interventions

With the exception of Hu (1990), few economic studies report either on the cost of incontinence in specific settings or on the cost-benefits associated with specific interventions. Several studies have examined the cost of incontinence care in nursing homes (Ouslander & Kane, 1984; Cella, 1988); however, no studies have investigated the costs associated with incontinence in acute hospitals or those related to community care. Several clinical trials on behavioral management of nursing home patients included a cost-benefit analysis of incontinence interventions. However, no studies have examined the costs associated with behavioral therapy or other incontinence interventions in treatment of outpatient and hospital inpatients. Thus, additional research on the cost of incontinence care is warranted.

Recommendations

Based on the foregoing assessment of research needs and opportunities in "Urinary Incontinence," the Panel has made the following recommendations for research.

- Conduct epidemiological studies to identify risk factors for development of urinary incontinence; determine its occurrence in specific populations (particularly men, nonwhites, individuals under age 65, and acute hospitalized patients); and describe the natural history of the various clinical and physiological subtypes.
- Conduct studies examining strategies to prevent the occurrence of urinary incontinence in high-risk populations.
- Investigate the mechanisms underlying the etiology, exacerbation, and response to treatment of specific forms of urinary incontinence and urgency.
- Develop and refine instruments to measure physiological and psychosocial variables associated with incontinence status; develop noninvasive techniques to assess lower urinary tract function, particularly for cognitively-impaired individuals.
- Evaluate the psychosocial impact of urinary incontinence on affected individuals and their caregivers, including examination of factors involved in help-seeking behavior.
- Develop and test new strategies using innovative techniques for the treatment of urinary incontinence, particularly in nursing home patients, frail and/or homebound adults, and those intractable to traditional forms of therapy.

- Develop and test nursing care delivery systems in acute-care and long-term care settings that foster staff participation and compliance in incontinence management programs.
- Conduct randomized clinical intervention trials, including longitudinal followup evaluation, algorithms for the systematic assessment and management of incontinent patients, and specific behavioral or pharmacological interventions, either alone or in combination.
- Clarify factors that predict treatment success to facilitate tailoring specific treatments to particular client characteristics; investigate adherence to interventions and strategies that promote optimal compliance.
- Conduct comparative clinical trials of products and equipment used in the management of refractory incontinence.
- Conduct studies on the natural history of bacteriuria associated with the use of condom and intermittent catheters.
- Investigate indwelling catheter-related problems such as leakage around catheters and bladder retraining post-catheterization.
- Carry out economic studies that examine the costs and benefits associated with incontinence treatment, with attention to the level of improvement experienced by incontinent individuals.
- Develop strategies to translate research innovations into clinical practice with emphasis on nurses' involvement in the assessment and management of urinary incontinence.

References

Benvenuti, F., Caputo, G.M., Bandinelli, S., Mayer, F., Biagini, C., & Sommavilla, A. (1987). Re-educative treatment of female genuine stress incontinence. American Journal of Physical Therapy, 66, 155-168.

Blaivas, J.G., Stanton, S.L., & Jensen, J.T. (1988). The standardization of terminology of lower urinary tract function. Scandinavian Journal of Urology and Nephrology, 114 (Suppl), 5-19.

Brink, C.A., Sampselle, C.M., Wells, T.J., Diokno, A.C., & Gillis, G.L. (1989). A digital test for pelvic muscle strength in older women with urinary incontinence. Nursing Research, 38, 196-199.

Brink, C.A., Wells, T.J., & Diokno, A.C. (1987). Urinary incontinence in women. Public Health Nursing, 4, 114-119.

Burns, P.A. (1988). Combined pelvic floor exercises and biofeedback. Proceedings from the NIH consensus development conference on urinary incontinence, (pp. 98-102). Bethesda, MD.

Campbell, A.J., Reinken, J., & McCosh, L. (1985). Incontinence in older persons: prevalence and prognosis. Age and Aging, 14, 65-70.

Cardozo, L., Abrams, P.D., Stanton, S.L., & Feneley, R.C.L. (1978). Idiopathic bladder instability treated by biofeedback. British Journal of Urology, 50, 27-30.

Cella, M. (1988). The nursing costs of urinary incontinence in a nursing home population. Nursing Clinics of North America, 23, 159-165.

Clay, E. (1978). Incontinence of urine: A regimen for retraining. Nursing Mirror, 146, 23-24.

Colling, J, Hadley, B.J., Ouslander, J.G., Campbell, E.B., & Eisch, J.S. (1989). An individualized behavioral approach to treat urinary incontinence among nursing home residents. Gerontologist, 29, 281A.

Consensus Conference. (1989). Urinary Incontinence in Adults. Journal of the American Medical Association, 261,(18), 2685-2690.

Diokno, A.C., Brock, B.M., & Herzog, A.R. (1986). Prevalence of urinary incontinence and other urological symptoms in the noninstitutionalized elderly. Journal of Urology, 136, 1022-1025.

Dougherty, M.C., Abrams, R., & McKey, P.L. (1986). An instrument to assess the dynamic characteristics of the circumvaginal musculature. Nursing Research, 35, 202-206.

Ekelund, P. & Rundgren, A. (1987). Urinary incontinence in older persons with implications for hospital care consumption and social disability. Archives of Gerontology and Geriatrics, 6, 11-18.

Eriksen, B.C., & Eik-Nes, S.H. (1989). Long-term electrostimulation of the pelvic floor: Primary therapy in female stress incontinence? Urologia Internationalis, 44, 90-95.

Fall,M. (1984). Does electrostimulation cure urinary incontinence. Journal of Urology, 131, 664-667.

Fantl, J.A., Wyman, J.F., Harkins, S.W., & Hadley, E.C. (1990). Bladder training in the management of lower urinary tract dysfunction in women. Journal of the American Geriatrics Society, 38, 329-332.

Fantl, J.A., Wyman, J.F., McClish, D.K., Harkins, S.W., Elswick, R.K., Taylor, J.R., & Hadley, E.C. (1991). Eficacy of bladder training in older women with urinary incontinence. Journal of the American Medical Association, 265, 609-613.

Fantl, J.A., Harkins, S.W., Wyman, J.F., Choi, S.C., Taylor, J.R. (1987). Fluid loss quantitation test in women with urinary incontinence: A test-retest analysis. Obstetrics and Gynecology, 70, 739-743.

Fantl, J.A., Hurt, W.G., & Dunn, L.J. (1981). Detrusor instability syndrome: The use of bladder retraining drills with and without anticholinergics. American Journal of Obstetrics and Gynecology, 140, 885-890.

Herzog, A.R. & Fultz, N.H. (1990). Prevalence and incidence of urinary incontinence in the community-dwelling population. Journal of the American Geriatrics Society, 38, 273-281.

Herzog, A.G., Fultz, N.H., Normolle, D.P., Brock, B.M., & Diokno, A.C. (1989). Methods used to manage urinary incontinence by older adults in the community. Journal of the American Geriatrics Society, 37, 339-347.

Hilton, P.V., & Stanton, S.L. (1981). Algorithmic method for assessing urinary incontinence in elderly women. British Medical Journal, 282, 940-942.

Holst, K. & Wilson, P.D. (1988). The prevalence of female urinary incontinence and reasons for not seeking treatment. New England Medical Journal, 101, 756-758.

Hu, T. (1990). Impact of urinary incontinence on health care costs. Journal of the American Geriatrics Society, 38, 292-295.

Hu, T.W., Igou, J., Kaltreider, L., Yu, L., Rohner, T., Dennis, P., Craighead, W., Hadley, E., & Ory, M. (1989). A clinical trial of a behavioral therapy to reduce urinary incontinence in nursing

homes. Journal of the American Medical Association, 261, 2656-2662.

Kegel, A.H. (1948). Progressive resistance exercise in the functional restoration of the perineal muscles. American Journal of Obstetrics and Gynecology, 56, 238-248.

King, M.R. (1980). Treatment of incontinence. Nursing Mirror, 76, 1006-1010.

Kromann-Anderson, B., Jakobsen, H., & Andersen, J.T. (1989). Pad-weighing test: A literature survey on test accuracy and reproducibility. Neurourology and Urodynamics, 8, 237-242.

Leach, G.E. & Bavendam, T.G. (1989). Prospective evaluation of the Incontan transrectal stimulator in women with urinary incontinence. Neurourology and Urodynamics, 8, 231-236.

Merrill, D. (1979). The treatment of detrusor instability by electrical stimulation. Journal of Urology, 122, 515-517.

Mitteness, L.S. (1987). The management of urinary incontinence by community-living elderly. Gerontologist, 27, 185-193.

Mohide, A. (1986). The prevalence and scope of urinary incontinence. Clinics in Geriatric Medicine, 2, 639-656.

Noelker, L.S. (1987). Incontinence in elderly cared for by family. Gerontologist, 27, 194-200.

O'Donnell, P.D., Doyle, R., & Beck, C. (1988). Biofeedback therapy of urinary incontinence in older inpatient men. Proceedings from the NIH consensus development conference on urinary incontinence, (pp. 91-93). Bethesda, MD.

O'Donnell, P.D., Sutton, L., Beck, C., & Finkbeiner, A.E. (1987). Urinary incontinence detection in elderly inpatient men. Neurourology and Urodynamics, 6, 101-108.

Ouslander, J.G., Blaustein, J., Connor, A., & Pitt, A. (1988). Habit training and oxybutynin for incontinence in nursing home patients: A placebo-controlled trial. Journal of the American Geriatrics Society, 36, 40-46.

Ouslander, J.G. & Kane, R. (1984). The costs of urinary incontinence in nursing homes. Medical Care, 22, 69-79.

Ouslander, J., Leach, G., Staskin, D., Abelsen, S., Blaustein, J., Morishita, L., & Raz, S. (1989). Prospective evaluation of an assessment strategy for geriatric urinary incontinence. Journal of the American Geriatrics Society, 37, 715-724.

Ouslander, J.G., Morishita, L., Blaustein, J., Drzeck, S., Dunn, S., & Sayre, J. (1987). Clinical, functional, and psychosocial characteristics of an incontinent nursing home population. Journal of Gerontology, 42, 631-637.

Ory, M.G., Wyman, J.F., & Yu, L. (1986). Psychosocial factors in urinary incontinence. Clinics in Geriatric Medicine, 2, 657-671.

Peattie, A., Plevnik, S., & Stanton, S. (1988). Vaginal cones: A conservative method of treating genuine stress incontinence. British Journal of Obstetrics and Gynecology, 95, 1049-1053.

Perry, J.D. & Whipple, B. (1982). Vaginal myography. In B. Garber (Ed.). Circumvaginal musculature and sexual function, (pp. 61-73). New York: S Karger.

Rooney, V. (1982). A question of habit. Nursing Mirror, 154, 2-6.

Sanford, J.R.A. (1975). Tolerance of debility in elderly dependents by supporters at home: Its significance for hospital practice. British Medical Journal, 3, 471-473.

Schnelle, J.D. (1990). Treatment of urinary incontinence in nursing home patients by prompted voiding. Journal of the American Geriatrics Society, 38, 34-39.

Sogbein, S.K. & Awad, S.A. (1982). Behavioral treatment of urinary incontinence in geriatric patients. Canadian Medical Journal, 127, 863-864.

Sotiropoulous, A. (1975). Urinary incontinence management with electrical stimulation of the pelvic floor. Urology, 6, 312-315.

Sullivan, D.H. & Lindsay, R. W. (1984). Urinary incontinence in the geriatric population of an acute care hospital. Journal of the American Geriatrics Society, 32, 646-650.

Tchou, D.C.H., Adams, C., Varner, R.E., & Denton, B. (1988). Pelvic-floor musculature exercises in treatment of anatomical urinary stress incontinence. Physiotherapy, 5, 652-655.

U.S. Department of Health and Human Services. (1990). Healthy People 2000: National Health Promotion and Disease Prevention Objectives. Washington, D.C.: U.S. Government Printing Office. (DHHS Publication No. (PHS) 91-50213.

Vetter, N.J., Jones, P.A., & Victor, C.R. (1981). Urinary incontinence in older persons at home. Lancet, 2, 1275-1277.

Wells, T.J. (1990). Pelvic (floor) muscle exercises. Journal of the American Geriatircs Society, 38, 333-337.

Wells, T.J., Brink, C.A., Diokno, A.C., Wolfe, R., & Gills, G.L. (1991). Pelvic muscle exercises for stress incontinence in elderly women. Journal of the American Geriatrics Society, 39, 785-791.

Worth, A.M., Dougerty, M.C., McKey, P.L. (1986). Development and testing of the circumvaginal muscles rating scale. Nursing Research, 35, 166-168.

Wyman, J.F., Choi, S.C., Harkins, S.W., Wilson, M. & Fantl, J.A. (1988). The urinary diary in evaluation of incontinent women: A test-retest analysis. Obstetrics and Gynecology, 71, 812-817.

Wyman, J.F., Elswick, R.K., Wilson, M.S., & Fantl, J.A. (1991). Relationship of fluid intake to voluntary misfunctions and urinary incontinence in women. Neurology and Urodynamics, 10, 463-473.

Wyman, J.F., Harkins, S.W., & Fantl, J.A. (1990). Psychosocial impact of urinary incontinence in the community-dwelling population. Journal of the American Geriatrics Society, 38, 282-288.

Yu, L. (1987). Incontinence stress index: Measuring psychological impact. Journal of Gerontological Nursing, 13(7), 18-25.

Yu, L.C. & Kaltreider, D.L. (1987). Stressed nurses: Dealing with incontinent patients. Journal of Gerontological Nursing, 13(1), 27-30.

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