Urinary Incontinence: Nonsurgical Treatments

11

Diane K. Newman, Kathryn L. Burgio,
Alayne D. Markland, and Patricia S. Goode

Introduction

Lower urinary tract symptoms (LUTS) including urinary incontinence (UI) can often be successfully treated with nonsurgical options, including behavioral treatments and drug therapies. Combining these interventions has also been shown to improve outcomes. Behavioral interventions are considered first-line treatment options for adults and include toileting programs with scheduled, timed, or prompted voiding and habit or bladder training; caffeine and fluid management; pelvic floor muscle training; stress and urge reduction strategies; nocturia reduction strategies; constipation management; and functional and environmental changes [1]. Drug therapy for LUTS includes alpha-blocker agents and 5-alpha-reductase inhibitors for men. Medications for overactive bladder (OAB) include antimuscarinic and beta-adrenergic medications for men and women and topical vaginal estrogens for women. This chapter will review the nonsurgical treatments of behavioral interventions and drug therapy in older adults with UI and related LUTS. Devices include intraurethral inserts, intravaginal incontinence pessaries, and penile compression devices. Other products are available for urine containment.

D.K. Newman, D.N.P., F.A.A.N., B.C.B.-P.M.D. (✉)
Division of Urology, Department of Surgery,
University of Pennsylvania Medical Center,
3rd Floor, West Pavilion, Perelman Center,
34th & Civic Center Blvd, Philadelphia, PA 19312 USA
e-mail: diane.newman@uphs.upenn.edu

K.L. Burgio, Ph.D. • A.D. Markland, D.O., M.Sc.
P.S. Goode, M.S.N., M.D.
Department of Medicine, Division of Gerontology,
Geriatrics and Palliative Care, University of Alabama
at Birmingham, Birmingham, AL, USA

Department of Veterans Affairs Medical Center,
Birmingham/Atlanta Geriatric Research, Education,
and Clinical Center (GRECC); VA Medical Center,
GRECC/11G, 700 19th St S, Birmingham,
AL 35233, USA
e-mail: kburgio@aging.uab.edu;
amarkland@aging.uab.edu; pgoode@aging.uab.edu

Toileting Programs

Behavioral interventions improve symptoms through teaching new skills or changing a person's habits and/or lifestyle choices that are contributing factors or triggers of LUTS. Toileting programs, commonly referred to as voiding regimens, have been the mainstay of treatment for decades for UI and symptoms of overactive bladder (OAB) in older adults (see Table 11.1). They include scheduled toileting regimens that most often rely on caregiver involvement or bladder training regimens that require the patient to resist urgency and delay voiding. Toileting programs are often combined with lifestyle modifications as described in Table 11.2 and are the cornerstone

T.L. Griebling (ed.), *Geriatric Urology*, DOI 10.1007/978-1-4614-9047-0_11,

Table 11.1 Understanding toileting programs

Type	Key components
Scheduled or timed toileting	Fixed, predetermined time intervals between toileting The following is an example of a toileting program that can be used by institutions or caregivers that includes 8 times in a 24-h period or every 3 h • Day—upon awakening, after breakfast, midmorning, before lunch, and following an afternoon nap (midafternoon) • Evening—before dinner and at bedtime • Night—determine if the person wants to be awakened at night to void and identify times
Habit training	Using a bladder diary, incontinence and voiding pattern are identified, and the development of an individualized toileting schedule is developed. The voiding times preempt involuntary bladder emptying. In institutions such as nursing homes, a typical toileting schedule may be determined around daily events
Prompted voiding	Prompted voiding involves timed or scheduled toileting and promotes toileting behavior. Prompted voiding is most successful in individuals who can ask for assistance or void when prompted. The major elements of prompted voiding are: • Monitoring—the caregiver checks on a regular basis (use toileting schedule described in scheduled toileting) and person is asked to report verbally if wet or dry • Prompting—the person is asked if they need to void and assisted with voiding • Praise and encouragement—the caregiver provides if the person is continent
Bladder training	Promotes restoration of normal bladder function through education of urge inhibition techniques. Requires person to be able and willing to participate in active rehabilitation and education techniques Four primary components: 1. Education program that usually combines written, visual, and verbal instruction that addresses the physiology and pathophysiology of the lower urinary tract 2. Scheduled voiding with systematic delay of voiding that requires the ability to resist or inhibit the sensation of urgency to postpone voiding and to urinate according to a timetable rather than according to the urinary urge 3. Gradual increases in voiding interval 4. Reinforcement through consistent encouragement and positive feedback

Adapted from Newman DK. &Wein, AJ. (2009) *Managing and Treating Urinary Incontinence*. 2nd Ed. Baltimore: Health Professions Press:245–263

of continence care in cognitively impaired and mobility impaired persons.

In the older adult, interventions such as toileting programs can be categorized as "patient dependent" or "caregiver dependent." Bladder training and pelvic floor muscle training are "patient independent" interventions. These necessitate adequate function, learning capability, and motivation of the individual. Patient-dependent interventions, including scheduled voiding, habit training, and prompted voiding, are useful in people with functional disabilities. The success of these interventions is largely dependent on caregiver knowledge and motivation, rather than on the person's physical function and mental status. However, bladder training relies on the person's understanding of voiding habits and the ability to practice strategies to resist or delay voiding, often referred to as urgency suppression.

Several Cochrane Collaboration publications [2–7] and other systematic reviews [8, 9] have detailed the outcomes for toileting programs, including timed or scheduled voiding, habit training, prompted voiding, and bladder training. All toileting programs, excluding bladder training, are usually "caregiver dependent," which is defined as the need of a professional or family caregiver to assist with toileting [10]. These programs can be utilized to improve continence. The choice of program is determined by the cognitive and functional status of the individual, the variability of the voiding pattern, and the need for psychological reinforcement for adherence to the regimen [11].

Table 11.2 Guide on lifestyle modifications

Adequate fluid intake—individuals with urinary symptoms often limit fluids so as to decrease frequency. Individuals with urgency incontinence and who have a high fluid intake (>2,400 ccs/day) may show a reduction in incontinence episodes and voiding frequency by lowering fluid intake. Incontinent persons with low fluid intakes (<1,500 ccs/day) may benefit from increasing their fluid intake. Reducing fluid intake after 6 pm and concentrating fluid intake during morning and afternoon hours may decrease nighttime incontinence episodes
Stop smoking—nicotine in cigarettes can be irritating to the bladder muscle causing bladder contractions and urgency. A smoker's repeated and chronic coughing may cause urinary leakage. Smoking cessation may help to decrease urine leakage
Diet and medications Certain food and beverages can irritate the bladder and make symptoms worse. They are: • Alcoholic beverages • Beer, wine • Carbonated beverages • Milk/milk products • Soft drinks with caffeine, tea, coffee even decaffeinated • Citrus juices and fruits • Highly spiced foods • Sugar, honey • Corn syrup • Artificial sweetener—NutraSweet (Equal)
Also some over-the-counter medications and prescription drugs contain caffeine which can worsen bladder problems such as Excedrin, Midol, Anacin, Dristan, and Sinarest
Maintain a healthy weight—being overweight can put pressure on your bladder, which may cause leakage of urine when laughing or coughing. If you are overweight, losing some weight can lessen the pressure on your bladder
Keep healthy bowel habits—constipation and difficulty with defecation (e.g., straining) causes more pressure on the bladder leading to urinary urgency and urine leakage

The impact of a toileting regimen on caregivers can be significant. UI management has been rated as the third most troublesome caregiving task, behind a lack of time for their own needs and managing care recipient emotional and behavioral problems [12]. Caregivers do not feel prepared to deal with UI [12]. Engberg and colleagues [13] reported areas of caregiver strain in relation to incontinence, including odor (56 %), toileting (55 %), changing pads and clothing (53 %), UI-related costs for pads or briefs (53 %), wet clothing (50 %), and changing bed linens (44 %). Drennan [14] conducted a qualitative study of managing incontinence for people with dementia living at home and found that toilet prompting or reminding can lead to irritation and arguments, as persons perceive this as being treated like a child.

Timed Voiding

Timed voiding has also been called scheduled toileting, routine toileting, and fixed toileting. It provides toileting on a scheduled or fixed time basis such as every 3–4 h [3, 5]. This is a "passive" type of toileting program, as it takes place whether or not a sensation to void is present, but the schedule is usually only followed during waking hours [4]. The goal is to keep the person dry, and no effort is made to alter an individual's voiding pattern or to motivate the person to resist the urge to urinate. The premise of these programs is that if the person toilets on a preplanned schedule, the bladder will be emptied before incontinence occurs.

Prefixed times, such as every 2 h, have been adopted for toileting programs in many nursing homes, with the schedule usually determined by administrative staff. However, a more realistic schedule may be related to certain daily routines such as upon awakening, before or after meals, and at bedtime. If the individual self-toilets independently, then scheduled times are readjusted. Ideally, the schedule for toileting is based on some objective measure, such as a bladder diary, on data collected using a bladder volume recording instrument [15], or from an electronic device used to monitor and record incontinence episodes [16].

A timed voiding toileting program can be beneficial for toileting-dependent residents in nursing homes or individuals living at home who have an available and willing caregiver. These individuals may have mobility or cognitive impairment and

Table 11.3 Scheduled toileting: patient/caregiver handout[a]

When you have an overactive bladder that causes urinary urgency and frequency, it is very important to go to the bathroom on a regular schedule. It can help prevent leakage
One possible schedule:
1. Go to the bathroom first thing in the morning 2. Go to the bathroom before and after every meal 3. Go to the bathroom at bedtime
Another possible schedule:
1. Go to the bathroom first thing in the morning 2. Go to the bathroom every 2 h by the clock while you are awake (even or odd hours) 3. Go to the bathroom at bedtime
Go to the bathroom on these schedules, even though you don't think you need to urinate Waiting for urgency makes you more likely to get wet Using a schedule can put you in control!

[a]Used with permission. © University of Alabama at Birmingham Continence Clinic

may need some assistance from at least one person but are able to cooperate with toileting. While fewer than 20 % of frail elders become completely dry with timed voiding, between 30 and 50 % of incontinent elders may improve, reducing the number and volume of incontinence episodes. This is probably also true in people being cared for in their homes. A sample patient and caregiver handout that can be used for scheduled or timed voiding is shown in Table 11.3.

Timed voiding can also be useful for cognitively intact elders who have developed bladder sensory impairment due to neurologic conditions. Voiding by the clock, instead of waiting for urgency, and before spontaneous bladder emptying occurs can prevent or reduce incontinence. A trial of timed voiding can determine if it will be successful for an individual. Voiding intervals can be guided by habit training described below.

Habit Training

Habit training is a toileting regimen that matches the person's voiding habits or needs based on their voiding pattern. The goal is for the person to follow a planned schedule that is shorter than the person's normal voiding pattern and is timed prior to a possible incontinence episode [6]. To successfully implement a habit training regimen, the caregiver will identify specific times the person is likely to void by tracking the voiding pattern for at least 3 days using a bladder diary. Based on the pattern observed and times identified, efforts are made to schedule toileting opportunities prior to these times. If the person is taking a diuretic, the toileting schedule may need to be altered, because the urine volume will be increased at the diuretic's peak action time.

Colling and colleagues [12] conducted a habit training program in caregiver-dependent homebound frail elders that combined electronic monitoring of UI episodes. The program was called Pattern Urge-Response Toileting (PURT). Three weeks of voiding patterns were obtained from electronic data loggers, individualized toileting schedules were identified based on each person's voiding pattern, and caregivers were taught when and how to toilet the care recipient. The PURT program reduced the number of incontinence episodes over 24 h by 18 %, decreased the mean number of daily episodes from 4.9 to 4.0, and reduced the volume of UI over 24 h by 39 %. In this study, caregivers were relatives, usually spouses providing care.

Prompted Voiding

Prompted voiding is a toileting program that combines scheduled voiding with "prompting" from a caregiver. It is used to teach people with or without cognitive impairment to initiate their own toileting through requests for help and positive reinforcement from caregivers when they do so [2, 10]. It has been used primarily in nursing home settings with cognitively and physically impaired older adults [17, 18]. Prompted voiding has been shown to reduce UI episodes by up to 33 % in nursing home residents with UI regardless of the type of UI or cognitive deficit. Prompted voiding has three components: (1) regular monitoring with encouragement to report continence status, (2) prompting of resident to toilet on a scheduled basis, and (3) praise with positive feedback when the resident is continent and tries to toilet [10]. For prompted voiding to be effective, the individual must be able to delay voiding and cooperate with toileting or have awareness of

urge sensation of when there is a need to void. But prompted voiding has also been shown to be effective in residents with cognitive impairment.

Research in the area of prompted voiding has been conducted mostly in nursing homes and has shown that between 25 and 40 % of incontinent residents respond well to toileting assistance, while approximately 38 % cannot successfully toilet even when provided help by research assistants [19]. In one study of 191 incontinent residents in seven nursing facilities, 25–40 % responded well to prompted voiding during the day, with incontinence episodes decreasing from three or four during the day to one or none.

Combining prompted voiding with other activities of daily living, as part of a multicomponent intervention, may be an option in older adults with UI [20]. Ouslander and colleagues [21] employed a "designated" versus "integrated" nursing assistant role to combine restorative care including a walking program, exercise therapy, and continence care. Specifically, the Functional Incidental Training (FIT) intervention, which combines prompted voiding with functionally oriented low-intensity endurance and strength-training exercises, has repeatedly been noted to improve physical function and UI in nursing facility residents [21, 22]. Schnelle and colleagues [23] reported on a multicomponent program that combined prompted voiding with physical activity and fluid management which improved UI, frequency of bowel movements, and percent of bowel movements in toilet.

Nighttime Toileting

Nighttime voiding (nocturia) and nighttime UI (nocturnal enuresis) are bothersome problems for many older adults [24], especially in those with chronic medical conditions [25]. Nocturia is defined as "waking at night one or more times to void" where each void is preceded and followed by sleep [26]. Interrupted sleep caused by nocturia can impact many areas of an older person's daily life and care. It can cause daytime fatigue, poor concentration, memory impairment, and mood alterations with physical aggression and hostility [27]; increase the number of falls [28, 29]; and increase requests for pain medication and sedatives. Nocturia is a predictor of mortality, with higher mortality risk associated with an increased number of nightly voids [30].

In nursing homes, routine nighttime care involves frequent and routine awakenings for managing incontinence episodes, leading to interrupted sleep in most residents. Nighttime waking episodes lasting 4 min or longer are associated with noise, light, or incontinence care activities. This is despite the fact that most experts recommend toileting programs such as prompted voiding should not be followed during nighttime sleep hours [31, 32]. Instead, strategies to reduce nighttime urine volume and voiding should be adopted, and alternative measures, such as devices and absorbent incontinence products, should be used to manage the urine leakage (see Fig. 11.1). The goal is to follow strategies that promote an adequate sleep period (see Table 11.4).

Barriers to Implementing Toileting Programs

Although intervention studies of toileting programs have consistently demonstrated improvements in incontinence [17, 31–33], there are barriers and obstacles to translation of these evidence-based "best practices" in all care settings. Cognitive and functional impairments causing immobility are primary risk factors for UI, but not good predictors of a person's potential responsiveness to toileting programs. These can interfere with independent toileting and bladder training, so a comprehensive evaluation of cognition, functional ability, voiding behavior, and the person's environment is an important part of the initial assessment.

Cognitive and Functional Impairment

A cognitive assessment is important to determine the person's ability to understand instructions, motivation, and affect [34]. If the person can recognize a sensation of bladder fullness and an urge to void, then a bladder training program may be more successful. Recognizing the location of the

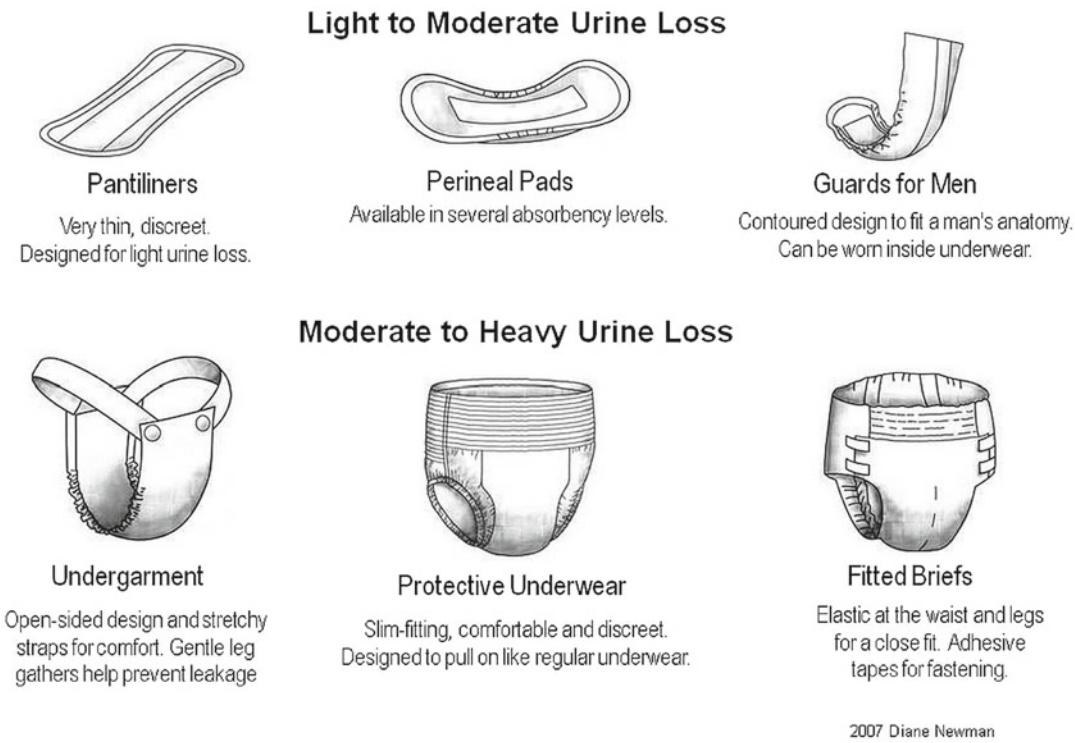


Fig. 11.1 Incontinence products and absorbency. Copyright 2007 Diane K Newman

toileting facility and bathrooms will aid independent toileting. In cognitively impaired individuals, observing body language for cues about the need to use the toilet such as fidgeting, nervousness, pacing, or increased anxiety can assist the caregiver in determining the voiding times [10].

In the frail elder, impaired mobility, balance, and physical function are associated with UI due to difficulties with reaching the toilet in time or having the manual dexterity to manage clothing [10, 35]. This is often a part of what is called "functional incontinence," which is due to contributing factors that are outside of the urinary tract. A functional ability assessment, including manual dexterity and ability to disrobe, should be performed to evaluate a person's capacity to accomplish toileting independently. Very few studies include interventions to improve functional impairments. Since functional impairments with gait speed, balance, and leg strength have been associated with UI in frail older adults, interventions targeting these factors may optimize continence status. An individual's fear of falling during toileting affects their independence in this activity of daily living [36]. Common chronic conditions such as osteoarthritis and joint pain can limit mobility [37] and thus contribute to difficulty in using the toilet. In addition, conditions such as a stroke can limit physical mobility. Chen et al. [38] found that of 138 in-hospital falls, 38 % of the falls occurred when patients tried to get to or from the toilet. Similarly, Tzeng [39] concluded that 45 % of falls in the acute care setting were related to toileting. Toilet-assisted technology, such as a standing lift, can be used to transfer the individual between beds, wheelchairs, or commodes. Functional Incidental Training (FIT), which combines mobility and transfer training with prompted voiding, has reduced UI in nursing home residents [21, 22] and can improve overall ADL abilities [40]. Research is needed regarding programs that combine physical activity and toileting regimens, and these should be tested outside the nursing home setting.

Table 11.4 Strategies that promote sleep hygiene and minimize nighttime voiding[a]

Ensure a conducive sleep environment that combines individualized nighttime incontinence care with a noise and light abatement program to reduce awakenings. Such a program including commonsense procedures, such as closing doors to rooms, fixing squeaky equipment and doors, turning off unattended TVs and radios, and using table lamps instead of overhead lights, should be followed other strategies include:

- Voiding at bedtime
- Use of appropriate absorbent incontinence products that will prevent skin problems
- Consider the appropriateness of a toileting assistive device such as a urinal or bedside commode or application of an external condom catheter in men
- Limiting fluid intake in the late afternoon and evening hours before bedtime so as to decrease nocturnal polyuria. This could be a helpful first step to reduce nocturnal enuresis. However, this does not mean that overall fluid intake should be reduced; rather, the person should be instructed to reduce fluid intake after 6 p.m. and shift intake toward the morning and afternoon
- In individuals with peripheral edema, promote daytime diuresis by elevation of lower extremities for several hours during the afternoon and using support stockings. Altering the administration time of certain medications. Taking diuretics midafternoon and calcium channel blockers in the morning rather than evening may help symptomatic patients

[a]Used with permission. © Diane K. Newman

Voiding Behavior

Optimal voiding behavior, posture, and position are important to ensure complete bladder emptying. If at all possible, the person should sit upright on a bathroom toilet seat or a bedside commode, rather than on a bedpan. Some women do not sit fully on the toilet seat, particularly in public restrooms, and instead "hover" over the toilet. This contracts the pelvic floor muscles and can inhibit adequate bladder evacuation [41]. Feet should be flat on the floor so the person can relax during voiding and easily move from sitting to standing. Making clothing easier to remove will encourage toileting independence. Suggest the use of underwear whenever possible, as this serves as a reminder for the person to stay dry, is a stimulus to use the toilet, and prompts one not to wet if it can be avoided.

Toileting Environment

Environmental factors such as difficulty reaching the toilet and availability of toileting equipment can affect continence. Adaptation of the physical environment to the individual's toileting needs can promote independent toileting and reduce adverse events including falls. A number of solutions can be sought to addressing environmental concerns [10]. For example, a bedside commode or urinal can be placed by the bed for ease of toileting overnight, and clothing can be chosen or altered for ease of use. Additionally, poor lighting, obstacles on the way to the toilet, and a low toilet without hand rails can make getting to the toilet difficult and create safety issues. If the person is utilizing a bathroom toilet, keep a clear, unobstructed, direct walking path to the bathroom; place night-lights along the path; and ensure privacy. In nursing homes, visual cues to indicate the location of the bathroom such as putting the word "toilet" on the outside of the bathroom door can be helpful. Making sure the toilet is easy to use and of the right height is important. Raised toilet seats and grab bars can be used for this purpose. Capezuti and colleagues [42] noted that toilet height for 45.2 % of nursing home residents was actually higher than the optimal height, defined as 100–120 % of the resident's lower leg length, which could consequently increase risk of falls and difficulty in toileting.

Staff and Care Models

In the long-term care setting, another barrier to quality continence care is nursing staff who lack an understating of the types of UI and are not aware of the effectiveness of toileting programs. The Centers for Medicare and Medicaid Service's Resident Assessment Instrument 3.0 Manual recommends that nursing home residents be given a trial of a toileting program both on admission or once UI is noted. This could include scheduled toileting, prompted voiding, or bladder training programs. Staff should document the type of toileting program, the resident's response to the trial program, and whether it continues. Education alone is insufficient to change continence care practices, but organizational and culture change [43] and an incentive payment program can be successful [44]. Nursing staff in care facilities have stated that barriers to implementation of toileting programs include lack of time and resources, lack of authority to change practice,

and little support from the administration, physicians, and other staff [45]. Most would agree that it is difficult for staff to maintain toileting interventions after research staff leave [19, 46] and that proper follow-through with toileting care requires staff-management systems [17, 47]. Rahman and colleagues [48] advocate using a distance coaching course to facilitate adoption of evidence-based practice, although in their study, one-third of the nursing homes dropped out before or soon after the course started. Nursing staff have a difficult time providing resident-centered toileting because of the labor-intensive care needed by many nursing home residents [49]. So, a team approach is necessary. Medical directors in collaborative practice with advanced practice nurses such as nurse practitioners are ideally positioned to take up this challenge to improve the quality of care. Rantz and colleagues [50] recommend a continence "champion" who engages and encourages staff toward improvement and evidence-based practice. Over a 2-year period, these authors showed improvement in pressure ulcers and weight loss in residents in 29 facilities who received multilevel interventions with monthly on-site consultation from a geriatric advanced practice registered nurse.

Pelvic Floor Muscle Training and Exercise

Pelvic floor muscle training (PFMT) and exercise is a cornerstone of behavioral treatment for both men and women with UI. Originally it was designed to teach patients how to control periurethral muscles and exercise them daily to increase strength and reduce stress incontinence. Dr. Arnold Kegel, a gynecologist who first popularized this approach, proposed that stress incontinence was due to a lack of awareness of function and coordination of pelvic floor muscles [51]. He demonstrated that women could significantly reduce stress incontinence through PFMT and exercise [51, 52]. Over time, this intervention has evolved both as a behavior treatment and as a physical therapy, combining principles from both fields into a widely accepted nonsurgical treatment for stress, urgency, and mixed UI. It can also be useful in some patients with fecal urgency or fecal incontinence.

Teaching Pelvic Floor Muscle Control

The first step in training is to teach the patient to identify the pelvic floor muscles and to contract and relax them selectively, usually without increasing pressure on the bladder or pelvic floor. Not being able to identify the pelvic floor muscles or to exercise them correctly is probably the most common reason for poor outcomes with this treatment modality. Confirming that patients have identified and isolated the correct muscles is essential and often overlooked. Many clinicians teach pelvic floor muscle exercises by giving patients a pamphlet or brief verbal instructions to "lift the pelvic floor," to hold back the passage of flatus, or to interrupt the urinary stream. While this simple approach may be adequate for some patients, it does not ensure that they understand which muscles to use when they begin their exercises at home. Several techniques can be used to help patients learn to exercise correctly, including verbal feedback based on vaginal or anal palpation [53], biofeedback [54–56], or electrical stimulation [57]. Some clinicians use resistive devices or weighted vaginal cones to increase the patient's awareness of the pelvic floor or enhance the effects of exercise on strength, but there is little research to support these methods [58].

One problem that typically arises in PFMT is that patients tend to use other muscles, such as the rectus abdominis muscles or gluteal muscles, instead of or in addition to the pelvic floor muscles. Contracting some abdominal muscles can be counterproductive when it increases pressure on the bladder or pelvic floor. Therefore, it is important for clinicians to observe when patients are bearing down and help them to relax these abdominal muscles and exercise the pelvic floor muscles selectively. It is often helpful to remind patients not to hold their breath or to count out loud during pelvic floor muscle exercise.

Some clinicians and researchers have recommended coordinated training of transversus

abdominis muscles, because it is believed that these muscles facilitate pelvic floor muscle contraction. However, this approach remains controversial, and a review of the literature has noted an absence of evidence for this type of training [59].

Daily Pelvic Floor Muscle Exercise

Once patients demonstrate the ability to properly contract and relax the pelvic floor muscles with the clinician, instructions for daily practice and exercise are provided. The purpose of daily exercise is not only to increase muscle strength but also to enhance motor skills through practice. Specific exercise regimens vary considerably in frequency and intensity, and the ideal exercise regimen has not yet been determined. However, good results have been achieved in many studies using 45–50 contractions per day paired with relaxations [60]. To avoid muscle fatigue, it is usually recommended that patients space the exercises across 2–5 sessions per day. Exercising in the supine position is often recommended at first, because it is the least challenging and facilitates patients' concentration during the learning phase. However, it is important for patients to progress to the more difficult sitting or standing positions with time, so they can become comfortable and skilled using their muscles to prevent incontinence in the positions they assume in daily life.

To increase muscle strength, contractions should be sustained for 2–10 s, depending on what the patient is able to do initially. Exercise regimens should be individualized for each patient, so they can succeed with a comfortable and achievable duration and gradually progress to 10 s. Each exercise consists of a muscle contraction followed by a period of relaxation using a 1:1 or 1:2 ratio [61]. The relaxation between contractions allows the muscles to recover, optimizes strength building, and reduces fatigue.

Strategies to Prevent Stress Incontinence

The goal of behavioral treatment for stress incontinence is to teach patients to occlude the urethra by consciously contracting pelvic floor muscles during coughing, sneezing, lifting, standing, or any other physical activities that precipitate urine leakage. Exercise alone can improve urethral pressure and structural support and reduce incontinence [62]. But in recent years, more emphasis has been placed on teaching patients the skill of contracting the pelvic floor muscles to increase urethral closure pressure during physical activities that cause stress incontinence [57, 63, 64]. This skill has been referred to as the "stress strategy" [63, 64], "counterbracing," "perineal co-contraction," "the Knack" [64], and "the perineal blockage before stress technique" [65]. As with any new skill, this requires the patient to be vigilant and make a conscious effort at first. With time and consistent practice, however, patients can develop the habit of using their muscles to occlude the urethra, and the behavior eventually becomes automatic. Table 11.5 shows a sample stress strategy handout to reinforce teaching.

Table 11.5 Stress strategies: patient handout[a]

Stress leakage occurs when the pressure pushing urine out is higher than the pressure holding it in, such as during coughing, sneezing, standing up, bending, or lifting. It is possible to squeeze your pelvic floor muscles during specific activities and prevent leakage. A bladder diary will help you identify activities that cause leakage

1. Remember: "**squeeze before you sneeze"**
2. Quickly squeeze your pelvic floor muscles (like trying to hold back gas) just before and during activities that normally cause you to leak (coughing, sneezing, bending, lifting, getting up from a chair)
3. If you forget to squeeze your muscles and urine leaks out, go ahead and squeeze your muscles right then. It won't prevent that accident but will help link squeezing the muscles with that activity
4. The stress strategy requires careful timing and practice. Don't get discouraged. Eventually, it will become automatic

[a]Adapted from Burgio KL, Pearce KL, Lucco AJ. Staying Dry: A Practical Guide to Bladder Control. Baltimore, MD: Johns Hopkins Press, 1989;67–100

Because most comprehensive PFMT programs include daily practice to increase strength as well as skill, little attention is paid to their relative contributions. It is important to note, however, that even those with weak muscles can benefit from simply learning how to control their muscles and use them actively to prevent incontinence. This has been shown clearly in a randomized trial

that found reduced leakage after only 1 week of training among women taught to voluntarily contract their pelvic floor muscles before or during coughing [64].

The literature on PFMT and exercise has demonstrated that it is effective for reducing stress, urgency, and mixed UI in most outpatients who cooperate with training. Cochrane Database systematic reviews [66] and the International Consultation on Incontinence [60] concluded that there is grade A evidence for PFMT and that it should be offered as first-line treatment to women with stress, urgency, or mixed incontinence [60, 66, 67]. Less research has been conducted with men. However, a recent randomized trial of an exercise-based behavioral training program for men with persistent post-prostatectomy incontinence demonstrated a 51 % reduction in incontinence episodes, significantly greater than the 24 % reduction in the control group [68].

Urge Suppression Strategies

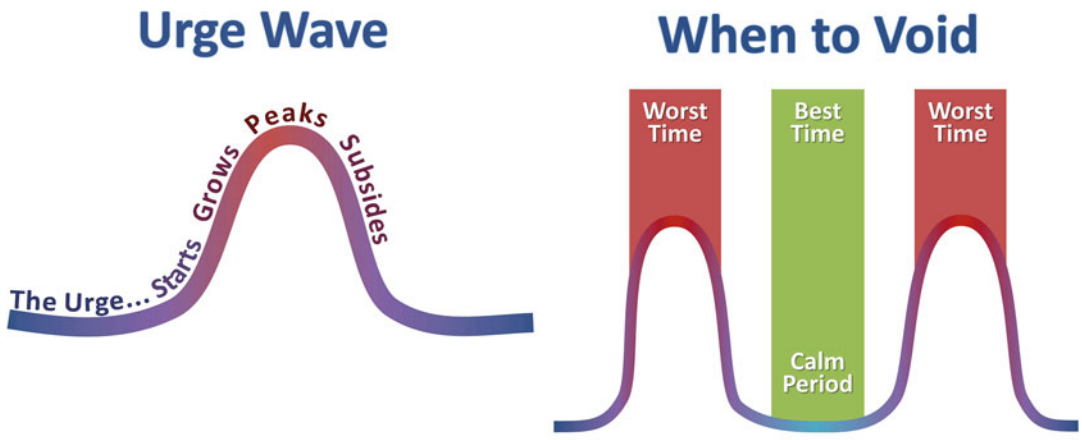
Although originally conceived for the treatment of stress incontinence, PFMT and exercise now plays a major role in behavioral training for urgency and urge incontinence, because pelvic floor muscle contractions can also be used to suppress detrusor contraction [55, 63, 69]. Muscle control and exercise is taught using the same methods available for treating stress UI. What differs is how patients with urge UI use their muscles to respond to urgency and prevent urge incontinence episodes. Not only do they use active pelvic floor muscle contraction to occlude the urethra during detrusor contraction, more importantly, they use volitional muscle contractions to inhibit or suppress the detrusor contraction.

The urge suppression strategy is an essential component in teaching patients a new and more adaptive way of responding to the sensation of urgency. Ordinarily, men and women with urge incontinence feel compelled to rush to the bathroom to avoid leaking when they feel the urge to void. In behavioral training, they learn how this natural reaction is actually counterproductive, because it increases physical pressure on the bladder, increases the feeling of fullness, and exacerbates urgency. Approaching the bathroom, they are also exposed to visual cues that can trigger urgency and detrusor contraction, increasing the risk of an incontinence episode.

Although patients may find it paradoxical at first, they can learn not to rush to the bathroom when they feel the urge to void. Instead, they are taught to stay away from the bathroom and to avoid exposure to cues that trigger urgency. They are encouraged to pause, sit down if possible, relax the entire body, and contract pelvic floor muscles repeatedly, without relaxing in between contractions, to diminish urgency, inhibit detrusor contraction, and prevent urine loss. As they wait for the urge to subside, they breathe evenly and focus on inhibiting the urge. Once the urge sensation subsides, they walk at a normal pace to the toilet. Patient instructions for using the urge suppression strategy are presented in Fig. 11.2.

In addition to daily pelvic floor muscle exercise, it is also helpful for patients with urge incontinence to interrupt or slow the urinary stream during voiding once per day. Not only does this provide practice in using muscles to occlude the urethra and interrupt detrusor contraction, it does so in the presence of the urge sensation, when they need it most. Some clinicians have expressed concern that repeated interruption of the urinary stream may interfere with complete bladder emptying in certain groups of patients. Therefore, caution is recommended when using this technique with patients who may be at risk for voiding dysfunction.

The effectiveness of behavioral training with urge suppression for urge incontinence has been demonstrated in several clinical series [55, 70–72] and in randomized controlled trials using intention-to-treat models. Mean reductions in frequency of incontinence episodes range from 60 to 80 % [53, 69]. The first randomized controlled trial of behavioral training used biofeedback to teach pelvic floor muscle control. Results showed that behavioral training reduced incontinence episodes significantly more than drug treatment and that patient perceptions of improvement and satisfaction with their progress were better [69]. A more recent trial demonstrated the



When the Urge Strikes...

- Stop and stay still. Sit down if you can.
- Squeeze your pelvic floor muscles quickly 3 to 5 times and repeat as needed – Don't relax muscles in between.
- Relax the rest of your body by taking several slow, deep breaths.
- Concentrate on suppressing the urgency and once it calms down, squeeze again as you stand up.
- Walk to the bathroom at a normal pace, do not rush or hurry.
- If the urge returns on the way to the bathroom, stop and squeeze away the urge again.

Fig. 11.2 Urge suppression strategy: patient handout. Burgio KL, Pearce KL, Lucco AJ. Staying Dry: A Practical Guide to Bladder Control. Baltimore, MD: Johns Hopkins Press, 1989; 67–100

effectiveness of PFMT and urge suppression strategies in men with overactive bladder with or without incontinence and without clinically demonstrable outlet obstruction [73]. Behavioral training led to reductions in voiding frequency that were statistically equivalent to those achieved with antimuscarinic drug therapy. Reductions in UI were also significant and similar to those seen with drug therapy.

Bladder Training and Delayed Voiding

Bladder training and other voiding schedules have been used for decades to treat urge incontinence [74–78]. Many patients who experience urgency incontinence or overactive bladder symptoms tend to void frequently. This provides immediate, short-term relief from the urgency sensation, but it sets the stage for more and more frequent voiding. Once this becomes a habit, it can be difficult to change and can lead to reduced functional bladder capacity, detrusor overactivity, and, in some cases, urge incontinence. Detrusor overactivity in turn produces urgency, completing a cycle of urgency and frequency, which is then perpetuated. This cycle can be broken by initiating a regular voiding schedule using bladder training or by using a program of progressive delayed voiding.

Bladder Training

The goal of the bladder training is to break the cycle of urgency and frequency using incremental voiding schedules to reduce voiding frequency, increase bladder capacity, and restore

normal bladder function. Patients first complete a voiding diary to determine how often they typically void. The clinician reviews the diary with the patient and then selects a voiding interval that is comfortable for the patient based on the longest time interval between voids. The patient is advised to void at specific predetermined intervals, rather than in response to urgency. Instructions are given to void first thing in the morning, every time the selected interval passes, and before going to bed at night. Over time, the voiding interval is increased at comfortable intervals up to every 3–4 h.

When patients experience the sensation of urgency, they must resist the urge to void and postpone urination in order to comply with the voiding schedule. Several behavioral techniques have been used to help patients control these urges while they wait for their voiding interval to pass. A traditional approach has been to suggest techniques for relaxation or cognitive distraction [77, 78]. Patients are encouraged to get their minds off the bladder by engaging in a task that requires mental but not physical effort, such as calling a friend, reading, or making a to-do list. Affirming self-statements are also used, such as "I am in control of my bladder" or "I can wait." More recently, the urge suppression strategy using repeated contractions of the pelvic floor muscles without relaxing them in between, known as "quick flicks," has been used to help control urgency while the patient postpones urination until the next scheduled time. Table 11.6 shows a sample patient handout to guide urge suppression strategies.

Several studies have demonstrated the effectiveness of bladder training for treating urge incontinence [74–78]. The most definitive randomized clinical trial demonstrated a mean 57 % reduction in frequency of incontinence in older women [77]. In this study, bladder training not only reduced urgency incontinence but also stress UI. It is possible that this unanticipated finding could be explained by patients developing a greater awareness of bladder function or bladder habits in general or that postponing urination increased pelvic floor muscle activity. In another trial that compared bladder training to oxybutynin, 73 % of women in bladder training were reported to be "clinically cured" [76].

Table 11.6 Controlling bladder urgency and frequency: patient handout[a]

When you feel a sudden, urgent need to urinate, do not rush or try to hurry to the bathroom. Rushing will jiggle your bladder and increase the urge to go. You can take control over your urgency and frequency by using some simple strategies:

- *Focus on another body sensation*. Sit down and take five slow, deep breaths. Think about the air moving in and out of your lungs instead of how your bladder feels
- *Squeeze your pelvic floor muscles five times quickly and strongly*. These "quick flicks" will relax the bladder so that the feeling of urgency goes away. Or you could try holding one strong squeeze of your pelvic floor muscles. Try each way and see which one works best for you
- *Distract yourself* by focusing on a mental activity: Use mind games. Turn your attention to counting backward from 100 by 7 s or working on a crossword puzzle. Do a task that requires a lot of thought—for example, balance your checkbook, write a letter, and do handwork or some other activity that requires a great deal of attention
- *Use self-talk or good self-statements*. Tell yourself: "I am the boss, not my bladder." "I am in control." "I can beat this." Create a statement that fits your situation and personality the best. Keep saying this statement over and over until the feeling of urgency passes

After the urge goes away, try to wait at least several minutes longer and then go to the bathroom whether you feel you have to go or not. Never rush or run to the bathroom—walk slowly. It may take some practice with these strategies, but over time, you will see that you are gaining more control and experiencing fewer episodes of urgency

[a]Used with permission. © Diane K Newman

Delayed Voiding

Delayed voiding is another way to help patients improve bladder control by expanding the interval between voids [73]. It differs from bladder training in that patients do not follow a predetermined voiding schedule. Instead, they are instructed to use their urge suppression strategies to reduce any urgency they experience. Then, instead of going to the bathroom immediately after suppressing the urge, they are to postpone urination by 5 min before voiding. Once they are comfortable with a 5-min delay, the delay time can be increased gradually. Patients are often surprised to find that after a brief wait, the urge subsides or disappears altogether. This enhances their sense of control and confidence to gradually increase the delay time to achieve a normal frequency.

Table 11.7 Prevent leakage without warning: patient handout[a]

Do you stand up and urine comes out without warning?
To prevent this from happening:
1. Before you get out of a chair, squeeze your pelvic floor muscles (like trying to hold back gas) and hold them as you stand up
2. Before you get out of bed, squeeze your pelvic floor muscles before you move to sit on the side of the bed and then squeeze again as you stand up
3. Be sure your bladder/bowels are under control before you start walking (urgency gone)
4. Walk to the bathroom once you are in control
5. If the urge returns on the way to the bathroom or in the bathroom, STOP, stand still, and squeeze again until your bladder calms down

[a]Used with permission. © University of Alabama at Birmingham Continence Clinic

Strategies to Prevent Sudden Urine Loss Without Warning

Many elderly patients, particularly frail older adults, will complain that they lose urine as soon as they stand up from a chair or from their bed, often without any warning. With the sarcopenia that is common with advanced age, getting out of a chair or the bed is difficult for many frail older persons. They may suppress the urgency when sitting or lying still, but after struggling to get up, when their feet hit the floor, the urine flow starts. The strategy to prevent this is to contract pelvic floor muscles *every* time as they stand up. This can effectively prevent the detrusor instability that standing initiates. Table 11.7 shows a sample patient handout to reinforce this teaching concept.

Strategies to Prevent Post-void Dribbling

Post-void dribbling is a common complaint in both older men and women. This is often caused by a small amount of residual urine in the bladder neck or urethra. Pelvic floor muscle contraction can be used to prevent post-void dribbling in both men and women. Table 11.8 shows a sample patient handout for this technique in men. Women with persistent post-void dribbling should be examined for evidence of a urethral diverticulum. Common associated symptoms include dysuria caused by infection of urine trapped in the diverticulum and dyspareunia in sexually active women. Pelvic examination may show soft tissue bulging from the urethra. Cystoscopy can also be useful, and magnetic resonance imaging (MRI) of the pelvis can help to confirm the diagnosis. Surgical treatment may be required to excise the diverticulum and repair the urethra if this is discovered to be the cause of post-void dribbling.

Drug Therapy

Drug therapy (Table 11.9) is available to treat UI and other LUTS in older adults. The type of drug used depends on the underlying cause of the urinary symptoms. Comorbid conditions, including frailty and dementia, must be carefully considered. The most common drug categories for UI and LUTS include anticholinergic drugs, nonselective and selective alpha-antagonist agents and 5-alpha-reductase inhibitors in men, topical estrogens in women, and the newest category, beta-3 adrenoreceptor agonists.

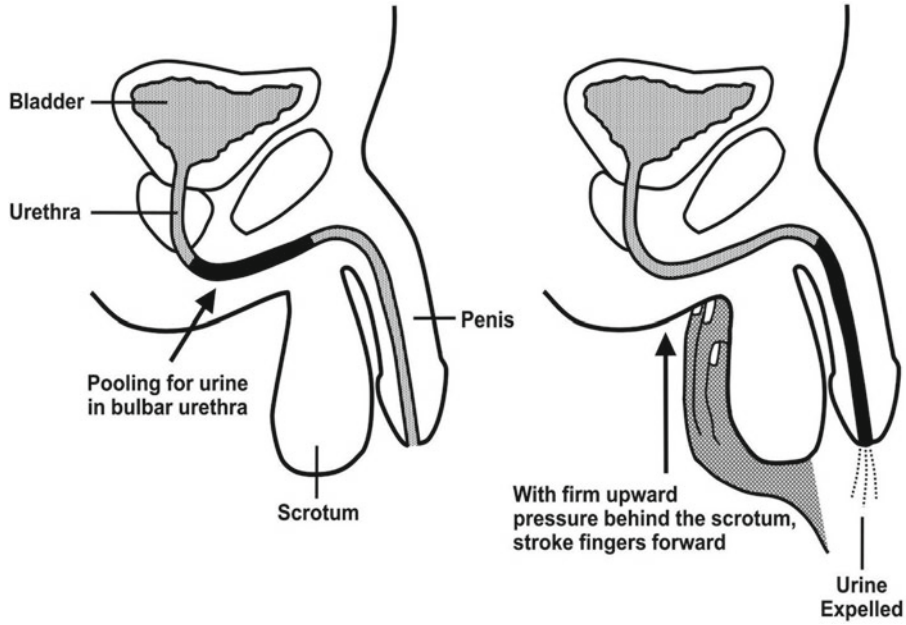
Anticholinergic drugs, which target the muscarinic receptors of bladder smooth muscle leading to bladder relaxation, are most often used to treat urgency or mixed incontinence [84, 85]. These antimuscarinic drugs can be used in men and women, and all have similar efficacy [86, 87]. Side effects of antimuscarinic therapy such as dry mouth and constipation are frequent [86–88] and can contribute to limited long-term adherence [89]. Patients who demonstrate incomplete bladder emptying should be monitored for significant urinary retention, generally accepted as a residual urine volume immediately post-void of ≥200 mL, while taking antimuscarinic agents.

Antimuscarinic drugs should be used with caution among older adults with liver and renal impairment (see Table 11.9). For all older patients, using the lowest possible effective dose is recommended. The potential for drug–drug and drug–food interactions also exist with the antimuscarinic drugs. The most common drug–drug interactions may occur with drugs that also require hepatic metabolism. Common food

Table 11.8 Dripping after you urinate: patient handout[a]

Sometimes after you urinate, urine continues to drip. This happens because the pelvic floor muscles are still relaxed. To help prevent this dripping:

1. After you urinate, squeeze your pelvic floor muscles tightly (like you are trying to hold back gas). Then do your final shake or wipe
2. If you sit to urinate, also squeeze those muscles as you stand up
3. Men can use the pads of your finger to exert a firm, upward pressure behind your scrotum. Move your fingers forward in a stroking motion. This will "milk out" the trapped urine and force it to the end of the urethra, where it can be removed by shaking or squeezing your penis



[a]Used with permission. © University of Alabama at Birmingham Continence Clinic
Illustration © Diane K. Newman

interactions include alcohol and grapefruit juice due to inhibition of the cytochrome P450 pathway. Use of these medications is also contraindicated in patients with a history of closed-angle glaucoma, also called narrow-angle glaucoma. Antimuscarinic medications can cause dangerous elevation of intraocular pressures in these patients. Older adults with open-angle glaucoma, which is the more common form of the disease, can usually use these medications without problems. If in doubt regarding the type of glaucoma, the healthcare provider should check with the patient's ophthalmologist or optometrist prior to prescribing any antimuscarinic medication.

Antimuscarinic agents can be used as single drug therapy in men with symptoms of urgency incontinence but are often prescribed in combination with drug treatments targeting symptoms associated with benign prostatic enlargement (BPE). Alpha-adrenergic antagonists and 5-alpha-reductase inhibitors are effective for LUTS associated with BPE which may include urgency incontinence [90, 91]. Patients using a selective alpha-adrenergic antagonist may have less risk of orthostatic hypotension compared to nonselective agents. However, titration of the dose and using the lowest effective dose may be easier with the nonselective alpha-adrenergic agents such as terazosin that have a wider range of dosages than the selective agents. Five-alpha-reductase inhibitors, when used for at least 1 year alone or in combination with an alpha-adrenergic antagonist, have been shown to reduce progression of urinary symptoms associated with BPE,

Table 11.9 Drug therapy for the treatment of urinary incontinence and other lower urinary tract symptoms

Drugs	Usual adult dose	Metabolizing liver enzyme	Hepatic impairment	Renal impairment	Food interaction	Comments
Drugs with predominantly antimuscarinic effects						
Darifenacin	7.5–15.0 mg daily orally	CYP3A4 CYP2D6 [a]mostly 3A4 in poor 2D6 metabolizers	Mild—no dose adjustment Moderate—7.5 mg daily Severe—do not use	No dose adjustment	Grapefruit (minor)	The drug is selective for the bladder muscarinic receptor and had fewer cognitive side effects than other agents in cognitively intact older adults [79]
Fesoterodine	4–8 mg daily orally	Hydrolysis CYP2D6 CYP3A4	Mild—no dose adjustment Moderate—4 mg daily Severe—do not use	GFR 30–80 mL/min—consider lower dose GFR < 30 mL/min—4 mg daily	Grapefruit (moderate)	This prodrug is easily converted to an active metabolite chemically identical to the active metabolite of tolterodine Demonstrated efficacy in frail older adults. May have low cognitive side effects in healthy vulnerable frail older adults [80, 81]
Oxybutynin[a]	2.5–5.0 mg 1–3 times daily orally (short acting) 5–30 mg daily orally (long acting) 3.9 mg over a 96-h period (transdermal) 10 % topical gel—½–1 g daily	CYP3A4	Not well studied—use with caution	Not well studied—use with caution	Alcohol (moderate)	Short-acting preparations can cause more side effects than long-acting and transdermal preparations The transdermal application can cause local skin irritation in some patients, the patch more than the gel
Solifenacin	5–10 mg daily orally	CYP3A4	Mild—no dose adjustment Moderate—5 mg daily Severe—do not use	GFR < 30 mL/min—5 mg daily	None noted	The drug is more selective for the bladder M3 muscarinic receptor over other muscarinic receptors
Tolterodine[a]	2–4 mg daily orally	CYP2D6: strong CYP3A4: weak	Use 2 mg daily with moderate/severe impairment	GFR < 30 mL/min—2 mg daily	Grapefruit (moderate) Alcohol (moderate)	The drug has relatively low lipophilicity with theoretically more limited ability to penetrate the blood–brain barrier and cause confusion
Trospium	20 mg twice daily orally 60 mg daily orally (long acting)	Negligible	Not well studied—use with caution; lower doses with moderate/severe impairment	GFR < 30 mL/min—20 mg daily (do not use longer-acting formulation)	Alcohol (moderate) Take on empty stomach or 1 h before meal	The agent is a quaternary ammonium compound, theoretically less likely to cross the blood–brain barrier

(continued)

Table 11.9 (continued)

Drugs	Usual adult dose	Metabolizing liver enzyme	Hepatic impairment	Renal impairment	Food interaction	Comments
Beta-3 adrenergic agonist						
Mirabegron	25 mg daily orally 50 mg daily orally	CYP3A4: strong CYP2D6: weak	Mild—no dose adjustment Moderate—25 mg daily Severe—do not use	GFR 30–80 mL/min—consider lower dose GFR <30 mL/min—25 mg daily	May be taken with or without food	Key safety issues: cardiovascular (slight increases seen with heart rate and blood pressure, cardiovascular adverse events), neoplasms, hepatic, urinary tract-related diverse events, and hypersensitivity reactions
Topical vaginal estrogen (for women)						
	Approximately 0.5 g cream applied topically nightly for 2 weeks, then twice per week Estradiol ring, replaced every 90 days Estradiol, 1 vaginal tablet daily for 2 weeks, then 1 tablet twice a week	CYP3A4	Select dosage cautiously when on multiple other medications	Select dosage cautiously when on multiple other medications	Less interactions with topical than oral preparations	Local vaginal preparations are probably more effective for urgency related to local irritation than oral estrogen, but definitive data on effectiveness are lacking. Use is generally contraindicated in women with a personal history of breast or uterine cancers. Some women with a history of estrogen receptor negative breast cancer might be candidates if approved by their oncologist [82]
Serotonin and noradrenaline reuptake inhibitor						
Duloxetine	20–80 mg daily	CYP2D6 CYP1A2	Not recommended for use with hepatic insufficiency or substantial alcohol use	GFR 30–80 mL min—use lower dose GFR <30 mL/min—do not use	Alcohol (moderate) Caffeine (moderate)	Not FDA approved in the USA for this indication; however, a systematic review of clinical trial data suggests improvement in stress UI [83]. Transient nausea is a common side effect
Alpha-adrenergic antagonists (for men) *Nonselective alpha-adrenergic antagonists*						
Doxazosin[a]	1–8 mg daily orally at bedtime		Use lower dose (≤4 mg daily), and when on multiple other medications, do not use with severe impairment	Use lower dose (≤4 mg) and when on multiple other medications	Alcohol (moderate)	Orthostatic hypotension can be a serious side effect
Prazosin	1–5 mg twice daily orally		Do not use with severe impairment	GFR 30–80 mL/min—1 mg twice daily GFR <30 mL/min—1 mg daily	Alcohol (moderate)	Orthostatic hypotension can be a serious side effect Also used for post-traumatic stress disorder in men

Terazosin[a]	1–10 mg daily orally at bedtime		No specific dosage recommendations	No dosage adjustment needed; caution when on multiple other medications	Alcohol (moderate)	Orthostatic hypotension can be a serious side effect
Selective alpha-adrenergic antagonists						
Alfuzosin	10 mg daily orally	Oxidation in liver	Do not use with moderate/ severe impairment	Use with caution with severe impairment	Alcohol (moderate) Give with or immediately after a meal	Orthostatic hypotension can be a serious side effect Doses of nonselective agents should be increased gradually to facilitate tolerance
Silodosin	4–8 mg daily orally	CYP3A4	Do not use with severe impairment	Reduce dose to 4 mg with GFR 30–50 mL/min	Alcohol (moderate) Take with meal	Orthostatic hypotension can be a serious side effect
				Do not use with GFR <30 mL/min		
Tamsulosin[a]	0.4–0.8 mg daily orally	CYP enzymes (specific enzymes not identified)	No specific dosage recommendations	No dosage adjustment needed; caution when on multiple other medications	Alcohol (moderate) Give 30 min after a meal	Orthostatic hypotension can be a serious side effect, especially if taking a beta-blocking drug
5-alpha-reductase inhibitors (for men)						
Dutasteride	0.5 mg daily orally	CYP3A4 CYP3A5	No specific dosage recommendations	Dosage adjustment not required	None noted	Can lead to decreased libido and gynecomastia
Finasteride[a]	5 mg daily orally	CYP3A4 CYP3A5	Do not use with moderate/ severe liver disease	Dosage adjustment not required	None noted	Can lead to decreased libido and gynecomastia

[a]Available as a generic Key: *GFR* glomerular filtration rate, *CYP* cytochrome P450 family

risk of acute urinary retention, and need for future invasive surgical therapy [92].

As of July 2012, a nonselective beta-3 adrenoreceptor agonist (beta 3-AR), mirabegron, was approved by the FDA as the first agent in this newest category of pharmaceutical treatment for overactive bladder and UI in men and women [93]. In placebo-controlled clinical trials, mirabegron reduced 24-h urinary frequency and UI episodes. Mirabegron was found to slightly increase heart rate and blood pressure in clinical trials, with greater increases seen with higher dosages. Improved efficacy may exist in the initial studies for older adults (65–80 years of age) compared to younger adults (<55 years of age). Reductions in dose (25 mg daily) are recommended for patients with liver and renal impairment. Mirabegron is not indicated for patients with severe liver impairment or uncontrolled hypertension.

No pharmacologic treatments are currently approved for the treatment of stress UI in the USA. However, duloxetine, a serotonin and norepinephrine reuptake inhibitor, has been evaluated in several randomized controlled trials, and a recent systematic review suggests it may be beneficial for treatment of mild stress incontinence in women [83].

Low-dose, topical vaginal estrogen can be effective to reduce urinary urgency, frequency, and urgency incontinence among older women [94]. Systemic absorption is low when using doses appropriate for treating urogenital atrophy, 0.5 g of estrogen cream three times a week. However, vaginal estrogen is generally considered to be contraindicated in women with a personal history of breast or uterine cancer. Some oncologists will permit use in select women with a history of breast cancer, particularly if the primary tumor was estrogen receptor negative [82]. Once the quality of the vaginal epithelium is restored, the dosing frequency of vaginal estrogen cream should be reduced. An intravaginal estradiol ring, which is changed every 90 days, may be a convenient method of treatment for many older women. If the patient is sexually active, the ring can be removed prior to intercourse and subsequently replaced.

Perineal skin irritation from incontinence or incontinence-associated dermatitis (IAD) should be treated with an antifungal cream if a fungal etiology exists and with a moisture barrier ointment for prevention, if indicated [95].

Urinary Incontinence in Frail Elders

Urinary incontinence in frail older patients requires special considerations. Dementia is common in these patients, so the index of suspicion should be high. A patient may seem to be cognitively intact when giving a history, but frail patients with dementia may not respond well to treatment protocols designed for younger patients. One clue of dementia can be that the patient denies any problems, while the caregiver is clear that incontinence is a problem. The following case study provides a typical example.

Case Study

Mr. J is an 88-year-old man who is brought to the urologist by his daughter who is his caregiver. He has begun having more frequent incontinence episodes which is quite burdensome to his daughter because he refuses to wear pads. She tells the urologist that her father just sits in his chair all day watching television. When he gets up to go to the bathroom, which he does about every 4–5 h, he walks very slowly due to his knee osteoarthritis, and urine starts to flow before he can get to the bathroom. This is happening several times a day. He uses a bedside urinal at night and stays dry.

His medical history includes hypertension, coronary artery disease, and degenerative joint disease. His medications are aspirin, metoprolol, lisinopril, hydrochlorothiazide, and donepezil. On physical examination, he is alert and pleasant but repeats himself a good bit. His physical examination is completely unremarkable; his pulse is 60 beats per minute, blood pressure 110/60 mmHg; rectal examination reveals a slightly enlarged but smooth and

(continued)

(continued)

symmetric prostate. His urinalysis is normal; his uroflow is 9 mL/s with a prolonged flow curve and voided volume of 350 mL; post-void residual is 80 mL.

You prescribe a selective alpha-1a adrenergic receptor antagonist and give him a return appointment in 3 months. The daughter calls you in a week and tells you her father has become much more unsteady on his feet and has fallen on the way to the bathroom twice. She is worried he will break a hip. His urine leakage might be a little better, but not much. What is the next step?

Despite the selective alpha-blocker, most likely Mr. J has developed symptomatic orthostatic hypotension. The potential morbidity and mortality associated with hip fracture are significant. Discontinuing the alpha-blocker is prudent. A clinician could prescribe an antimuscarinic medication, but most likely, it would make this frail man with dementia more confused, due to its anticholinergic effect. Also, anticholinergic medications are relatively contraindicated with acetylcholinesterase inhibitors such as donepezil. They have opposite effects on both the brain and the bladder. Donepezil allows acetylcholine to be present in the synapses longer and has been shown to help slow progression of dementia but can worsen detrusor overactivity and incontinence [96]. Most family members are reluctant to discontinue cholinesterase inhibitors due to the serious impact of dementia and the possibility that these medications are slowing dementia progression. However, a discussion with the family of the possible benefits of the cholinesterase inhibitors versus the burden of incontinence will help with the decision of whether the medication should be withdrawn to see if incontinence improves. Finally, once informed that antimuscarinic drugs can precipitate confusion and worsen constipation, most frail elderly and their caregivers wisely decline a trial. A beta-3 adrenoreceptor agonist might be a reasonable choice, but experience with this new class of agents in frail older persons is limited. Behavioral treatments would be the safest and most appropriate treatment for this older patient.

Behavioral Interventions in Frail Elders with Dementia

As with other older patients, behavioral measures can improve incontinence in frail, older adults with dementia. Tapering caffeine can reduce incontinence frequency and volume [97]. Prompted voiding is often an effective intervention in this population, as well [2]. An effective procedure for prompted voiding is for the caregiver to approach the patient every 2–3 h while awake and tell them, "It is time to go the bathroom," and to assist them as necessary. This prevents the patient from saying, "No, I don't need to go." The caregiver can remind the patient that their urologist recommended regular trips to the bathroom for "bladder health." A 3-day trial can determine whether prompted voiding will be effective [19]. If it decreases wetness and increases quality of life for the patient and caregiver, it can be continued. If not, a check and change strategy with absorbent pads or other products should be employed.

Fluid Intake

Encouraging intake of at least 6 eight-ounce glasses of liquids daily can help dilute the urine and reduce odor should leakage occur. Restricting fluids should be considered only for strategic purposes to enable certain activities, such as going to church or temple. Otherwise, it simply predisposes the patient to dehydration. More highly concentrated urine can actually increase urinary urgency by direct irritation of the bladder epithelium. Patients on a loop diuretic can delay administration until mid- to late afternoon to allow more daytime hours free of polyuria. The diuretic will wear off before bedtime, so it will not adversely affect nocturia.

Constipation

Chronic constipation can precipitate urinary retention and overflow incontinence and should be included in the differential diagnosis for frail older adults with new or worsened incontinence. The digital rectal exam and abdominal exam can be useful to uncover constipation that the patient may not be able to detect or communicate to the caregiver due to dementia [98]. Initiation of a bowel regimen to treat chronic constipation can also be useful with potential improvement in urinary symptoms.

Perineal Skin Irritation

Urinary incontinence can often cause skin irritation or breakdown. Perineal skin problems can also be diagnosed during physical examination. The caregiver may not be aware of the problem if the patient is still doing most of their own self-care. Antifungal cream should be prescribed if indicated and a moisture barrier ointment used to protect the skin while it heals and afterward to help prevent further irritation.

Asymptomatic Bacteriuria and Urinary Tract Infections

The relationship between Urinary Tract Infections (UTIs) and incontinence in patients with dementia is complex. UTIs can precipitate incontinence, but treating asymptomatic bacteriuria can result in antibiotic resistance and increase adverse events. A solid history of *new* or *worsened* incontinence in the setting of a positive urine culture may suggest that a trial of antibiotics is reasonable. After treatment, if the incontinence continues unchanged despite a negative urinalysis or repeat culture, a diagnosis of asymptomatic bacteriuria should be noted to prevent additional use of antibiotics in the absence of fever or other constitutional symptoms. One constitutional symptom common in patients with dementia is worsened mental status, so UTI is always in the differential diagnosis for patients with dementia and altered cognitive status or delirium.

Pharmacotherapy

For patients with dementia who fail prompted voiding and fluid and caffeine management and who do not have constipation or a UTI, medications such as selective alpha-blockers, antimuscarinics, or beta-3 adrenoreceptor agonists can be tried. Caution is advised to watch for potential adverse events as previously described. If improvement is not noted within a month or if the patient has a functional decline or intolerable side effects, the medication should be discontinued.

Devices

Devices for the treatment of incontinence include urethral inserts, intravaginal devices, and penile compression devices [99].

Intraurethral Devices

A catheter-like device can be inserted into the urethra to block leakage occurring in women with stress UI [100]. The current device available in the USA, the FemSoft® Insert, is a sterile disposable, single-use intraurethral device (see Fig. 11.3a, b). It consists of a narrow, silicone tube entirely enclosed in a soft, thin, mineral oil-filled silicone sleeve that forms a balloon on the tip of the device. As the insert is advanced into the urethra, oil in the balloon is transferred toward the external retainer to facilitate passage through the urethra. Once the tip of the insert has entered the bladder, the fluid returns to fill the balloon forming a mechanical barrier to retain urine within the bladder. To assist with insertion, the insert is supplied on a disposable applicator and with a lubricating gel. The insert has a string to facilitate removal. The device is easily removed for voiding and should be removed at least once every 6 h. It is available in three diameter sizes (16, 18, 20 French) and two lengths (3.5 cm, 4.5 cm) for each diameter. The insert must be properly sized to the woman's anatomy. Adverse events reported include hematuria, recurrent UTIs, and urethral discomfort.

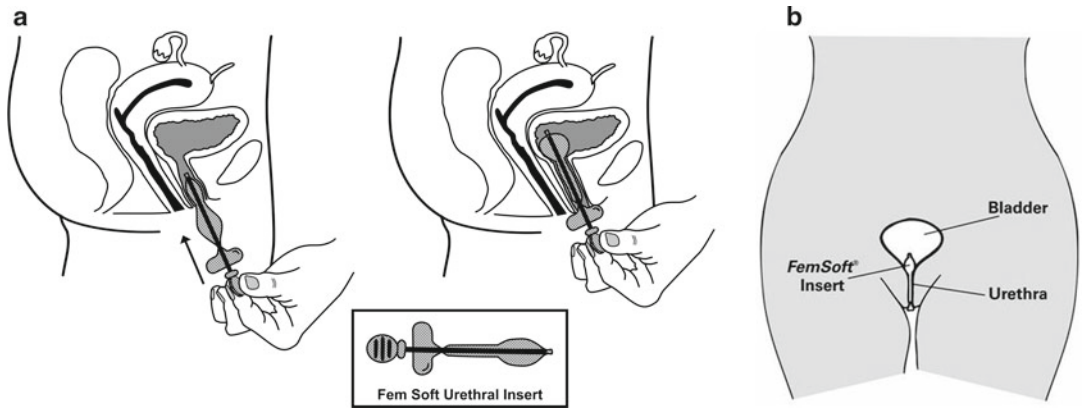


Fig. 11.3 (**a**) FemSoft insert (**b**) FemSoft urethral insert in place
Illustrations © Diane K. Newman

Intravaginal Devices

The use of an intravaginal incontinence pessary may also be effective in alleviating stress UI symptoms. This type of pessary is usually round, available with or without a support diaphragm in the center for pelvic organ prolapse, and has a knob, which adds a centimeter to the size of the pessary (see Fig. 11.4). The knob should be situated so it is suburethral behind the symphysis pubis, ideally at the level of the urethrovesical junction to stabilize and support the bladder neck and compress the urethra to prevent urine leakage during an increase in pressure from above. The ATLAS trial in women with stress incontinence treated with pessary, behavioral therapy, or combined therapy showed all three groups to be equally effective at 1 year, with 33–40 % of women reporting no bothersome stress incontinence symptoms and 50–54 % satisfied with treatment outcome [101].

Fig. 11.4 Incontinence dish with support pessary

Penile Compression Device

A penile compression or "clamp" device is an external occlusive device that is often used by men after prostate cancer surgery to stop stress UI or by men with continuous urine leakage [10]. These devices mechanically compress the soft tissue of the penis by applying external pressure to the urethra, thus preventing leakage (see Fig. 11.5). Used correctly, penile compression devices are one method of controlling UI in select men who are cognitively intact, have normal genital sensation, have intact penile skin, have adequate penile length, are aware of bladder filling, and have sufficient manual dexterity to open and close the device. Usually the device is placed halfway down the shaft of the penis and then tightened to a comfortable pressure to compress the urethra.

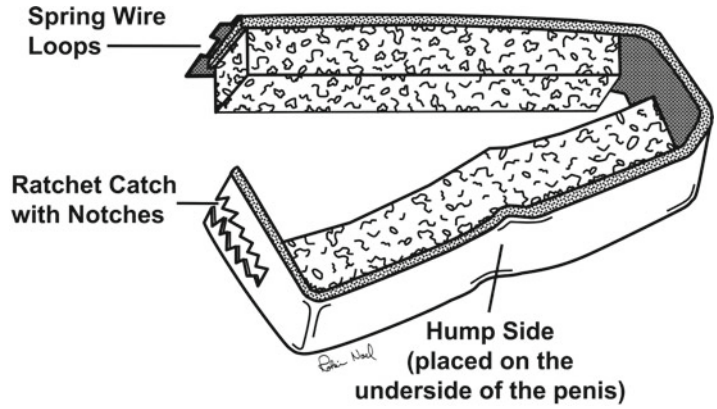


Fig. 11.5 Cunningham penile clamp Illustration © Diane K. Newman

Moore et al. [102] conducted a study to assess the safety, efficacy, comfort, and user satisfaction with three penile compression devices: the Cunningham Penile Clamp, C-3, and U-Tex. Subjects were men ($N=12$) who had undergone prostate cancer surgery in the past 6 months. Penile Doppler ultrasonography was performed to assess circulatory impedance with and without the compression device in place. Color flow assessment was made distal to the device. The results indicated that the Cunningham device was the most efficacious and most acceptable to users but also contributed to reduced systolic velocity in all men. None of the devices completely eliminated urine loss.

Potential complications including edema, urethral erosion, pain, and obstruction limit their use. Soft tissue damage by excess compression can occur with these clamps, and thus, their use is contraindicated in men with sensory impairment. Skin breakdown, swelling, and strictures (scarring) can occur inside the urethra if a clamp is left in place too long. If used properly and released every 1–2 h for bladder emptying, these devices can be very beneficial.

Products for Management of Urinary Incontinence

Incontinence products, such as absorbent products, external catheters, urinary and fecal pouches, and toilet substitutes (e.g., urinals and bedside commodes), can be effective ways to manage urine leakage for patients and their caregivers. They may be adjunctive management in addition to incontinence treatments or may be used in patients who have failed or are not candidates for certain interventions. These products contain urine leakage, maintain skin integrity, conceal the problem, and in many older adults improve quality of life [103].

Absorbent Products

The use of absorbent garments and pads can do much to contain incontinence, reduce caregiver burden, and preserve dignity. Perineal pads and pantiliners are commonly used by women to absorb mild to moderate urine leakage (see Fig. 11.1). Underwear substitution can be helpful in some patients who decline to wear adult briefs, such as Mr. J in the case study. Many patients with dementia, particularly women, will wear protective "pull-up"-type underwear if they are substituted for their regular underwear.

Continued advances in the design of disposable absorbent incontinence pads and products have helped them to become more fluid absorbent and can also help with odor control. Incontinence absorbent products have an upper layer through which moisture passes and one or more absorbent layers. Some pads incorporate a superabsorbent polymer that "locks" urine into a gel that holds much more urine for its weight than does fluff

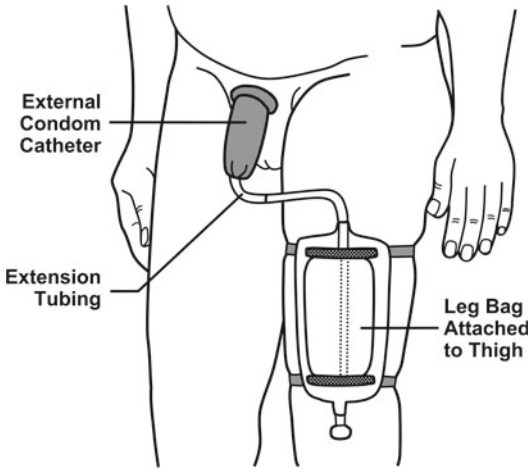


Fig. 11.6 External condom catheter
Illustration © Diane K. Newman

pulp (an absorbent pulp made from wood fiber) and retains it better. Reusable products are available, but they are not as popular with patients although they might be less expensive.

External Catheters and Pouches

External catheters are condom-type sheaths applied (usually rolled) over the penis and connected to a drainage bag (see Fig. 11.6). They are used primarily for urine collection in men who experience UI. The most commonly used external catheters are disposable and must be changed every 24–48 h (see Fig. 11.7a, b). There are reusable external catheter systems (see Fig. 11.8). Another external collection device is a flexible, plastic form-fitting pericup device placed over the urinary meatus (in men and women) to funnel urine away from the perineum into a drainage bag. Current pouches were modeled on ostomy pouches using similar synthetic adhesive. Problems with leakage persist because of poor adherence. These external devices use adhesive to adhere to the skin, and adverse events include local erythema, periurethral edema with removal, and urine leaking around the device if sizing is incorrect.

Toileting Assistive Devices

Handheld containers and devices, often referred to as "portable toilet substitutes," can be used by patients and caregivers to collect urine. There are two general categories: one includes commode seats or bedside commodes and the other handheld devices such as a bedpan or urinal. These devices can promote self-toileting especially if toilet facilities are inaccessible, doorways and bathrooms are too narrow for access (e.g., if using a walker, wheelchair), nocturnal frequency and urgency is a significant problem, and decreased mobility limits ambulation. Many different commodes exist which can ease toileting. Some have drop arms and adjustable heights to allow for tailoring the commode to the patient's needs. Other commodes are backless and can be placed on a toilet for quick adaptation in a bathroom. There are general areas that need consideration when selecting a commode, including:

- Height and weight of the person using the commode.
- A plastic seat with a large soft surface area may allow even distribution of body weight.
- Seats with grab bars on either side can prevent falling and provide assistance when rising.

Often the use of a fracture pan makes the patient more likely to be able to urinate without pain, especially in the period after a fracture or hip repair. Patients should not be left on the bedpan for more than 15–20 min, as this device does not allow correct positioning for complete bladder emptying.

Urinals have the potential to enable patients who experience difficulty accessing a toilet or bedside commode to regain continence. Also, they are useful for patients who have severe mobility restrictions or who are confined to bed or chair. Most urinals have handles, so they can be placed next to the patient; hung on a bedrail, wheelchair, or walker; or laid flat on the bed. Toilet-assisted technology, such as a standing lift, can be used to transfer the patient between beds, wheelchairs, and commodes. The lift is equipped with safety devices to prevent falls.

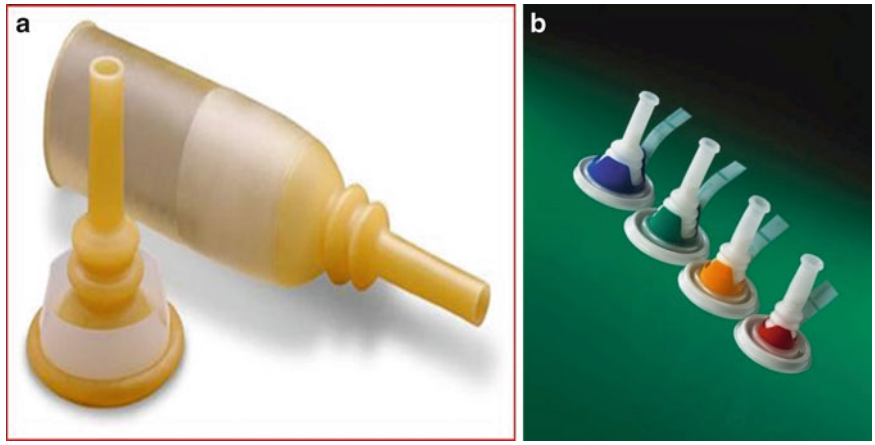


Fig. 11.7 Self-adhesive disposable external catheter. (**a**) Hollister, (**b**) Coloplast

Fig. 11.8 AlphaDry reusable external collection device in place

Summary

Urinary incontinence is a common clinical problem in both older men and women. A wide variety of nonsurgical treatment options are available that can address these conditions. In most cases, symptoms can be significantly improved, or sometimes completely resolved, by use of behavioral therapy, medications, devices, or combined therapies. This can have an enormous influence on both patients and their caregivers and can improve functional abilities and quality of life for many people. Additional research will likely lead to additional medications and other treatments in the future. Clinicians should work to incorporate these therapeutic options into their treatment armamentarium for older adults with incontinence, offering behavioral therapy as first-line treatment for incontinence.

References

1. Gormley EA, Lightner DJ, Burgio KL, Chai TC, Clemens JQ, Culkin DJ, Das AK, Foster HE, Scarpero HM, Tessier CD, Vasavada SP, American Urological Association (AUA) Guideline. Diagnosis and treatment of overactive bladder (non0neurogenic) in adults. AUA/SUFU GUIDELINE. Retrieved http://www.auanet.org/content/media/OAB_guideline.pdf
2. Eustice S, Roe B, Paterson J. Prompted voiding for the management of urinary incontinence in adults. Cochrane Database Syst Rev. 2000;(2):CD002113.
3. Ostaszkiewicz J, Roe B, Johnston L. Effects of timed voiding for the management of urinary incontinence in adults: systematic review. J Adv Nurs. 2005;52:420–31.
4. Ostaszkiewicz J, Johnston L, Roe B. Timed voiding for the management of urinary incontinence in adults. J Urol. 2005;173(4):1262–3.

5. Ostaszkiewicz J, Johnston, L, Roe, B. Timed voiding for the management of urinary incontinence in adults. Cochrane Database Syst Rev. 2004a;(1): CD002802.
6. Ostaszkiewicz J, Johnston L, Roe B. Habit retraining for the management of urinary incontinence in adults. Cochrane Database Syst Rev. 2004b; (2):CD002801.
7. Roe B, Ostaszkiewicz J, Milne J, Wallace S. Systematic reviews of bladder training and voiding programmes in adults: a synopsis of findings from data analysis and outcomes using metastudy techniques. J Adv Nurs. 2007;57(1):15–31.
8. Roe B, Flanagan L, Jack B, Barrett J, Chung A, Shaw C, Williams K. Systematic review of the management of incontinence and promotion of continence in older people in care homes: descriptive studies with urinary incontinence as primary focus. J Adv Nurs. 2011;67(2):228–50.
9. Fink HA, Taylor BC, Tacklind JW, Rutks IR, Wilt TJ. Treatment interventions in nursing home residents with urinary incontinence: a systematic review of randomized trials. Mayo Clin Proc. 2008;83(12):1332–43.
10. Newman DK, Wein AJ. Managing and treating urinary incontinence. 2nd ed. Baltimore, MD: Health Professions Press; 2009. p. 245–306.
11. Lekan-Rutledge D, Colling J. Urinary incontinence in the frail elderly: even when it's too late to prevent a problem, you can still slow its progress. Am J Nurs. 2003; (Suppl):36–40.
12. Colling J, Owen TR, McCreedy M, Newman D. The effects of a continence program on frail community dwelling elderly persons. UrolNurs. 2003;23:117.22. 127e131.
13. Engberg SJ, Sereika SM, McDowell BJ, Weber E, Brodak I. Effectiveness of prompted voiding in treating urinary incontinence in cognitively impaired homebound older adults. J Wound Ostomy Continence Nurs. 2002;29:252–65.
14. Drennan VM, Cole L, Iliffe S. A taboo within a stigma? a qualitative study of managing incontinence with people with dementia living at home. BMC Geriatr. 2011;11:75.
15. Newman DK, Gaines T, Snare E. Innovation in bladder assessment: use of technology in extended care. J Gerontol Nurs. 2005;31(12):33–41.
16. Schnelle JF, Newman D, White M, Abbey J, Wallston KA, Fogarty T, Ory MG. Maintaining continence in nursing home residents through the application of industrial quality control. Gerontologist. 1993;33(1):114–21.
17. Burgio LD, McCormick KA, Scheve AS, et al. The effects of changing prompted voiding schedules in the treatment of incontinence in nursing home residents. J Am Geriatr Soc. 1994;42(3):315–20.
18. Schnelle JF, Traughber B, Sowell VA, Newman DR, Petrilli CO, Ory M. Prompted voiding treatment of urinary incontinence in nursing home patients: a behavior management approach for nursing home staff. J Am Geriatr Soc. 1989;37(11):1051–7.
19. Ouslander JG, Schnelle JF, Uman G, Fingold S, Nigam JG, Tuico E, Bates-Jensen B. Predictors of successful prompted voiding among incontinent nursing home residents. JAMA. 1995;273(17): 1366–70.
20. Sackley CM, Rodriguez NA, van den Berg M, et al. A phase II exploratory cluster randomised controlled trial of a group mobility training and staff education intervention to promote urinary continence in UK care homes. Clin Rehabil. 2008;22:714–21.
21. Ouslander JG, Griffiths PC, McConnell E, Riolo L, Kutner M, Schnelle J. Functional incidental training: a randomized, controlled, crossover trial in veterans affairs nursing homes. J Am Geriatr Soc. 2005;53: 1091–100.
22. Schnelle JF, MacRae PG, Ouslander JG, Simmons SF, Nitta M. Functional incidental training, mobility performance, and incontinence care with nursing home residents. J Am Geriatr Soc. 1995;43(12):1356–62.
23. Schnelle JF, Leung FW, Rao SS, Beuscher L, Keeler E, Clift JW, Simmons S. A controlled trial of an intervention to improve urinary and fecal incontinence and constipation. J Am Geriatr Soc. 2010;58(8):1504–11.
24. Bosch JL, Weiss JP. The prevalence and causes of nocturia. J Urol. 2010;184:440–6.
25. Plantinga L, Rao MN, Schillinger D. Prevalence of self-reported sleep problems among people with diabetes in the United States, 2005–2008. Prev Chronic Dis. 2012;9:E76.
26. Van Kerrebroeck P, Abrams P, Chaikin D, et al. The standardization of terminology in nocturia: report from the standardization subcommittee of the International Continence Society. BJU Int. 2002;90 Suppl 3:11–5.
27. Burgio KL, Johnson 2nd TM, Goode PS, et al. Prevalence and correlates of nocturia in community-dwelling older adults. J Am Geriatr Soc. 2010;58: 861–6.
28. Galizia G, Langellotto A, Cacciatore F, Mazzella F, Testa G, Della-Morte D, Gargiulo G, Ungar A, Ferrara N, Rengo F, Abete P. Association between nocturia and falls-related long-term mortality risk in the elderly. J Am Med Dir Assoc. 2012;13(7):640–4.
29. Asplund R. Hip fractures, nocturia, and nocturnal polyuria in the elderly. Arch Gerontol Geriatr. 2006;43:319–26.
30. Kupelian V, Fitzgerald MP, Kaplan SA, Norgaard JP, Chiu GR, Rosen RC. Association of nocturia and mortality: results from the Third National Health and Nutrition Examination Survey. J Urol. 2011;185:571–7.
31. Ouslander JG, Ai-Samarrai N, Schnelle JF. Prompted voiding for nighttime incontinence in nursing homes: is it effective? J Am Geriatr Soc. 2001;49(6):706–9.
32. Schnelle JF, Cruise PA, Alessi CA, et al. Individualizing nighttime incontinence care in nursing home residents. Nurs Res. 1998;47(4):197–204.

33. Schnelle JF, Kapur K, Alessi C, et al. Does an exercise and incontinence intervention save healthcare costs in a nursing home population? J Am Geriatr Soc. 2003;51(2):161–8.
34. Hägglund D. A systematic literature review of incontinence care for persons with dementia: the research evidence. J Clin Nurs. 2010;19(3–4): 303–12.
35. Wang J, Chang LH, Eberly LE, Virnig BA, Kane RL. Cognition moderates the relationship between facility characteristics, personal impairments, and nursing home residents' activities of daily living. J Am Geriatr Soc. 2010;58(12):2275–83.
36. Ko A, Nguyen HV, Chan L, Shen Q, Ding XM, Chan DL, Chan DK, Brock K, Clemson L. Developing a self-reported tool on fall risk based on toileting responses on in-hospital falls. Geriatr Nurs. 2012;33(1):9–16.
37. Gilmour H, Park J. Dependency, chronic conditions and pain in seniors. Health Rep. 2006;16(Suppl): 21–31.
38. Chen XL, Liu YH, Chan DK, Shen Q, Van Nguyen H. Characteristics associated with falls among the elderly within aged care wards in a tertiary hospital: a retrospective. Chin Med J (Engl). 2010;123(13): 1668–72.
39. Tzeng HM. Inpatient falls in adult acute care settings: influence of patients' mental status. J Adv Nurs. 2010;66(8):1741–6.
40. Vinsnes AG, Helbostad JL, Nyrønning S, Harkless GE, Granbo R, Seim A. Effect of physical training on urinary incontinence: a randomized parallel group trial in nursing homes. Clin Interv Aging. 2012;7:45–50.
41. Wang K, Palmer MH. Women's toileting behaviour related to urinary elimination: concept analysis. J Adv Nurs. 2010;66(8):1874–84.
42. Capezuti E, Wagner L, Brush BL, Boltz M, Renz S, Secic M. Bed and toilet height as potential environmental risk factors. Clin Nurs Res. 2008;17(1):50–66.
43. Lyons SS. How do people make continence care happen? An analysis of organizational culture in two nursing homes. Gerontologist. 2010;50(3):327–39.
44. Cooke V, Arling G, Lewis T, Abrahamson KA, Mueller C, Edstrom L. Minnesota's Nursing Facility Performance-Based Incentive Payment Program: an innovative model for promoting care quality. Gerontologist. 2010;50(4):556–63.
45. Etheridge F, Tannenbaum C, Couturier Y. A system-wide formula for continence care: overcoming barriers, clarifying solutions, and defining team members' roles. J Am Med Dir Assoc. 2008;9(3):178–89.
46. Schnelle JF, Alessi CA, Simmons SF, Al-Samarrai NR, Beck JC, Ouslander JG. Translating clinical research into practice: a randomized controlled trial of exercise and incontinence care with nursing home residents. J Am Geriatr Soc. 2002;50:1476–83.
47. Morgan C, Endozoa N, Paradiso C, McNamara M, McGuire M. Enhanced toileting program decreases incontinence in long term care. Jt Comm J Qual Patient Saf. 2008;34(4):206–8.
48. Rahman AN, Schnelle JF, Applebaum R, Lindabury K, Simmons S. Distance coursework and coaching to improve nursing home incontinence care: lessons learned. J Am Geriatr Soc. 2012;60(6):1157–64.
49. Simmons SF, Durkin DW, Rahman AN, Choi L, Beuscher L, Schnelle JF. Resident characteristics related to the lack of morning care provision in long-term care. Gerontologist. 2013;53(1):151–61.
50. Rantz MJ, Zwygart-Stauffacher M, Hicks L, Mehr D, Flesner M, Petroski GF, Madsen RW, Scott-Cawiezell J. Randomized multilevel intervention to improve outcomes of residents in nursing homes in need of improvement. J Am Med Dir Assoc. 2012;13(1):60–8.
51. Kegel AH. Progressive resistance exercise in the functional restoration of the perineal muscles. Am J Obstet Gynecol. 1948;56:238–48.
52. Kegel AH. Stress incontinence of urine in women: physiologic treatment. J Int Coll Surg. 1956;25: 487–99.
53. Burgio KL, Goode PS, Locher JL, Umlauf MG, Roth DL, Richter HE, et al. Behavioral training with and without biofeedback in the treatment of urge incontinence in older women: a randomized controlled trial. JAMA. 2002;288:2293–9.
54. Burns PA, Pranikoff K, Nochajski TH, Hadley EC, Levy KJ, Ory MG. A comparison of effectiveness of biofeedback and pelvic muscle exercise treatment of stress incontinence in older community-dwelling women. J Gerontol. 1993;48:167–74.
55. Burgio KL, Whitehead WE, Engel BT. Urinary incontinence in the elderly. Bladder-sphincter biofeedback and toileting skills training. Ann Intern Med. 1985;104:507–15.
56. Burgio KL, Robinson JC, Engel BT. The role of biofeedback in Kegel exercise training for stress urinary incontinence. Am J Obstet Gynecol. 1986;157:58–64.
57. Goode PS, Burgio KL, Locher JL, Roth DL, Umlauf MG, Richter HE, Varner RE, Lloyd LK. Effect of behavioral training with or without pelvic floor electrical stimulation on stress incontinence in women: a randomized controlled trial. JAMA. 2003;290:345–52.
58. Herbison GP, Dean N. Weighted vaginal cones for urinary incontinence. Cochrane Database Syst Rev. 2013;7:CD002114.
59. Bø K, Morkved S, Frawley H, Sherburn M. Evidence for benefit of transversus abdominus training alone or in combination with pelvic floor muscle training to treat female urinary incontinence: a systematic review. Neurourol Urodyn. 2009;28:368–73.
60. Moore K, Dumoulin C, Bradley C, et al. Adult conservative management. In: Abrams P, Cardozo L, Khoury S, Wein A, editors. Incontinence, 5th International Consultation on Incontinence. Paris, France: European Association of Urology; 2013. p. 1101–1227.

61. Kisner C, Colby LA. Therapeutic exercise. Foundations and techniques. 4th ed. Philadelphia, PA: FA Davis; 2003.
62. Bø K. Pelvic floor muscle exercise for the treatment of stress urinary incontinence: an exercise physiology perspective. Int Urogynecol J. 1995;6:282–91.
63. Burgio KL, Pearce KL, Lucco AJ. Staying dry: a practical guide to bladder control. Baltimore, MD: Johns Hopkins Press; 1989. p. 67–100.
64. Miller JM, Ashton-Miller JA, DeLancey JOL. A pelvic muscle precontraction can reduce cough-related urine loss in selected women with mild SUI. J Am Geriatr Soc. 1998;46:870–4.
65. Bourcier AP, Juras JC, Jacquetin B. Urinary incontinence in physically active and sportswomen. In: Appell RA, Bourcier AP, La Torre F, editors. Pelvic floor dysfunction: investigations and conservative treatment. Rome: C.E.S.I; 1999. p. 9–17.
66. Dumoulin C, Hay-Smith J. Pelvic floor muscle training versus no treatment, or inactive control treatments, for urinary incontinence in women. Cochrane Database Syst Rev. 2010;1:CC005654.
67. Shamliyan T, Wyman JF, Ramakrishnan R, Sainfort F, Kane RL. Systematic review: randomized, controlled trials of nonsurgical treatments for urinary incontinence in women. Ann Intern Med. 2008;148(6):459–73.
68. Goode PS, Burgio KL, Johnson TJ, et al. Behavioral therapy with or without biofeedback and pelvic floor electrical stimulation for persistent postprostatectomy incontinence. JAMA. 2011;305: 151–9.
69. Burgio KL, Locher JL, Goode PS, Hardin JM, McDowell BJ, Dombrowski M, Candib D. Behavioral versus drug treatment for urge incontinence in older women: a randomized clinical trial. JAMA. 1998;23:1995–2000.
70. Rose MA, Baigis-Smith J, Smith D, Newman D. Behavioral management of urinary incontinence in homebound older adults. Home Healthc Nurse. 1990;8:10–5.
71. Baigis-Smith J, Smith DAJ, Rose M, Newman DK. Managing urinary incontinence in community-residing elderly persons. Gerontologist. 1989;229:33.
72. McDowell BJ, Burgio KL, Dombrowski M, Locher JL, Rodriguez E. Interdisciplinary approach to the assessment and behavioral treatment of urinary incontinence in geriatric outpatients. J Am Geriatr Soc. 1992;40:370–4.
73. Burgio K, Goode P, Johnson II TM, Hammontree L, Ouslander J, Markland A, et al. Behavioral versus drug treatment for overactive bladder in men: the male overactive bladder treatment in veterans (MOTIVE) trial. J Am Geriatr Soc. 2011;59:2209–16.
74. Jarvis GJ, Millar DR. Controlled trial of bladder drill for detrusor instability. Br Med J. 1980;281: 1322–3.
75. Pengelly AW, Booth CM. A prospective trial of bladder training as treatment for detrusor instability. Br J Urol. 1980;52(6):463–6.
76. Colombo M, Zanetta G, Scalambrino S, Milani R. Oxybutynin and bladder training in the management of female urinary urge incontinence: a randomized study. Int Urogynecol J. 1995;6:63–7.
77. Fantl JA, Wyman JF, McClish DK, et al. Efficacy of bladder training in older women with urinary incontinence. JAMA. 1991;265:609–13.
78. Wyman JF, Fantl JA, McClish DK, Bump RC, et al. Comparative efficacy of behavioral interventions in the management of female urinary incontinence. Am J Obstet Gynecol. 1998;179:999–1007.
79. Kay GG, Abou-Donia MB, Messer Jr WS, Murphy DG, Tsao JW, Ouslander JG. Antimuscarinic drugs for overactive bladder and their potential effects on cognitive function in older patients. J Am Geriatr Soc. 2005;53(12):2195–201.
80. Dubeau CE, Morrow JD, Kraus SR, Creanga D, Bavendam T. Efficacy and tolerability of fesoterodine versus tolterodine in older and younger subjects with overactive bladder: a post hoc, pooled analysis from two placebo-controlled trials. Neurourol Urodyn. 2012;31(8):1258–65.
81. Kay GG, Maruff P, Scholfield D, Malhotra B, Whelan L, Darekar A, Martire DL. Evaluation of cognitive function in healthy older subjects treated with fesoterodine. Postgrad Med. 2012;124(3):7–15.
82. Ponzone R, Biglia N, Jacomuzzi ME, et al. Vaginal oestrogen therapy after breast cancer: is it safe? Eur J Cancer. 2005;41:2673–81.
83. Mariappan P, Alhasso A, Ballantyne Z, et al. Duloxetine, a serotonin and noradrenaline reuptake inhibitor (SNRI) for the treatment of stress urinary incontinence: a systematic review. Eur Urol. 2007;51:67–74.
84. Ouslander JG. Management of overactive bladder. N Engl J Med. 2004;350:786–99.
85. Madhuvrata P, Cody JD, Ellis G, Herbison GP, Hay-Smith EJ. Which anticholinergic drug for overactive bladder symptoms in adults. Cochrane Database Syst Rev. 2012;1:CD005429.
86. Hay-Smith J, Herbison P, Ellis G, et al. Which anticholinergic drug for overactive bladder symptoms in adults. Cochrane Database Syst Rev. 2005:CD005429.
87. Hartmann K, PcPheeters M, Biller D, et al. Treatment of overactive bladder in women. Evidence Report/ Technology Assessment No.187 (Prepared by the Vanderbilt Evidence-based Practice Center under Contract No. 290-2007-10065-I) AHRQ Publication No. 09-E017. Rockville, MD: Agency for Healthcare Research and Quality; 2009.
88. Goode PS, Burgio KL, Richter HE, Markland AD. Incontinence in older women. JAMA. 2010;303: 2172–81.
89. Gopal M, Haynes K, Bellamy SL, et al. Discontinuation rates of anticholinergic medications used for the treatment of lower urinary tract symptoms. Obstet Gynecol. 2008;112:1311–8.
90. Kaplan SA, Roehrborn CG, Rovner ES, et al. Tolterodine and tamsulosin for treatment of men with lower urinary tract symptoms and overactive

bladder: a randomized controlled trial. JAMA. 2006;296:2319–28 [erratum appears in JAMA. 2007 Mar 21:297(11):1195].
91. McConnell JD, Roehrborn CG, Bautista OM, et al. The long-term effect of doxazosin, finasteride, and combination therapy on the clinical progression of benign prostatic hyperplasia. N Engl J Med. 2003;349:2387–98.
92. Lepor H, Williford WO, Barry MJ, et al. The efficacy of terazosin, finasteride, or both in benign prostatic hyperplasia. Veterans Affairs Cooperative Studies Benign Prostatic Hyperplasia Study Group. N Engl J Med. 1996;335:533–9.
93. FDA News Release. FDA approves Myrbetriq for overactive bladder. Retrieved http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm310096.htm
94. Cardozo L, Bachmann G, McClish D, et al. Meta-analysis of estrogen therapy in the management of urogenital atrophy in postmenopausal women: second report of the Hormones and Urogenital Therapy Committee. Obstet Gynecol. 1998;92:722–7.
95. Gray M, Beeckman D, Bliss DZ, et al. Incontinence-associated dermatitis: a comprehensive review and update. J Wound Ostomy Continence Nurs. 2012;39(1):61–74.
96. Starr JM. Cholinesterase inhibitor treatment and urinary incontinence in Alzheimer's disease. J Am Geriatr Soc. 2007;55(5):800–1.
97. Bryant CM, Dowell CJ, Fairbrother G. Caffeine reduction education to improve urinary symptoms. Br J Nurs. 2002;11(8):560–5.
98. DuBeau CE, Ouslander JG, Palmer MH. Knowledge and attitudes of nursing home staff and surveyors about the revised federal guidance for incontinence care. Gerontologist. 2007;47(4):468–79.
99. Newman DK. Incontinence products and devices for the elderly. Urol Nurs. 2004;24:316–34.
100. Lipp A, Shaw C, Glavind K. Mechanical devices for urinary incontinence in women. Cochrane Database Syst Rev. 2011;7:CD001756.
101. Richter H, Burgio K, Brubaker L, et al. Continence pessary compared with behavioral therapy or combined therapy for stress incontinence: a randomized controlled trial. Obstet Gynecol. 2010;115: 609–17.
102. Moore KN, Schieman S, Ackerman T, Dzus HY, Metcalfe JB, Voaklander DC. Assessing comfort, safety, and patient satisfaction with three commonly used penile compression devices. Urology. 2004;63:150–4.
103. Newman DK, Fader M, Bliss DZ. Managing incontinence using technology, devices and products. Nurs Res. 2004;53(6 Suppl):S42–8.