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# Evaluation and current treatments for urinary incontinence

***Abstract:** Although aging and urinary incontinence are often associated, urinary incontinence is not a normal part of aging. As the population ages, the challenge of urinary incontinence will place a greater demand on the healthcare system. NPs can effectively direct treatments to mitigate the symptoms of urinary incontinence, improving patient quality of life.*

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As the US population ages, the challenges of urinary incontinence (UI) will place greater demands on the healthcare system. But UI does not have to be an accepted part of the aging process. Many methods of treatment, both pharmacologic and nonpharmacologic, are available to help patients with UI manage their symptoms. This article reviews the types of UI, screening measures NPs can employ to identify UI early, and various treatment options to help patients with this condition achieve a better quality of life.

## Epidemiology and types of UI

The International Continence Society defines UI as involuntary loss of urine and overactive bladder (OAB) as urinary urgency, with and without UI, usually with increased daytime frequency and nocturia, not caused by infection or other pathologic conditions.[1] Worldwide, an estimated 350 million individuals have some type of UI.[2] In the US, UI incidence varies from 5% to 75% based on type of UI.[3] UI is among the costliest kidney or urologic diseases in the US and is predicted to reach approximately $82 billion by the year 2020.[3,4]

**Keywords: bladder, mixed urinary incontinence, nocturia, overactive bladder, percutaneous tibial nerve stimulation, sacral nerve stimulator, stress urinary incontinence, urge urinary incontinence, urinary incontinence**

Women suffer from UI more often than men, yet many do not seek treatment because of longstanding beliefs that there are no treatments and it is a normal part of aging, and embarrassment.[5,6] Known risk factors for developing UI in women include pregnancy, childbirth, White race, menopause, hysterectomy, and obesity.[7] In men, risk factors for UI include an enlarged prostate and as a result of treatments for prostate disease or cancer.

UI is divided into several subtypes, with the two primary subtypes being urgency urinary incontinence (UUI) and stress urinary incontinence (SUI). Mixed urinary incontinence (MUI) is a combination of SUI and UUI.[7] Treatments for UI are based on gender, type, extent, and the impact on the individual's quality of life. (See *Types of UI*.)

## Pathophysiology

Voiding is a coordinated effort involving the bladder, urethra, and urinary sphincters. The bladder's function is to store urine at a low pressure until it is convenient to void. As the bladder gradually fills, it stretches to accommodate the increase in urine volume. The sensation of bladder filling normally does not occur until 40% to 50% of the normal 300- to 500-mL adult bladder capacity is reached.[7] Neural cells within the bladder, in part, help to coordinate the storage and voiding phases of urination with the sympathetic nervous system working to maintain continence. The parasympathetic system, sacral plexus, and S-2 to S-4 pelvic nerves coordinate voiding. OAB is a non-life-threatening system complex that is not well understood.[8] In UUI, the coordination of these events is thought to be disrupted, causing the bladder to leak. Researchers are currently investigating where the physiology of this system is disrupted. One theory is an inflammatory or infectious process involving the microbiota of the bladder.[9] SUI occurs because of a weakness or loss of support of the urinary sphincter, trauma, surgery, neurologic disease, aging, or vaginal atrophy associated with the genitourinary syndrome of menopause (GSM).[7]

## Diagnosis and screening

NPs are experts in gathering a detailed patient history. For UI, a thorough history would include onset, duration, occurrence of symptoms, degree of bother, and any associated lower urinary tract or voiding symptoms. Because there are numerous types of incontinence, the simple question, "In what situations do you leak urine?" can assist in classifying most types of UI.

There are also several useful clinical symptom assessments that can assist providers and patients. A quick recall by the patient of the number of times voided during the day and night with any reported straining or sensation of incomplete emptying is helpful in determining the degree of urinary urgency and nocturia. Voiding up to seven times a day on average is considered normal; however, this varies from individual to individual based on fluid intake, climate,

### Types of UI[1,7]

UI is the involuntary loss of urine. The following are subtypes of UI.

| Types | Description |
|---|---|
| UUI | Involuntary loss of urine associated with urgency to void |
| SUI | Involuntary loss of urine associated with physical exertion (such as sneezing, coughing, laughing, or running) |
| MUI | Involuntary loss of urine associated with urgency and with physical exertion (such as sneezing, coughing, laughing, or running) |
| Postural urinary incontinence | Involuntary loss of urine associated with change in body position, such as moving from a sitting to standing position |
| Continuous urinary incontinence | Continuous involuntary loss of urine (fistula) |
| Insensible urinary incontinence | Urinary incontinence that occurs without awareness |
| Coital urinary incontinence | Involuntary loss of urine with coitus; can be subdivided into loss of urine with penetration and loss with orgasm |
| Nocturnal enuresis | Involuntary loss of urine that occurs during sleep |

medications, and other body parameters.[1] Ask patients if they wear pads, adult diapers, or incontinence underwear, and if so, asking how many per day can confirm severity. Most patients with UI will respond to some form of treatment, whether behavioral or medical. However, some patients may warrant specialist referral, as UI may be a symptom of a more serious condition. For a list of list of signs, symptoms, and history of UI requiring specialist referral, see https://www.aafp.org/afp/2013/0415/p543.html.

**Dietary history.** Several foods and drinks can cause bladder irritation and urinary urgency. Caffeinated beverages, chocolate, alcohol, acidic fruits, tomatoes, sugar, spicy foods, artificial sweeteners, and soft drinks are a few offenders. A dietary history can be used as a starting point to educate patients in making behavioral changes. It can also be useful in detecting and eliminating foods that cause bladder sensitivity.[12]

Knowledge of a patient's fluid intake over the course of 24 hours in many cases makes a tremendous improvement for patients reporting urinary urgency and frequency. Asking patients to include type and kind of fluid consumed would unveil overconsumption of fluids, for instance in the patient who drinks a "pot of coffee" daily.

Few studies have examined fluid intake as a method to reduce incontinence episodes. A Cochrane review included three studies comparing change in fluid intake versus no change. Although the studies were of low quality, symptom-specific scores related to quality of life improved with decreased fluid intake. However, some individuals reported headaches, constipation, or thirst with decreasing fluids. Three additional trials saw no change in incontinence with reduction of caffeine.[13]

Counseling patients to decrease fluids can lead to concentrated urine, which in turn can irritate the bladder, increasing urinary urgency and UI. Age, body weight, activity, body metabolism, medications, and disease states should be taken into consideration when asking patients to decrease fluids. Recommended dietary reference intake values for water have been developed by The National Academies. This table can be located at: www.nationalacademies.org.

Bladder diaries can additionally be used for habit training. Patients often learn from keeping the voiding diary that if they go to the bathroom every 1 to 2 hours on average, they may have fewer UI episodes. Prompted voiding and timed voiding are used for individuals who require assistance in the form of reminders.[12] Wearable products that can be set at timed intervals to remind patients to void are particularly useful in patients who have a poor memory. Distraction and urge suppression techniques can be used when the patient experiences a strong urge to void. Counting backward from 100, sitting still and waiting until the urge passes before getting up to go to the toilet, relaxation techniques, pelvic floor muscle exercises, and "quick flicks" of the pelvic muscles can suppress the urge to urinate.

Biofeedback, supervised and group pelvic floor muscle therapy, surface electromyography relaxation techniques, and electrical muscle stimulation can be provided by physical therapists who are trained in pelvic floor disorders. Weighted vaginal cones can be found online and purchased for home use to provide sensory biofeedback and increase pelvic floor muscle strength. Meditation as well as mindfulness exercises have also recently been shown to improve UI.[14,15]

**Constipation and UI.** There is a strong association between constipation and incontinence. Constipation causes a distended rectum, significantly influencing the sensation of bladder filling and detrusor overactivity.[16] A Bristol stool chart is a pictorial rendering of stool consistency.[17] Information in this chart can help patients discuss constipation. Having the patient point to the type of stools they have serves as a springboard for NPs to educate patients and discuss constipation as a potential contributing factor to UI. From there, NPs can discuss treatment options with patients.

**Medical and social history.** A past medical history is important in assessing UI and includes a gynecologic history with parity for females, presentation, and complications of delivery. In both the male and female patient, ask if there have been accidents that may have caused injuries impacting the sacrum or low back. Chronic medical conditions including chronic obstructive pulmonary disease, asthma, emphysema, diabetes mellitus, and declining health also contribute to unwanted and unexpected urine leakage ranging from a few drops to amounts requiring hourly pad changes or numerous clothing changes per day. A thorough social history, including occupation and smoking history, can assist the NP in identifying factors contributing to bladder issues. Work and school environments that limit water availability and toilet access, or occupations such as taxi cab drivers, nurses, and teachers that mandate deferment of fluids to avoid bathroom

visits, putting these individuals at risk for pelvic floor disorders such as UI.[18,19] Exposure to chemicals and smoking can increase the risk of bladder cancer that can present as sudden onset of UI. Individuals working as painters, printers, machinists, hairdressers, and truck drivers would fall among this group.[20]

## Physical exam

**Women with UI.** Adequate cognition, mobility, motivation, and manual dexterity are required to maintain continence. Logically, any neurologic, psychological, muscle, or abnormal findings, such as fibroids or tumors, can cause dysfunction in the lower urinary tract. Performing exams for cognition, hand function, strength, coordination and mobility, lower extremity strength, reflexes, and perineal sensation can uncover neurologic conditions that contribute to UI. An abdominal exam would assess for masses, tenderness, fibroids, or an overdistended bladder. The pelvic exam should visualize the external genitalia, first assessing for GSM (previously known as atrophic vaginitis) and skin irritation from pads or urine exposure. GSM can contribute to urinary urgency and UI.[21] Palpate the urethra to determine if there is tenderness or discharge indicating a urethral diverticulum. Urethral diverticula are rarely seen but can contribute to symptoms of UUI or SUI. Patients with urethral diverticula may report the classic triad of symptoms: dysuria, dyspareunia, and postvoid dribbling.[22]

Evaluate for pelvic organ prolapse and look for descent of the bladder, uterus, or vaginal walls by having the patient perform a Valsalva maneuver. Note any vaginal discharge, which can sometimes be mistaken as urine leakage. During the digital exam, evaluate the strength of the patient's pelvic muscles by having the patient squeeze the pelvic muscles (perform a Kegel exercise). Have the patient cough or perform a Valsalva maneuver to observe for a hypermobile urethra and urine loss. This can be a quick and easy method for detecting SUI. A spinal exam may reveal congenital conditions such as spina bifida or tethered cord syndrome. These conditions usually present as open sinuses, dimples, or spinal curvatures, especially if accompanied by skin discoloration or tufts of hair.[23]

**Men with UI.** In men with UI, perform an abdominal exam to assess for masses or tenderness. Also perform a genital exam to evaluate for penile discharge and skin irritation. Men who are uncircumcised should have the foreskin retracted to examine the location, size, and position of the urethral meatus. It should be located at the tip of the glans. An exam of the scrotum and testicles should evaluate for tenderness, size, and shape. A digital rectal exam can assess for sphincter tone and prostate size. An exam of the anal sphincter and an assessment of sphincter tone should be performed in men with UI as a flaccid or spastic anal sphincter mimics that of the urinary sphincter and may indicate neurologic disease.[24] It is difficult to determine the exact size of the prostate as only the posterior surface of the prostate can be palpated. The size and shape of the prostate gland is often described as walnut-, pear-, or heart-shaped. Romero and colleagues developed a guideline for "technique, skills, and reproducibility" of prostate exams. In this guideline, the prostate gland is graded from I to IV, with Grade I (normal) being a 20-g prostate and Grade IV (enlarged) being 80 g or more.[25]

## Diagnostic testing

A clean catch urine sample and rapid urine test are used as screening for urinary tract infection (UTI), a frequent cause of UI. Keep in mind the reagent test strip has a low sensitivity and high specificity for identifying UTI and a culture may provide additional evidence supporting an OAB diagnosis.[26] It is important to note that a patient with irritative voiding symptoms (urinary urgency, frequency, and incontinence) and gross hematuria without evidence of UTI should merit referral to a specialist for evaluation and possible cystoscopy.[27] A few other additional causes of irritative voiding symptoms not associated with UTI include kidney stones, bladder cancer, incomplete bladder emptying, and, in men, benign prostatic hyperplasia, to name a few.

**Postvoid residual.** A bladder scanner can be used to measure the volume of urine left in the bladder immediately after voiding. It is an important tool in assessing and sorting out a diagnosis of urinary retention and incomplete bladder emptying. As mentioned earlier in this article this can be a cause of urinary urgency and urine leakage. Measuring a postvoid residual can also be performed with ultrasound or in-and-out catheterization if no bladder scanner or ultrasound is available. There are no clear guidelines as to what is considered a normal amount of urine left in the bladder after voiding because of differences in individuals and time of day. Volumes greater than 100 mL may indicate incomplete emptying in older adults or bladder outlet obstruction.[28,29] Volumes in excess of 100 mL on average may indicate urinary retention.

## Screening prevention and management

UI is rarely addressed during routine office visits.[30] The degree of bother, length, and frequency of urinary symptoms influence whether patients report symptoms of UI to providers.[31,32] NPs should screen for UI during health promotion and prevention screenings. This is especially important for NPs caring for older adults who have a high rate of morbidity from falls, fractures, and institutionalization associated with UI.[33,34]

## Nonsurgical management in the treatment of UI

Bladder diaries and pelvic floor muscle exercises are used as first-line therapy to evaluate and assist the patient who develops UI. Technology has made keeping a bladder diary more convenient and less burdensome for patients. Now, patients can use apps that can keep track of fluid intake and urine output to help with record keeping. Patients can refer to several apps and YouTube videos for help with pelvic floor muscle exercises, making self-care more cost effective. In a recent Cochrane review, supervised pelvic floor muscle therapy improved or cured all types of UI in women; women were more satisfied with this treatment and they reported better sexual outcomes.[35] Biofeedback is another method to train the pelvic floor muscles. Physical therapists and some gynecology and urology offices offer biofeedback. In biofeedback therapy, the trained therapist uses a small sensor that is placed into the vagina and/or around the pelvic floor. These sensors are attached to a computer and detect and measure muscle strength.

**Weight loss.** Obesity is related to many health conditions and disorders, and UI is certainly among them. A study by Subak and colleagues of women who were obese or overweight who attended a weight reduction program found that women in the immediate intervention weight loss program group had a 60% median reduction in weekly UI episodes compared with the women in the delayed (wait-list) weight loss program group who had a median 15% reduction in weekly UI episodes. Results of this study provide evidence that weight loss (of even 5% to 10%) is effective as a first-line treatment for UI.[36]

**Pessaries.** Pessaries have been used since ancient times to lift and support the bladder and uterus and are considered a first-line nonsurgical treatment for pelvic organ prolapse. For women with a cystocele, a pessary can improve incomplete bladder emptying. For women with SUI, there are pessaries designed to support the urethra and decrease urine leakage. Patients can be taught to insert pessaries before exercise and remove them afterward to prevent urine loss caused by high impact exercises such as running.

**Medications.** A wide variety of medications can provoke or precipitate OAB. (See *Medications contributing to UI* and *Drugs used to treat UUI*.) It is important that the patient's medication list be up-to-date and that any new medications be correlated with the onset of urinary symptoms to identify medications as a

### Medications contributing to UI

**Alpha-adrenergic agonists**
- Increase smooth muscle tone in the urethra
- Can induce urinary retention

**Alpha-adrenergic antagonists**
- Decrease smooth muscle tone in the urethra
- Can induce SUI

**Angiotensin-converting enzyme inhibitors**
- Adverse reaction of cough can contribute to or worsen SUI

**Anticholinergics**
- Can induce urinary retention or incomplete bladder emptying
- Can cause constipation
- Can cause dry mouth

**Calcium channel blockers**
- Can cause urinary retention or incomplete bladder emptying
- Can cause constipation
- Can cause dependent edema leading to nocturia

**Cholinesterase inhibitors**
- Increase bladder contractility
- Can cause urinary urgency and UUI

**Diuretics**
- Cause diuresis leading to urinary urgency and UUI

**Lithium**
- Causes polyuria through induced diabetes insipidus

**Opioid analgesics**
- Cause urinary retention, constipation, confusion, and immobility leading to UI

**Psychotropic drugs, sedatives, hypnotics, antipsychotics, and histamine I receptor antagonists**
- Can cause confusion, impaired mobility, and precipitate UI

**Selective serotonin reuptake inhibitors**
- Urinary urgency and UUI

**Gabapentin, glitazones, and NSAIDs**
- Can cause edema leading to nocturia and nocturnal enuresis

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possible contributor. It is particularly helpful to ask about recent use of over-the-counter medications.

## Surgical and invasive treatments

**Percutaneous tibial nerve stimulation.** Percutaneous tibial nerve stimulation (PTNS) is a once-weekly treatment similar to and originating from acupuncture.[37] NPs in urology and urogynecology offices have been trained and provide this therapy based on state board of nursing regulations. The company sends a representative to train individuals on how to perform these treatments. During this procedure, the patient is asked to lie down or sit with the treatment leg supported. After searching for the medial malleolus located between the posterior margin of the tibia and soleus muscle, a sterile stainless-steel needle is inserted close to the posterior tibial nerve without coming into contact with it. Insertion of the needle is 2 to 4 cm into the ankle at a 60° to 90° angle. An electrode is then attached to the needle and a grounding pad is placed on the sole of the foot. A programmer is then used to adjust the intensity of the pulse from the unit.[38] Treatments last for 30 minutes each visit. In one study, 71% of individuals responded positively to this treatment versus placebo.[39] In a second study, a decrease in urinary urgency or UUI rates was greater than 50% and daytime and nighttime frequency rates decreased by 33% to 71%.[40] If PTNS is determined to be effective as reported by the patient, as documented by the decrease in UI episodes by the patient in a diary, the treatment plan is to continue for 12 weeks. The diary is to document whether the patient is improving or not improving and that they are following behavioral therapies or taking medications in addition. It is for the provider and the patient, as the patient brings the diary each week and a discussion takes place between the patient and provider documenting fluid intake and number of voids per day, treatments continue for 12 weeks, with maintenance treatments to be determined thereafter. Contraindications for PTNS include having a pacemaker or implantable defibrillator, nerve damage to the affected limb, pregnancy or planning to become pregnant during treatment, or if the patient is prone to excessive bleeding. Adverse reactions include discomfort and pain (including throbbing pain) near the stimulation site, redness/inflammation at or near the stimulation site, local bleeding, toe numbness, or abdominal discomfort.[41]

**Sacral nerve stimulation.** The sacral nerve stimulation (SNS), also known as sacral neuromodulation, is a therapy approved for the treatment of urinary retention and symptoms of OAB, including UUI in 1997. The implantable neurostimulator device sends electric stimulation to the spinal nerves of the bladder, bowel, urinary, anal sphincters, and pelvic floor muscles. Although SNS is a surgical treatment, it is

### Drugs used to treat UUI

| Class | Medication | Common adverse reactions |
|---|---|---|
| Nonselective antimuscarinics | • Fesoterodine fumarate, extended release (ER)<br>• Oxybutynin Chloride, immediate release (IR), ER<br>• Oxybutynin transdermal patch<br>• Oxybutynin gel<br>• Tolterodine tartrate, IR, ER<br>• Trospium chloride, IR, ER | • Dry mouth<br>• Blurred vision<br>• Constipation<br>• Impaired cognition<br>• Impaired memory |
| Selective M3 antimuscarinics (competitive muscarinic receptor antagonists with affinity for M3 receptor) | • Darifenacin, ER<br>• Solifenacin succinate, IR | • Dry mouth<br>• Dry eyes<br>• Constipation<br>• Blurred vision<br>• Dizziness |
| Human beta$_3$ adrenergic receptor agonist | • Mirabegron, ER | • Headache<br>• Dizziness<br>• Dry mouth<br>• Hypertension |

Adapted from: Aoki Y, Brown HW, Brubaker L, Cornu JN, Daly JO, Cartwright R. Urinary incontinence in women. *Nat Rev Dis Primers.* 2018;3:1-31. Used with permission.

worth mentioning here as it requires patient education for use and in programming to gain the greatest benefits from the device. NPs can become skilled in educating patients about the surgical procedure for implanting the device as well as in programming the device once it has been implanted by the surgeon. The patient modulates the intensity of the current sent to the nerves using an external programmer. Implanting the SNS is a two-step process; the first step involves a trial to determine if improvement in symptoms is achieved. If the patient determines improvement in symptoms as documented in a diary, then the device is implanted. Contraindications to SNS include inadequate response, mechanical outlet obstruction, and diathermy use (shortwave, microwave, ultrasound). Safety and efficacy have not yet been determined for bilateral stimulation, pregnancy, unborn fetus and delivery, patients younger than age 16, and patients with neurologic conditions such as multiple sclerosis. The neurostimulator contains a battery that loses power over time, depending on use. When the battery life is depleted, the neurostimulator will need to be replaced.

**Intravesical onabotulinumtoxinA injections.** The use of intravesical onabotulinumtoxinA has been found to have a similar effect to that of bladder medications.[42] It is considered a third-line treatment for UUI.[8] Before treatment, it is important for the patient to learn to perform intermittent catherization or make frequent visits to the office for postvoid residual assessment, as one of the adverse reactions of treatment is transient inability to urinate. Additional adverse reactions include dysuria and UTIs. Contraindications to intravesical onabotulinumtoxinA are hypersensitivity to any botulinum toxin preparation or to any of the components, infection at the proposed injection site, UTI, or urinary retention.[43]

## Conclusions

UI is a symptom syndrome that is highly prevalent and expected to increase in the coming years as the population ages. Individuals with UI have a poor quality of life with limitations in social, physical, and leisure activities. A detailed history and physical exam can help determine the type of UI and, in some cases, the cause. Diagnostic tests provide direction for the need for referral and additional workup. Education is an important part of the management of OAB. Shared decision-making discussion can guide in treatment decisions. Patients found to have hematuria and neurologic symptoms should be referred to a specialist for further evaluation. NPs are well suited to provide holistic patient-centered care in the management of patients with UI and other bladder and urologic conditions. NPs who presently work in urology or find the field of urology of interest can find training, education, and certification through the Society of Urologic Nurses and Associates.[44] NP

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