Overactive Bladder in Women

An evidence-based review of screening, assessment, and management.

ABSTRACT: Overactive bladder is a term used to describe a group of lower urinary tract symptoms that are prevalent in women, particularly as they age. Those with overactive bladder often experience related physical and psychological symptoms or conditions and report a poorer quality of life than other women. Many factors that increase the risk of developing overactive bladder are modifiable; therefore, lifestyle and behavioral interventions are first-line treatments. More treatment options are becoming available to women as research provides new information about the underlying pathophysiology of overactive bladder. Nurses play a major role in its screening, assessment, and management in women, many of whom do not seek help and try to self-manage symptoms, leading to a continuing cycle of unpredictable urgency and incontinence.

Keywords: overactive bladder, urgency, urinary incontinence, women

During her annual wellness physical examination, Cassandra Conway describes herself as in excellent health but notes she is overweight and doesn't exercise as much as she wants. (This case is a composite based on our experience.) Ms. Conway, who is 56 years old, says her work is stressful and requires that she work long hours. She also mentions that she is concerned about the declining health of her elderly mother, who lives out of state.

Near the end of the appointment, Ms. Conway asks for a recommendation of the best absorbent products for occasional incontinence, because "my bladder feels so full sometimes at work, and I can barely hold it long enough to get to the bathroom." This is the first time she has mentioned a concern about urinary leakage. A check of her medical record reveals no documentation of overactive bladder or other urinary symptoms.

WHAT IS OVERACTIVE BLADDER?

Overactive bladder refers to a group of lower urinary tract symptoms related to the storage of urine in the bladder. Normally the bladder fills and stores urine without discomfort or leakage. The sensation of bladder fullness gradually increases until the need to void comes to conscious awareness. (For a depiction of the normal bladder anatomy, see Figure 1.) In those who have overactive bladder, however, the sensation to void is altered (and generally delayed) to the extent that involuntary urination may occur.[1] The pathogenesis of overactive bladder is not yet entirely clear. Although overactivity of the smooth muscle of the bladder (the detrusor) is considered the primary cause of the condition, there is evidence that central neurologic system dysfunction may also play a role.[1]

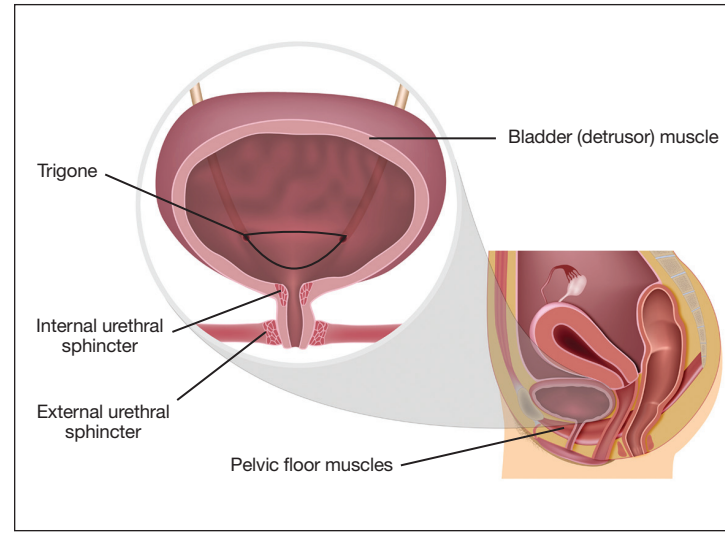
The International Continence Society (ICS) defines overactive bladder as "[u]rinary urgency, usually accompanied by frequency and nocturia, with or without urgency urinary incontinence, in the absence of urinary tract infection . . . or other obvious pathology."[2] According to the ICS, frequency is defined as when the patient "considers that he/she voids too often by day," and nocturia is when at least one micturition interrupts sleep at night.[3]

The hallmark symptom of overactive bladder is urgency, which is defined as a "sudden compelling desire to pass urine, which is difficult to defer."[3] Urgency

with urinary incontinence (UUI) is defined as an involuntary loss of urine associated with urgency.[3] In another type of incontinence, mixed urinary incontinence (MUI), people experience the symptoms of UUI as well as those of stress urinary incontinence (SUI), in which physical movement leads to pressure on the bladder and the involuntary loss of urine, particularly in women. Those who have MUI may experience urine loss upon exertion, such as when laughing, coughing, and sneezing, as well as leakage that is accompanied by a compelling sensation of urgency.

Researchers who conducted a qualitative study to gain a better understanding of the concept of urgency among women with overactive bladder found that the women described the need to empty their bladders using phrases such as "full bladder" and "must go."[4] They noted that these women differentiated between the "regular" sensations associated with the need or urge to void and the strong desire to void that is the hallmark of urinary urgency.[4] In another study, in which researchers collected and categorized descriptions of the "desire to void" by people with and without symptoms of overactive bladder, those who had the condition were more likely to use descriptors related to the sensation of urgency, whereas those who didn't were more likely to use descriptors related to fullness.[5]

Figure 1. Anatomy of the Bladder



The normal bladder musculature is shown in cross section. The trigone is the triangular region of the bladder wall between the orifices of the two ureters and the urethra. At right, the bladder can be seen in relation to other structures in the female pelvis. Image © Shutterstock.

PREVALENCE AND COST

Overactive bladder, UUI in particular, is prevalent in women. It occurred at least "sometimes" in 30% of women compared with 16.4% of men among 10,000 survey respondents who were 18 to 70 years of age.[6] African American women have higher rates of overactive bladder (45.9%) than white (43.4%), Hispanic (42%), and Asian (26.6%) women.[7]

De Boer and colleagues found overactive bladder prevalence increased with age, with 54.5% of women 66 to 75 years old and 63.6% of women 76 to 85 years old reporting symptoms (these included frequency, urgency, and urge incontinence).[8] Unlike SUI, the prevalence rates of UUI and MUI rise as women age.[9] As the baby boom generation (those born between 1946 and 1964) ages, more women of this generation—who have higher life expectancy rates than the men[10]—are expected to experience the symptoms of overactive bladder.

The estimated overall annual cost of overactive bladder and UUI is expected to be $82.6 billion by 2020.[11] Women may incur the costs associated with prescription medications as well as absorbent products, which offer emotional security and ensure concealment in the case of unexpected leakage. The global market for disposable incontinence products, especially adult products, is growing, with an estimated $8 billion annual value.[12] The costs also affect society in general and employers in particular: employed women who have overactive bladder miss more days of work, take more time off because of disability, and are less productive than those who don't have the condition.[13]

COMORBIDITIES, BEHAVIORS, AND OVERACTIVE BLADDER

Certain comorbidities, including psychological and physical conditions or diseases, are associated with overactive bladder. Women who have UUI, for example, are at risk for falls and fractures, because presumably they often rush to the toilet to prevent leakage.[14] Women who have daily UUI symptoms have a higher risk of falls and fractures than women who experience UUI less frequently (weekly, for example).[14]

Functional limitations are also associated with the development of MUI and UUI. In one large epidemiologic study, middle-aged and older women were more likely to develop MUI and UUI as their number of functional limitations increased.[9]

Symptoms of overactive bladder have a negative effect on a woman's well-being, including her quality of life. Although UUI alone has a stronger impact on quality of life than SUI alone, the relationship is complex.[15] When UUI and SUI coexist—that is, when a woman has MUI—their combined effect can be more than the sum of their individual effects. Researchers found that as both types of incontinence become more severe, so does the impact on quality of life.[15]

The relationship between overactive bladder and affective symptoms is inconsistent. One systematic review reported that depression may be a consequence of overactive bladder, and that anxiety may be both a risk factor and a consequence.[14] Another systematic review concluded that a positive relationship between overactive bladder and affective symptoms exists, although additional research is needed to determine the precise nature of this relationship.[16]

Other comorbidities, conditions, and behaviors associated with overactive bladder include the following:

Urinary tract infections. The results of a survey of 5,204 U.S. adults revealed that a history of a urinary tract infection (UTI) in the previous four weeks was associated with overactive bladder in women.[17] Overactivity of the detrusor is presumed to play a role in this relationship.

Fecal incontinence and chronic constipation. In a recent systematic review, the median prevalence of fecal incontinence, excluding incontinence of flatus, in women who live in the community was 8.9%, with a range of 2% to 20.7%.[18] Factors associated with fecal incontinence were increasing age, diarrhea or fecal urgency, and urinary incontinence or overactive bladder; underlying pelvic floor dysfunction or sensorimotor nerve function are the presumed causes.[18]

Chronic constipation is associated with overactive bladder, possibly owing to shared embryologic tissue origin and nerve pathways.[19] Among 2,000 respondents to a cross-sectional Internet-based survey, both men and women with overactive bladder were significantly more likely to report chronic constipation than those without overactive bladder.[19] Chronic constipation was defined using modified Rome III diagnostic criteria, in which two of the following conditions must be present for at least six months: (1) fewer than three bowel movements per week, (2) hard lumpy stools, (3) straining during bowel movements, (4) a feeling of incomplete emptying after bowel movements, (5) a sensation that feces could not be passed during a bowel movement, (6) needing to press on or around anus to remove stool to complete a bowel movement, and (7) difficulty in relaxing or allowing feces to pass during a bowel movement.

Obesity, when a person has a body mass index (BMI) greater than or equal to 30 kg/m^2, is considered a modifiable risk factor for both UUI and nocturia.[20,21] A recent systematic review of observational studies noted that some components of metabolic syndrome—particularly obesity and, according to one study, insulin resistance—are associated with overactive bladder.[22] The authors suggested that damage may occur to all layers of the bladder wall because of the chronic inflammation and oxidative stress associated with metabolic syndrome. Contributors to the development of overactive bladder in women ages 40 and older include poor diet and low levels of physical activity.[23]

Hormonal factors. Postmenopausal status is associated with symptoms of overactive bladder, which are thought to be caused by low estrogen levels. Estrogen plays an important role in the modulation of the lower urinary tract. Estrogen receptors can be found in the vagina, urethra, bladder, and pelvic floor musculature, which suggests a potential role for vaginal estrogen in the treatment of overactive bladder symptoms, although current evidence is mixed.[24] Pelvic organ prolapse is associated with overactive bladder.[8,25] There is no consistent evidence of a relationship between the compartment or stage of prolapse and the prevalence of the condition, although the treatment of prolapse has reduced its symptoms in some women.[26]

Behavioral and lifestyle factors. Certain behaviors—limiting fluids, for example—can be counterproductive but are sometimes employed by women in an attempt to prevent leaking urine or the need to void while away from home.[27] Low fluid intake, for instance, may predispose women to UTIs.[28]

High caffeine intake (more than 400 mg/day) has been associated with overactive bladder.[29-31] Evidence exists that ingesting an increased amount of caffeine raises the odds of the progression of urgency (defined as an increase of three or more points in the total International Prostate Symptom Score, which has a range of 0 to 35, an instrument that has been validated in women).[32] Women who drank an increasing amount of caffeinated diet soda over time were more likely to have a variety of lower urinary tract symptoms or a progression of symptoms at five-year follow-up.[32]

Contributors to the development of overactive bladder in women ages 40 and older include poor diet and low levels of physical activity.

A recent study showed that 89% of women in the United States ingest caffeine, with middle-aged and older women (51 to 70 years of age) consuming more caffeine than younger women (19 to 30 years of age).[33] High levels of tea consumption increased the odds of nocturia and overactive bladder in a study of adult female Swedish twins.[34] Caffeine can

be found in beverages other than coffee and tea, as well as in some foods. Examples include decaffeinated coffee (which can contain small but varying levels of caffeine), cocoa drinks and frosting, chocolate candy and candy bars, energy drinks and bars, and cereals. Contrary to a belief held by some clinicians, findings from a large study indicate that intake of acidic fruit juice (orange and grapefruit) was not associated with the development of UUI, MUI, or SUI in women.[35] Instead, vitamin C ingestion from fluids and foods was inversely associated with urgency symptoms in women.[36]

Smoking has been shown to increase the odds of developing lower urinary tract symptoms.[37] In a study of women 18 to 79 years old, women who smoked were three times more likely than nonsmokers to experience urgency and frequency, but smoking was not associated with UUI.[38]

SCREENING, ASSESSMENT, AND DIAGNOSIS

Because of the prevalence of overactive bladder in women, women should be routinely screened for symptoms. The International Consultation on Incontinence Modular Questionnaire, a validated four-item screening tool for clinicians and researchers, is available at www.iciq.net/ICIQ.OABmodule.html. The King's Health Questionnaire can also be useful in measuring the impact of overactive bladder.[39,40]

Diagnosis of overactive bladder requires an assessment of a woman's urinary signs and symptoms while ruling out other conditions. To make an accurate diagnosis, a thorough history and physical examination must be obtained, and laboratory testing is needed. The history should include information on the woman's baseline physical functional level as well as current symptoms that impede functioning. It is important to assess bladder storage and bladder emptying. This can be accomplished by obtaining a postvoid residual urine volume either by using a portable ultrasound bladder scanner or by performing a straight catheterization.

A key component of the health history is the woman's oral fluid intake. Both excessive and limited fluid intake can lead to frequency and urgency symptoms, although there is no consensus on the quantity of fluid women should drink to maintain ideal hydration.[41]

A bladder diary is useful in obtaining an objective measure of the type and amount of fluid intake as well as the timing of voiding, including incontinent episodes, and the timing and frequency of bowel movements. A bladder diary requires the cooperation of the woman, or her caregiver, who completes it during a three-day period. (For an example of an easy-to-use bladder diary, see www.niddk.nih.gov/health-information/health-topics/urologic-disease/daily-bladder-diary/Documents/diary_508.pdf.) A bladder diary can be useful in revealing voiding and bowel movement patterns and in detecting fecal incontinence or constipation. Women should also be asked to complete a food diary to quantify the amount of food, fluid, and caffeine they consume.

Because of the strong association between obesity and overactive bladder, a woman's BMI should be calculated; in overweight and obese women, metabolic syndrome screening should occur as well.

Other symptoms, such as hematuria, dysuria, dyspareunia, pelvic organ prolapse, neurologic deficits, and pelvic pain, should also be assessed. In addition, all comorbidities and prescribed and over-the-counter medications should be reviewed, as they can also contribute to overactive bladder symptoms.

During the physical examination, particular attention should be paid to the abdominal and genitourinary aspects, and a rectal examination and evaluation for lower extremity edema should also occur.[42] Because of the strong association between obesity and overactive bladder, the woman's BMI should be calculated; in overweight and obese women, metabolic syndrome screening should occur as well.[22] In women with neurologic disease (multiple sclerosis, Parkinson's disease, or dementia, for example), a neurologic examination of the genital region should be considered to determine the impact of the disease on the functioning of the lower urinary tract. A postvoid residual urine volume should also be obtained using a portable ultrasound scanner or by straight catheterization, especially if the woman complains of obstructive symptoms or has had prior pelvic organ prolapse or urinary incontinence surgery.[43]

A urinalysis should be performed to rule out both infection and hematuria.[42] For women with a complex medical history, additional testing, including urodynamic evaluation, cystoscopy, and upper genitourinary tract imaging, can be used to differentiate between overactive bladder and other etiologies.[42]

Table 1. Medications for Overactive Bladder

Medication	Dose	Frequency
Tolterodine	1 or 2 mg	BID
Tolterodine LA[a]	2 or 4 mg	Daily
Oxybutynin	5 mg	BID or TID
Oxybutynin XL[a]	5, 10, or 15 mg	Start with 5 or 10 mg/day; dose should not exceed 30 mg/day
Fesoterodine[a]	4 or 8 mg	Daily
Darifenacin[a]	7.5 or 15 mg	Daily
Solifenacin	5 or 10 mg	Daily
Trospium	20 mg	BID
Trospium XL[a]	60 mg	Daily
Mirabegron[a]	25 or 50 mg	Daily

[a]Extended-release formulation.

TREATMENT

The American Urological Association's treatment guideline for overactive bladder has three levels: first-line treatment is lifestyle changes and behavioral therapy, second-line treatment is pharmacologic therapy, and third-line treatment involves neuromodulation.[44]

Lifestyle changes. These include weight loss; dietary changes; modifications in fluid intake; constipation prevention measures; smoking cessation; increased physical activity; and a reduced intake of caffeinated, carbonated, and alcoholic drinks. Reducing fluid intake by 25% (as long as daily fluid intake is not less than one liter per day), for instance, has been recommended to manage overactive bladder.[41]

Imamura and colleagues found that sustained weight loss can improve incontinence symptoms.[45] Although they found little to no data to support other lifestyle changes to prevent or improve overactive bladder symptoms (such as reducing caffeine and fluid volume intake), many lifestyle changes can improve or promote overall health and carry little to no risk of adverse effects and therefore should be included in any wellness plan.[45] Encouraging women to lose excess weight is an important clinical intervention, considering the significant increase in the prevalence of obesity from 31.5% in 2002–2003 to 38.1% in 2011–2012 among female participants ages 60 and older in the National Health and Nutrition Examination Survey.[46] A recent study noted that bariatric surgery resulted in significant improvement in overactive bladder symptoms among obese women.[47]

To prevent injury from falls, women should avoid rushing to the toilet (by attending to the sensation of the need to void when it first occurs, rather than delaying use of the toilet, for example). Precautions that can prevent falls include installing bright lighting, reducing clutter, and removing scatter rugs. Screening for overactive bladder symptoms should be included in falls prevention programs for middle-aged and older women.

Bladder training is another behavioral modification that aims to increase the interval between voiding. Although data are limited, there is evidence that bladder training may be helpful in the treatment of UUI.[48] Bladder training may include teaching a woman to contract her pelvic floor muscles (using Kegel exercises) to reduce the urge to void and encouraging her to implement a toileting schedule that gradually increases the time between voids and ultimately helps to improve bladder control.[48]

Pharmacologic therapy. Medications are used as second-line treatment, often in conjunction with behavioral modifications.[44] The principal class of pharmaceutical agents used to manage overactive bladder is a subtype of anticholinergics known as antimuscarinics. The adverse effects of these agents include dry mouth, dry eyes, heart palpitations, constipation, and cognitive impairment.[49, 50]

Several commonly prescribed antimuscarinic agents are available for the treatment of overactive bladder: tolterodine (Detrol), oxybutynin (Oxytrol, Ditropan), fesoterodine (Toviaz), darifenacin (Enablex), solifenacin (VESIcare), and trospium (Sanctura)—see *Medications for Overactive Bladder*. No one medication has been shown to be more effective than another, but the extended-release versions tend to have fewer adverse effects. Tolerability of adverse effects and cost of medication often dictate which medication is selected for treatment.[50]

Research into the pathophysiology of overactive bladder has led to the identification of β-adrenoceptors in the bladder. Specifically, the β3-adrenoceptor is predominant and is thought to be responsible for relaxation of the detrusor during urine storage. Mirabegron (Myrbetriq) is the only β-adrenoceptor agonist available for the management of overactive bladder. Its main adverse effects are an increase in blood pressure (up to 1 to 3 mmHg on average) and a slight increase in heart rate (of one beat per minute, although this varies depending on the dose).[51, 52] Given the differing adverse effect profiles of the antimuscarinics and β-adrenoceptor agonists, mirabegron may be prescribed in conjunction with an antimuscarinic to minimize adverse effects while increasing efficacy.[53]

Neuromodulation. If first- and second-line treatments do not improve symptoms of overactive bladder, the condition is considered to be refractory. In that case, treatment may involve regulation of the nerves that control the bladder through the use of one of three neuromodulation techniques: percutaneous tibial nerve stimulation (PTNS), sacral neuromodulation, and temporary chemical denervation of the detrusor.[54]

PTNS. The mechanism of action of PTNS is not completely understood. This treatment modality is thought to exert both motor and sensory neuromodulatory effects, such as increasing inhibitory tone, decreasing awareness of stimuli, and reorganizing the neuronal system, resulting in restoration of normal reflexes. Treatment involves insertion of a 34-gauge needle electrode in the medial aspect of the ankle. It is attached to a stimulator. Each treatment session is about 30 minutes. Treatment can last for 12 weekly sessions, followed by tapering as well as maintenance treatments. Common adverse effects include mild pain or skin inflammation at the needle insertion site. The STEP (Sustained Therapeutic Effects of Percutaneous Tibial Nerve Stimulation) study demonstrated that improvement in overactive bladder as a result of PTNS treatment was safely sustained for three years when participants continued, on average, to receive one maintenance treatment per month.[55]

Sacral nerve stimulation. In this technique, mild electrical impulses are delivered to the sacral nerve roots through an electrode implanted adjacent to the third sacral nerve root and connected to a neurostimulator placed in the subcutaneous space over the buttocks.[56] The generator lasts about five years before it must be replaced. Adverse effects include pain at the implantation site, lead migration, infection, technical problems, adverse changes in bowel or bladder function, and undesirable stimulation, such as impulses that are too intense to tolerate or in the wrong location. In a randomized, multicenter study, Seigel and colleagues compared sacral neuromodulation with standard medical therapy for six months.[57] Patients treated with sacral neuromodulation demonstrated significantly greater improvement than those given standard medical therapy in terms of overactive bladder symptoms (61% versus 42%), UUI (71% versus 47%), and urinary frequency (61% versus 37%).[57]

Temporary chemical denervation of the detrusor. The third refractory therapy for overactive bladder involves injecting a chemodenervation agent, onabotulinumtoxinA, into the bladder. OnabotulinumtoxinA acts at the presynaptic membrane of the neuromuscular junction to prevent the release of acetylcholine. This leads to temporary paralysis of the detrusor muscle fibers. The procedure is performed in the clinician's office with the use of cystoscopy. The associated risks include urinary retention; therefore, women must be willing to catheterize themselves, if needed, until the medication's effect wears off.[54]

Visco and colleagues performed a randomized, double-blind, double-placebo-controlled trial involving women with UUI.[58] Women received either daily solifenacin for six months (plus a single injection of saline) or a single injection of 100 units of onabotulinumtoxinA (plus six months of daily placebo). Both therapies were associated with similar reductions in the frequency of daily episodes of UUI. Women receiving onabotulinumtoxinA were less likely to have dry mouth and more likely to have complete resolution of UUI symptoms. This group also had, however, higher rates of transient urinary retention and UTIs than women receiving solifenacin.

IN PRACTICE

If you were conducting the examination of Cassandra Conway, the patient in the opening scenario who asked for absorbent product recommendations, how would you respond to her question? First, you should schedule an appointment for Ms. Conway, so that her urinary symptoms can be assessed. It is also important to give her information on how her bladder works and changes she can make immediately to reduce the symptoms and progression of overactive bladder.

Ask her to complete an overactive bladder screening survey and a three-day bladder diary. She should bring the completed forms to her assessment appointment. In the meantime, she can undertake lifestyle changes, especially reducing her daily intake of caffeine to less than or equal to 400 mg, monitoring the amount of fluid she drinks throughout the day, and attending to the sensation of the need to void immediately. Encourage her to engage in physical exercise, such as more frequent and longer walks, and to contact friends for emotional support to alleviate the effects of stress.

No one medication for overactive bladder has been shown to be more effective than another, but the extended-release versions tend to have fewer adverse effects.

Until her appointment, Ms. Conway may also want to wear an absorbent product that best matches the volume of urine she typically loses. It's important to guide her to objective information on how to choose absorbent products from trusted sources, such as the National Association for Continence (www.nafc.org/products) and the Simon Foundation for Continence (http://simonfoundation.org/absorbent-incontinence-products). Ms. Conway needs to understand that absorbent products are

used only to contain urinary leakage; they have no therapeutic effects on the bladder. The assessment of her symptoms is important in order to identify the underlying cause(s) of her overactive bladder and to engage in effective strategies to prevent or reduce additional symptoms—and possibly eliminate the need for absorbent products. Ms. Conway may need coaching and encouragement to remain motivated to continue the long-term behavioral changes—such as achieving and maintaining a normal BMI and improving her overall health—that can help to relieve overactive bladder symptoms.

Women who don't seek help for overactive bladder and try to self-manage its symptoms may inadvertently worsen them.

Many women do not seek help for overactive bladder and try to self-manage its symptoms. As a consequence, they may inadvertently worsen symptoms and increase their risk of developing incontinence and being injured in a fall. Many women are caught in a relentless cycle, experiencing unpredictable urgency, being incontinent, stopping physical exercise to prevent more incontinence, gaining weight, experiencing functional limitation, feeling anxious, and continuing to experience unpredictable urgency and urinary leakage. Nurses can play a significant role in breaking this cycle. Nurses should advocate—and conduct—routine screening of all women for symptoms of overactive bladder. For women who have been diagnosed with the condition, nurses should provide falls prevention information and help them to make changes in the type and amount of fluid they drink, incorporate physical activity into their daily schedule, attempt to attain and maintain their ideal weight, improve their overall health, and seek further professional help if first-line treatment is ineffective. ▼

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