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Basic Evaluation of Urinary Incontinence

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Abstract: Urinary incontinence is a significant, quality of life health condition affecting millions of women. Incontinence is increasingly common as the population ages, and women present with varying degrees of bother. With basic in-office evaluation, most subtypes of urinary incontinence can be defined, evaluated, and treated. Basic in-office evaluation involves a detailed history with a review of current medical problems and medications, a physical examination, and selective in-office testing.

Key words: urinary incontinence, quality of life, in-office basic evaluation, overactive bladder, stress incontinence, mixed incontinence

Urinary incontinence (UI) is a common, expensive, and highly bothersome medical condition. Proper understanding, evaluation, and management of incontinence is necessary as prevalence increases with the aging population. It is estimated that the number of people aged 65 and over will increase from 39 million in 2010 to 69 million by 2030. Furthermore, the age group over 85 will be the fastest growing with a projected 18.2 million by 2050. And finally, census reports estimate that by 2030, 1/5 of all women will be over the age of 65.[1] The prevalence of UI varies widely by study with rates in older women ranging from 17% to 55%. Women are twice as likely as men to experience UI.[2] Population based studies estimate the prevalence of UI to be 25% and increases with age.[3] Within the US, the prevalence of moderate to severe UI was found to be 15.7%.[4]

While the reported prevalence of UI is high, it is often misperceived as a normal and inevitable consequence of childbirth and aging. This common misconception leads to underreporting and failure to seek treatment. In addition, health care providers with increasing time constraints may not fully explore the subject with their patients. As women age and self-care becomes more difficult, many resort to management methods which can be embarrassing, costly and socially isolating. Direct costs alone for UI were already estimated at 16.3 billion dollars per year over 20 years ago. Not surprisingly, the cost of UI is estimated to have increased 250% from 1984 to 1995.[5] A 2010 review of the economic impact of this growth projected the direct annual cost of isolated urge UI for adults over the age of 25 to reach $82.6 billion (about $250 per person in the United States) by 2020.[6]

UI as defined by the International Continence Society-International

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Urogynecological Association is the complaint of any involuntary loss of urine and is subclassified into 3 main groups: stress urinary incontinence (SUI), urgency urinary incontinence (UUI), and mixed urinary incontinence (MUI). SUI is the complaint of involuntary leakage on effort or exertion or on sneezing or coughing. UUI is the complaint of involuntary leakage accompanied by or immediately preceded by urgency. Finally, MUI, a combination of SUI and UUI, is the complaint of involuntary leakage associated with urgency and with effort, exertion, sneezing and coughing.[7] Other less common types of UI include continuous incontinence because of anatomic variants such as an ectopic ureter or genitourinary (GU) fistulas, postural incontinence, insensible incontinence, and overflow incontinence. In the absence of anatomic problems, a vast majority of cases can ultimately be classified as SUI, UUI, or MUI.

In the Norwegian EPINCONT study, nearly 28,000 women between 1995 and 1997 responded to a survey regarding the prevalence of urinary tract infection (UTI). This large epidemiologic study sampled community-dwelling women and obtained subjective outcome measures only. Stress incontinence was found to be the most common urinary subtype, affecting 50% of respondants.[3] Risk factors for SUI include Caucasian race and obesity.[8] Stress incontinence commonly affects women between the ages of 25 and 49 and then decreases with age. Mixed UI is the second most common subtype occurring in 20% to 36% of women.[3] Mixed UI poses the greatest challenge to classification and treatment. Likely because they are affected by both SUI and UUI, women with mixed symptoms report more severe UI, more bother and worsened quality of life because of the UI.[9] The mechanism for this is unclear. Urgency incontinence, with urgency, frequency, nocturia, and urgency-related leakage, is the least common subtype of UI. In a national telephone survey with follow up, nested controls, the NOBLE study found that nearly 17% of women experienced symptoms of urgency, frequency, urge leakage, and nocturia. This study highlights that while not all women will leak urine, there are other bothersome symptoms of overactive bladder (OAB) that should be addressed as they can still affect quality of life. Symptoms of OAB increased with age with a 9-fold increase in symptoms between the ages of 18 to 24 and 65 to 74 years.[10]

As physicians increasingly encounter patients with UI in their office practices, the basic evaluation of UI becomes paramount in obtaining a correct diagnosis to be able to create a safe and effective treatment plan. The evaluation needs to be accurate, cost effective, efficient, and evidence based, and in most cases, this can be accomplished within the first 1 to 2 patient encounters. For example, low-risk empiric treatment such as behavioral modifications can be initiated immediately, even before the full evaluation is completed, minimizing time to symptoms improvement. This approach is particularly well suited for virtual visits. In some cases, multiple treatments can be offered concurrently to achieve patient goals in efficiently. Practicing value-based medicine is increasingly important as payors will be less likely to agree to costly, unnecessary work ups. Close follow up of patients that have initiated treatment allows the clinician to evaluate efficacy, compliance, side effects, and ultimate success of treatment. Response to initial treatment can inform next steps in the management of symptoms.

In this review, we address the basic evidence based, in-office evaluation of UI. It is organized into history, physical exam, basic and advanced testing and details the different components essential to the diagnosis and treatment of UI.

History

Taking a thorough history can begin even before the patient's first office visit. Using symptom-based questionnaires, patients can consider their symptoms in depth before presentation. The in-office history further explores symptoms, so the diagnosis of UI and subtype classification takes shape. This initial impression is further refined by analyzing past medical, surgical history, medications, allergies, and social history. The diagnosis of UI begins with a thorough understanding of the patient's symptoms, which may be difficult to obtain as the topic can be embarrassing for patients to describe. Younger women of childbearing age may not be forthcoming with symptoms of UI, believing them to be a normal consequence of childbirth. Similarly, the older woman may consider it a normal part of aging and have other competing medical issues that concern her. The goal of the history is not be limited to eliciting the symptoms of UI but also, if present, the severity, degree of bother, and type of UI.

Symptom questionnaires are a simple, comprehensive, and time-saving method to determine the presence of UI and delve into the specifics of degree, bother, and subtype. Many validated symptom questionnaires are available and can be completed by patients before their visits through online portals allowing patients to consider their symptoms thoughtfully and private, without feeling rushed. One widely accepted instrument is the urogenital distress inventory, often administered in conjunction with the Incontinence Impact Questionnaire (IIQ). It is designed to identify the presence and degree of bother from UI.[11] Using a scale of 0 (no bother) to 4 (greatly bothered), the urogenital distress inventory originally contained 28 questions and assessed urgency, frequency, leakage, pain, obstructive, and irritative symptoms. The IIQ, originally consisting of 30 items, addressed the degree of bother related to leakage during different day-to-day activities (ie, shopping, entertainment) and the effect of UI on feelings (ie, fear, anger, frustration). The IIQ uses a Likert scale from 0 (no impact at all) to 3 (exerts a great impact). The instruments have been shown to be reliable, valid, and sensitive to change.[12] These questionnaires are commonly administered in short forms, which have been validated against their full-length versions, and are available online without a fee. Several other validated questionnaires including the Medical, Epidemiological and Social Aspects of Aging (MESA) questionnaire are commonly utilized in research and clinical practice as well.

While questionnaires have been found useful in identifying symptomatic patients and degree of bother, the actual correlation with the subtype of UI is not exact. In a study looking at the sensitivity and specificity of a basic instrument, the 3 incontinence questions, a tool for primary care providers, the sensitivity for finding UUI was 75% and SUI 86% meaning that 14% to 25% of women with a particular subtype of UI were missed. The specificity for UUI was 77% and 60% for SUI meaning that between 23% and 40% of women could be inappropriately treated for the wrong condition.[13] This illustrates that the utility of questionnaires lies mostly in determining if the symptoms of UI are present and the degree to which patients are bothered by their symptoms. Questionnaires are not exhaustive, and further evaluation as described below are necessary to diagnose UI subtypes accurately.

The patient interview provides details of the history of present illness such as onset, timing, duration of symptoms, severity, precipitating or alleviating factors, associated pelvic floor symptoms, contributions of medical and surgical events as well as medications, and prior treatments attempted. Furthermore,

information on pad use, impact of UI on sexual function, and lifestyle limitations around UI can further indicate degree of bother. Inquiry about an inciting event that may have prompted the patient to come in can further determine motivation for intervention.

The presentation of patient symptoms themselves often guide the workup of UI. For example, acute symptom onset, that is, over a period of days to weeks, is commonly seen in women after acute UTI. If UTI has been ruled out, the presence of acute onset of OAB symptoms in younger women should cause suspicion for neurological conditions, some of which require immediate evaluation such as cauda equina syndrome, and some which may require a more involved workup, such as multiple sclerosis. In both cases, urological symptoms can be presenting symptoms for previously undiagnosed neurological conditions. Two to 2.5% of women with multiple sclerosis present initially with bladder symptoms.[14]

Characterizing the timing of UI can distinguish between incontinence because of bladder versus nonbladder pathology. For example, nocturnal leakage can represent a primary sleep disorder. Nocturia is the sudden strong urge to urinate that awakens a person from sleep. It is often accompanied by leakage with the inability to make it to the bathroom on time. This should be distinguished from patients who wake because of poor sleep and then decide to use the bathroom before falling back to sleep, which is not a primary bladder problem but a sleep-related disorder. Sleep apnea can also cause disruptive nighttime voiding and excessive nighttime urine production. Release of atrial natriuretic peptide with obstructive sleep apnea leads to nocturnal polyuria. Other common nighttime bladder disturbances include nocturnal enuresis, urinary dysfunction related to substance use, nocturnal polyuria related to metabolic disturbances, and intrinsic sphincteric deficiency. Careful assessment of symptoms will help differentiate between these diagnoses.

Duration of symptoms and symptom severity also help in determining the cause of UI and the length of time likely needed to address and manage the UI. If the duration of symptoms is short, that is, <1 month, consideration of recent lifestyle changes, increase in fluid intake, or infection are helpful. If the duration of symptoms is longer term, then prior treatments and the progression of disease becomes important. If symptoms are not severe or bothersome, then no further evaluation or workup may be needed. Often, simple reassurance is enough in these instances. Evaluating for fluid intake, bladder irritants, new exercise routines, loss of mobility, and cognitive decline are all important in determining the etiology of a patient's urinary incontinence.

While UI can be bothersome in and of itself, it is well known that pelvic floor disorders will co-exist in women. In a cross-sectional analysis of 196, nonpregnant women (≥ 20 y) who participated in the 2005 to 2006 National Health and Nutrition Examination Survey, Nygaard et al[4] estimated that 23.7% of women had one or more pelvic floor disorders. Eighty percent of women with stress or urge UI also report another pelvic floor symptom such as pelvic organ prolapse (POP), voiding dysfunction, abdominal/pelvic pain, or bowel dysfunction.[15] An assessment of concomitant pelvic floor disorders is imperative in the UI workup as a comprehensive history can improve the provider's understanding of the etiology and treatment options for UI. For example, constipation can worsen UI, so managing constipation may be an effective initial step in managing UI in women with constipation. Women who present with progressively worsening vaginal prolapse may report that urination becomes progressively more difficult as the day goes

on, coinciding with descent of prolapse, or a history of splinting the prolapse to release residual urine or even initiate urine flow. Others may reports a history of stress incontinence which improved as the prolapse worsened because of progressively worsening obstruction. In these cases, while the patient may not report current stress incontinence at the time of evaluation, treatment of the prolapse without addressing urinary function can (much to the dismay of the patient and her provider) unmask occult SUI.

A careful review of the patient's past medical history also can be revealing. For example, in women with allergies or asthma, the worsening of a patient's SUI symptoms may correlated with exacerbations of these problems during certain times of the year. Women with chronic obstructive pulmonary disease may develop a persistent cough, which can lead to SUI symptoms. Congestive heart failure can alter fluid return to the heart and kidneys, increasing fluid excretion at night, when the patient is recumbent, causing nocturnal polyuria. A history of Parkinson disease, multiple sclerosis, stroke or other neurological conditions could lead to neurologically mediated bladder dysfunction. Risk factors for the development of UI are listed in Table 1.

Past surgical history of both GU and non-GU procedures also can shed light on the workup of UI. Orthopedic surgery such as lower extremity joint replacement can lead to pelvic floor muscle dysfunction, which can worsen UI. Neurosurgical interventions also can improve or worsen symptoms of UI and urinary retention. Prior GU surgical interventions that require may impact the success of future SUI procedures. For example, in women with recurrent SUI after synthetic mesh midurethral slings, prior mesh procedures may affect the success rates of future procedures or impact the selection of a specific sling device in the future.[16] In addition, treatment of SUI may resolve SUI symptoms but may not completely ameliorate all incontinence symptoms. Despite many patients undergoing SUI procedures reporting improvement in urge symptoms, some report no improvement or worsening of urgency incontinence. Some of these women feel that their surgical procedures failed and require counseling that their stress incontinence has been successfully treated, but their urgency incontinence remains untreated. Prior prolapse surgery without a concomitant stress incontinence procedure may lead to occult SUI postoperatively. Also, prior prolapse surgery in the anterior compartment can cause disruption of the nerve supply to the bladder leading to both stress and urge incontinence. Finally, dissection or use of exogenous materials in the anterior compartment for prolapse repair may affect the surgical approach for subsequent incontinence surgeries.

Review of a patient's medications will commonly reveal agents that affect lower

TABLE 1. Risk Factors for Urinary Incontinence

Endocrine/increased fluid production	Diabetes
	Obesity
	Fluid overload
	Excessive fluid intake
	Pregnancy/delivery
	Congestive heart failure
Infection	Urethritis
	Urinary tract infection
Neurological	Multiple sclerosis
	Cerebro-vascular accident
	Parkinson
	Delirium
Gastrointestinal	Constipation
	Stool impaction
Iatrogenic	Medications
	Prior pelvic surgeries
	Prior radiation therapy
Gynecological	Atrophic vaginitis
	Pelvic organ prolapse
Urologic	Urethral diverticulum
	Ectopic ureter
	Urinary retention
Musculoskeletal	Impaired or restricted mobility

urinary tract function. Diuretics and alpha-adrenergic drugs can cause or worsen urinary urgency, frequency, and incontinence. Anticholinergics, antihistamines, psychotropic drugs, alpha-adrenergic agonists, and calcium channel blockers can cause a variety of symptoms including retention, sedation, and constipation, which can worsen UI. Some of these medications can be eliminated, or their doses or scheduling can be modified to minimize urinary effects. Diuretics and other medications affecting the cardiovascular system require consultation with the patient's prescribing providers before alterations are made.

Several patient factors can cause barriers to the patient-provider interaction and affect diagnosis and treatment of UI. Cognitive decline is particularly common in the aging patient with UI, who may be confused about the events surrounding her leakage, prior treatments for UI, or even current medications. Polypharmacy, common in the elderly, often causes confusion regarding prior and current treatments for UI or side effects of other medications on the bladder. Patients who are not functioning independently may come to their visits with caregivers, who can provide varying degrees of detail about the patient's UI based on their exposure to and understanding of the patient's condition. While caregivers can be integral to obtaining a history from again and disabled patients, their input must be balanced by a respect for patient autonomy. Finally, cultural and language barriers can prevent open discussion of UI symptoms. A literature review of the health care disparities in the LatinX population in 2002 found evidence that those "with limited proficiency in English are at risk for experiencing decreased access to care and decreased quality of care."[17]

If the clinician finds the history to be of limited utility, bladder diaries are commonly obtained. The National Institute of Diabetes and Digestive and Kidney Diseases has developed a daily bladder diary (https://journals.lww.com/fpmrs/Fulltext/2015/11000/Urinary_Incontinence_in_Women.3.aspx) (Fig. 1). If the patient cannot complete the diary herself, a caregiver may be able to produce a log of intake and pad counts. Bladder diaries can be requested before the initial visit or after the initial visit when insufficient or inconclusive information has been obtained. Voiding or bladder diaries provide a longer-term snapshot of symptoms. Typical diaries span 3 to 5 days, and their accuracy tends to diminish with duration. Information gathered includes frequency and quantity of voids, frequency and severity of leakage and urgency episodes, events surrounding leakage episodes, and timing and amount of fluid intake. With a simple diary, various bladder measures can be quantified and analyzed such as average bladder capacity, maximum functional bladder capacity, approximate daily fluid intake and output, nocturnal urine output, nocturia, stress incontinence episodes and urgency incontinence episodes. Nocturnal polyuria is defined by a nightly output that is $\geq 33\%$ of the patient's total 24-hour output. Diaries can also help distinguish between wet and dry OAB.

Physical Exam

After a thorough history is obtained, the next portion of the evaluation will be the physical exam, which can confirm or exclude many etiologies for UI. Mobility, cognitive status, and general health can be assessed in the first few minutes of consultation. Abdominal exam can reveal masses and surgical scars indicating prior abdominal/pelvic surgeries as well as masses. After a brief general exam, the clinician will proceed with a targeted pelvic exam.

Pelvic exams in this population start with a gross initial overview of the area for lesions, support defects and other abnormalities. Obliterative vulvar disease, such as lichen planus or lichen

Your Daily Bladder Diary

NIH National Institute of Diabetes and Digestive and Kidney Diseases

This diary will help you and your health care team figure out the causes of your bladder control trouble.
The "sample" line shows you how to use the diary.

Time	Drinks		Trips to the Bathroom		Accidental Leaks		Did you feel a strong urge to go?	What were you doing at the time?
	What kind?	How much? oz, mL, cups	How many times?	How much urine?	How much urine?			Sneezing, lifting, arriving home, sleeping, etc.
Sample	Juice	8 ounces	✓✓	sm med lg	sm med lg		Yes No	Running
6–7 a.m.				sm med lg	sm med lg		Yes No	
7–8 a.m.				sm med lg	sm med lg		Yes No	
8–9 a.m.				sm med lg	sm med lg		Yes No	
9–10 a.m.				sm med lg	sm med lg		Yes No	
10–11 a.m.				sm med lg	sm med lg		Yes No	
11–12 noon				sm med lg	sm med lg		Yes No	
12–1 p.m.				sm med lg	sm med lg		Yes No	
1–2 p.m.				sm med lg	sm med lg		Yes No	
2–3 p.m.				sm med lg	sm med lg		Yes No	
3–4 p.m.				sm med lg	sm med lg		Yes No	
4–5 p.m.				sm med lg	sm med lg		Yes No	
5–6 p.m.				sm med lg	sm med lg		Yes No	
6–7 p.m.				sm med lg	sm med lg		Yes No	
7–8 p.m.				sm med lg	sm med lg		Yes No	
8–9 p.m.				sm med lg	sm med lg		Yes No	
9–10 p.m.				sm med lg	sm med lg		Yes No	
10–11 p.m.				sm med lg	sm med lg		Yes No	
11–12 mid.				sm med lg	sm med lg		Yes No	
12–1 a.m.				sm med lg	sm med lg		Yes No	
1–2 a.m.				sm med lg	sm med lg		Yes No	
2–3 a.m.				sm med lg	sm med lg		Yes No	
3–4 a.m.				sm med lg	sm med lg		Yes No	
4–5 a.m.				sm med lg	sm med lg		Yes No	
5–6 a.m.				sm med lg	sm med lg		Yes No	

Use this sheet as a master for making copies that you can use as a bladder diary for as many days as you need.

I used _____ pads today. I used _____ diapers today (write number).

Questions to ask my health care team: _____

FIGURE 1. Bladder diary.[18] full color online

sclerosis can be obstructive and are obvious on visual inspection. In addition, excessive vaginal discharge can be mistaken for urine loss and will be seen on exam. POP should be evaluated is in standing and lithotomy positions. Each compartment of the pelvic floor; anterior, apical, and posterior can be examined separately and documented using the POP quantification system or POP-Q.[19]

If POP is identified, its role in UI symptoms can be assessed. Mild vaginal prolapse (stage 1 or 2) is common in the general population. In fact, 73% of

women presenting for annual gynecologic examination will present with stage 1 or stage 2 prolapse.[20] Because the urethra runs along the anterior vaginal wall, POP can have implications for urethral support. Assessment of urethral mobility is of debatable clinical significance, but this is assessed by visualization or using the Q-Tip test. In the Q-Tip test, a lubricated thin cotton swab is placed gently into the urethra into the bladder and then pulled distally until mild resistance is met, indicating that the head of the swab is resting at the bladder neck. The angle of rotation of the swab from rest to maximum Valsalva is measured, and angles >30 degrees indicate urethral hypermobility, suggesting diminished support of the urethra from the vaginal wall. An approximation of the Q-Tip test can be performed more easily and without discomfort to the patient by visually observing the anterior vaginal wall during cough or Valsalva.

While urethral mobility is seen commonly in women complaining of mild to moderate SUI, some women, particularly those with severe SUI may not display any mobility at all. This finding is more concerning for intrinsic sphincteric deficiency or prior surgery. The presence of hypermobility may impact a surgeon's counseling about the expected efficacy of a specific SUI procedure.[21]

In women with significant (stage 3 or 4) anterior vaginal prolapse, an assessment for occult SUI can be performed by reducing the prolapse while the patient bears down or coughs. This exam also may be a good opportunity to reassure women about the safety of reducing her prolapse to urinate and instruct them how to do it.

The physical exam should also include palpation of the urethra for urethral diverticulum. Typically, a diverticulum appears as a suburethral bulge which can express a urethral discharge with palpation. Urethral diverticulum is an unusual cause of UI, but some women with diverticular experience postvoid dribbling, with or without UTIs and pain. Other atypical causes of UI including urinary fistula or ectopic ureter can be demonstrated by urine in the vaginal vault and patient history.

A brief neurological exam typically involves sensory and motor assessment of lumbosacral nerve roots in addition to general mental status. Neurological abnormalities that can cause bladder dysfunction include Parkinson Disease, multiple sclerosis, cerebrovascular disorders, infections, and tumors. The sacral segments contain the neuronal pathways to the end organs which control micturition. Sensory function can be assessed by response to light touch, pin prick, and temperature. Specific areas of interest include the perineum and perianal skin supplied by the pudendal nerve (S2-4), mons pubis and upper labia majora supplied by the ilioinguinal nerve (L1-2), front of knees (L3-4), and soles of feet (S1). On pelvic exam, the bulbocavernosus and anal reflex can be used to assess the integrity of the S2-4 sacral segments as well as the afferent and efferent pathways of the pudendal nerve. The bulbocavernosus reflex is elicited by squeezing or tapping the clitoris and observing movement at the anal sphincter. The anal reflex is elicited by provoking the anal sphincter with a pin prick and observing contraction of the external anal sphincter known as an anal wink. Motor function is assessed by observing extension and flexion of the hips, knees, ankle, and foot. Pelvic floor muscle examination involves palpation of the levator ani complex with determination of strength, tone, tenderness, and ability of the pelvic floor musculature to relax. Clinicians can also assess the patient's ability to perform a pelvic floor muscle contraction and coach her as needed. Rectal examination provides information regarding resting anal sphincter tone, contraction strength, and

anatomy of the anal sphincter. Finally, impaction of stool, palpated in the posterior vagina and in the anal canal can help diagnose constipation or obstipation which is a common, treatable cause of UI.

Cough Stress Test

The gold standard for diagnosis of SUI a positive cough stress test (CST). The immediate visualization of urine from the urethral meatus with increased abdominal pressures, either with cough or bearing down, is diagnostic of SUI. Delayed release of urine after a increasing intra-abdominal pressure, leakage with urge, or complete bladder emptying is not diagnostic of SUI and warrants further investigation of possible stress induced detrusor overactivity. The CST can be done in the standing or lithotomy position, with provocative maneuvers and ideally with a full bladder. If the test is negative with an empty bladder, the patient can be retro filled with typically 300 ml of fluid and the test repeated. Objective demonstration of SUI is a prerequisite for surgical management of SUI, and the CST is the simplest and least expensive method to document SUI.[22]

Urinalysis

Laboratory testing for UI involves, at minimum, an in-office urine dipstick to rule out hematuria and infection. If found, UTI is an easily treatable cause of UI of acute onset. Urine culture maybe appropriate in certain patients in whom the urinalysis is unreliable or equivocal those who have taken urinary analgesics such as phenazopyridine. A straight-catheterized specimen is optimal as this ensures that there is no contamination from the nearby vagina or rectum. Gross or microscopic hematuria, if discovered in the absence of a UTI, should be evaluated following current guidelines around upper urinary tract imaging and cystoscopy for lower urinary tract evaluation.

Postvoid Residual

Postvoid residual (PVR) volume is obtained to assess voiding function. Residuals can be obtained with ultrasonic bladder scanners or straight catherization, usually obtained within ten minutes of voiding. Residuals obtained by bladder scanner are more comfortable for patients and may reduce the risk of UTI.[23] Various cutoffs have been proposed for defining an elevated residual with the United States Department of Health and Human Services Agency for Health Care Policy and Research recommending that a PVR >200 mL be considered inadequate emptying.[24] In the Value of Urodynamic Evaluation (VALUE) Trial, a PVR <150 ml signaled adequate bladder emptying in women undergoing SUI surgery.[25] Isolated elevated residual volume should be confirmed with repeat testing.

Other Testing

It is well established that imaging such as ultrasound, intravenous pyelograms, and computed tomography scans are not required in the initial workup of most women with UI. In rare situations, renal and pelvic ultrasounds may be useful in settings of paradoxical and confirmed urinary retention with UI. Renal ultrasounds evaluate for hydroureteronephrosis, a long term upper tract sequela of urinary retention, in the setting of overflow incontinence.

While not typical, cystoscopy can be considered in UI patients with lower urinary tract symptoms including irritative voiding refractory to first-line and second-line treatments, bladder pain, recurrent cystitis, diverticulum, or other suburethral mass, suspected foreign body, microscopic hematuria or in women with lower urinary tract symptoms and known

risk factors for urothelial cancers such as smoking. Cystoscopy is most routinely done as an in-office procedure with minimal to no local anesthesia.

Urodynamic testing is an available testing modality that can further elucidate the specific type of UI. While most straightforward cases of UI do not require urodynamic testing, it is helpful in complicated patients with recurrence, co-existing pelvic floor disorders, neurological conditions, or failed prior treatment. Urodynamics previously had been used a confirmatory test before SUI surgery. However, the VALUE study, a randomized control trial of 630 women undergoing preoperative urodynamic testing versus in-office evaluation found no difference in treatment outcomes 1 year after surgery. In office evaluation in the VALUE trial included a positive result on the MESA questionnaire for SUI, a PVR under 150 ml, negative urinalysis or culture, clinical assessment of urethral mobility, positive provocative stress test.[25]

Urodynamic testing consists of multiple test including simple or multichannel cystometry. Simple urodynamic studies involves instilling sterile saline or water by aliquots into the bladder through a Foley attached to a 50 ml Tumi syringe. Data such as volume of first sensation, first desire, strong desire and maximum capacity is recorded. Detrusor contractions are noted when a rise in the water meniscus is seen in the Tumi syringe during filling. At the end of filling, the catheter is removed, and the patient asked to perform a provocative maneuver, such as coughing or jumping, for evaluation of SUI.

Multichannel urodynamic testing, with or without a video component, is typically performed only in subspecialty offices. A water or air charged catheter is placed transurethrally to measure bladder and urethral pressures, and another is placed rectally or vaginally to approximate abdominal pressures. Cystometry provides a visual depiction of bladder, detrusor, and abdominal pressures during filling and storage. Uroflow and pressure flow studies provides data on flow time, flow pattern, urethral function, and detrusor activity during voiding. Data obtained in pressure flow studies can help determine causes of urinary retention or voiding dysfunction. Measurements of urethral pressures and leak point pressures have been used to guide surgical decisions; however, data is variable on the utility of measurements in predicting surgical outcomes.[26] Needle electromyography was used in the past to identify and study the motor unit potentials within the striated urethral sphincter as part of urodynamic testing. Equipment and expertise in this technique is no longer widely available. Patch electrodes placed on the skin have been used with the hope of obtaining similar information, but they lack the specificity to provide clinically useful information as they are unable to detect urethral sphincter activity.

The prevalence of UI will mirror the rising population of aging women. Incontinence has the potential to significantly limit a woman's quality of life, affecting not only her but her family, friends, and caregivers. In addition, the economic impact of UI has a substantial effect on society. Simple in-office evaluation of UI can help lessen the effects of UI. History, physical exam, and urine testing available to most clinicians allows for the classification of UI type in most women. After gaining a better understanding into the severity and type of UI experienced by the woman, treatments can be initiated as soon as the first patient encounter. Follow-up evaluation and readdressing the history and evolution of symptoms during treatment is equally important in maintaining improvements. Future developments in the evaluation of UI will likely involve the use of web-based technology to document, quantify, and possibly test for UI, making it easier for women to obtain treatments sooner.

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