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Committee on Practice Bulletins—Gynecology and the American Urogynecologic Society. This Practice Bulletin was developed by the Committee on Practice Bulletins—Gynecology and the American Urogynecologic Society with the assistance of Kimberly S. Kenton, MD, and Scott W. Smilen, MD. The information is designed to aid practitioners in making decisions about appropriate obstetric and gynecologic care. These guidelines should not be construed as dictating an exclusive course of treatment or procedure. Variations in practice may be warranted based on the needs of the individual patient, resources, and limitations unique to the institution or type of practice.

PDF Format

Urinary Incontinence in Women

Urinary incontinence, the involuntary leakage of urine, is caused by a variety of factors and may result in a wide range of urinary symptoms that can affect women's physical, psychological, and social well-being and sometimes can impose significant lifestyle restrictions. Identifying the etiology of each woman's urinary incontinence symptoms and developing an individualized treatment plan is essential for improving her quality of life. The purpose of this joint document of the American College of Obstetricians and Gynecologists and the American Urogynecologic Society is to review information on the current understanding of urinary incontinence in women and to outline guidelines for diagnosis and management that are consistent with the best available scientific evidence.

Background

Urinary incontinence is a common condition in women. Approximately 25% of young women (1), 44–57% of middle-aged and postmenopausal women (2), and 75% of older women experience some involuntary urine loss (3, 4). The estimated direct cost of urinary incontinence care in the United States is $19.5 billion (5). Approximately 6% of nursing home admissions of older women can be attributed to urinary incontinence (5), with an estimated cost of $3 billion per year (6).

**Box 1. Differential Diagnosis of
Urinary Incontinence in Women** ⇐

Genitourinary Etiology
- Filling and storage disorders
    - Urodynamic stress incontinence
    - Detrusor overactivity (idiopathic)
    - Detrusor overactivity (neurogenic)
    - Mixed types
- Fistula
    - Vesical
    - Ureteral
    - Urethral
- Infectious
    - Urinary tract infection
    - Vaginitis
- Congenital
    - Ectopic ureter
    - Epispadias

Nongenitourinary Etiology
- Functional
    - Neurologic
    - Cognitive
    - Psychologic
    - Physical impairment
- Environmental
- Pharmacologic
- Metabolic

Despite the prevalence of urinary incontinence, many women are hesitant to seek care or discuss their symptoms with a physician. In a survey of women in the United States, only 45% of women who reported at least weekly urine leakage sought care for their incontinence symptoms (7). As a result, many women with urinary incontinence live with physical, functional, and psychological limitations and diminished quality of life at home and at work (8). Because urinary incontinence can be a difficult topic for patients to discuss, physicians should elicit information from patients and screen for these symptoms.

Etiology

Urinary incontinence can be caused by a variety of factors. The differential diagnosis includes genitourinary and nongenitourinary conditions (see Box 1). Some conditions that cause or contribute to urinary incontinence are potentially reversible.

Types

There are three main types of urinary incontinence in women: 1) stress urinary incontinence, 2) urgency urinary incontinence, and 3) mixed urinary incontinence. Box 2 includes descriptions of these forms of urinary incontinence as well as other important subtypes to consider during an evaluation. Correct diagnosis is important in the evaluation and treatment of women with urinary incontinence, as is determining the effect on the woman's quality of life (9). Depending on the degree of symptom severity, women may select more or less invasive treatment options or no treatment at all. Most women cope better with stress urinary incontinence symptoms and report a poorer quality of life from symptoms of urgency and urge urinary incontinence (10, 11).

Basic Office Evaluation

A basic office evaluation is the first and most important step in the assessment of urinary incontinence. Office evaluation in all women should include a thorough history, physical examination, assessment of symptom severity, and goals for treatment. In addition, all women with symptoms of urinary incontinence should have screening for urinary tract infection and postvoid residual urine volume to rule out retention and overflow incontinence before initiating any treatment. A simple cough stress test is useful in the initial evaluation, especially in women with stress incontinence symptoms. Often, a diagnosis is made with basic office evaluation, and therapy can be initiated based on these findings. Additional specialized urodynamic studies may be necessary if complex conditions are present or the etiology of incontinence is unclear after a basic evaluation.

Additional Evaluation

Urodynamic Testing

Urodynamic testing refers to a battery of tests that are used to assess lower urinary tract function by measuring various aspects of urine storage and evacuation. Its purpose is to aid in understanding physiologic mechanisms of lower urinary tract dysfunction, thereby improving the accuracy of diagnosis and facilitating targeted treatment.

Urodynamic testing may be conducted with or without video and may include the following:

- *Cystometry* provides a graphic depiction of bladder (and abdominal) pressure relative to fluid volume during filling, storage, and voiding to assess bladder sensation, capacity, and compliance and to determine the presence and magnitude of voluntary and involuntary detrusor contractions.
- *Uroflowmetry and pressure-flow studies* measure the rate of urine flow and the mechanism of bladder emptying (ie, presence or absence of coordinated detrusor contractions and urethral relaxation) and may be useful in the evaluation of voiding dysfunction.
- *Measures of urethral function, including urethral pressure profiles and Valsalva leak point pressures*; studies have demonstrated considerable test-retest variation and overlap of normal and pathologic urethral pressure measurements (12), which makes their clinical use questionable. Although outcomes studies suggest that lower urethral pressure measurements may be associated with poorer continence outcomes, investigators have not found a reliable cutoff measure to accurately predict surgical failure (13). Similarly, although Valsalva leak point pressures are associated weakly with subjective measures of incontinence severity, they do not reliably predict surgical outcomes (14, 15). Therefore, it is unclear how useful these measurements are for clinical decision making.

- Electromyography is used to study neuromuscular activity, especially that of pelvic muscles and urethral sphincter during voiding. Its main role is detecting coordination (or lack thereof) between detrusor muscle contraction and simultaneous urethral sphincter relaxation.

Cystourethroscopy

Cystourethroscopy is a surgical procedure in which a rigid or flexible fiberoptic endoscope is used to examine the lumen of the bladder (cystoscopy) and urethra (urethroscopy) (16). Endoscopic evaluation of the urethra and bladder is not routinely indicated in the evaluation of urinary incontinence in women. However, cystourethroscopy should be considered as part of an incontinence evaluation in women with microscopic hematuria, acute-onset or refractory urgency incontinence, recurrent urinary tract infections, or suspicion for fistula or foreign body after gynecologic surgery.

Treatment Options

Numerous highly effective treatments, which are supported by evidence from randomized controlled trials, are available to manage urinary incontinence in women. Treatment options for urinary incontinence range from conservative to surgical. When women are evaluated for urinary incontinence, counseling about treatment should begin with conservative options (17). Conservative options include pelvic floor muscle exercises (with or without physical therapy), behavioral and lifestyle modifications, continence-support pessaries, and pharmacotherapy. Surgical treatment options include anti-incontinence procedures, such as urethral bulking agents, retropubic colposuspension, autologous fascial slings, and synthetic midurethral slings. Intraoperative or immediate postoperative complications of surgery for stress incontinence include direct surgical injury to the lower urinary tract, hemorrhage, bowel injury, wound complications, retention, and urinary tract infection. In patients who undergo retropubic or sling procedures, gynecologic surgeons should perform intraoperative cystourethroscopy to verify ureteral patency and the absence of sutures or sling material in the bladder (17, 18). Most of the chronic

Box 2. Types of Urinary Incontinence in Women ⇦

Chronic urinary retention–involuntary loss of urine when the bladder does not empty completely; associated with high residual urine volumes*

Coital urinary incontinence–involuntary loss of urine with sexual intercourse

Continuous urinary incontinence–continuous involuntary loss of urine

Extraurethral urinary incontinence–urine leakage through channels other than the urethral meatus (eg, vesicovaginal, urethrovaginal, or ureterovaginal genitourinary fistulas; ectopic ureter)

Functional urinary incontinence–involuntary loss of urine that is due to cognitive, functional, or mobility impairments in the presence of an intact lower urinary tract system*

Insensible urinary incontinence–involuntary loss of urine that occurs without awareness

Mixed urinary incontinence–involuntary loss of urine associated with urgency and with physical exertion, sneezing, or coughing

Nocturnal enuresis–involuntary loss of urine that occurs during sleep

Occult stress incontinence–stress urinary incontinence (see below) that is observed only after the reduction of coexistent pelvic organ prolapse

Overactive bladder–urinary urgency, typically accompanied by frequency and nocturia, with and without urge urinary incontinence in the absence of urinary tract infection or other obvious pathology

Postmicturition leakage–involuntary passage of urine after the completion of micturition

Postural urinary incontinence–involuntary loss of urine associated with change of body position

Stress urinary incontinence–involuntary loss of urine with effort or physical exertion (eg, sporting activities) or when sneezing or coughing

Urgency urinary incontinence–involuntary loss of urine associated with urgency or a sudden, compelling desire to void that is difficult to defer

*Data from Abrams P, Andersson KE, Artibani W, Birder L, Bliss D, Brubaker L, et al. Recommendations of the International Scientific Committee: evaluation and treatment of urinary incontinence, pelvic organ prolapse and faecal incontinence. 5th International Consultation on Incontinence. In: Abrams P, Cardozo L, Khoury S, Wein A, editors. Incontinence. 5th ed. Paris: ICUD-EAU; 2013. p. 1895–956.

Data from Haylen BT, de Ridder D, Freeman RM, Swift SE, Berghmans B, Lee J, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. Int Urogynecol J 2010;21:5–26.

complications after Burch colposuspension and sling procedures relate to voiding dysfunction and urge symptoms.

Because treatment options vary by incontinence type and effectiveness, it is important to first determine the etiology and severity of the patient's symptoms. After determining the type of incontinence, physicians should assess each woman's goals and expectations for treatment to help her select the best treatment option.

Clinical Considerations and Recommendations

- *What office evaluation is useful for evaluation of urinary incontinence?*

  The minimum evaluation in women with symptoms of urinary incontinence includes the following six steps: 1) history, 2) urinalysis, 3) physical examination, 4) demonstration of stress incontinence, 5) assessment of urethral mobility, and 6) measurement of postvoid residual urine volume.

History

The purpose of history taking is to help determine the type of urinary incontinence (Box 2). History should include characterization of incontinence (eg, stress, urgency, mixed), duration, precipitating events, fluid intake, frequency of occurrence, interference with activities of daily life, severity, pad use, and effect of symptoms on activities of daily living. Questions should assess symptoms related to bladder storage (frequency, nocturia, urgency, and incontinence) and emptying (hesitancy, slow stream, straining to void, feeling of incomplete emptying, and dysuria). Physicians can use validated questionnaires (Box 3) to evaluate bother, severity, and the relative contribution of urgency and stress incontinence symptoms (17).

Thorough medical, surgical, gynecologic, and neurologic histories also should be obtained. Certain medical and neurologic conditions, such as multiple sclerosis, diabetes, stroke, and lumbar disk disease, may precipitate urinary incontinence (Box 1). A bowel history is important because anal incontinence and constipation are common in women with urinary incontinence. A complete list of the patient's medications should be reviewed to determine whether any medications might be contributing to the woman's urinary symptoms. Agents that can affect lower urinary tract function include diuretics, caffeine, alcohol, narcotic analgesics, anticholinergic drugs, antihistamines, psychotropic drugs, alpha–adrenergic blockers, alpha–adrenergic agonists, and calcium channel blockers (17).

Box 3. Examples of Validated Urinary Incontinence Questionnaires ⇦

- Urogenital Distress Inventory (UDI)*
- Incontinence Impact Questionnaire (IIQ)*
- Questionnaire for Urinary Incontinence Diagnosis (QUID)†
- Incontinence Quality of Life Questionnaire (I-QOL)‡
- Incontinence Severity Index (ISI)§
- International Consultation on Incontinence Questionnaire (ICIQ)‖

*Shumaker SA, Wyman JF, Uebersax JS, McClish D, Fantl JA. Health-related quality of life measures for women with urinary incontinence: the Incontinence Impact Questionnaire and the Urogenital Distress Inventory. Continence Program in Women (CPW) Research Group. Qual Life Res 1994;3:291–306 and Uebersax JS, Wyman JF, Shumaker SA, McClish DK, Fantl JA. Short forms to assess life quality and symptom distress for urinary incontinence in women: the Incontinence Impact Questionnaire and the Urogenital Distress Inventory. Continence Program for Women Research Group. Neurourol Urodyn 1995;14:131–9.

†Bradley CS, Rahn DD, Nygaard IE, Barber MD, Nager CW, Kenton KS, et al. The questionnaire for urinary incontinence diagnosis (QUID): validity and responsiveness to change in women undergoing non-surgical therapies for treatment of stress predominant urinary incontinence. Neurourol Urodyn 2010;29:727–34.

‡Brown JS, Grady D, Ouslander JG, Herzog AR, Varner RE, Posner SF. Prevalence of urinary incontinence and associated risk factors in postmenopausal women. Heart & Estrogen/Progestin Replacement Study (HERS) Research Group. Obstet Gynecol 1999;94:66–70.

§Sandvik H, Seim A, Vanvik A, Hunskaar S. A severity index for epidemiological surveys of female urinary incontinence: comparison with 48-hour pad-weighing tests. Neurourol Urodyn 2000;19:137–45.

‖Avery K, Donovan J, Peters TJ, Shaw C, Gotoh M, Abrams P. ICIQ: a brief and robust measure for evaluating the symptoms and impact of urinary incontinence. Neurourol Urodyn 2004;23:322–30.

Reprinted from Evaluation of uncomplicated stress urinary incontinence in women before surgical treatment. Committee Opinion No. 603. American College of Obstetricians and Gynecologists. Obstet Gynecol 2014;123:1403–7.

Bladder diaries are useful adjuncts to the history obtained from the patient. They are simple tools that can provide information about fluid intake, voiding patterns, and urine leakage episodes, which can assist in the diagnosis and treatment of urinary incontinence. Over a continuous 24-hour period, the patient records the timing and amount of fluid intake, voids and voided volumes, leakage episodes, and activity during leakage. Bladder diaries also are helpful in documenting symptoms, which can be useful in initiating behavioral changes and thus improving patient adherence (19, 20). Recording for 3–5 days generally will provide sufficient clinical data. The National Institute of Diabetes and Digestive and Kidney Diseases has developed a daily bladder diary, which is available online at www.niddk.nih.gov/health-information/health-topics/urologic-disease/daily-bladder-diary/Documents/diary_508.pdf.

Urinalysis

Urinary tract infections should be identified using urinalysis and treated before initiating further investigation or therapeutic intervention for urinary incontinence (17). A clean midstream or catheterized urine sample should be obtained for dipstick urinalysis. If suspicious for infection (ie, nitrites, leukocytes, or both are present), a urine culture should be sent and appropriate empiric antibiotic therapy initiated for treatment of uncomplicated cystitis (21). If microscopic hematuria is present, further upper and lower urinary tract evaluation with cystoscopy and computed tomography is recommended (22). The American Urological Association defines *microscopic hematuria* as three or more red blood cells per high-power field on "microscopic examination of urinary sediment and not on a dipstick reading" and "in the absence of an obvious benign cause" (22).

Physical Examination

The primary purpose of the physical examination is to exclude confounding or contributing factors to urinary incontinence or its management. A urethral

diverticulum can produce incontinence or postvoid dribbling. Occasionally, patients confuse vaginal discharge with urinary incontinence. Extraurethral incontinence from a fistula or ectopic ureter opening in the vagina is rare but sometimes can be seen on vaginal examination. Therefore, it is recommended that all pelvic support compartments (anterior, posterior, and apical) be assessed in women with urinary incontinence symptoms (17, 23, 24). Prolapse can mask or decrease the severity of the woman's incontinence symptoms, especially stress incontinence symptoms; this is referred to as occult, potential, masked, or hidden stress urinary incontinence. When the prolapse is decreased with a nonobstructing pessary or large cotton swabs, stress urinary incontinence may become apparent or worsen (17, 25).

All patients with urinary incontinence symptoms should undergo a bimanual examination, including pelvic floor muscle examination with assessment of muscle strength and voluntary muscle relaxation. Motor and sensory differences, unilateral defects, and asymmetry should be documented when present (26).

A rectal examination is useful to further evaluate anorectal pathology and fecal impaction, the latter of which may be associated with voiding difficulties and incontinence in older women. Urinary incontinence often improves after treating fecal impaction (10). Rectal examination should assess anal sphincter tone and strength; prior anal sphincter tears; fecal impaction; and other rectal pathology, including rectovaginal fistula, tumor, hemorrhoids, or fissure.

Urinary incontinence may be the presenting symptom of neurologic disease. The screening neurologic examination should include mental status as well as sensory and motor function of the perineum and both lower extremities. Sacral segments 2 through 4 contain the important neurons controlling micturition. Lower extremity motor function and sensory function along the sacral dermatomes are important to evaluate. The anal wink and bulbocavernosus reflexes are used to assess integrity of sacral reflex pathways; however, they may be clinically absent in women without neurologic disease (27).

Demonstration of Stress Incontinence: Cough Stress Test

Stress urinary incontinence should be demonstrated objectively before any surgery is performed (28). Visualization of fluid loss from the urethra simultaneous with a cough is a positive test diagnostic of stress urinary incontinence. Urine loss that occurs in a delayed manner after cough is considered a negative test result and suggests cough-induced overactive bladder. The cough stress test can be performed in the supine position during the pelvic examination. However, if urine leakage is not observed in the supine position, the test should be repeated with the patient standing and with a full bladder (or at a minimum bladder volume of 300 mL) to maximize sensitivity (17). Some physicians ask patients to come to the office with a full bladder during an initial evaluation so that a cough stress test can be performed before bladder emptying (28). If no leakage is observed despite patient symptoms of stress urinary incontinence, the physician may need to retrograde fill the bladder until the patient reports bladder fullness or has a bladder volume of at least 300 mL of fluid and then repeat the cough stress test. If the standing cough stress test result remains negative despite patient reports of stress urinary incontinence, then multichannel urodynamic testing is recommended (17).

Assessment of Urethral Mobility

Urethral mobility generally is defined as a resting angle or displacement angle of the urethra-bladder neck with maximum Valsalva of at least 30 degrees from the horizontal (29). The cotton swab test has been the

traditional method to assess urethral mobility (30), but other methods of evaluating urethral mobility include measurement of point Aa of the pelvic organ prolapse quantification system, visualization, palpation, and ultrasonography (31–33). Continence surgery is more successful in women with urethral mobility before surgery. Lack of urethral mobility is associated with a 1.9-fold increase in the failure rate of midurethral sling treatment of stress urinary incontinence (34). Patients who lack urethral mobility may be better candidates for urethral bulking agents rather than sling or retropubic procedures.

Postvoid Residual Urine Volume

The presence of an elevated postvoid residual volume can indicate the presence of chronic urinary retention. According to the Value of Urodynamic Evaluation trial, a postvoid residual volume of less than 150 mL measured by bladder ultrasonography or catheter indicates adequate bladder emptying in women undergoing stress urinary incontinence surgery (35). Because isolated instances of elevated residual urine volume may not be significant, the test should be repeated when a single abnormally high value is obtained. An elevated postvoid residual urine volume in the absence of pelvic organ prolapse is uncommon and should trigger an evaluation of the bladder-emptying mechanism, usually with a pressure-flow urodynamic study (17).

- *When is multichannel urodynamic testing useful for evaluation of urinary incontinence?*

  Women for whom further lower urinary tract evaluation with multichannel urodynamic testing may be indicated include those with an unclear diagnosis after basic office evaluation (eg, negative cough stress test result, even with a full bladder), symptoms that do not correlate with objective findings, failure to improve with treatment, or prior incontinence or pelvic floor surgery. Indications for urodynamic testing remain controversial, but most experts do not recommend urodynamic testing in the initial evaluation of uncomplicated urinary incontinence (12).

  The results of an Agency for Healthcare Research and Quality systematic review show that diagnosis by urodynamic testing does not better predict which patients would benefit from nonsurgical treatments when compared with diagnosis by patients' symptom reports (4). Randomized controlled trial results have demonstrated that basic office evaluation, including normal postvoid residual urine volume, negative urinalysis result, and positive cough stress test result, is not inferior to urodynamic testing in women with stress-predominant urinary incontinence undergoing anti-incontinence surgery (35). In women with uncomplicated stress urinary incontinence, outcomes 1 year after midurethral sling surgery were the same for those who had a basic office assessment performed by trained pelvic floor health care providers compared with those who had a preoperative evaluation that included urodynamic testing (35). Thus, preoperative multichannel urodynamic testing is not necessary before planning primary anti-incontinence surgery in women with uncomplicated stress urinary incontinence (defined as postvoid residual urine volume less than 150 mL, negative urinalysis result, a positive cough stress test result, and no pelvic organ prolapse beyond the hymen) (17, 35, 36). However, women who have complicated stress urinary incontinence may benefit from multichannel urodynamic testing and other diagnostic tests before initiation of treatment, especially surgery. Determination of the need for additional diagnostic testing before surgery should be based on clinical judgment after completion of the basic urinary incontinence evaluation outlined in this document. Clinical judgment should guide the physician's decision to perform preoperative multichannel urodynamic testing or to refer the patient to a specialist with appropriate training and experience in female pelvic medicine and reconstructive surgery.

- *Are incontinence pessaries effective for the treatment of urinary incontinence?*

  Incontinence pessaries may improve the symptoms of stress and mixed urinary incontinence, but objective evidence regarding their effectiveness has not been reported. Incontinence pessaries are believed to control stress incontinence symptoms by supporting the urethra and increasing urethral resistance. Studies on pessary use have reported patient satisfaction outcomes as a measure of pessary effectiveness. The results of a randomized controlled trial comparing behavioral therapy with pelvic floor muscle training, incontinence pessaries, and combination therapy in women with stress-predominant urinary incontinence showed that patient satisfaction after 3 months was higher in the behavioral-physical therapy group (75%) compared with the pessary group (63%) (37). Patient satisfaction in the combination therapy group was not superior to single therapy (79%); however, by 1 year, patient satisfaction rates decreased in all groups to approximately 50% (37). Patients can be counseled that incontinence pessary therapy may be an effective management option for stress urinary incontinence in women who wish to avoid surgery and who are not likely to adhere to behavioral-physical therapy or want more immediate symptom control than is provided with behavioral-physical therapy (37).

- *Are behavioral and lifestyle modifications effective for the treatment of urinary incontinence?*

  Several behavioral and lifestyle modifications, including bladder training, weight loss, and fluid management, have proved effective for the treatment of urinary incontinence. In one randomized controlled trial, behavioral therapy (including group and individual instruction, scheduled voiding, diary keeping, and pelvic floor muscle exercises) resulted in a 50% reduction in mean incontinence episodes compared with a 15% reduction in controls (38). There were no differences in treatment efficacy by type of incontinence (stress, urgency, or mixed) (38). Therefore, behavioral therapy and pelvic floor muscle exercises improve symptoms of urinary incontinence and may be recommended as an initial, noninvasive treatment in many women.

Bladder Training

Bladder training, which includes interventions such as timed voiding and bladder drills, aims to increase the time interval between voiding by use of either a mandatory or self-adjusted schedule. Although bladder training typically is used for the treatment of urgency incontinence, it also has been found to be effective in the management of stress urinary incontinence and mixed urinary incontinence (39). A Cochrane review tentatively concluded, based on limited and variable-quality available evidence, that bladder training may be helpful for the treatment of urinary incontinence, including urge, stress, and mixed incontinence (40).

Weight Loss

Obesity is an independent risk factor for the development of urinary incontinence, with obese women having a 4.2-fold greater risk of stress urinary incontinence than those with an average body mass index (41, 42). Evidence from several trials demonstrates that moderate weight loss can improve urinary incontinence symptoms in overweight and obese women (43, 44). A randomized trial comparing a 6-month weight-loss program with a structured education program in overweight and obese women with urinary incontinence showed a reduction in weekly incontinence episodes (mostly stress urinary incontinence) of 47% and 28%, respectively (43). Mean weight loss was only 7.8 kg (8% of baseline weight)

in the intervention group, which suggests that even moderate weight loss can improve stress urinary incontinence. Another study of overweight and obese women with type 2 diabetes mellitus found that each 1-kg reduction in weight resulted in a 3% decrease in the likelihood of development of urinary incontinence (44).

Dietary Fluid Management

Women with urinary incontinence should be counseled regarding fluid management. Those with nighttime or early-morning incontinence should be advised to decrease fluid intake several hours before bedtime. Reduction in excessive fluid intake (eg, to no more than 2 liters per day) and frequent bladder emptying can be useful strategies as well. Caffeine intake equivalent to as little as 1 cup of coffee per day is associated with urinary incontinence; therefore, it also may be helpful to suggest to women with urinary incontinence that they decrease their caffeine intake (45).

- *Are pelvic floor muscle exercises effective for the treatment of urinary incontinence?*

  Pelvic floor muscle (Kegel) exercises are performed to strengthen the voluntary periurethral and perivaginal muscles (voluntary urethral sphincter and levator ani). Pelvic muscle exercises may be used alone or augmented with bladder training, biofeedback, or electrical stimulation. Pelvic floor muscle exercises can be effective as a first-line treatment for stress, urgency, or mixed urinary incontinence (4, 37, 46). Numerous descriptions of specific pelvic floor muscle training programs exist; however, it is unclear which is most effective (47). Treatment efficiency decreases over time and is most effective when initiated under the supervision of a physician.

  An Agency for Healthcare Research and Quality systematic review concluded that pelvic floor muscle exercises, regardless of regimen, are effective alone and in combination with bladder training or biofeedback, electrical stimulation, or weight loss with exercise to achieve continence and improvement in urinary incontinence (4). Approximately one half of women with stress-predominant urinary incontinence are satisfied 1 year after starting pelvic floor muscle training (37). However, it remains unclear whether the addition of pelvic muscle training to a more active treatment already in place, such as pessary, pharmacologic treatment, or surgical intervention, is beneficial compared with the active treatment alone (37, 48). A recent trial that compared pelvic floor muscle training with midurethral sling for treatment of stress urinary incontinence found that 49% of women in the pelvic floor muscle training group crossed over to surgery, and 11% of women in the surgery group crossed over to physical therapy (49). Subjective 1-year cure rates were 85% in the surgery group and 53% in the physical therapy group, and rates of objective cure were 76.5% and 58.8%, respectively. These results suggest that although pelvic floor muscle training generally is regarded as first-line treatment for stress urinary incontinence, initial midurethral sling surgery may be offered as an alternative primary treatment option in appropriately counseled women.

- *Is pharmacotherapy effective for the treatment of urinary incontinence?*

  Current evidenced-based medical treatments typically are reserved for urgency urinary incontinence. Medical therapies for treatment of stress urinary incontinence are less effective and generally are not recommended. Available medical treatments for urgency urinary incontinence include antimuscarinic agents (also known as anticholinergic agents), beta-agonists, onabotulinumtoxinA, and estrogen.

Antimuscarinic Medications

Antimuscarinic medications typically are prescribed after behavioral therapy, physical therapy, or both for the treatment of urgency urinary incontinence, but they also may be offered as a primary treatment option after appropriate patient counseling. These agents block parasympathetic muscarinic receptors and act on bladder M2 and M3 receptors to inhibit involuntary detrusor contractions.

In systematic reviews, use of antimuscarinic medications resulted in clinical improvement and higher continence rates compared with placebo for reducing urgency incontinence; however, the magnitude of effect was modest (50, 51). Antimuscarinic medications also were associated with significant discontinuation rates because of bothersome adverse effects, with dry mouth as the most frequently reported adverse event. Numerous antimuscarinic agents are available, including darifenacin, fesoterodine, oxybutynin, solifenacin, tolterodine, and trospium, that have similar efficacy and safety profiles; however, conclusions regarding comparative effectiveness and safety are limited by the lack of high-quality evidence from head-to-head trials between specific agents.

Because long-term adherence and continence rates with antimuscarinic agents are suboptimal, combining antimuscarinic agents with behavioral–physical therapy has been proposed. However, the combination of behavioral and antimuscarinic therapy for urgency urinary incontinence has not been found to be more effective than antimuscarinic therapy alone (4, 52, 53). Further study in this area will be helpful in directing management.

Beta-agonists

Mirabegron is a beta-agonist that activates the beta-3 adrenergic receptor in the detrusor muscle, which leads to muscle relaxation and increased bladder capacity. It is approved by the U.S. Food and Drug Administration for the treatment of urinary urgency and frequency and urge incontinence. In short-term, randomized, double-blind trials, mirabegron demonstrated significant reductions in urge incontinence episodes, with adverse event rates (most commonly, tachycardia, headache, and diarrhea) similar to those for placebo (54). Mirabegron is not recommended for patients with severe uncontrolled hypertension, end-stage renal disease, or significant liver impairment.

OnabotulinumtoxinA

The U.S. Food and Drug Administration has approved the use of onabotulinumtoxinA (also known as Botox A) for the treatment of overactive bladder. Botulinum toxin, a potent neurotoxin derived from the anaerobic bacterium *Clostridium botulinum*, acts primarily as a muscle paralytic by inhibiting the presynaptic release of acetylcholine from motor neurons at the neuromuscular junction. OnabotulinumtoxinA is administered by cystoscopic injection of multiple aliquots into the detrusor muscle.

A multicenter randomized trial that compared the effectiveness of 6 months of daily antimuscarinic therapy with a single intradetrusor injection of 100 units of onabotulinumtoxinA in patients with overactive bladder symptoms (who had never taken antimuscarinic medications and those who had taken two or fewer prior antimuscarinic medications) found that antimuscarinics had similar rates of improvement in symptoms of overactive bladder compared with onabotulinumtoxinA injections (55). The

treatments resulted in similar reductions in daily incontinence episodes at 6 months; however, 27% of women in the onabotulinumtoxinA group compared with only 13% in the antimuscarinic group reported complete resolution of urgency urinary incontinence (55). Adverse events differed in the treatment groups, with women in the onabotulinumtoxinA group reporting less dry mouth but having a higher risk of urinary tract infection (33%) and voiding dysfunction that required catheterization (5%).

Therefore, compared with antimuscarinic treatment, intravesical onabotulinumtoxinA results in similar reduction of incontinence episodes, and more patients report complete resolution of incontinence. Thus, intradetrusor onabotulinumtoxinA may be a treatment option for overactive bladder in appropriate patients, and consideration of its use requires shared decision making between the patient and physician. Patients should be counseled about risks and possible postprocedure adverse events of onabotulinumtoxinA injections, including urinary retention, incomplete bladder emptying, and urinary tract infections (56).

- *Is neuromodulation effective for the treatment of urinary incontinence?*

  Sacral neuromodulation refers to stimulation of nerves that innervate the bladder and pelvic floor to treat lower urinary tract dysfunction. The exact mechanism of action remains unknown, but it may modulate reflex pathways affecting bladder storage and emptying (57). The procedure is performed in two stages: the first, a trial phase that involves electrode placement to determine if symptoms are improved sufficiently in order to proceed to the second stage, implantation of a pulse generator.

  One prospective clinical trial found a 62% clinical success rate for treating refractory urinary urgency incontinence; 26% of patients reported complete dryness and 36% demonstrated more than a 50% reduction of incontinence episodes (58). Thus, sacral neuromodulation may be considered for patients with recalcitrant urinary urge incontinence who have failed other conservative measures, including bladder training, pelvic floor physical therapy with biofeedback, and pharmacologic treatment.

- *Is there a role for estrogen in the treatment of urinary incontinence?*

  Systemic estrogen therapy, with or without progesterone, does not appear to be effective in the prevention or treatment of urinary incontinence; in fact, several large trials of hormone therapy have found an increased occurrence of stress incontinence in users of hormone therapy (estrogen alone or combined with progesterone) (59, 60). Locally administered (vaginal) estrogen, however, may be of some benefit in decreasing urinary incontinence (61, 62).

- *Is there a role for bulking agents in the treatment of urinary incontinence?*

  A number of bulking agents have been used for the treatment of stress incontinence with intrinsic sphincter deficiency in women. The bulking agents are injected transurethrally or periurethrally into the periurethral tissue around the bladder neck and proximal urethra to increase urethral resistance. Urethral bulking injections are a relatively noninvasive treatment for stress urinary incontinence that may be appropriate if surgery has failed to achieve adequate symptom reduction, if symptoms recur after surgery, in women with symptoms who do not have urethral mobility, or in older women with comorbidities who cannot tolerate anesthesia or more invasive surgery (63). However, urethral bulking agents are less effective than surgical procedures such as sling placement and are rarely used as primary treatment for

stress urinary incontinence. A Cochrane systematic review concluded that urethral bulking agents are less effective than surgery, with a 1.7-fold to 4.8-fold increased likelihood of cure with surgical treatment (64). The most significant shortcomings of urethral bulking agents are recurrent incontinence and the need for repeat injections.

There are several agents that are currently used, but there is insufficient evidence to recommend one in particular. Glutaraldehyde cross-linked bovine collagen was the most commonly used agent until it was discontinued in 2011; however, a 2012 systematic review found insufficient evidence to recommend an alternative agent (64). Evidence suggests that currently used agents, pyrolytic carbon-coated beads, and calcium hydroxylapatite, are comparable to collagen, with improvement rates ranging from 63% to 80% at 1 year (65, 66).

- *When is surgery indicated for the management of urinary incontinence?*

   Although urgency urinary incontinence generally is treated with conservative measures, pharmacotherapy, and nonsurgical procedures, surgery is indicated for appropriately counseled women with stress urinary incontinence who have insufficient symptom control after conservative treatment. In addition, surgery may be an appropriate first-line treatment in appropriately counseled women with stress urinary incontinence who decline conservative treatment. For example, initial midurethral sling surgery results in higher 1-year subjective and objective cure rates than pelvic floor physical therapy in women with stress urinary incontinence (49). Although surgical treatments are associated with higher success rates than conservative therapy, surgery also is associated with increased morbidity, including the potential for the development of postoperative voiding difficulty and urgency incontinence. Each woman must balance her degree of symptom severity, quality-of-life effects, and goals for treatment when deciding on surgical management of stress urinary incontinence.

- *Are midurethral synthetic mesh slings effective and appropriate to use in the surgical treatment of urinary incontinence?*

   Synthetic midurethral mesh slings are the most common primary surgical treatment for stress urinary incontinence in women (67). Synthetic midurethral slings demonstrate efficacy that is similar to traditional suburethral fascial slings, open colposuspension, and laparoscopic colposuspension (68–70). Compared with suburethral fascial slings, fewer adverse events have been reported with synthetic midurethral slings (68). Voiding dysfunction is more common with open colposuspension than with synthetic midurethral slings (69). For these reasons, midurethral synthetic mesh slings have become the primary surgical treatment for stress urinary incontinence in women (67, 71). However, in women who decline or are not candidates for synthetic mesh slings, autologous fascial bladder neck slings and Burch colposuspension (laparoscopic or open) remain effective treatment options.

   Although controversy exists about the role of synthetic mesh used in the vaginal repair of pelvic organ prolapse, there are substantial safety and efficacy data that support the role of synthetic mesh midurethral slings as a primary surgical treatment option for stress urinary incontinence in women. For this reason, and to clarify uncertainty for patients and practitioners, the American Urogynecologic Society and the Society of Urodynamics, Female Pelvic Medicine & Urogenital Reconstruction published a position statement recognizing polypropylene mesh midurethral slings as the "standard of care" in the surgical treatment of stress urinary incontinence (72).

- *Is there an optimal type of midurethral sling procedure?*

  Although there are many ways to place midurethral slings, the main approaches used are retropubic and transobturator techniques. Evidence from a 2015 systematic review demonstrates that these approaches are effective and appear to be comparable in terms of efficacy and patient satisfaction (73). Subjective cure rates up to 1 year after surgery were similar and ranged from 62% to 98% (transobturator route) and 71% to 97% (retropubic route). Short-term objective and long-term (more than 5 years) subjective and objective cure rates also were similar. Voiding dysfunction, bladder perforation, major vascular or visceral injury, and operative blood loss were more common with retropubic slings, whereas groin pain was more common with transobturator slings. Mesh complications (eg, exposures, erosions) were uncommon and did not differ between routes of sling placement (2% overall).

  Single-incision mini-slings are shorter than standard-length retropubic and transobturator slings and do not pass through the retropubic or obturator spaces. How-ever, two meta-analyses of randomized controlled trials (74, 75) demonstrated significantly lower subjective and objective cure rates with single-incision mini-slings compared with standard-length slings, with one of the reviews demonstrating higher rates of reoperation for stress urinary incontinence (75). Thus, the risk-benefit profile for each procedure, along with the patient's goals and expectations, should be considered in determining the preferred sling type for each individual.

- *What is the role for autologous fascial bladder neck slings in the treatment of stress urinary incontinence?*

  In women who decline or are not candidates for synthetic mesh slings, autologous fascial bladder neck slings are an effective treatment alternative. Autologous fascial bladder neck slings should be considered in women with severe stress urinary incontinence and a nonmobile, fixed urethra; urethral diverticula or fistula; or with complications from mesh previously placed in the anterior vagina:

- *Severe stress incontinence with a nonmobile, fixed urethra, requiring a more obstructive procedure*. An autologous bladder neck sling can be placed under more tension than a synthetic sling secondary to risks of urethral erosion with synthetic material.
- *Concomitant urethral reconstruction procedures (eg, diverticulectomy or fistula repair)*. Several investigators reported good incontinence outcomes and low complication rates after urethral diverticulectomy and placement of autologous fascial sling (76, 77).
- *Complications from mesh previously placed in the anterior vagina (for urinary incontinence or pelvic organ prolapse)*. Several case series report good outcomes with removal of prior mesh and placement of an autologous fascial sling (78, 79).

- *What is the appropriate surgical management of urinary incontinence with coexisting pelvic organ prolapse?*

  Although pelvic organ prolapse and stress urinary incontinence coexist in up to 80% of women with pelvic floor disorders (80), these disorders often are not equally symptomatic for the patient. In women with bothersome pelvic organ prolapse and stress urinary incontinence symptoms, it is prudent to correct both disorders to reduce persistent or worsening stress incontinence after surgery. Because there is no single procedure that adequately treats pelvic organ prolapse and urinary incontinence, two procedures are done concomitantly. Thus, women with bothersome stress urinary incontinence who are undergoing pelvic

organ prolapse surgery should have concomitant treatment for both disorders. The type of continence procedure often is selected based on the route of access for the prolapse repair.

- *For patients with pelvic organ prolapse but without stress urinary incontinence, are incontinence procedures appropriate at the time of prolapse repair?*

   Approximately 40% of women without stress urinary incontinence develop symptoms of stress incontinence after surgical correction of pelvic organ prolapse (81, 82). This condition, known as occult stress urinary incontinence, likely occurs because the prolapse kinks and obstructs the urethra, and the obstruction is alleviated when the prolapse is repaired. All women with significant apical prolapse, anterior prolapse, or both should have a preoperative evaluation for occult stress incontinence, with cough stress testing or urodynamic testing with the prolapse reduced. When stress urinary incontinence is demonstrated during cough stress testing, an increased rate of stress urinary incontinence after pelvic organ prolapse surgery is expected (25). These women should consider an incontinence procedure at the time of pelvic organ prolapse repair after appropriate counseling of the benefits and risks of additional surgery.

   Several large trials have examined the efficacy of a concomitant continence procedure at the time of prolapse repair (81, 82). In the Colpopexy and Urinary Reduction Efforts trial, women with no reported preoperative stress urinary incontinence who were undergoing open abdominal sacrocolpopexy for prolapse repair were randomized to receive concomitant Burch colposuspension or no continence procedure (81). Fewer women who underwent concomitant Burch colposuspension had postoperative stress incontinence compared with those who underwent sacrocolpopexy alone (24% versus 44%). Similar results were found in the outcomes after the Vaginal Prolapse Repair and Midurethral Sling trial, which evaluated placement of a prophylactic midurethral sling at the time of vaginal prolapse surgery (82). Of women who underwent prophylactic midurethral sling placement at the time of vaginal surgery, 24% developed stress urinary incontinence after surgery, compared with 49% in those who underwent only pelvic organ prolapse surgery. The authors concluded that retropubic midurethral sling surgery at the time of pelvic organ prolapse surgery decreases the risk of postoperative stress urinary incontinence in women without preoperative stress urinary incontinence (82), albeit with an expected increase in adverse effects from an additional procedure, including urinary tract infection, bleeding complications, and voiding dysfunction. Thus, Burch colposuspension at the time of abdominal sacrocolpopexy and retropubic midurethral sling at the time of vaginal surgery for pelvic organ prolapse repair decrease the risk of postoperative stress urinary incontinence in women without preoperative stress urinary incontinence (81, 82). Patients with pelvic organ prolapse but without stress urinary incontinence who are undergoing either abdominal or vaginal prolapse repair should be counseled that postoperative stress urinary incontinence is more likely without a concomitant continence procedure but that the risk of adverse effects is increased with an additional procedure.

Summary of Conclusions and Recommendations

The following conclusions and recommendations are based on good and consistent scientific evidence (Level A):

- Basic office evaluation, including normal postvoid residual urine volume, negative urinalysis result, and positive cough stress test result, is not inferior to urodynamic testing in women with stress-predominant urinary incontinence undergoing anti-incontinence surgery.
- Preoperative multichannel urodynamic testing is not necessary before planning primary anti-incontinence surgery in women with uncomplicated stress urinary incontinence (defined as postvoid residual urine volume less than 150 mL, negative urinalysis result, a positive cough stress test result, and no pelvic organ prolapse beyond the hymen).
- Behavioral therapy and pelvic floor muscle exercises improve symptoms of urinary incontinence and may be recommended as an initial, noninvasive treatment in many women.
- Moderate weight loss can improve urinary incontinence symptoms in overweight and obese women.
- Compared with antimuscarinic treatment, intravesical onabotulinumtoxinA results in similar reduction of incontinence episodes, and more patients report complete resolution of incontinence. Thus, intra-detrusor onabotulinumtoxinA may be a treatment option for overactive bladder in appropriate patients, and consideration of its use requires shared decision making between the patient and physician.
- Initial midurethral sling surgery results in higher 1-year subjective and objective cure rates than pelvic floor physical therapy in women with stress urinary incontinence.
- Synthetic midurethral slings demonstrate efficacy that is similar to traditional suburethral fascial slings, open colposuspension, and laparoscopic colposuspension. Compared with suburethral fascial slings, fewer adverse events have been reported with synthetic midurethral slings. Voiding dysfunction is more common with open colposuspension than with synthetic midurethral slings.
- There are substantial safety and efficacy data that support the role of synthetic mesh midurethral slings as a primary surgical treatment option for stress urinary incontinence in women.
- Burch colposuspension at the time of abdominal sacrocolpopexy and retropubic midurethral sling at the time of vaginal surgery for pelvic organ prolapse repair decrease the risk of postoperative stress urinary incontinence in women without preoperative stress urinary incontinence.

The following conclusions and recommendations are based on limited or inconsistent scientific evidence (Level B):

- Incontinence pessaries may improve the symptoms of stress and mixed urinary incontinence, but objective evidence regarding their effectiveness has not been reported.
- Urethral bulking injections are a relatively noninvasive treatment for stress urinary incontinence that may be appropriate if surgery has failed to achieve adequate symptom reduction, if symptoms recur after surgery, in women with symptoms who do not have urethral mobility, or in older women with comorbidities who cannot tolerate anesthesia or more invasive surgery.
- When stress urinary incontinence is demonstrated during cough stress testing, an increased rate of stress urinary incontinence after pelvic organ prolapse surgery is expected.

The following conclusions and recommendations are based primarily on consensus and expert opinion (Level C):

- The minimum evaluation in women with symptoms of urinary incontinence includes the following six steps: 1) history, 2) urinalysis, 3) physical examination, 4) demonstration of stress incontinence, 5) assessment of urethral mobility, and 6) measurement of postvoid residual urine volume.
- Urinary tract infections should be identified using urinalysis and treated before initiating further investigation or therapeutic intervention for urinary incontinence.

- Autologous fascial bladder neck slings should be considered in women with severe stress urinary incontinence and a nonmobile, fixed urethra; urethral diverticula or fistula; or with complications from mesh previously placed in the anterior vagina.
- Women with bothersome stress urinary incontinence who are undergoing pelvic organ prolapse surgery should have concomitant treatment for both disorders.

Proposed Performance Measure

Percentage of women in whom urinary incontinence is diagnosed and who receive counseling on pelvic floor physical therapy and behavioral modifications for first-line management

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The MEDLINE database, the Cochrane Library, and the American College of Obstetricians and Gynecologists' own internal resources and documents were used to conduct a literature search to locate relevant articles published between January 2000–January 2015. The search was restricted to articles published in the English language. Priority was given to articles reporting results of original research, although review articles and commentaries also were consulted. Abstracts of research presented at symposia and scientific conferences were not considered adequate for inclusion in this document. Guidelines published by organizations or institutions such as the National Institutes of Health and the American College of Obstetricians and Gynecologists were reviewed, and additional studies were located by reviewing bibliographies of identified articles. When reliable research was not available, expert opinions from obstetrician–gynecologists were used.

Studies were reviewed and evaluated for quality according to the method outlined by the U.S. Preventive Services Task Force:

I   Evidence obtained from at least one properly designed randomized controlled trial.

II-1   Evidence obtained from well-designed controlled trials without randomization.

II-2   Evidence obtained from well-designed cohort or case–control analytic studies, preferably from more than one center or research group.

II-3   Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments also could be regarded as this type of evidence.

III   Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

Based on the highest level of evidence found in the data, recommendations are provided and graded according to the following categories:

Level A—Recommendations are based on good and consistent scientific evidence.

Level B—Recommendations are based on limited or inconsistent scientific evidence.

Level C—Recommendations are based primarily on consensus and expert opinion.