Managing Urinary Incontinence in Older Patients
G. Michael Harper, MD

ABSTRACT

PURPOSE: Urinary incontinence (UI) is a common problem in older adults that is often overlooked by both patients who may believe that it is an accepted part of aging, and primary care providers who may not routinely inquire about it. Because urinary incontinence is closely linked with quality of life and preservation of independence for older adults, it is important for primary care providers to be familiar with the evaluation and initial treatment of this condition.

EPIDEMIOLOGY: The prevalence of UI among community-dwelling older adults may be as high as 55% in women and 34% in men and at least 50% among nursing home residents.

REVIEW SUMMARY: Asking patients about symptoms of UI is the first and most important step in its evaluation. The history should look for evidence of reversible causes and include a detailed description of voiding symptoms. The examination should include a focused but detailed abdominal and genitourinary examination including a pelvic examination for women, a rectal examination for both sexes, and measurement of postvoid residual volume. In motivated older patients, behavioral therapy is effective and in some cases may require augmentation by the addition of pharmacologic treatment. In refractory cases urologic consultation should be considered for nonmedical management with individualized treatment, depending upon the predominant cause of the UI.

TYPE OF AVAILABLE EVIDENCE: Randomized-controlled trials, systematic reviews.

GRADE OF AVAILABLE EVIDENCE: Good.

CONCLUSION: UI is a condition with multiple causes, many of which respond well to behavioral therapy and/or pharmacotherapy, and should not be viewed as an expected and accepted part of growing old. As the number of active older individuals continues to grow, primary care physicians should be prepared to address the symptoms of UI with their patients, and suggest options for the treatment of what is often a needlessly expensive, distressing, and disabling condition.

part of aging. Too many choose to manage the problem themselves with incontinence pads and garments. Primary care physicians need to be proactive in asking about symptoms of UI because much can be done in the primary care office to help these patients.

**Epidemiology and Pathophysiology**

Estimates of UI in community-dwelling older women range from 17% to 55%. In the Heart and Estrogen/Progesterin Replacement Study (HERS) of hormone replacement therapy, 56% of the 2763 postmenopausal women who completed a questionnaire at baseline reported at least weekly incontinence. The prevalence of UI in men has been harder to determine and has mainly focused on UI that follows urologic procedures. However, there is a substantial prevalence of urge UI that increases with age and affects at least 10% of men over age 75 with rates of all types as high as 34%. UI is thought to affect at least 50% of nursing home residents and up to 90% of elderly patients with dementia or cognitive impairment.

The prevalence of UI increases with age, partly because of urologic changes. It is common for bladder capacity and urethral closure pressure to be reduced in older adults and for postvoid residual urine volume to be elevated. Especially in women, there may be degeneration and fibrosis of the bladder wall, diminished muscle tone in the bladder, internal and external sphincters, and pelvic floor musculature, and reduction of bladder contractility. Diminished renal concentrating capacity, reduced ability to conserve sodium, and hormonal changes can alter the circadian rhythm of water excretion and result in nocturnal polyuria. In men, an enlarged obstructing prostate may lead to changes in detrusor control and may contribute to detrusor overactivity.

Other reasons that the prevalence of UI increases with age include a greater frequency of contributory diseases, greater use of contributory medications, and impaired mobility. It is important to recognize that UI may be transient; the mnemonic, “DIAPPERS,” summarizes the causes: delirium, infection, atriope urethritis and vaginitis, pharmaceutical agents (such as diuretics, anticholinergics, and narcotic analgesics), psychologic causes, excessive urine output (secondary to hyperglycemia or congestive heart failure, for example), restricted mobility or dexterity, and stool impaction.

Most cases of UI that persist after transient causes have been addressed can be classified as one of the following clinical types:

- **Urge UI**: Loss of urine associated with a sudden, strong desire to void. This usually is associated with involuntary bladder contractions, known as detrusor overactivity. The term overactive bladder (OAB) is the symptom of urgency, usually with frequency and nocturia with or without urge incontinence.
- **Stress UI**: Typically occurs during activities that increase intra-abdominal pressure, such as coughing, sneezing, laughing, straining, exercising, or sexual activity. It usually is a result of weakness in the pelvic floor muscles allowing for urethral hypermobility. A less common subtype of stress UI is intrinsic sphincter deficiency (ISD), which can lead to continuous leakage at rest or with minimal exertion. ISD typically is associated with trauma resulting from surgery.
- **Overflow UI**: Loss of urine associated with an overfilled bladder (eg, because of outlet obstruction, poor detrusor contractility, or impaired sensation of fullness).
- **Mixed UI**: The coincident symptoms of both stress and urge incontinence, common particularly in older women.

The term “functional incontinence” has been used to describe individuals who have UI on the basis of limited mobility or cognitive impairment. This categorization, however, still requires a systematic evaluation to exclude other possible contributing factors. Detrusor hyperactivity with impaired contractility (DHIC) is a variant of detrusor overactivity that occurs when involuntary bladder contractions are weak, and it accounts for most cases of UI in the frail older adult population. DHIC can be difficult to identify because its symptoms can mimic those of other causes of UI. However, DHIC should be suspected in patients with symptoms of urge UI and a high postvoid residual (PVR) volume, and caution should be exercised when considering medications to relax the detrusor.

**Introduction of a Case**

In response to questioning, a 72-year-old nonsmoking woman reported a 2-year history of urinary frequency and leakage. She wore incontinence pads day and night because 2 to 3 times a day and occasionally at night she would have a sudden urge to void and would have an accident on the way to the bathroom. Because of this, she rarely left the house. She had to get up 2 or 3 times a night to void. She wore incontinence pads day and night because she had very rare leaking with activity, coughing, or sneezing. Her past medical history was significant for coronary artery disease, type 2 diabetes mellitus, hypertension, bilateral knee osteoarthritis, hypothyroidism, obesity, and hyperlipidemia. Her medications included L-thyroxine, aspirin, amlodipine, atenolol, acetaminophen, metformin, glipizide, atorvastatin, and lisinopril.

This case is typical in that, as emphasized earlier, patients rarely disclose spontaneously that they are experiencing urinary or bladder dysfunction. The
symptoms of UI need to be not only elicited but acted upon, as well.

**Evaluation**

Because so many nonurologic conditions can dispose older patients to UI, a thorough history and physical examination are essential. In addition to a review of comorbidities and current pharmacotherapy, this should include:

- A voiding history, with questions about obstructive symptoms (straining, decreased force of urine stream, intermittent flow, and hesitancy) and irritative symptoms (urgency, frequency, and urge incontinence)
- A history of previous surgery, especially pelvic or spinal surgery
- Palpation of the abdomen for masses, bladder distension, and costovertebral angle tenderness
- A tailored neuro-urologic examination to test perianal sensation, anal sphincter tone, and voluntary pelvic floor contractions
- A rectal examination to exclude fecal impaction and to assess anal sphincter tone
- For women, a vaginal examination to detect atrophic vaginitis, pelvic floor descent, and prolapse of pelvic organs
- Stress or cough test: with a full bladder and in a nearly upright position the patient is asked to cough once vigorously, to look for instantaneous leakage as a sign of stress UI
- Measurement of PVR with bladder ultrasound or catheterization, to detect overflow incontinence. This is particularly important because the symptoms of overflow incontinence often are nonspecific and can be mistaken for urge or stress UI. To properly measure a PVR the patient should be asked to voluntarily empty the bladder without invoking a Valsalva maneuver, and the residual volume should be measured within 5 minutes of the void. Residual volumes of more than 200 cc are considered abnormal.

In addition, the patient should keep a bladder or voiding record for at least 48 hours (Figure 1). The information gathered can provide important clues as to the causes and factors contributing to the episodes of incontinence. After treatment begins subsequent bladder records can document the effects of therapy.

Routine laboratory testing for new symptoms of UI should include a urinalysis and culture, measurements of renal function, calcium, and glucose. Though there is little association between UI and bacteriuria, especially in chronic incontinence, a single course of antibi-

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**Figure 1. Sample Bladder Record**

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
</table>

**INSTRUCTIONS:** Place a check in the appropriate column next to the time you urinated in the toilet or when an incontinence episode occurred. Note the reason for the incontinence and describe your liquid intake (for example, coffee, water) and estimate the amount (for example, one cup).

<table>
<thead>
<tr>
<th>Time</th>
<th>Unurinated in toilet</th>
<th>Amount</th>
<th>Leaking accident (small amount)</th>
<th>Large accident (pad soaked or clothes wet)</th>
<th>Reason for incontinence/liquid intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-8 am</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-10 am</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-noon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noon-2 pm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-4 pm</td>
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<tr>
<td>4-6 pm</td>
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<td></td>
<td></td>
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<tr>
<td>6-8 pm</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-10 pm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-midnight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overnight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of pads used today</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Patients should note the time of each void, whether they voided in the toilet, had a leaking accident, or had a large accident; and any circumstances that might have led to the accident. (The case patient did not follow instructions completely.)

otic treatment is reasonable when symptoms are new because UI may be the only manifestation of a urinary tract infection. If symptoms do not resolve, however, antibiotic therapy need not be repeated.

Indications for referral to a urologist for further evaluation, which may include urodynamic testing, include10,16,17:

- Associated hematuria (either microscopic or gross)
- Frequent urinary tract infections
- Marked pelvic prolapse
- Recent pelvic, vaginal, bladder, or prostate surgery or radiation
- Large PVRs
- No or limited response to therapy

**EVALUATION OF THE CASE PATIENT**

In the case presentation above the patient exhibited no palpable bladder distension, external genitalia were normal, and rectal tone was normal with no fecal impaction. A small cystocele was noted without urethral hypermobility and there was mild atrophic vaginitis. Very minimal leakage occurred upon coughing in a near-upright position. None of the patient’s medications was thought to be contributing to the UI. Her blood sugar was normal and urinalysis found no hematuria, glycosuria, few bacteria, and nitrite negative. A properly performed PVR was 80 cc. Her voiding record demonstrated 4 episodes of incontinence, 2 large and 2 small. On each occurrence she had been seated and failed to reach the bathroom in time. Based on the entirety of the evaluation the assessment was that the patient had mixed stress and urge incontinence, with urge as the predominant factor. The remainder of this article focuses on these 2 types of incontinence.

**MANAGEMENT**

For patients in whom urge, stress, or mixed incontinence is suspected, effective treatment can be implemented in the primary care office. For male patients it is important to rule out bladder outlet obstruction from prostatic enlargement as a cause of UI, but having done so the management approaches are similar for men and women: lifestyle modification and behavioral therapy should be instituted before pharmacotherapy in motivated individuals,18,19 and pharmacotherapy should be tried before referral for surgery unless there are contraindications to this. In older men, stress incontinence typically is seen only after prostate surgery; it can be difficult to treat and may require urologic consultation if conservative therapies fail.17

**BEHAVIORAL THERAPY**

The most straightforward behavioral intervention is prompted voiding, also called assisted toileting. As the name implies, a caregiver reminds the patient to go to the bathroom at regular intervals (eg, every 2 hours) before they have the urge to void. This option usually is reserved for cognitively impaired individuals and residents of nursing homes.

Bladder training is the mainstay of treatment for urge incontinence, and it can be beneficial for stress incontinence, as well.20 The goal is to gradually lengthen the intervals between voiding episodes. To begin, the patient voids on a schedule, based on the shortest interval recorded on the voiding record. He or she continues to keep a voiding record and attempts to increase the interval by 30 minutes every week, postponing the urge to void through use of relaxation techniques, such as visualization of a peaceful scene. In case of a “relapse,” the patient should decrease the most recently achieved interval by a half hour, then try to increase it again until the target number of daily incontinence episodes has been reached.

Bladder training is well documented as a valuable method for older women with UI. In one randomized-controlled trial of 123 patients 55 years of age and older, bladder training reduced the number of incontinence episodes by 57%. Women with stress incontinence benefited from bladder training as much as did those with urge or mixed incontinence.20

Pelvic floor muscle exercises, also called Kegel exercises, strengthen the urethral sphincter and levator muscles of the pelvic floor. They are particularly effective for stress incontinence in women and also are recommended for women with urge incontinence and men with postprostatectomy incontinence. The technique is to pull in the pelvic floor muscles and hold initially for at least 6 seconds, eventually increasing to 10 seconds. An initial regimen would be a minimum of 3 sets of 10 contractions daily. Performing the exercises in different positions (standing, sitting, lying down) is especially beneficial.

A problem with pelvic muscle exercises is that many people mistakenly contract their abdominal muscles, which can make incontinence worse. To help patients identify the correct set of muscles, the physician or nurse can insert a finger in the rectum and ask them to squeeze, or ask them to squeeze the muscles that they would use if they were trying to stop passing gas. Women can practice trying to stop the flow of urine while they are sitting on the toilet.

Patients will need encouragement, because bladder control typically does not improve until after 3 to 6 weeks of regular exercise. When patients have trouble learning the technique or adhering to the regimen, exercises are sometimes combined with biofeedback (which requires referral to a continence specialist or a physical therapist), electrical stimulation (placement of electrodes in the anus or vagina to stimulate the pudendal nerve), or the use of vaginal cones (sets of
tampon-like appliances of increasing weight that must be retained by contraction of the pelvic floor). In a placebo-controlled, randomized trial of women aged 55 to 92 years, biofeedback-assisted behavioral therapy was significantly better than oxybutynin for urge incontinence or mixed incontinence with urge as the predominant pattern. On the other hand, a meta-analysis of 24 randomized trials found no evidence that the addition of biofeedback to pelvic muscle exercises was more effective than the exercises alone in treating stress incontinence.

In another randomized-controlled trial, the addition of electric stimulation did not significantly improve the results of a pelvic muscle exercise regimen in women with stress incontinence who were aged 40 to 78 years. A study of 152 women of an average age of 70 years underscores that behavioral therapy for UI can start in the primary care office. Based on symptom pattern UI was classified as stress, urge, or mixed incontinence. The subjects were randomly assigned to combination behavioral therapy (bladder training, pelvic muscle exercises, and voiding records, with weekly 20-minute educational sessions) or to voiding records alone for 6 weeks followed by 6 weeks of combination behavioral therapy. The treatment group had a nearly 50% reduction in the number of weekly incontinence episodes whereas the control group had a 15% reduction (Table 1). Much of the benefit seen in the treatment group was maintained at 6 months.

In summary, behavioral therapy is effective for urge, stress, and mixed UI and can be initiated by primary care clinicians. Bladder records and instructions for bladder training and pelvic floor muscle exercises can easily be provided, but it must be kept in mind that success is dependent upon a motivated cognitively intact patient who is provided with reinforcement and encouragement.

### Behavioral Therapy for the Case Patient

The case patient received instruction from her primary care provider about bladder retraining and pelvic muscle exercises, and after several months she had moderate improvement. Although she was pleased with the results she reported that her incontinence episodes still limited her desire to leave her home. She was interested in knowing what additional treatment could be added to her behavioral therapy.

### Pharmacologic Treatment

For patients who do not achieve adequate results from behavioral therapy alone, the addition of medication may provide additional benefit. One caveat is that most trials of pharmacotherapy for incontinence are industry sponsored. The 2 drugs for which there is the most experience in treating urge UI are oxybutynin, available in both an oral form (Ditropan IR and Ditropan XL) and a transdermal form (Oxytrol), and tolterodine (Detrol IR and Detrol LA). These drugs are classified as antimuscarinics and act by relaxing the detrusor muscle. The anticholinergic side effects of these drugs include most notably dry mouth, constipation, blurred vision, and cognitive impairment, which limits their usefulness in older patients who are more susceptible to these effects than are younger patients.

Short-acting oxybutynin and short-acting tolterodine are similarly effective in patients with urge incontinence or overactive bladder. The side-effects profile seems to be somewhat better with tolterodine, but generic short-acting oxybutynin is much less expensive than tolterodine, a consideration that may be important to some patients.

A large, multisite, prospective randomized-controlled trial comparing the extended-release forms of these agents demonstrated similar efficacy in reducing weekly incontinence episodes. The participants, 790 women with OAB, experienced 21 to 60 incontinence episodes per week and an average of 10 or more voids in a 24-hour period. Their average age was 60 years (range, 18 to 92 years). The patients were treated for 12 weeks with extended-release oxybutynin 10 mg/day or extended-release tolterodine 4 mg daily.

Dry mouth was more common in the oxybutynin group (29.7% vs 22.3%), but discontinuation rates were similar in both groups. Table 2 shows that both drugs reduced the average number of urge incontinence episodes per week, the main outcome measure, but with no statistical difference between the groups. The magnitude of the reduction in the mean number of total

### Table 1. Efficacy of Behavioral Therapy for Urinary Incontinence in Older Women*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Baseline</th>
<th>Week 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total incontinence episodes per week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment group</td>
<td>9.6</td>
<td>5.2†‡</td>
</tr>
<tr>
<td>Control group</td>
<td>13.2</td>
<td>11.0</td>
</tr>
<tr>
<td>Nocturnal incontinence episodes per week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment group</td>
<td>1.6</td>
<td>1.1</td>
</tr>
<tr>
<td>Control group</td>
<td>1.2</td>
<td>1.4</td>
</tr>
<tr>
<td>Diurnal incontinence episodes per week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment group</td>
<td>8.1</td>
<td>4.2†§</td>
</tr>
<tr>
<td>Control group</td>
<td>12.0</td>
<td>9.6</td>
</tr>
</tbody>
</table>

*Adapted with permission from Subak et al.†

†P = .001; paired t test week 6 vs baseline.
‡P = .001 vs controls at week 6.
§P = .02 vs controls at week 6.
incontinence episodes also was similar in the 2 groups. In a previous study by some of the same investigators, once-daily extended-release oxybutynin was statistically superior to twice-daily immediate-release tolterodine at reducing urge and total incontinence episodes but clinically important differences were less obvious. Rates of dry mouth were similar in both groups. 

Transdermal oxybutynin (Oxytrol) also is available for the treatment of OAB and urge UI. In a multicenter, randomized-controlled trial of 361 patients with urge or mixed incontinence, it was as effective as extended-release tolterodine at reducing the daily number of incontinence episodes. The incidence of dry mouth was 7% over 12 weeks of therapy. The most common adverse event was application-site pruritus, which occurred in 14% of patients.

Since May, 2004, 3 additional drugs have received Food and Drug Administration (FDA) approval for the treatment of OAB and urge UI. Trospium chloride (Sanctura), a quaternary ammonium derivative with antimuscarinic effects, was as effective as short-acting oxybutynin at reducing symptoms of OAB and urge incontinence in a 52-week randomized-controlled trial of 358 mostly female subjects (average age 53.7, range 19 to 89) with OAB symptoms and urge and mixed incontinence. Although both groups had substantial reports of dry mouth, there were more complaints among the oxybutynin group (50% vs 33%, P<.01) and trospium had better overall tolerability. The recommended dose of 20 mg twice a day may be reduced to 20 mg daily in patients 75 years of age or older. Comparison trials of trospium with long-acting antimuscarinic drugs are not available. Darifenacin (Enablex) and solifenacin (Vesicare) are antimuscarinic agents, selective for the M3 receptor, which is thought to be primarily responsible for human bladder contractions. In a pooled analysis of 3 12-week randomized placebo-controlled trials of 371 subjects who were 65 years of age or older with OAB symptoms, darifenacin 7.5 mg or 15 mg daily was superior to placebo in reducing the number of weekly incontinence episodes. Dry mouth and constipation were more common in the darifenacin group, but adverse events of the central nervous system were negligible in all groups. A small 4-way crossover study of 76 patients, average age 59.9 years, comparing 2 doses of darifenacin (15 mg and 30 mg daily) to short-acting oxybutynin and placebo found both darifenacin and oxybutynin were similarly effective at reducing incontinence episodes, compared with placebo. Dry mouth was more common in the high-dosage arm of darifenacin and the oxybutynin arm compared with the low-dosage arm of darifenacin. It should be noted that the dose used in the high-dosage arm (30 mg daily) is 2 to 4 times the marketed dose. Solifenacin has shown similar efficacy and tolerability at the recommended starting dosage of 5 mg daily, but with an increased incidence of dry mouth at a 10-mg-daily dosage.

Antimuscarinics are the mainstay of pharmacologic therapy for urge UI. The currently approved drugs have similar efficacy and, whereas newer agents may prove more tolerable, some caution should be taken when prescribing these because of the limited data in older adults.

**Table 2. Efficacy of Extended-Release Oxybutynin vs Extended-Release Tolterodine for Urinary Incontinence**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Oxybutynin (N = 391)</th>
<th>Tolterodine (N = 399)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urge incontinence episodes/week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>37.2</td>
<td>36.9</td>
<td>NS</td>
</tr>
<tr>
<td>12 weeks</td>
<td>10.8</td>
<td>11.2</td>
<td>NS</td>
</tr>
<tr>
<td>Total incontinence episodes/week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>43.3</td>
<td>42.6</td>
<td>NS</td>
</tr>
<tr>
<td>12 weeks</td>
<td>12.3</td>
<td>13.8</td>
<td>NS</td>
</tr>
</tbody>
</table>

Adapted from Diokno et al.

The role of estrogen in the treatment of UI has been unclear. The authors of a 2003 Cochrane systematic review that included 28 trials and 2926 women concluded that estrogen was beneficial—more so in urge than in stress UI—however, the analysis contained small numbers of subjects enrolled in randomized-controlled trials. By contrast, a recent randomized-controlled trial of 23 296 women enrolled in the Women’s Health Initiative hormone replacement trial found that estrogen both with or without medroxyprogesterone increased the 1-year incidence of UI in women who were continent at the start of the study. For women who already had UI hormone replacement therapy increased the severity of their symptoms. Although this large study provides strong evidence that hormone replacement therapy has no role in the treatment of UI, the role of topical estrogens remains largely unknown.

At the present time there are no FDA-approved drug treatments for stress UI. Because of serious cardiovascular and central nervous system side effects associated with the α-adrenergic agonist ephedrine and hemorrhagic stroke attributed to phenylpropanolamine, these agents are no longer available to treat stress UI.

Duloxetine (Cymbalta), a selective serotonin-norepinephrine reuptake inhibitor now available for the treatment of major depression and painful diabetic neuropathy, has been investigated in placebo-con-
trolled trials as a treatment for stress UI.41-44 Through what is believed to be a centrally mediated action, duloxetine has been shown to increase bladder capacity and urethral sphincter activity in a cat model.45 In a phase 3 trial of 683 women ranging in age from 22 to 84 years (average age 52.3 years in the duloxetine group and 53.3 years in the placebo group), duloxetine was significantly better than placebo in reducing the frequency of incontinence episodes and increasing the voiding interval in women with stress incontinence. The most common side effect was nausea.46 Whereas other placebo-controlled trials have demonstrated similar efficacy and side-effect profiles,42-44 none of the currently available studies can assure us of their safety in older patients.

Pharmacologic therapy for stress UI remains limited with currently no FDA-approved drug treatments. Because of serious side effects α-adrenergic agonists can no longer be recommended and hormone replacement therapy may worsen symptoms of stress UI. Duloxetine may prove to be an effective treatment but because of limited experience in older patients vigilance is necessary in assessing side effects.

Pharmacotherapy for the Case Patient

The patient was encouraged to continue with behavioral therapy and long-acting oxybutynin was added to her treatment. She noticed a further decrease in her incontinence episodes but she could not tolerate the dry mouth. She was switched to long-acting tolterodine with similar results. At this point she was referred for urologic evaluation.

How Urologists Treat Urinary Incontinence

Referral to a urologist is appropriate for any patient with UI that has not improved with behavioral therapy or pharmacotherapy. Surgery to correct pelvic organ prolapse can improve the symptoms of urge incontinence, although with varying success rates.46 More dramatic options for urge incontinence, such as detrusor myectomy and bladder augmentation, should be attempted only as a last resort.46 On the other hand, surgery corrects or reduces stress incontinence in 30% to 90% of women, depending on the technique used.46 There are many variations, but the general approaches are bladder neck suspension to correct urethral hypermobility, or a bladder sling to correct intrinsic sphincter insufficiency.46 Artificial urinary sphincters sometimes are implanted in men with postprostatectomy incontinence or neurologic causes of intrinsic sphincter deficiency, and occasionally in women with severe intrinsic sphincter deficiency.46

A minimally invasive procedure, transurethral injection of a bulking agent such as collagen, is an option for both men and women with stress incontinence. Submucosal placement of the material builds up the tissues around the bladder neck and improves the “seal” of the urethral mucosa. The procedure can take place on an outpatient basis but repeated injections often are required. When collagen is used a skin test is required to exclude a potential allergic reaction. Long-term studies of men and women treated with collagen injection have shown mixed results47-49 and a recent review concluded that efficacy declines with time.50

Sacral nerve stimulation has been FDA-approved since 1997 for treatment of refractory urge incontinence. Medicare coverage was granted in 2001. The development of this system was based on the observation that electrical stimulation of sacral nerves can modulate neural reflexes that influence bladder function. A pacemaker-sized pulse generator is implanted in the upper buttock or abdomen, and a lead is placed adjacent the sacral nerve (S3) and attached to the pulse generator with an extension. Improvements in the equipment, approved by the FDA in 2002, have made the surgery minimally invasive, and able to be conducted under local anesthesia.

The pivotal trial of sacral nerve stimulation was a 16-center study of 76 patients, of whom 80% were women.51 The average patient age was 46 years (range, 20 to 79 years) and the average duration of urinary symptoms was 9 years (range, 0.6 to 35.4 years). The patients were randomly assigned to 6 months of stimulation therapy, either immediately or after a delay of 6 months (control group). At baseline, the average number of daily incontinence episodes was 8.9. After 6 months of follow-up, the number of episodes was significantly lower in the treatment group than in the

Figure 2. Short-term Efficacy of Sacral Nerve Stimulation for Treatment of Urinary Incontinence*

![Figure 2](https://example.com/figure2.png)

Daily leaking episodes in patients with refractory urge incontinence after 6 months of sacral nerve stimulation (N = 34) or continuation of standard treatment (N = 42). Significant reduction, ≥50% reduction in number of episodes; slight reduction, <50% reduction; no reduction, no change or slight increase.

* Reprinted with permission from Schmidt, et al.51
control group. As shown in Figure 2, close to half of the treated patients (47%) but none of the controls had zero daily incontinence episodes. Conversely, 74% of the controls but only 9% of the treatment group had no reduction in incontinence episodes.

A nonrandomized trial by the same group showed that improvement in symptoms persists during long-term sacral nerve stimulation. As is typical practice to do so today, the study subjects first underwent a short period of percutaneous test stimulation. The 96 patients who showed >50% reduction in incontinence symptoms received the device and were followed for an average of 31 months (range, 12 to 60). About 25% experienced zero leakage, and 36% reported a significant reduction in incontinence episodes (Figure 3). Adverse events included pain at the surgical site (14%), new pain (11%), suspected lead migration (9%), infection (7%), pain at the lead site (6%), and transient electric shock (6%). One third of patients required surgical revision due to an adverse event. Eleven patients had to have the device removed because of lack of efficacy (N = 9), chronic leg pain (N = 1), or bowel dysfunction (N = 1).

Since the late 1980s, more than 8000 sacral nerve stimulation systems have been implanted. In 6506 months of experience with 250 patients, 368 adverse events occurred in 157 individuals. None of the events were unanticipated, and 89% resolved within 1 year.

**Referral of the Case Patient**

The urologist who evaluated the patient for her recurrent urinary tract infections sent her to an incontinence specialist because of her pronounced urge incontinence. That urologist concluded that she would be a candidate for sacral nerve stimulation. During the test stimulation period the patient had about a 50% reduction in her incontinence episodes, and she underwent implantation of the stimulator. She has had mixed results with some complaints of leg pain that have required adjustment to the neuromodulation.

**Conclusion**

UI should not be viewed as an expected and accepted part of growing old. Many of its multiple causes are amenable to behavioral therapy or pharmacotherapy supervised by the primary care clinician. If conservative measures fail, older patients may be candidates for minimally invasive surgery, including transurethral injection of a bulking agent or sacral nerve stimulation, as well as conventional surgery. As the number of active older individuals continues to grow, primary care clinicians should be prepared to acknowledge and treat what is often a needlessly expensive, distressing, and disabling condition for many older adults.

**References**


**Figure 3. Long-term Efficacy of Sacral Nerve Stimulation for Treatment of Urinary Incontinence**

<table>
<thead>
<tr>
<th>Patients, %</th>
<th>Zero Leaks</th>
<th>Significant Improvement</th>
<th>Slight Improvement</th>
<th>No Improvement</th>
<th>Explanted</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>36</td>
<td>20</td>
<td>6</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

Daily leaking episodes in patients with refractory urge incontinence after an average of 31 months of sacral nerve stimulation (N = 96). Significant reduction, ≥50% reduction in number of episodes; slight reduction, <50% reduction; no reduction, no change or slight increase.

*Reprinted with permission from Janknegt, et al. [52]
36. Zinner N, Tuttle J, Marks L. Efficacy and tolerability of darifenacin, a muscarinic M3 selective receptor antagonist (M3 SRA), compared with oxybutynin in the treatment of patients with overactive bladder. World J Urol. 2005 Aug 12.[Epub ahead of print]