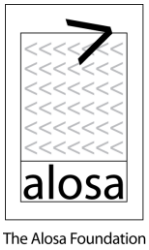
Diagnosing and treating urinary incontinence:

Why your patients don't just have to go with the flow.



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These are general recommendations only; specific clinical decisions should be made by the treating physician based on an individual patient's clinical condition.

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Introduction

Urinary incontinence afflicts almost one in three older people, especially women, but it is not an inevitable part of aging.[1] It presents significant physical and emotional challenges for patients, families and other caregivers, and is a major precipitant of placement in long term institutional care.[2]

Despite its high prevalence, many elderly patients with urinary incontinence remain undiagnosed and untreated.[1] More than 50% of women who have symptoms do not seek medical care.[3] Patients are often reluctant to report the problem, and clinicians often do not ask about it.[1]

Simple screening questions, an evaluation of causes of incontinence, medication review, and several non-invasive interventions can make a big difference in the physical and psychological well-being of patients and caregivers. In some cases, this can mean the difference between the ability to continue living independently in the community and the need for institutional care.

This document summarizes the current medical literature about urinary incontinence and offers practical strategies for the diagnosis and management of this common problem. Much can be done by primary care clinicians to successfully identify and manage urinary incontinence; most patients can be helped without specialized testing and referral. However, inaction can contribute to the false sense that incontinence is an inevitable part of 'just getting old.' Incontinence is often cited as the 'last straw' that influences whether a person can continue to be managed at home or requires institutional care.

Burden of disease and definitions

Urinary incontinence can impair participation in daily activities, physical functioning, psychological well-being, and overall quality of life. It increases the risk of falls, fractures and nursing home admissions, leading to reduced quality of life and increased health care expenditures.[2] Incontinence also puts older patients at increased risk of skin and urinary tract infections.

The total estimated economic cost of urinary incontinence in 2000 was around $26 billion in the U.S. alone, with institutional care accounting for approximately $8.4 billion;[4] these costs will continue to rise as the population ages. The cost of informal care giving, which is not included in the above estimates, is also substantial.

Types of urinary incontinence

Urinary incontinence can be divided into five major groups:

- stress
- urge
- mixed
- overflow
- functional

These are summarized below. A glossary of terms is provided on page 52. Urinary tract fistulas may also cause uncontrolled urine loss and though rare, should be considered in the differential diagnosis.

Table 1. Types of urinary incontinence.

Urge urinary incontinence	Involuntary leakage accompanied by or immediately preceded by a sense of urgency.[5] Results from an overactive detrusor.
Stress urinary incontinence	Involuntary leakage on effort, exertion, sneezing or coughing.[5] Results from increased urethral mobility, poor intrinsic sphincter function and/or poor pelvic floor muscle strength.
Mixed urinary incontinence	Involuntary leakage associated with both urgency and stress.[5]
Overflow incontinence (chronic urinary retention)	Involuntary loss of urine resulting from poor bladder emptying and urinary retention; caused by detrusor muscle weakness, bladder outflow obstruction, or both. Patients may have weak urinary stream, dribbling, hesitancy, intermittency, frequency, nocturia, and urge or stress incontinence symptoms.[1]
Functional incontinence	Urine loss associated with difficulty reaching a toilet when needed in an otherwise continent person. It can result from impaired mobility caused by conditions such as severe arthritis, muscle weakness, stroke, cognitive impairment, dementia, confusion, or sedation.

Some patients have more than one cause of incontinence or may transition from one type to another over time.

Prevalence

Urinary incontinence is a very common condition, with the highest prevalence in older women. Up to 30% of people aged ≥ 65 years have urinary incontinence.[1]

Stress incontinence is the commonest cause in younger women, but as women age the prevalence of urge and mixed incontinence increases. Incontinence in men is often associated with prostate disease and its treatment, and generally includes hesitancy, poor stream, and dribbling. The prevalence of urinary incontinence in men is about a third that in women until age 80, when rates converge.[6] One survey of frail older community-dwelling people found prevalence rates of 52% of women and 49% of men .[7]

The condition is likely under-reported because of patient embarrassment. Severe or socially disabling incontinence has been reported to affect almost 3% of the adult population, or 1 out of every 35 people.[8]

Consequences

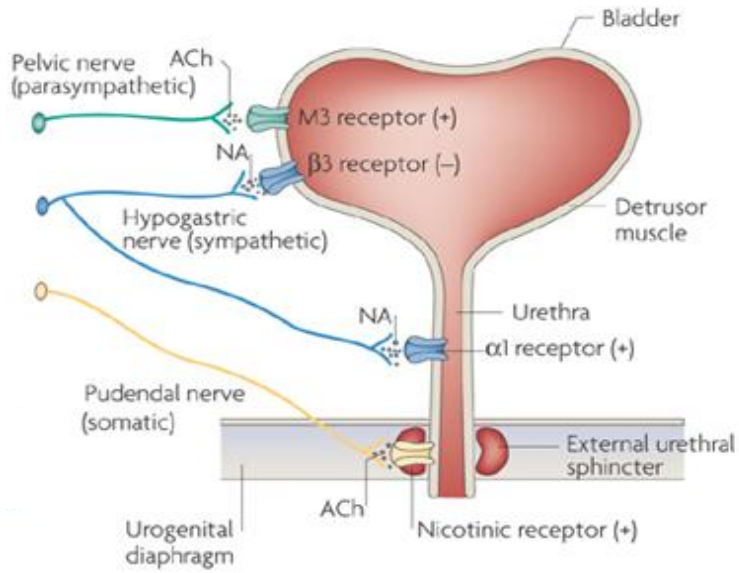
Risk of falls

A recent meta-analysis[9] found that patients with urge incontinence were almost twice as likely to fall as patients without (odds ratio 1.94). Patients with stress incontinence were also more likely to fall.[9] This may be because of patients' concern that they may not reach a toilet in time. As a result, when older people seek help for either falls prevention or management of urinary incontinence, they should be linked to interventions that address each of these issues.

Functional anatomy and physiology of the lower urinary tract

Incontinence in the frail older patient may be the result of a specific cause, or it may be multifactorial. In the latter case, it may be the result of the failure to compensate for stressors rather than specific physiological changes in the urinary tract.[10]

Figure 1. Diagram of the lower urinary tract.



NA = noradrenalin; Ach = acetylcholine; M3 receptor = muscarinic receptor; β3 receptor = adrenergic receptor; α1 receptor = adrenergic receptor

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Urine storage and voiding
Storage: requires relaxation of the detrusor (β-adrenergic) and contraction of the internal (α-adrenergic) and external (voluntary) sphincters
Emptying/voiding: usually voluntary; bladder contraction (parasympathetic) in coordination with sphincter relaxation

Stress Incontinence

Stress urinary incontinence is far more common in women, with pregnancy and childbirth the most common precipitating events. During pregnancy the release of relaxin relaxes and softens the pelvic floor muscles. One recent study found that women with C-section or vaginal delivery had higher rates of stress incontinence compared to nullparous women (odds ratios 1.4 and 3.0 respectively).[11] In younger women, relaxin is also released each month prior to ovulation and if fertilization does not occur, production is ceased until next cycle. This may account for stress urinary incontinence experienced by some women immediately prior to menstruation.[10] Stress incontinence following delivery is thought to be related to the pressure, stretch, and shearing effects on pelvic muscles, pubourethral ligaments, and nerves. Episiotomy, forceps and vacuum assisted delivery can compound the risk of damage to the pelvic floor supports.

After menopause, decreases in circulating estrogen can cause bladder muscle weakness and atrophy of the mucosal tissue lining the urethra. Reduction in pelvic floor resilience in later life may combine with mechanical factors and estrogen depletion in contributing to urinary incontinence after menopause.

Hysterectomy, pelvic floor surgery, chronic constipation, obesity, frank prolapse, and urinary tract infections are additional risk factors.[10]

In men stress urinary incontinence is most commonly caused by prostate surgery. Incontinence after radical prostatectomy is related to intrinsic sphincter deficiency in most patients, although detrusor over-activity or compliance abnormalities may also exist.[12]

Urge Incontinence ('overactive bladder')

Overactive bladder is common in both older men and women. It is a sudden and compelling desire to pass urine (urgency), which is difficult to avoid and may result in an involuntary leakage.[13] It is caused by an involuntary increase in bladder pressure due to bladder smooth muscle over-activity. Other symptoms include urinary frequency and nocturia.

Mixed incontinence

Mixed Incontinence is a combination of urge and stress incontinence. The symptoms may vary depending on which type of incontinence predominates.

Overflow incontinence

Overflow incontinence results from urinary retention due to detrusor muscle weakness, bladder outlet obstruction, or both. A common cause of detrusor weakness is the use of medications with anticholinergic effects (see Table 2 below). Bladder outlet obstruction can result from prostatic hypertrophy, prostate cancer, urethral stricture, kidney stones, or renal calculi. Drugs are also an important potential cause of bladder outlet obstruction and these include anticholinergics, antihistamines, and pseudoephedrine. Approximately two thirds of men who present with lower urinary tract symptoms will have bladder outlet obstruction.[14, 15] They may have symptoms of dribbling, weak urinary stream, intermittency, hesitancy, frequency, and nocturia. There may be a substantial overlap in symptoms with other types of urinary incontinence.[1] In women, severe pelvic floor prolapse can cause outlet obstruction by creating a kinking effect at the bladder neck.

Several medical conditions, including spinal cord injury and multiple sclerosis can cause detrusor muscle weakness. Pelvic organ prolapse can contribute to bladder outlet obstruction in women.

Constipation can obstruct the urethra and result in urinary retention and overflow incontinence. Fecal impaction can cause several symptoms including urgency, frequency, urge incontinence, stress incontinence, mixed incontinence, and nocturia.

The following table (adapted from and available at: http://www.empr.com/medications-with-significant-anticholinergic-properties/article/123667/) lists medications with significant anticholinergic effects.

Table 2. Medications with an anticholinergic effect.

Antihistamines chlorpheniramine, cyproheptadine, diphenhydramine, hydroxyzine, loratadine, cetirizine
Anticonvulsants carbamazepine **Antidepressants** amoxapine, amitriptyline, clomipramine, desipramine, doxepin, imipramine, nortriptyline, protriptyline, paroxetine, trazodone, mirtazapine
Antiemetics prochlorperazine, promethazine
Antipsychotics chlorpromazine, clozapine, olanzapine, thioridazine, haloperidol
Antitussives benzonatate **Antivertigo** meclizine, scopolamine
Respiratory Ipratropium, tiotropium **Cardiovascular** furosemide, digoxin, nifedipine, disopyramide
Gastrointestinal Antidiarrheal: diphenoxylate atropine Antispasmodics: belladonna, clidinium, chlordiazepoxide, dicyclomine, hyoscyamine, propantheline Antiulcer: cimetidine, ranitidine, famotidine
Muscle Relaxants cyclobenzaprine, dantrolene, orphenadrine, tizanidine
Parkinsonism amantadine, benztropine, biperiden, trihexyphenidyl
Urinary Incontinence darifenacin, fesoterodine oxybutynin, solifenacin, tolterodine, trospium

Functional incontinence

Characterized by urine loss associated with difficulty reaching a toilet when needed in an otherwise continent person. It can result from impaired mobility caused by conditions such as arthritis, muscle weakness, stroke, cognitive impairment, dementia, confusion, or sedation.

Contributing illness, impairment, and drugs

The 'DIAPPERS' mnemonic

This is a useful way to recall factors to be considered when evaluating a patient with urinary incontinence.[16]

D	Delirium
I	Infection (urinary tract)
A	Atrophic urethritis/vaginitis
P	Pharmaceuticals
P	Psychological
E	Excess urine
R	Reduced mobility
S	Stool impaction

These reversible conditions are common; identifying them can help avoid more complicated evaluations and treatments and often results in amelioration or elimination of symptoms.[17]

Delirium

Delirium is a transient loss of orientation and cognitive function, characterized by a reduced ability to focus, sustain, or shift attention. It most commonly develops over a short period of time (usually over hours or days), and generally fluctuates during the course of the day. Common precipitants include hypoxia, fever, renal failure, dehydration, infections such as pneumonia and urinary tract, medications (includes withdrawal of some medicines), stroke, and myocardial infarction. The onset of incontinence may be an early sign of delirium.

Infection (urinary tract)

Urinary tract infections are the most common infections in older people and are 50 times more frequent in women than men. It is a common cause of acute (but not chronic) incontinence even if dysuria and frequency are not prominent presenting complaints. Incontinence is also a risk factor for urinary tract infection.

Atrophic urethritis/vaginitis

A decline in estrogen levels from the peri-menopausal period onward causes changes in vaginal tissues and vaginal pH; symptoms related to vaginal atrophy are reported in over 50% of women aged over 60. These include vaginal dryness, itchiness, dyspareunia, stress incontinence, urgency, frequency and dysuria. Recurrent UTI and vaginal infections may occur in women with atrophic vaginitis.

Pharmaceuticals

A number of medicines may contribute to or cause urinary incontinence (see Table 4 on page 15). A review of all prescription and non-prescription medicines should be conducted (see the section titled '5) Medications' under Clinical Assessment on page 14 for a detailed discussion of this issue).

Psychological

Depression may contribute to development of urinary incontinence or worsen pre-existing incontinence. Both conditions are associated with social isolation. Incontinence can lead to stigmatization, hopelessness and depression. Daily activities become major planning exercises to avoid embarrassing 'accidents,' leading to increasing social isolation. Planning ahead for regular toilet stops can help people get out and about in the community.

Excess urine

Polyuria is urine output greater than 2500 mL in 24 hours. Some common medical conditions such as hyperglycemia and hypercalcemia can cause polyuria. A bladder diary (see Appendix 1) can help identify excessively high fluid intake, or indicate whether medicines or co-morbid conditions may be contributing.

Nocturnal polyuria occurs when (i) 24 hour urine volume is normal, and (ii) the total volume of all night voids and the first void on rising in the morning represents ≥ 1/3rd of 24 hour urine volume.

Causes of nocturnal polyuria include heart failure, sleep apnea, renal insufficiency, daytime fluid retention, and medicines such as diuretics. Nocturia is very common in the older population with 78% of women over 75 years reporting symptoms of nocturia.[18] Nocturnal polyuria is a common underlying cause and has been reported in 51% of women.[18] Nocturia can affect sleep quality and pose a falls risk.

Reduced mobility

Impaired mobility in the elderly can be caused by numerous medical conditions, as well as by the loss of confidence following a fall. Mobility is also influenced by problems with vision, cognitive function, medications, arthritis, and aids such as canes or crutches. These factors can all increase the time needed to reach the toilet and manage clothing appropriately to avoid urine leakage.

Environmental changes can lessen the impact of poor mobility and manual dexterity. These include proper lighting in corridors, bathroom and toilet, easy-access clothing, and appropriate footwear.

Stool impaction

Constipation is common in the elderly. The extent of fecal impaction in the older community dwelling population is unknown, but is likely to be high. Rates of 30% have been reported in residents in nursing homes.[19]

Constipation can contribute to the burden of incontinence, and identifying and treating it can make an important difference to the treatment of urinary incontinence. Many common medications can cause constipation (see Table 3 below); less constipating alternatives are sometimes available. Other common causes of constipation include immobility, depression, reduced fluid/fiber intake, bowel obstruction, hypothyroidism and hypercalcemia.

Table 3.Selected medicines which can cause constipation.

Class of drug	Selected examples
Anticholinergic	antihistamines, antiparkinsonian agents, phenothiazines, antipsychotics, tricyclic antidepressants, and drugs used to treat urge incontinence (oxybutynin, solfenacin, darifenacin, tolterodine, fesoterodine, trospium)
Opioids	codeine, morphine, oxycodone, methadone, fentanyl, buprenorphine, tramadol
Calcium channel blockers	Verapamil
Calcium Supplements	calcium carbonate
Iron Supplements	ferrous sulfate
Diuretics	furosemide, thiazide and thiazide-like diuretics
Antacids	containing calcium or aluminum
5HT-3 receptor antagonists	ondansetron, granisetron, dolasetron

Bottom line: A number of medical conditions, impairments, and medicines cause or worsen urinary incontinence. The "DIAPPERS" mnemonic can be helpful in recognizing reversible causes.

Clinical assessment

Screening

Many older patients who are distressed by urinary incontinence do not report it.[1] Simple screening questions about 'a common and sometimes difficult to raise issue' can be helpful:[1]

- Do you have trouble with your bladder?
- Do you ever lose urine when you don't want to?
- Do you wear pads or adult diapers for protection?

History

If the patient answers 'yes' to any of the above screening questions, take a more detailed history.[3, 20, 21]

1) Define the type of incontinence

- Do you leak urine with activities like coughing, sneezing, lifting, or exercise (stress incontinence), or do you get a strong urge to urinate (urge incontinence)?
- Do you find it difficult to get to the toilet in time? Is this because of confusion, drowsiness, difficulty in moving or walking, or poor lighting (functional incontinence)?

2) Define the causes and precipitants of incontinence

- How often do you go to the toilet during the day to pass urine?
- How often do you get up at night to pass urine?
- When do you leak urine?
- What is your caffeine and alcohol intake?
- What prescription and non-prescription drugs do you take (see below)?
- Do you have diabetes? Constipation?
- Ask about risk factors for stress incontinence including parity, history of large babies, forceps and breech deliveries, chronic cough, and obesity.
- Have you had any previous urinary tract or gynecological surgery such as incontinence or prolapse procedures, or hysterectomy?

Ask the patient to complete a bladder diary (see below and Appendix 1).

3) Exclude other pathology

Patients who have typical stress or urge incontinence should not have any of the following features:

- hematuria

- dysuria
- acute onset of symptoms (the usual history is of a gradual onset)
- obstructive symptoms such as straining to void, or a sensation of incomplete bladder emptying
- recurrent urinary tract infections
- neurological symptoms such as new-onset numbness or tingling, weakness, back pain, visual disturbances, or altered bowel habit with constipation or fecal incontinence

Patients who have atypical features, major pelvic organ prolapse, and/or severe symptoms should be considered for specialist referral and are likely to warrant full assessment with cystoscopy and urodynamic study.

4) Assess the severity and impact of incontinence

Severity of incontinence and impact on quality of life are not necessarily the same. Even mild urinary incontinence can have a significant impact on a patient's quality of life. It is important to obtain information about both incontinence severity and impact.

- How often do you leak urine?
- How bad is it when you do leak? Are your pants damp, wet through to your clothes, or soaked to the floor?
- Do you need to use pads for the leakage?
- Does the leaking affect your social engagements or day to day activities?
- Does the leaking affect your quality of life?

There are many incontinence-specific quality of life and symptom severity scales.[22, 23] The International Consultation on Incontinence (ICI) has produced a validated questionnaire (the ICIQ) which assesses both the severity and impact on quality of life of urinary symptoms.[24] Its short form (ICIQ-SF) is provided in Appendix 2. Other tools to assess the effect of urinary incontinence on quality of life include the Incontinence Impact Questionnaire short form (IIQ-7) and the Urogenital Distress Inventory short form (UDI-6)[25](see Appendix 3).

5) Medications

Assessment should include a review of all prescription and over-the-counter medicines (including complementary and alternative medicines), alcohol, and caffeine. Medications that can contribute to urinary incontinence are listed in Table 4 below.

Table 4. Medications that can affect urinary tract function and symptoms.[14, 26-28]

Class	Medication	Effect	Type of incontinence caused
Antihypertensives	ACE-Inhibitors	Cough	stress
	Diuretics	Diuresis (polyuria)	urge
	Verapamil	Impaired emptying (retention), voiding difficulty, constipation, dependent edema (nocturnal polyuria)	overflow, urge
Alpha adrenergic agents	Alpha adrenergic agonists (pseudoephedrine)	Increase urethral and prostate capsule smooth muscle tone (obstruction and retention)	overflow
	Alpha adrenergic antagonists (alfuzosin doxazosin, prazosin, tamsulosin, terazosin)	Sphincter relaxation	stress
Anticholinergics (see also psychotropics below)	e.g. darifenacin, fesoterodine, oxybutynin, solifenacin, tolterodine, trospium, antihistamines (see Table 2 on page 9 for a full list)	Reduce detrusor activity (retention), bladder outlet obstruction, constipation, sedation, dry mouth (polydipsia), blurred vision, confusion, delirium	overflow, functional, urge
Psychotropics	Antidepressants SSRIs	Increased detrusor activity, sedation	urge, functional
	Tricyclics	Anticholinergic effect (see above), sedation, confusion	overflow, functional
	Antipsychotics	Anticholinergic effect (see above), sedation, confusion, impaired mobility, parkinsonism, constipation	overflow, functional, stress
	Benzodiazepines	Sedation, confusion, impaired mobility	functional
Narcotics	e.g. oxycodone, morphine, fentanyl, codeine, tramadol	Impaired voiding reflex (retention), reduce detrusor activity, constipation, sedation, confusion	overflow, functional
Other	Alcohol	Diuresis (polyuria), lowers central inhibition	urge
	Caffeine	Diuresis (polyuria)	urge
	Beta agonists	Impaired emptying (retention)	overflow
	Cholinergics (donepezil, galantamine, rivastigmine, bethanecol)	Increased detrusor activity	urge
	Gabapentin	Dependent edema (nocturnal polyuria)	urge
	Glitazones (rosiglitazone, pioglitazone)	Dependent edema (nocturnal polyuria)	urge
	Lithium	Polydipsia (polyuria)	urge
	Non-steroidal anti-inflammatory agents	Dependent edema (nocturnal polyuria)	urge

The risk of anticholinergic adverse effects is greater in the elderly and in patients with co-morbidities. Many drugs have anticholinergic adverse effects which are usually dose-related and may be additive. Even if the contribution of each individual agent is small, a patient's total anticholinergic load may be sufficient to cause or worsen urinary incontinence.

St John's Wort has been associated with voiding difficulty; other complementary medicines containing guarana or large amounts of caffeine can increase diuresis, aggravate detrusor instability, and worsen urge incontinence.

Physical examination

The physical exam in women presenting with symptoms of incontinence should include pelvic, abdominal, rectal, neurological, and cardiac examinations.[20, 21, 26] Findings and implications are presented in Table 5 opposite.

Table 5. Physical examination finding and implications.

Organ System	Exam Findings	Implications
Pelvic	Pelvic organ prolapse	Overflow incontinence (from bladder outlet obstruction) or voiding dysfunction
	Vulvar/vaginal atrophy	Urge incontinence or voiding dysfunction
	Weak pelvic floor muscle assessment	Stress incontinence
	Anterior vaginal wall palpation for urethral tenderness or discharge	Irritative symptoms (frequency, urgency, burning) from urethral infection or inflammation
	Bimanual exam for pelvic masses	Voiding dysfunction from pelvic masses
Abdominal	Fullness, bloating, masses, ascites	Voiding dysfunction from abdominal pressure
	Palpable bladder	Overflow incontinence
Rectal	Reduced or absent anal sphincter tone	Overflow incontinence
	Fissures may indicate chronic constipation or fecal impaction	Overflow incontinence (from bladder outlet obstruction) or voiding dysfunction
Neurologic	Mental status	Functional or mixed incontinence due to decreased awareness of need to void
	Abnormal perineum and lower extremity exam (motor/sensory)	Overflow incontinence
Cardiac	Volume overload	Nocturia or nocturnal incontinence

Pelvic organ prolapse

Pelvic organ prolapse (POP) is the herniation of one or more of the pelvic organs (uterus, bladder, rectum, or vaginal apex) and its associated vaginal segment from their usual anatomic location. In a study of women in a gynecologic visit, 31% had POP, but only 2% reached the introitus.[29] Seeing or feeling a bulge is a specific (100%) but not sensitive (16%) marker for prolapse beyond the introitus.[30] Women with symptomatic prolapse at or below the introitus should be referred to a specialist.[23]

Pelvic floor muscle strength assessment

Digital assessment of pelvic floor strength is easy to perform, correlates well with invasive assessment, and should be performed before the use of pelvic floor muscle training.

Pelvic floor muscle strength can be determined by asking the patient to contract her pelvic floor muscles while the examiner performs a digital vaginal examination. Women who do not know how to consciously contract their pelvic floor muscles can be instructed to contract the muscles they would use to keep from passing gas or to stop themselves from voiding. During digital vaginal palpation, the examiner places the index finger at 4 o'clock and then 8 o'clock. The tone and strength of the pelvic muscles at rest and with Valsalva can be rated with a subjective 5 point scale: 0 (no tone or strength) to 5 (strong tone and strength).[20]

Invasive assessment of muscle strength (by electromyography (EMG) or perineometry) is not recommended, and digital palpation is sufficient,[31, 32] even though it has poor inter-rater observer reliability.[23] Some guidelines recommend digital assessment of pelvic floor muscle strength before the use of pelvic floor muscle training.[23]

Urine stress test

The stress test involves observation for urine loss with coughing or a Valsalva maneuver. A stress test is easy to perform in the office. In either the standing or lithotomy position, urine loss from a comfortably full bladder with stress (Valsalva or cough) is a positive test and indicates stress incontinence.[20]

A meta-analysis of five cohort studies found that a positive urine stress test substantially increases the likelihood of stress incontinence by threefold , and a negative test substantially decreases its likelihood by about two-thirds.[20] No additional diagnostic accuracy is obtained with more complicated stress tests (such as sequential emptying/filling or supine/standing positioning). As a result, a full-bladder supine clinical stress test is non-invasive and highly reliable, and should be a routine part of the stress urinary incontinence evaluation.

Bladder diaries

Bladder diaries (also called voiding diaries or frequency volume charts) are a practical, reliable, and simple method of quantifying urinary frequency and incontinence episodes.[21, 23, 26] Bladder diaries are highly reproducible and correlate well with urodynamic diagnosis,[26] and should be used in the initial assessment of urinary incontinence.[22, 23]

In a bladder diary, the patient records voiding times and amounts, leakage episodes, triggers and degree of incontinence, degree of urgency, and fluid intake.[23] The patient should complete the diary for a minimum of 3 days, which do not need to be consecutive, but cover both working and leisure days. A 3-day period allows variation in day-to-day activities to be captured, while achieving reasonable compliance.[22, 23, 26]

A bladder diary[21] also provides an objective measure of the patient's symptoms, and engages the patient in treatment, facilitating comparison of symptoms over time and with treatment. It also encourages patient awareness of voiding habits and can therefore serve as a key tool in patient education/bladder retraining regimens.

Several patterns of abnormality may be observed on a bladder diary as shown below:[21]

Table 6. Bladder diary patterns and potential causes.

Pattern	Causes
Frequent small volume voids;	Overactive bladder or deliberate patient restriction of fluid intake to try and control urinary symptoms
Frequent large volume voids	excessive fluid intake, diabetes mellitus or insipidus, or hypercalcemia
Nocturnal polyuria	Aging, obstructive sleep apnea, cardiac failure, poorly timed diuretic use, or excess evening fluid intake.

A template of a bladder diary is provided in Appendix 1.

Urinalysis

A urine dipstick test should be done in all patients presenting with urinary incontinence to detect the presence of blood, glucose, protein, leucocytes, and nitrites.[22, 23, 32]

Bottom line: Some simple screening questions can help determine if a patient has a problem with urinary incontinence. A more detailed medical history, medication review and targeted physical examination, including simple assessment tools such as bladder diaries, severity/quality of life questionnaires, and stress test, can often establish the type of incontinence and help direct therapy. Perform a urinalysis on all patients with urinary incontinence.

Specialized testing

Post-Void Residual (PVR)

The PVR is the amount of urine left in the bladder after normal voiding. Normal residual is <50ml, but amounts up to 200ml can still be within the normal range. A PVR of >200ml is abnormal. This can indicate bladder outlet obstruction, detrusor failure, or neurologic disease. Measurement of PVR can be done by bladder ultrasound or catheterization. One study found that bladder ultrasound had good inter-rater reliability and a specificity of 97% compared to catheterization.[23, 33] For this reason, guidelines recommend bladder ultrasound instead of catheterization for the measurement of PVR. Indications for PVR measurement include women with recurrent urinary tract infections and patients with symptoms suggestive of voiding dysfunction.[22, 23]

Urodynamic Studies

Definitions

Lower urinary tract dysfunction is often categorized into storage vs. emptying abnormalities, and a variety of urodynamic evaluations help to categorize one or both, as described in the table below. All urodynamic studies should be interpreted in relation to symptoms and the physical exam, as well as any other non-invasive studies that have been performed.[34]

Table 7. Urodynamic studies.

Test	Description
Cystometry	Measures the pressure and volume within the bladder during filling. Measurements include bladder capacity, bladder compliance, bladder stability, and patient sensation.[35] Normally the detrusor allows bladder filling with little or no change in pressure. With detrusor overactivity, the bladder involuntarily contacts during the filling phase. Provocative measures to stimulate this overactivity during urodynamics include rapid filling, use of a cool medium, initiating postural changes, and hand washing.[35]
Uroflowmetry	Measures urine flow rate and pattern during emptying, by a free flow void into a recording device. The rate is expressed as ml per second, and flow is expressed as continuous (smooth or fluctuating) or intermittent.[35]
Pressure flow studies	Measure the relationship between pressure and flow rate during bladder emptying. Pressures curves are calculated for intravesical, abdominal, and detrusor pressures.[35] Distinguishes low flow associated with high bladder pressure (indicates outlet obstruction) from low flow associated with low pressure (indicates detrusor failure).
EMG	Directly measures the strength of the striated urethral sphincter and pelvic floor muscles.[35]
Videourodynamics	Simultaneous fluoroscopic displays of the bladder during multichannel cystometry.[35]

Urodynamic studies are considered the 'gold standard' test for urinary incontinence, but their utility must be evaluated according to whether the test results change management or outcomes. A small randomized controlled trial of patients with symptomatic urinary incontinence compared conservative treatment tailored to urodynamic study findings (pelvic floor muscle training or bladder retraining) vs. conservative treatment without urodynamic studies. After 3 months of treatment, no significant differences were seen between groups in any outcome (leakage episodes, frequency, nocturia, subjective assessment, short pad test), indicating that results of urodynamic studies may not change management or outcomes in uncomplicated cases.[36]

A Cochrane review evaluated the efficacy of urodynamic studies on management and outcomes. One trial found women who underwent urodynamic studies were twice as likely to receive medical or surgical treatment as those who did not undergo urodynamic studies. However, there were no differences between the groups in outcomes of cure rates, incontinence episodes, health status measures, or death. The number of patients included in this review was small (128 participants with available data), and the confidence intervals wide, so it was underpowered to determine if urodynamic studies had

any effect on clinical outcomes.[37] An ongoing trial may provide additional data.[38]

Because urodynamic studies have not been shown to affect outcomes and because they are expensive and uncomfortable, most consensus guidelines do not recommend routine urodynamic studies for patients with urinary incontinence before a trial of conservative treatment. Some guidelines recommend urodynamic studies in selected circumstances including before surgery (in selected cases),[23] for patients whose symptoms are not consistent with stress urinary incontinence, or when conservative or surgical measures have failed (for any type of urinary incontinence),[34] if the diagnosis is uncertain,[39] or if the PVR or urine flow rates are abnormal.[26]

Bottom line: Urodynamic studies should not routinely be performed in patients with urinary incontinence. Indications include patients with an uncertain diagnosis despite adequate history and exam (or discordance between history and exam), patients with voiding dysfunction, or those who fail to improve with conservative or surgical therapy.

Cystoscopy

Cystoscopy is the direct visualization of the urethra and bladder via a cystoscope. It is not recommended in the initial assessment of women with urinary incontinence alone.[23] It is indicated in patients with suspected urinary tract neoplasm, such as those with unexplained persistent hematuria, or with persistent irritative voiding symptoms (frequency, urgency, or urge incontinence) in the absence of a urinary tract infection. It can also be used to identify foreign bodies, bladder stones, urethral or bladder diverticuli, urethral strictures, or fistulas.[3]

Other imaging or laboratory tests

BUN and creatinine should be measured if renal insufficiency is suspected, and serum glucose levels measured in the presence of either polyuria or glycosuria.[26] Serum calcium should also be measured if the patient has polyuria. Other laboratory tests are not recommended for the routine assessment of patients with urinary incontinence.

Imaging tests such as magnetic resonance imaging, computed tomography, and X-ray are not recommended for the routine assessment of patients with urinary incontinence. Ultrasound is not generally recommended, other than for the assessment of PVR as discussed above, or if the physical examination suggests an abnormality.[23]

Initial assessment of urinary incontinence in women

Screening questions

- Do you have trouble with your bladder?
- Do you ever lose urine when you don't want to?
- Do you wear pads or adult diapers for protection?

Yes

History, medication review, and physical examination

Define as urge, stress, mixed, overflow, or functional incontinence.

- Severity/quality of life questionnaire (ICIS-SF)
- Bladder diary for 3 days
- Measure post-void residual volume if voiding dysfunction or recurrent UTI
- Clinical stress test
- Urine dipstick test for blood, protein, glucose, leukocytes, and nitrites
- Serum glucose in the presence of either polyuria or glycosuria; serum calcium if patient has polyuria

If urine dipstick is positive for nitrites or leukocytes OR patient has symptoms of UTI, send midstream urine sample for culture and antibiotic sensitivity

Are there any indications for referral?

Urgently refer women with:[20, 23]

- frank hematuria
- suspected mass in the urinary tract.
- microscopic hematuria if aged ≥ 50 years
- recurrent or persisting urinary tract infection with hematuria if aged ≥ 40 years

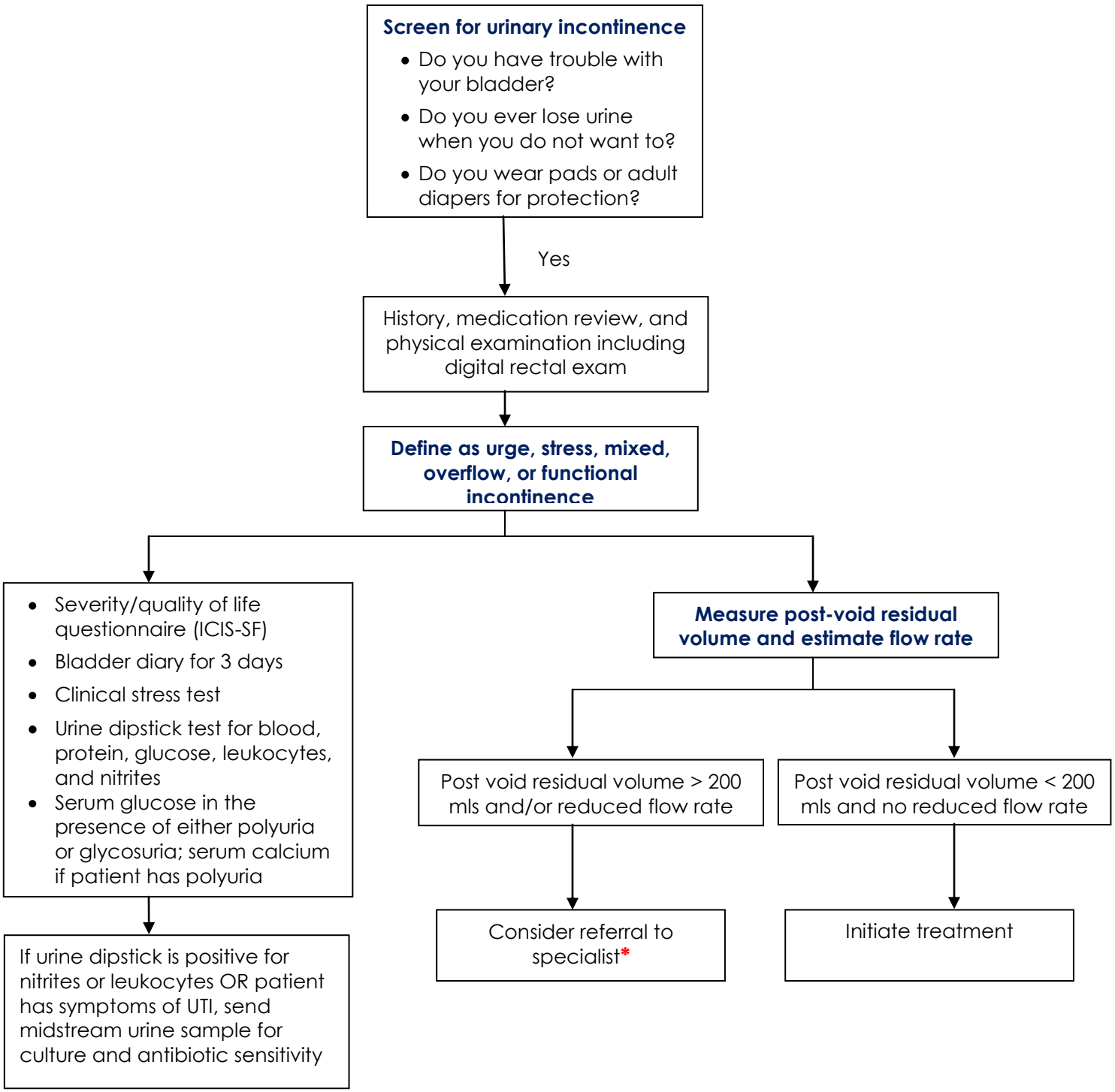
Refer women with:[23]

- symptomatic prolapse visible at or below the vaginal introitus
- palpable bladder on bimanual or physical examination after voiding
- pelvic mass

Other reasons for referral:[20, 23]

- persistent bladder or urethral pain
- clinically benign pelvic mass
- fecal incontinence
- suspected neurological disease
- voiding difficulty
- suspected urogenital fistulae
- previous continence surgery
- previous pelvic cancer surgery or radiation therapy
- diagnostic uncertainty
- inadequate response to previous therapy

Initial assessment of urinary incontinence in men



*Also consider referral to specialist care if hematuria, suspected malignancy, persistent bladder pain, fecal incontinence, previous continence surgery, recurrent UTIs, diagnostic uncertainty, or inadequate response to previous therapy.

Behavioral and physical interventions

Education about bladder function, environmental interventions such as having a safe well-lit path to the bathroom, and the use of toilet substitutes such as urinals or bedside commodes may help in managing urinary incontinence.[1] Behavioral and physical interventions can be very effective for the treatment of urinary incontinence. Such approaches are well studied in the elderly, generally non-invasive, effective for many common types of incontinence, suitable for outpatient primary care setting, and recommended by most guidelines as an initial approach to therapy.[1, 40]

In one study of women with incontinence, behavioral and physical therapy that included group and individual instruction, keeping a bladder diary, pelvic muscle exercises, and bladder training resulted in a 50% reduction in the mean number of incontinence episodes compared with a 15% reduction in controls which was maintained for 6 months.[40] Nearly a third of women were 100% improved (dry), 41% were at least 75% improved, and half were at least 50% improved. There were no differences in treatment efficacy by type of incontinence (stress, urge, mixed).[40] These interventions are described in more detail below.

Weight loss

Weight loss of 5-10% in overweight or obese women can decrease incontinence episodes by more than 50%, and sustain improvement for at least 6 months. Benefits occur in both stress and urge incontinence.[41] Weight loss has an efficacy similar to that of other non-surgical treatments and should be considered a first line therapy for incontinence.[41]

A recent study assigned 338 overweight women (median BMI = 36) with a mean age of 53 years and at least 10 urinary incontinence episodes per week to an intensive 6-month weight-loss program that included diet, exercise, and behavior modification (N = 226) or to a control group (N = 112).[2] The women in the intervention group had a mean weight loss of 8% (7.8 kg), as compared with 1.6% (1.5 kg) in the control group (P<0.001). After 6 months, the mean weekly number of incontinence episodes decreased by 47% in the intervention group, compared with 28% in the control group (P = 0.01). The intervention group had a significantly greater decrease in the frequency of stress incontinence episodes (P = 0.02), but not of urge-incontinence episodes when compared with the control group.

Physical activity

Older persons in the community who perform regular physical activities report a lower frequency of urinary incontinence episodes, but it is not clear what the causal relationship is.[42] Greater physical activity has also been found to reduce incontinence in nursing home populations.[42] Increased physical activity can improve mobility and has many other benefits apart from reducing urinary incontinence, including reducing the incidence of falls and improving balance, coordination, cardiorespiratory fitness, and quality of life.[42]

Prompted voiding

Prompted voiding is a behavioral therapy in which caregivers regularly ask about the need to go to the toilet (usually every 2-3 hours). It aims to improve bladder control for people with or without dementia using verbal prompts and positive reinforcement. Limited evidence suggests that prompted voiding decreases episodes of incontinence in the short-term by about 1 episode per day.[43]

Pelvic floor muscle training

Pelvic floor muscle training (also called Kegel) is an effective treatment for women with stress and mixed incontinence.[22, 26] It may also be effective in treating urge incontinence when used in combination with bladder training (see below).[22]

An assessment of pelvic floor muscle strength by digital anal or vaginal examination should ideally be made during an assessment before initiating pelvic floor muscle training.[22] The focus of this training is to build strength, endurance, and the coordination of the pelvic floor muscles. An effective program can increase contractile strength and increase the resting tone of the pelvic floor, which provides improved support of the pelvic organs.[44]

A recent Cochrane review found that women with stress, urge, or mixed incontinence who underwent pelvic floor muscle training were more likely to report cure or improvement and better quality of life, and to have fewer leakage episodes per day than controls .[45] The size of the treatment effect varied widely between studies and was greatest in women with stress incontinence alone. An earlier Cochrane review found that women undergoing pelvic floor muscle training were 7 times more likely to be cured and 23 times more likely to show improvement.[46] Such muscle training can reduce the need for incontinence surgery, and a stronger pelvic floor can also help with concomitant prolapse and improve sexual function.[44]

Instruction can be provided by the primary care clinician, or with the help of a physical therapist.[1, 47] One common regimen is to recommend that the patient perform 8–12 slow maximal contractions sustained for 6–8 seconds each,

three times daily, as if she is trying to hold in urine.[23, 47] Pelvic floor muscle training should be continued for 3–4 months before assessing outcomes.[23, 45, 47]

Once the pelvic floor muscles are contracting correctly, the key factor for success is adherence to the training program.[44] The primary care physician plays an important role in motivating patients. Correct technique, an adequate challenge to the muscles, and regular practice are key for success.[44]

Bladder training

Bladder training is a widely used and very helpful behavioral approach to incontinence. It aims to reduce incontinent episodes due to uninhibited detrusor contraction by putting the patient on a scheduled voiding program with gradual increases in the duration between voids, and uses urge suppression techniques with distraction or relaxation.[47] This approach is most commonly used for the treatment of urge incontinence, but may also improve symptoms of stress and mixed incontinence. It is most effective for patients who are physically and cognitively unimpaired, and requires a motivated patient. Results are improved with patient education and positive reinforcement by health care professionals.[26]

A Cochrane review found that bladder training may be helpful for the treatment of urinary incontinence, but trials were of variable quality and of small size. There was insufficient evidence to determine whether bladder training was useful as a supplement to other therapies.[48] Bladder training is more than just 'hanging on'. It involves learning to switch on the neural control of the bladder and engage the pelvic floor muscles to close the urethra and prevent urine leakage.[44]

The initial voiding interval is based on how frequently the patient is currently voiding during waking hours as assessed with a bladder diary (often about 1 hour), with a gradual increase by 15–30 minutes per week until a 2–3 hour voiding interval is reached.[47] Increase the interval between voids once there are consistently no leaks between voids > 75% of the time. A trial of bladder training should be conducted for at least 6 weeks.[23]

Advise the patient to do the following when the urge to urinate occurs:

- Stand still and take slow, relaxed breaths.
- Contract the pelvic floor muscles repeatedly.
- Concentrate on making the urge go away. Use mental imagery and self-talk to help suppress the urge.
- Use mental distraction to reduce awareness of the urge.
- When the urge subsides, do not use the toilet until the next scheduled void.

Also, advise the patient to:

- Use a watch or timer to remind of the next bathroom visit.

- Do not restrict fluids, but avoid caffeine and alcohol.
- Keep the bladder diary with them so that they can record bathroom visits and urine leaks.
- Practice pelvic muscle exercises on a regular basis.

For more information, see www.gericareonline.net

Other

Alcohol and caffeine restriction, smoking cessation, and relief of constipation and straining are commonly recommended to treat urinary incontinence, but the evidence for these interventions is not strong.[1, 22, 26, 47, 49] Fluid restriction has not been shown to be effective and may be potentially dangerous in an older person. The resulting concentrated urine may prove to be irritating and provoke detrusor overactivity

Devices

Tampons and pessaries are sometimes used for the treatment of stress incontinence. Pessaries are intra-vaginal devices that support the pelvic organs; incontinence pessaries have knobs that sit under the urethra to increase urethral support. Pessaries need to be removed and cleaned regularly; the risks associated with use are minimal but may include erosion of vaginal tissue and vaginal discharge. Pessaries come in a variety of shapes and sizes, and must be fitted for comfort and to optimize symptom relief. About half the women who are successfully fitted with a pessary use it for the next 1 to 2 years.[50]

A study comparing the use of super tampons or pessaries to the use of no device in women who were incontinent during exercise found that the tampons and pessaries were similarly effective in reducing the frequency of stress incontinence.[50, 51]

Bottom line: Behavioral and physical therapies can be very effective in treating the most common types of urinary incontinence and should be the initial approach to therapy. These interventions are well studied in the elderly, are non-invasive, and can be implemented by the primary care clinician.

Medications for incontinence

Introduction

Several medications are used to treat incontinence. However, most have been studied over short observation periods (generally less than 12 weeks).[52] Most data on the long-term effectiveness comes from open-label cohort studies.

Many studies have found a large placebo effect and no meaningful differences in outcome between placebo and active drug. A recent meta-analysis confirmed that there is a substantial placebo response in trials of anticholinergic drugs for overactive bladder, with substantial heterogeneity in reported treatment results.[52] This may reflect the use of diary, behavioral training, and/or the use of subjective endpoints in these treatment trials.[52]

Drug therapy can be effective, but given the limited efficacy and potential for adverse effects it is important to frequently re-evaluate the benefit and tolerability of the therapy.

Overactive bladder and urge incontinence

As discussed, overactive bladder is common; the resulting increase in bladder pressure can cause a strong desire to pass urine and may result in an involuntary leakage of urine (urge incontinence).[13] Most of the focus of pharmacotherapy for urge incontinence is targeted at blocking the parasympathetic acetylcholine pathway, to reduce the intensity of detrusor muscle contraction and the feeling of urgency.

Several drugs are available to treat overactive bladder and their use is widespread in clinical practice. However, uncertainties exist about the utility and timing of initiation of these drugs in the frail elderly, and those with multiple co-morbidities or who take multiple concomitant medicines. Nevertheless, the use of these agents is increasing. Most of the anticholinergic drugs used to treat overactive bladder and urge incontinence lack selectivity for the bladder, so that adverse effects on other parts of the body limit their usefulness in many patients.[10, 13]

Anticholinergic medications can precipitate acute and chronic confusion, and are among the most commonly implicated medications in delirium.[53, 54] In observational studies, anticholinergics (including bladder anticholinergics) have been associated with cognitive decline, and patients with dementia may be particularly sensitive to this effect.[55] A recent study found that the ability to perform activities of daily living declined 50% faster in higher-functioning patients taking a bladder anticholinergic and a cholinesterase inhibitor compared to those taking a cholinesterase inhibitor alone.[55] Medications with anticholinergic

and sedative effects may be associated with lower physical function over 5 years in the community-dwelling elderly.[56]

Anticholinergic medicines also commonly cause adverse effects such as sedation, dizziness, constipation, urinary retention, and blurred vision. These effects can contribute to overflow and functional incontinence. It is therefore important to be vigilant to the changes in urinary symptoms when new medicines are started and stopped, even when those medicines are initiated to treat incontinence.

Anticholinergics

A number of anticholinergic drugs are used to treat overactive bladder, differing in their selectivity for anticholinergic receptors. In addition to anticholinergic activity, they may have less specific actions such as direct smooth muscle effects. They fall into two main structural classes: (i) tertiary amines such as oxybutynin (Ditropan), tolterodine (Detrol), fesoterodine (Toviaz), darifenacin (Enablex), solifenacin (Vesicare) and (ii) the quarternary amine, trospium (Sanctura). Oxybutynin and tolterodine are the two most frequently prescribed drug treatments for overactive bladder.

A report published by the U.S. Agency for Healthcare Research and Quality (AHRQ) in 2009 provides an overview of the evidence for treatment of overactive bladder in women.[57] It found that all pharmacologic treatments were effective at improving one or more overactive bladder symptoms when compared to placebo.

The following figures provide estimates of treatment effects for various pharmacologic agents used for overactive bladder and urge urinary incontinence.[57]

Figure 2. Reductions in number of daily voids and incontinent episodes with medications used for urge incontinence.

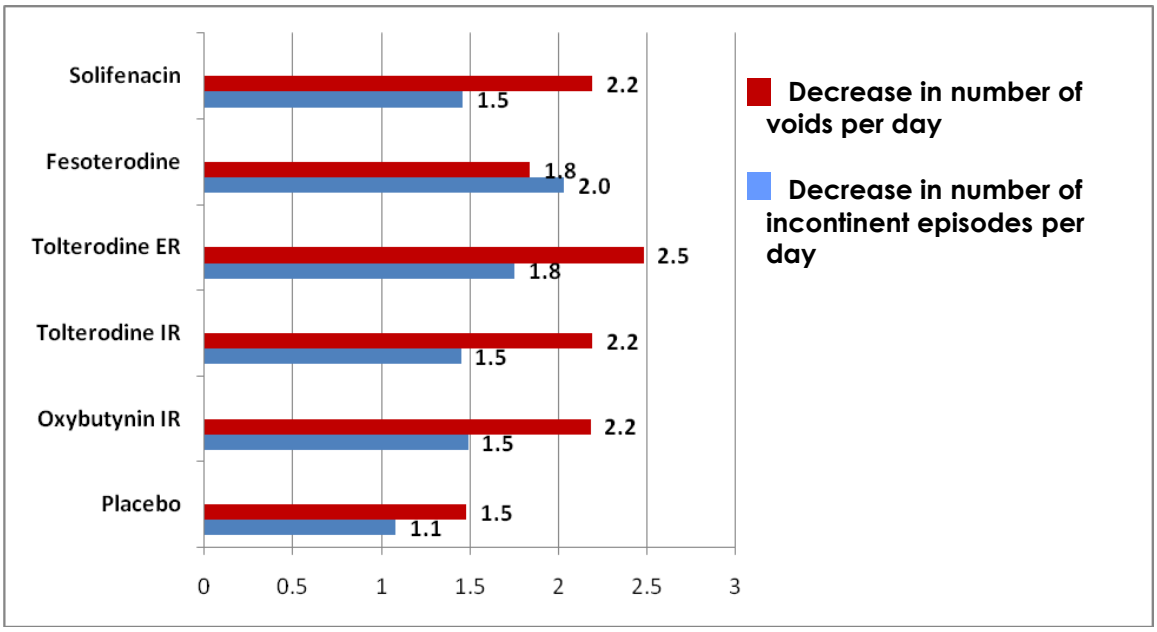
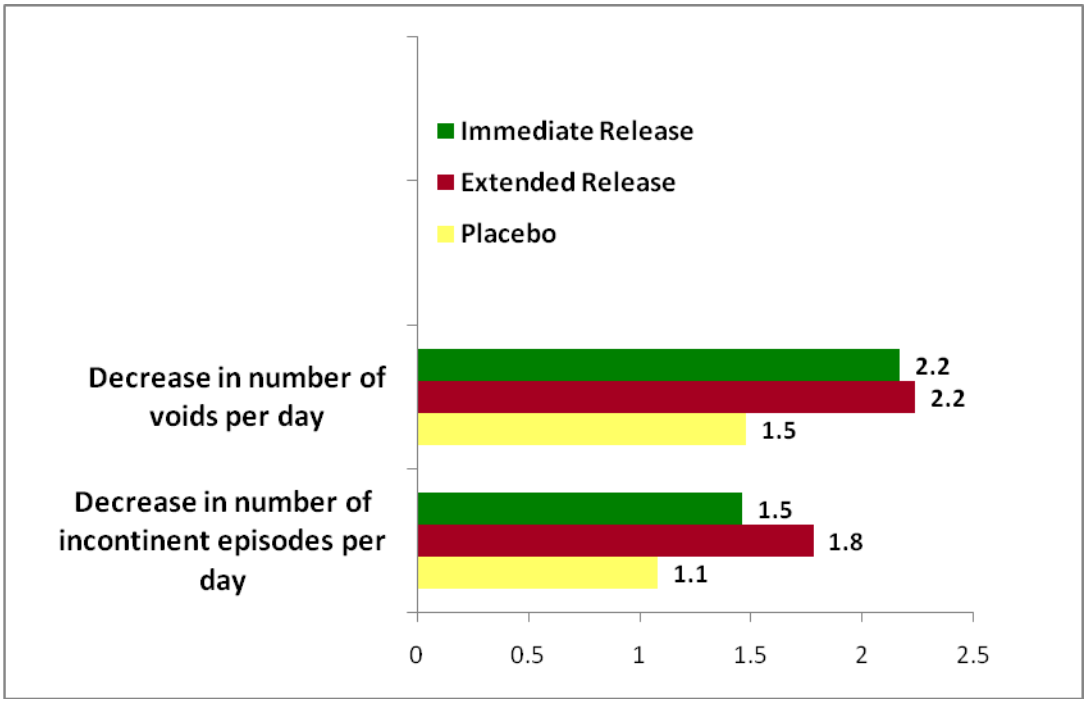


Figure 3. Reductions in number of daily voids and incontinent episodes with medications used for urge incontinence; combined comparison of extended versus immediate release formulations.



These reported reductions reflect modest benefit from baseline compared to placebo. There was insufficient data across studies to estimate the proportion of women who became symptom free.[57]

After reviewing 12 randomized head-to–head comparisons of different anticholinergics, the report found that no one drug was definitively superior to others, including the more recently approved drugs.[57] Extended release formulations achieved modestly better effects than immediate release, though the statistical significance of these findings varied.

Anticholinergic therapy should be trialed for a period of 6 weeks to assess benefits and adverse effects. Review after 6 months to determine continuing need.[22]

The most common adverse effects of these drugs are dry mouth, sedation, constipation, urinary retention, blurred vision, disturbed thinking, and delirium.[58] The risk of many anticholinergic adverse effects is greater in the elderly and in patients with co-morbidities.[59] Tolterodine may be less constipating than oxybutynin, darifenacin, and solifenacin; oral oxybutynin has the highest incidence of dry mouth.[59] Absolute contraindications include hypersensitivity to drug class, urinary retention, gastric retention or severely decreased gastric motility, and uncontrolled angle-closure glaucoma. There is some evidence to support beginning at half the usual starting dose for elderly patients.[60]

Bottom line: Anticholinergic medications are the drugs of choice for the management of overactive bladder and urge incontinence. No one drug has been conclusively shown to be better than another. The clinical usefulness of anticholinergics in the elderly may be limited by adverse effects including overflow or functional incontinence.

Topical estrogens

Intra-vaginal estrogens may be useful for the treatment of overactive bladder and urge incontinence in postmenopausal women with atrophic vaginitis or severe vaginal atrophy.[1] A systematic review found some evidence that topical estrogens may improve incontinence by 30% compared to placebo (Relative risk 0.7, 95% CI 0.6 to 0.9).[61] There was no evidence about whether benefits continue after stopping treatment, although this seems unlikely as patients would be expected to revert to naturally low estrogen levels.[61] Adverse effects reported across the studies of intra-vaginal estrogens were uncommon and included vaginal irritation or discomfort, burning and itching breast pain, and vaginal spotting or discharge.[23]

Stress incontinence

Drug treatment of stress urinary incontinence is aimed at increasing the

tone of the striated muscle in the urethra and pelvic floor.

Duloxetine

Duloxetine is a selective serotonin and noradrenaline reuptake inhibitor (SNRI) antidepressant. It acts principally in the sacral spinal cord where its action on nerve activity is thought to increase urethral sphincter contraction and closure pressure reducing urine leakage. It is used in moderate to severe stress urinary incontinence; however, duloxetine is not FDA-approved for the treatment of incontinence.[59]

Short-term studies (up to 12 weeks) suggest that the use of duloxetine can reduce the number of leakage episodes, increase the voiding interval, and improve quality of life in women with stress urinary incontinence.[23] Adverse effects are common, particularly nausea, with significantly more women discontinuing duloxetine than placebo. Other adverse effects included significantly more dry mouth, constipation, fatigue, insomnia, dizziness, increased sweating, vomiting, and somnolence.[23]

The potential for drug interactions should be considered in older adults with multiple co-morbidities and concomitant medicines. Avoid other serotonergic drugs that increase the risk of serotonin toxicity such as MAOIs, SSRIs, venlafaxine, tricyclic antidepressants, tramadol, pethidine, fentanyl, and St John's wort. Duloxetine is contraindicated in combination with strong inhibitors of CYP1A2 (e.g. ciprofloxacin). Duloxetine is a moderate inhibitor of CYP2D6 and therefore may interact with drugs that are extensively metabolized by CYP2D6.

Duloxetine can increase blood pressure in patients with cardiovascular disease. It can also precipitate a discontinuation syndrome; the dose should be tapered before stopping to reduce effects such as dizziness, nausea, headache and paresthesias. There have been case reports of tachycardia and worsening symptoms in people with advanced heart failure.[62]

Alpha adrenergic agonists

Pseudoephedrine has been used to increase outflow resistance but is not selective for urethral receptors. Its usefulness in clinical practice is limited by adverse effects such as elevated blood pressure, sleep disturbances, nausea, dry mouth, headache, tremor, palpitations, and exacerbation of abnormal cardiac rhythms. Trial evidence is lacking to support its use.

Beta2-adrenergic receptor agonists

Clenbuterol, a direct b2-adrenergic receptor agonist, has been used on the theoretical basis that agents in this drug class increase the contractility of the urethral striated sphincter by releasing acetylcholine at the neuromuscular junction. However, there is limited evidence from clinical trials and clenbuterol is not FDA approved for stress incontinence. Adverse effects include tremors, tachycardia, arrhythmia, increased sweating, and headache.[12]

Bottom line: Duloxetine may be useful in the treatment of stress incontinence but is not FDA approved for this indication. There is little evidence to support the use of other medications.

Systemic estrogen therapy for stress, urge, and mixed incontinence

The role of oral estrogens in the treatment of incontinence is controversial.[1] A 2006 review found no significant differences between oral estrogen and placebo for any outcome (leakage episodes, pad tests, frequency, quality of life, perception of improvement, objective cure) in three randomized controlled trials that lasted for 3 to 6 months.

The Heart and Estrogen/Progestin Replacement (HERS) study compared conjugated equine estrogen + medroxyprogesterone acetate with placebo. Over half the study subjects had urinary incontinence (stress, mixed, or urge) at baseline .[63] Contrary to expectations, after 4 years of treatment, significantly fewer women in the hormone therapy group reported improvement and significantly more reported worsening of their urinary incontinence symptoms, compared with the placebo group. In women who did not have urinary incontinence at baseline, the risk of developing incontinence was also significantly higher in the hormone therapy group.[63]

The Women's Health Initiative (WHI) study compared conjugated equine estrogen + medroxyprogesterone acetate with placebo, and conjugated equine estrogen with placebo.[64] In women who were continent at the beginning of the study (35%), the relative risk of developing urinary incontinence of any type at 1 year was significantly higher in both active treatment groups compared with placebo.[64]

A systematic review identified 33 trials involving 19,313 incontinent women of whom 9,417 received estrogen therapy.[61] The trials involved varying combinations of type of estrogen, dose, duration of treatment, and length of follow up. Overall, oral estrogen resulted in more incontinence symptoms than placebo.

Bottom line: Systemic estrogens, with or without progestins, can cause or worsen incontinence. Their use for the treatment of incontinence in postmenopausal women is not recommended.

Overflow incontinence

Overflow incontinence results from urinary retention due to detrusor muscle weakness, bladder outlet obstruction, or both. It is important to determine the cause of the incontinence in order to use the most appropriate management approach.

Alpha adrenergic antagonists

Alpha adrenergic antagonists reduce outflow obstruction in men by relaxing prostatic and urethral smooth muscle tone. However, these drugs may precipitate or worsen incontinence in women.

If a male patient has mild to moderate symptoms of benign prostatic hypertrophy, and there is no urgent reason for referral, a 3 month trial of an alpha adrenergic antagonist is generally the first approach. Options include alfuzosin (Uroxatral), doxazosin (generics, Cardura), prazosin (generics, Minipress), terazosin (generics, Hytrin), and tamsulosin (Flomax).

All these drugs seem to be similarly effective. Prazosin is taken twice daily; alfuzosin, doxazosin, tamsulosin, and terazosin can be taken once daily. Caution is required in older men, and in those taking antihypertensives or other drugs which can cause hypotension. Dizziness on standing may occur, especially when starting treatment or when the dose is increased. Patients must be advised to get up gradually from sitting or lying to minimize this effect. Taking the first dose at bedtime is sometimes suggested, but this needs to be carefully considered if the history includes nocturia. Poor compliance and intermittent use can lead to persistent postural hypotension.

5-alpha reductase inhibitors

5-alpha reductase inhibitors inhibit the conversion of testosterone to dihydrotestosterone, a potent cellular androgen that stimulates prostate growth. They reduce prostate size and decrease urinary outflow resistance. Options include dutasteride (Avodart) and finasteride (generics, Proscar). Clinical benefit may take up to 6 months, much longer than the alpha adrenergic antagonists. Adverse effects include impotence, erectile dysfunction, decreased libido, and decreased ejaculate volume. These drugs can reduce prostate-specific antigen concentrations by up to 50%.[65]

An ongoing study of dutasteride and tamsulosin, alone or in combination, for men with moderate to severe symptoms of benign prostatic hypertrophy found that combination therapy resulted in greater improvements in quality of life and treatment satisfaction than monotherapy after 2 years.[66] There were significantly more adverse effects with combination therapy compared to either monotherapy, although most did not result in discontinuation of treatment.[67]

Bethanecol

Bethanechol (generics, Urecholine) has been used to increase the strength of bladder contractions. However there is limited trial evidence and its use is not generally recommended.[1]

Symptom management

Containment products

Containment products include diapers, pads, and sanitary napkins. These can be useful in managing incontinence but should not replace active workup and treatment.[22] Patients prescribed behavioral, physical, or drug therapies may need them for the short- or long-term depending on the frequency and severity of episodes and response to treatment.[22] A number of factors may influence the choice of product, including personal preference, gender, level of disability, skin integrity, allergy, incidence of infection, and level of caregiver support.[22]

Although readily available, containment products are relatively expensive and are not covered by Medicare or most other insurance. Patients may choose to use them to avoid the embarrassment of seeing a clinician. Proper fit, comfort, and adequate absorptive capabilities are important. Information on products can be found at the National Association for Continence (http://www.nafc.org/).[1]

Because of their lower cost and less stigma, some women prefer sanitary napkins or mini-pads to incontinence pads; however, the latter are more effective for patients with incontinence.[50] A study comparing a variety of incontinence products found that patients preferred incontinence pads to menstrual pads, although the cost was higher.[68] Cleaning the urogenital area with pre-moistened wipes helps to control odor. Adult wipes are larger, and more brands contain odor-reducing and skin-care ingredients.[50]

Catheters

Bladder catheterization (intermittent or indwelling urethral or suprapubic) can be helpful when persistent urinary retention is causing incontinence, symptomatic infections, or renal dysfunction, and cannot otherwise be corrected.[23] Intermittent catheterization is a treatment option for patients with ongoing bladder emptying problems and high post-void residual volumes. The frequency of catheterization should be based on individual bladder volumes and patient tolerance.[1]

Chronic indwelling catheters can be a source of infection and should be used only after all alternative management strategies have been exhausted. They may be appropriate in patients with urinary retention causing:[1, 23]

- persistent overflow incontinence
- recurrent symptomatic urinary tract infections
- renal dysfunction that cannot be corrected surgically or medically and cannot be managed practically with intermittent catheterization

Chronic indwelling catheters should also be considered for patients with skin wounds, pressure sores, or irritations that are being contaminated by urine, and for those with a terminal illness or a severe impairment for whom bed and clothing changes are uncomfortable. [1]

Bottom line: Symptomatic management with containment products (incontinence pants, pads) and catheters are an important part of managing incontinence, but should not replace active workup and treatment. Containment products and catheters may be needed for the short or long-term depending on the frequency and severity of incontinence episodes and response to treatment.

Surgery

Surgery for urinary incontinence (particularly for stress incontinence) is frequently performed; in one study, by age 80, 11% of women had undergone surgery for urinary incontinence or pelvic organ prolapse. More than 25% of women undergo a second procedure. Urinary incontinence often occurs with pelvic floor disorders such as prolapse and fecal incontinence, and surgery for other conditions is performed in up to 70% of cases at the time of a procedure for incontinence. Because more than one surgical procedure is often performed at the same time, it is hard to assess the complications and outcomes of specific procedures.[69] There is little or no evidence on the comparative effectiveness of non-surgical versus surgical options for the treatment of incontinence.

Careful selection of patients and procedures is essential. Surgery should be considered in patients who fail non-surgical treatment and in those with a major anatomic abnormality. It may be indicated in men in whom incontinence is associated with documented outflow obstruction. The decision must be individualized, weighing carefully the degree to which the symptoms affect a patient and the potential risks and benefits of surgical treatment.[1] Table 8 describes the factors that influence the choice of procedure.[69, 70]

Table 8. Factors to consider when deciding on surgery for the treatment of incontinence.

Factors relating to the patient	Factors relating to the surgeon and procedure
Age Type and severity of incontinence Previous treatment Medical co-morbidities Lifestyle/patient preference Need for associated prolapse surgery Overactive bladder symptoms	Surgeon's experience Cure rates and outcome data Complication rates National and institutional guidelines

Surgery for stress incontinence

Although more than 100 surgical procedures have been described for the treatment of stress incontinence, the most commonly used techniques are injectable urethral bulking agents, mid-urethral tape procedures (retropubic or transobturator), colposuspension, and fascial slings,[69, 70] with the aim of increasing urethral support.[50] For a brief definition of these procedures see the glossary of terms in Appendix 4.

A recent study involving 655 women found better cure rates (assessed by combined objective and subjective measures of continence) for the fascial sling than for the Burch colposuspension at 2 years (47% vs. 38%); however, the sling resulted in higher rates of adverse events, including urinary tract infections, voiding dysfunction, and postoperative urge incontinence.[71]

Minimally invasive mid-urethral tape procedures have recently been introduced and these can be performed under local anesthesia. Tension-free vaginal tape has a similar 2-year success rate to Burch colposuspension. A newer technique (the use of transobturator tape) involves the placement of polypropylene mesh through the obturator foramen rather than through the retropubic space. A study comparing the use of transobturator tape and Burch colposuspension found similar success rates for the two procedures.[50]

Risks of surgery for stress incontinence include the development of overactive-bladder symptoms, voiding dysfunction, urinary tract infection, and failure to adequately treat incontinence symptoms.[50]

Cure rates with the fascial-sling procedure and Burch colposuspension have been reported as 70% to 85% at 5 to 8 years.[71] However, cure rates with surgical treatment by Burch colposuspension, suburethral sling, tension-free vaginal tape, or transobturator tape range from 30% to 100%.[50] This wide variation relates in part to the use of varying definitions of cure. Traditionally, cure for stress incontinence has been defined as no loss of urine on either urodynamics or pad

testing. However, relatively few women have absolutely no loss of urine after surgery for stress incontinence, although most women report satisfaction with surgery as well as improved quality of life, including improved sexual function.[50]

Intraurethral bulking agents are the least invasive procedure for the surgical treatment of stress incontinence but have a lower success rate than either mid-urethral tapes or colposuspension. A Cochrane review of 12 trials found only limited evidence that bulking agents can relieve stress incontinence in women. [72] A study of periurethral autologous fat injection as a treatment for female stress incontinence found no advantage over placebo, and reported significant complications including pulmonary fat embolism causing death in 1 of 189 procedures.[73] The most commonly used materials are GAX collagen, silicone particles, carbon-coated zirconium beads, and a non-animal-stabilized hyaluronic acid/dextranomer copolymer. Complications may include infection and voiding difficulty. Repeat injections may be required and efficacy decreases with time. This is treatment option in women who are unsuitable for or do not wish to undergo more extensive surgery.[69]

Urge incontinence

Urge incontinence is usually caused by detrusor overactivity and is often seen in combination with overactive bladder syndrome.[69, 70] Surgical treatments are only indicated in refractory cases of urge incontinence, i.e. in patients who have failed medical therapy with a combination of bladder retraining, pelvic floor physiotherapy and at least 2 anticholinergic agents.[70]

Treatment options for refractory urge incontinence due to detrusor overactivity include: [69, 70]

- intradetrusor injections of botulinum toxin
- sacral nerve neuromodulation
- open surgical procedures such as detrusor myomectomy, augmentation cystoplasty, and urinary diversion

Bottom line: Surgery is indicated for the treatment of stress or urge urinary incontinence when other therapies have failed to relieve symptoms and the patient wishes further treatment. Careful selection of both patients and specific surgical procedures is essential.

Therapeutic options by incontinence type

The table below summarizes therapeutic options for various types of incontinence.

Table 9. Therapeutic options by incontinence type.

Incontinence type	Lifestyle/behavioral/ physical interventions	Medication options	Surgical options
Urge incontinence	• Weight loss • Caffeine and alcohol reduction • Prompted voiding • Bladder training (trial for at least 6 weeks) • Pelvic floor muscle training • Containment products (diapers, pads)	**Medication review** **Anticholinergics** • oxybutynin (generics, Ditropan, Gelnique) • darifenacin (Enablex) • fesoterodine (Toviaz) • solifenacin (Vesicare) • tolterodine (Detrol) • trospium (Sanctura) **Other** • Intravaginal estrogen (cream, estradiol ring) for postmenopausal women with severe vaginal atrophy or atrophic vaginitis	• intradetrusor injections of botulinum toxin • sacral nerve neuromodulation • open surgical procedures such as detrusor myomectomy, augmentation cystoplasty, and urinary diversion.
Stress incontinence	• Weight loss • Prompted voiding • Pelvic floor muscle training • Bladder training • Pessaries and tampons • Containment products (diapers, pads)	**Medication review** **Drug therapy** • duloxetine (Cymbalta), but is not FDA approved for this purpose • [pseudoephedrine]*	Multiple; the most commonly used techniques are injectable urethral bulking agents, mid-urethral tape procedures (retropubic or transobturator), colposuspension, and fascial slings
Mixed incontinence	Choose one or a combination of above options for stress and urge incontinence, targeting most troubling symptom(s) and least invasive therapies first.		

***[Treatments in brackets have only weak evidence of benefit.]**[1]

Table 9. Therapeutic options by incontinence type (continued).

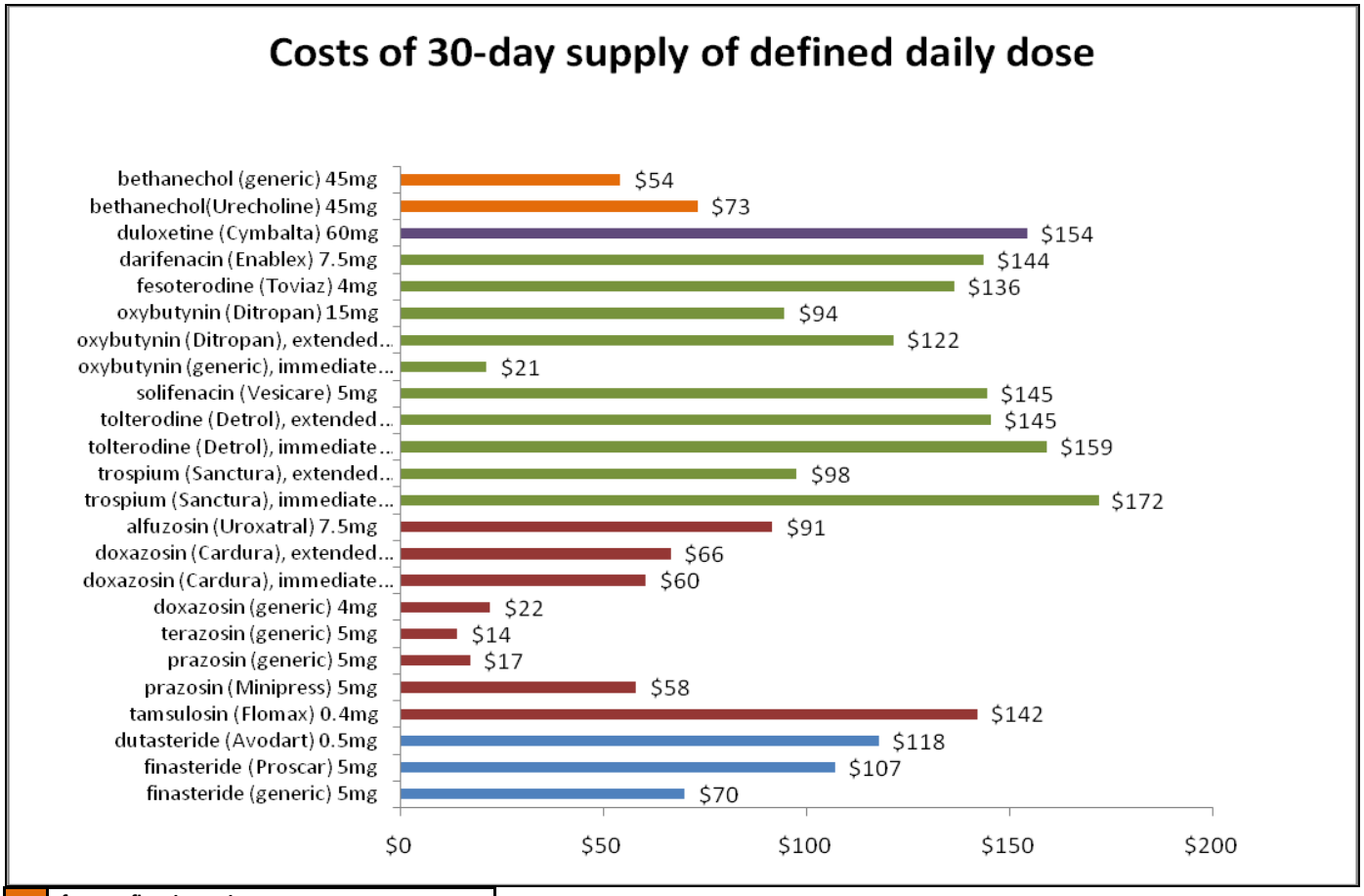
Incontinence type	Lifestyle/behavioral/ physical interventions	Medication options	Surgical options
Overflow incontinence	• Containment products (pads, diapers) • If cause is poor bladder muscle function rather than obstruction, drugs are usually not helpful. Gently squeezing just over the bladder with the hands may help patients who have difficulty emptying completely. • A catheter (intermittent or permanent) may be needed to completely drain the bladder.	**Medication review** **Caused by prostatic hypertrophy in men:** **5–alpha-reductase inhibitors** • dutasteride (Avodart) or finasteride (generics, Proscar) can reduce the size of the prostate or slow its growth. **Alpha adrenergic antagonists** • Drugs that reduce prostatic and urethral smooth muscle tone: alfuzosin (Uroxatral), doxazosin (generics, Cardura), prazosin (generics, Minipress), terazosin (generics, Hytrin), and tamsulosin (Flomax) **Caused by underactive bladder:** **Cholinergic agonist** • [bethanechol (generics, Urecholine)]*	Depend on underlying pathology e.g. enlarged prostate or other blockage
Functional incontinence	• Increased physical activity to improve mobility, and assessment for mobility aids • Treatment of underlying conditions such as depression, confusion, impaired mobility, sedation. • Prompted voiding • A bedside commode or a hand-held urinal may be useful for people who have difficulty getting to the toilet. • Containment products (pads, diapers)	**Medication review**	

***[Treatments in brackets have only weak evidence of benefit.]**[1]

Costs

Supportive therapies and behavioral and physical interventions such as increased exercise, pelvic floor muscle training, and bladder training are relatively inexpensive. On the other hand, the cost of containment products such as pads and diapers can be high, and surgical intervention can be very expensive. Medication costs vary considerably, particularly if generic alternatives to a drug are available. The costs of a 30-day supply of the defined daily dose of medications used to treat urinary incontinence are provided in below.

Figure 4. Cost of oral medications used for urinary incontinence.



	for overflow incontinence
	for stress incontinence
	for urge incontinence (and overactive bladder)
for Incontinence due to prostatic hypertrophy	
	alpha adrenergic antagonists
	5-alpha-reductase inhibitors

Defined daily doses obtained from http://www.whocc.no/atc_ddd_index/. Prices obtained from www.epocrates.com January 2010

Figure 5 below summarizes the comparative efficacy, safety, and cost of behavioral and drug therapies used in urge incontinence.

Figure 5. Summary of comparative efficacy, safety and cost of interventions for urge incontinence.[22,48, 57, 59]

Therapy	Efficacy	Adverse effects			Cost	Overall value
Behavioral/Physical		Dry mouth	Constipation	Sedation		
Pelvic floor muscle training	#					#
Bladder training						
Prompted voiding						
Drug (oral)						
oxybutynin (generics, Ditropan)*						
darifenacin (Enablex)						
fesoterodine (Toviaz)						
solifenacin (Vesicare)						
tolterodine (Detrol)*						
trospium (Sanctura)*						

Unknown or no effect	Best outcome	Intermediate	Problem

May be of value when used in combination with bladder training.

*Topical (oxybutynin) and extended release forms of these drugs may lower the risk/severity of adverse effects compared to immediate release formulations e.g., transdermal oxybutynin has the lowest incidence of dry mouth.

Other: Topical estrogen may be useful for urge incontinence associated with severe vaginal atrophy or atrophic vaginitis. Systemic estrogens may worsen incontinence and are therefore not recommended.

Behavioral/physical interventions can be very effective with or without medication, and should be considered for all patients.

Putting it all together

Incontinence is <u>not</u> a normal part of aging. Screen for it in all older patients.

Many elderly patients with incontinence go undiagnosed and untreated, because patients often do not report the problem, and health care professionals often do not ask about it.

- Three simple screening questions about 'a common and sometimes difficult to raise issue' can be helpful:
    - Do you have trouble with your bladder?
    - Do you ever lose urine when you don't want to?
    - Do you wear pads or adult diapers for protection?

Use basic office assessments including a medication review to assist in diagnosis.

- Establish a diagnosis with a targeted history, physical examination (gynecological, abdominal, rectal, neurological, and cardiac), and some simple tests (urinary stress test, post-void residual volume, dipstick urinalysis, and some basic blood work).
- Many drugs can cause or worsen urinary incontinence; conduct a complete review of medications (prescription and OTC, including complementary) to determine whether any may be contributing to the problem. Examples include overuse or poor timing of diuretics; anticholinergic drugs causing urinary retention and overflow incontinence; psychotropics causing sedation, confusion and impaired mobility leading to functional incontinence.
- Address potentially reversible risk factors (DIAPPERS).

Have the patient keep a bladder diary and complete a severity/quality of life questionnaire.

- Bladder diaries are a practical and reliable method of quantifying urinary frequency and incontinence episodes, and should be used in the initial assessment as well as to monitor effectiveness of therapy.
- Even mild incontinence can have a significant impact on quality of life. Use a well-tested questionnaire (the ICIQ-SF) to assess both the severity and impact on quality of life of urinary symptoms.

Recommend behavioral and physical therapies when indicated.

- These interventions can be very effective, are well studied in the elderly, are recommended by most guidelines as an initial approach to therapy, and can be implemented by the primary care clinician.
- Key therapies are pelvic muscle training (for stress and mixed incontinence), bladder training (primarily for urge incontinence), and prompted voiding. Others include weight loss for obese patients, increased physical activity, reduction in alcohol and caffeine intake, smoking cessation, and relief of constipation and straining.

Consider a time-limited trial of medication if appropriate. Monitor for side effects and discontinue if no improvement.

- Anticholinergic drugs [oxybutynin (generic, Ditropan, Gelnique), darifenacin (Enablex), solifenacin (Vesicare), tolterodine (Detrol), fesoterodine (Toviaz), and trospium (Sanctura)] can help with overactive bladder; monitor for effectiveness and adverse effects. Most products work as well as others in the same class.
- A drug prescribed to treat one type of incontinence may contribute to another type. For example, an anticholinergic agent such as oxybutynin used for urge incontinence may cause urinary retention and contribute to overflow and functional incontinence. Alpha-antagonists used to treat overflow incontinence caused by prostatic hypertrophy may cause excessive sphincter relaxation and contribute to stress incontinence; these drugs may also precipitate or worsen incontinence in women.
- Prescribe anticholinergics with caution in the frail elderly because of the potential for serious adverse effects. Consider starting at half the usual recommended starting dose to reduce adverse effects.

Appendix 1. Bladder diary

Please complete the following chart as accurately as you can. **Complete each of the 2 pages for each of 3 days.**

Your Daily Bladder Diary

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

Your name: _____

Date: _____

Time	Drinks		Trips to the Bathroom		Accidental Leaks	Did you feel a strong urge to go?	What were you doing at the time?
	What kind?	*How much?*	*How many times?*	*How much urine? (circle one)*	*How much? (circle one)*	*Circle one*	*Sneezing, exercising having sex, lifting, etc.*
Sample	Coffee	2 cups	✓✓	(sm) med lg	sm (med) lg	Yes (No)	Running
6–7 a.m.				sm med lg	sm med lg	Yes No	
7–8 a.m.				sm med lg	sm med lg	Yes No	
8–9 a.m.				sm med lg	sm med lg	Yes No	
9–10 a.m.				sm med lg	sm med lg	Yes No	
10–11 a.m.				sm med lg	sm med lg	Yes No	
11–12 noon				sm med lg	sm med lg	Yes No	
12–1 p.m.				sm med lg	sm med lg	Yes No	
1–2 p.m.				sm med lg	sm med lg	Yes No	
2–3 p.m.				sm med lg	sm med lg	Yes No	
3–4 p.m.				sm med lg	sm med lg	Yes No	
4–5 p.m				sm med lg	sm med lg	Yes No	
5–6 p.m.				sm med lg	sm med lg	Yes No	
6–7 p.m.				sm med lg	sm med lg	Yes No	

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

Time	Drinks		Trips to the Bathroom		Accidental Leaks	Did you feel a strong urge to go?	What were you doing at the time?
	What kind?	*How much?*	*How many times?*	*How much urine? (circle one)*	*How much? (circle one)*	*Circle one*	*Sneezing, exercising having sex, lifting, etc.*
Sample	Soda	2 cans	✓✓	(sm) med lg	(sm) med lg	Yes (No)	Running
7–8 p.m.				sm med lg	sm med lg	Yes No	
8–9 p.m.				sm med lg	sm med lg	Yes No	
9–10 p.m.				sm med lg	sm med lg	Yes No	
10–11 p.m.				sm med lg	sm med lg	Yes No	
11–12 midnight				sm med lg	sm med lg	Yes No	
12–1 a.m.				sm med lg	sm med lg	Yes No	
1–2 a.m.				sm med lg	sm med lg	Yes No	
2–3 a.m.				sm med lg	sm med lg	Yes No	
3–4 a.m.				sm med lg	sm med lg	Yes No	
4–5 a.m.				sm med lg	sm med lg	Yes No	
5–6 a.m.				sm med lg	sm med lg	Yes No	

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

Questions to ask my health care team: _____

_____

_____

_____

_____

Reproduced from the National Kidney and Urologic Diseases Information Clearinghouse, a service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), National Institutes of Health. Available at: http://kidney.niddk.nih.gov/kudiseases/pubs/pdf/diary.pdf

Appendix 2. International Consultation on Incontinence Questionnaire Short Form (ICIQ-SF)

Confidential ICIQ-UI SF **Today's date** ☐☐ ☐☐ ☐☐☐☐
Day Month Year

Patient Name……

Many people leak urine some of the time. We are trying to find out how many people leak urine, and how much this bothers them. We would be grateful if you could answer the following questions, thinking about how you have been, on average, over the PAST FOUR WEEKS.[22, 24]

1. Please write in your date of birth (month/day/year)……/……/……

2. Are you (Check one): Female ☐ Male ☐

3. How often do you leak urine *(Check one box)*

Never ☐ 0

About once a week or less often ☐ 1

Two or three times a week ☐ 2

About once a day ☐ 3

Several times a day ☐ 4

All the time ☐ 5

4. We would like to know how much urine <u>you think</u> leaks.
How much urine do you <u>usually</u> leak (whether you wear protection or not)? *(Check one box)*

None ☐ 0

A small amount ☐ 2

A moderate amount ☐ 4

A large amount ☐ 6

5. Overall, how much does leaking urine interfere with your everyday life?
Please circle a number between 0 (not at all) and 10 (a great deal)

0 1 2 3 4 5 6 7 8 9 10
not at all a great deal

ICIQ score: sum 3+4+5 = ☐

6. When does urine leak? *(Please check all that apply to you)*

never – urine does not leak ☐

leaks before you can get to the toilet ☐

leaks when you cough or sneeze ☐

leaks when you are asleep ☐

leaks when you are physically active/exercising ☐

leaks when you have finished urinating and are dressed ☐

leaks for no obvious reason ☐

leaks all the time ☐

While the scores of items 3-5 may be added to give an overall indication of the level and impact of incontinence, the responses to individual items may also be interpreted individually.[24] The unscored self-diagnostic item 6 helps to understand the patient's perception of the cause of their incontinence.[24]

Appendix 3. Incontinence Impact Questionnaire short form (IIQ-7) and Urogenital Distress Inventory short form (UDI-6)

Incontinence Impact Questionnaire (IIQ-7)

Date: ……../……../……
MM DD YYYY

("X" one for each question)

Has urine leakage affected your:	Not at all	Slightly	Moderately	Greatly
1. Ablility to do household chores (cooking, housecleaning, laundry)?	☐	☐	☐	☐
2. Physical recreation such as walking swimming or other exercise?	☐	☐	☐	☐
3. Entertainment activities (movies, concerts, etc.)?	☐	☐	☐	☐
4. Ability to travel by car or bus more than 30 minutes from home?	☐	☐	☐	☐
5. Participation in social activities outside your house?	☐	☐	☐	☐
6. Emotional health (nervousness, depression, etc)?	☐	☐	☐	☐
7. Feeling frustrated?	☐	☐	☐	☐

Appendix 3 (continued)

Urogenital Distress Inventory (UDI-6)

Date: ……../……../……
MM DD YYYY

Do you experience, and if so, how much are you bothered by:	("X" one for each question) Not at all	Slightly	Moderately	Greatly
1. Frequent urination?	☐	☐	☐	☐
2. Urine leakage related to the feeling of urgency?	☐	☐	☐	☐
3. Urine leakage related to physical activity, coughing, or sneezing?	☐	☐	☐	☐
4. Small amounts of urine leakage drops?	☐	☐	☐	☐
5. Difficulty emptying your bladder?	☐	☐	☐	☐
6. Pain or discomfort in the lower abdominal or genital area?	☐	☐	☐	☐

Do you have any uncontrolled leakage of gas, liquid, or solid stool?

___ Yes ___ No

If yes, mark which apply
____ gas
____ liquid stool
____ solid stool

On a scale of 0 to 100, where zero represents death and 100 represents perfect health, please indicate how you would rate your current state of health.

___ ___ ___ Number from 0 – 100

Appendix 4. Glossary of terms

This glossary of terms for urinary incontinence is reproduced in part and adapted from the National Collaborating Centre for Women's and Children's Health guidelines for the management of urinary incontinence in women.[23]

Anterior colporrhaphy: Vaginal operation for the treatment of cystocele (anterior vaginal wall prolapse). Involves plication of the fascia between vaginal and bladder walls. With the addition of plication of the fascia beneath the urethra, it has commonly been used for treatment of stress incontinence. Can be used as an additional procedure for prolapse repair along with a continence procedure.

Antimuscarinic drugs: Class of pharmacological agents acting on neuromuscular junctions in the autonomic nervous system, used for overactive bladder syndrome.

Bimanual examination: Vaginal examination carried out using the examiner's fingers of one hand in the vagina and of the other hand on the abdomen. Allows the description of observed and palpable anatomical abnormalities and the assessment of pelvic floor muscle function.

Biofeedback: The technique by which information about a normally unconscious physiological process is presented to the patient and/or the therapist as a visual, auditory or tactile signal.

Bladder diary: A diary that records voiding times and voided volumes, leakage episodes, pad usage and other information such as fluid intake, degree of urgency, and degree of incontinence. See also **frequency–volume chart**.

Bladder pain: Pain felt suprapubically or retropubically, which usually increases with bladder filling, and may persist after voiding.

Bladder training: Bladder training (also described as bladder retraining, bladder drill, bladder re-education, bladder discipline) actively involves the individual in attempting to increase the interval between the desire to void and the actual void.

Colposuspension: An operation to support the urethra and bladder neck to stop urine leaking. The procedure can be performed through an abdominal incision or laparoscopically. Also known as Burch colposuspension.

Cystocele: Herniation of the bladder through the wall of the vagina.

Cystometric (bladder) capacity: Bladder volume at the end of the filling phase of cystometry.

Cystometry: Cystometry is the measurement of intravesical pressure that can be carried out through a single recording channel (simple cystometry) or, more commonly, by multichannel cystometry, which involves the synchronous measurement of both bladder and intra-abdominal pressures by means of catheters inserted into the bladder and the rectum or vagina. The aim is to replicate the patient's symptoms by filling the bladder and observing pressure changes or leakage caused by provocation tests. See also **urodynamics**.

Detrusor overactivity (DO) : An urodynamic observation characterized by involuntary detrusor contractions during the filling phase of cystometry that may be spontaneous or provoked. See also **urodynamics**.

Electrical stimulation: The application of electrical current to stimulate the pelvic viscera or their nerve supply.

Electromyography (EMG): Recording of neuromuscular function from an electrode within or in proximity to a muscle. Feedback tool for pelvic floor muscle recruitment.

Fascial sling: Surgical procedure to increase urethral support as a treatment for stress incontinence. The surgery involves the placement of a piece of material under the urethra and anchoring it on either side of the pubic bone or to the abdominal wall or vaginal wall.

Frequency–volume chart (FVC): A chart that records voided volumes and times of voiding (day and night) for at least 24 hours. See also **bladder diary**.

Hesitancy: Difficulty in initiating micturition resulting in a delay in onset of voiding

Intrinsic sphincter deficiency (ISD) Incompetence of the urethral sphincter mechanisms usually associated with severe stress incontinence symptoms, due to inherent weakness of the sphincter itself, as opposed to the more common problem of impaired urethral support (hypermobility).

Mid-urethral tapes: Tape inserted retropubically or using a transobturator technique to provide mid-urethral support.

Mixed urinary incontinence (MUI): Involuntary leakage associated with urgency and also with exertion, effort, sneezing or coughing.

Nocturnal enuresis: Urinary incontinence occurring during sleep. The term enuresis itself is synonymous with incontinence and, where it is intended to denote incontinence during sleep, it should always be qualified with the adjective 'nocturnal'.

Overactive bladder (OAB) syndrome: Urgency, with or without urge urinary incontinence, usually with frequency and nocturia. OAB wet is where (urge) incontinence is present, and OAB dry is where incontinence is absent.

Pad test: A diagnostic method used to detect and quantify urine loss based on weight gain of absorbent pads during a set time period.

Pelvic floor muscle training (PFMT): Repetitive selective voluntary contraction and relaxation of specific pelvic floor muscles.

Pelvic organ prolapse (POP): Descent of one or more of the anterior vaginal wall, the posterior vaginal wall and the apex, or the vault of the vagina towards or through the vaginal introitus.

Pelvic organ prolapse quantification: A method for classifying the stage of prolapse, in which six specific quantification (POP-Q) vaginal sites (A, Ba, C, D, Bp, Ap) and the vaginal length are measured in centimetres from the introitus.

Perineometer: A device for measuring the strength of pelvic floor muscle contraction. Used as a form of biofeedback during treatment, or to measure treatment outcome.

Post-void residual urine (PVR): The volume of urine left in the bladder immediately after voiding.

Prompted voiding: Prompted voiding teaches people to initiate their own toileting through requests for help and positive reinforcement from carers. It has been used in institutionalised patients with cognitive and mobility problems. They are asked regularly if they wish to void and only assisted to the toilet when there is a positive response.

Rectocele: Herniation (protrusion) of the rectum into the vagina.

Stress test: A clinical test for the demonstration of stress urinary incontinence. The woman is asked to cough while the observer visualises the external urethral meatus. The test may be undertaken either after filling to a known volume, or prior to micturition, the volume being recorded thereafter. It may be undertaken supine or standing.

Stress urinary incontinence: The complaint of involuntary leakage on effort or exertion or on sneezing or coughing.

Timed voiding: Timed voiding (scheduled, routine or regular toileting) is a passive toileting assistance program that is initiated and maintained by a caregiver, e.g. for patients who cannot participate in independent toileting. Toileting is fixed by time or event, on a regular schedule, or a schedule to match the patient's voiding pattern.

Urethral competence: The ability of the urethral sphincter mechanisms to retain urine in the bladder at all times other than during normal micturition.

Urethral Competence test: There are several office-based maneuvers that can be done to evaluate urethral competence, bladder neck competence or urethral mobility. These are known as the Bonney or Marshall tests, the Fluid-Bridge test, and the Qtip test. Unfortunately, none of these tests produce adequately reliable results so they are not recommended for routine use.[20, 23, 32, 74]

Urethral Function tests: There are several invasive tests of urethral function, including urethral pressure profilometry and leak point pressure measurements. These measurements reflect the urethra's ability to resist urine flow, commonly referred to as maximum urethral closure pressure (MUCP), or abdominal /cough / Valsalva leak point pressures (ALPP, CLPP, VLPP).[35] Unfortunately, urethral pressure measurements have wide test-retest variability, and are affected by patient age, bladder volume, and patient position. The results of the tests also do not correlate well with the severity of the urinary incontinence symptoms. The ICI-CDT guidelines do not recommend urethral pressure measurements in isolation, and that if performed, they should be interpreted in the context of the patient symptoms and the other UDS findings.[34]

Urethral hypermobility: Incompetence of the urethral sphincter mechanisms usually associated with stress incontinence symptoms, due to failure of urethral support.

Urge urinary incontinence: Involuntary urine leakage accompanied by or immediately preceded by urgency.

Urgency: The complaint of a sudden compelling desire to pass urine which is difficult to defer'.

Urgency-frequency syndrome: Another name for **overactive bladder**.

Urinary retention (chronic): Inability to void that develops over a long period of time. High post-void residual volume can cause symptoms including frequency, nocturia, urgency and incontinence

Urodynamics (UD): The term urodynamics encompasses a number of varied physiological tests of bladder and urethral function that aim to demonstrate an underlying abnormality of storage or voiding. The term is often used loosely to mean multichannel cystometry. See also **cystometry** and **uroflowmetry**. Videourodynamics involves synchronous radiographic screening of the bladder with multichannel cystometry and is so called because originally the information was recorded to videotape. Ambulatory urodynamics involves multichannel cystometry carried out with physiological bladder filling rates and using portable recording devices that enable to patient to remain ambulant during the test.

Urodynamic stress urinary incontinence (USI): The demonstration of involuntary leakage of urine during increased abdominal pressure but in the absence of detrusor contraction during filling cystometry.

Uroflowmetry: Uroflowmetry entails a free-flow void into a recording device that provides the practitioner with information about the volume of urine passed, and the rate of urine flow.

Voiding dysfunction: The term is not formally defined but is used to indicate objective evidence of abnormal voiding. This is usually based on a combination of diminished urine flow rate, abnormal flow pattern, raised detrusor voiding pressure and the presence of post-micturition residual urine. It is often, but not always, associated with symptoms of voiding difficulty (hesitancy, straining, poor or intermittent urinary stream) and/or post-micturition symptoms (sensation of incomplete emptying, post-micturition dribble).

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