Urinary Incontinence & Voiding Dysfunction (Geriatric)

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1. Introduction

Urinary incontinence (UI) is defined as the involuntary loss of urine. While UI is often described by patients as the predominant bothersome symptom of the lower urinary tract, the overall term of voiding dysfunction (VD) constitutes a broader definition of urinary pathology referring to any anomaly in normal storage of urine as well the spontaneous and controlled elimination of urine. **Advancing age is a primary risk factor for UI**, with multiple studies linking UI to the risk of institutionalization. A variety of comorbid psychological issues are associated with UI in older adults including depression, feelings of isolation, embarrassment, and anxiety.[1,2]

In addition to financial and social personal costs, there are significant societal healthcare costs involved with managing UI, particularly in the elderly. In the United States, it has been suggested that the economic impact of UI may exceed $80 billion annually.[3,4] UUI and VD can and should be actively treated even in elderly, and often frail, older patients. **However, evaluation and management of lower urinary tract dysfunction and associated symptoms in the elderly needs to be specifically tailored to the individual patient's bother and functional status**.

Key Words

Geriatrics; Urinary incontinence; Voiding dysfunction; Lower urinary tract symptoms; Overactive bladder; Frailty

2. Epidemiology and Impact

Population based studies estimate **that UI may affect 15% to 30% of older adults in the community and approximately one-third of patients in acute-care settings**.[5] It is estimated de novo incontinence arises in approximately one-third of patients during acute care stays when any degree of cognitive impairment is present.[6] The prevalence of UI among the elderly in nursing homes may be greater than 50%.[7,8] It is estimated that the incidence of lower urinary tract symptoms (in males) increases 10% per decade from 40-79 years of age.[9] Urinary symptomatology adversely affects not only physical health but also psychological well-being. Multiple studies confirm that UI and

VD are often undiagnosed, undertreated and/or dismissed by many caregivers.[10,11]

3. Risk Factors and Pathophysiology

Numerous health and social factors contribute to the prevalence of UI and VD. Resnick et al published a valuable mnemonic “DIAPPERS” describing transient (and often modifiable) factors that may contribute to UI (**Table 1**).[12] In the geriatric setting there are often multiple contributing factors to the development of UI. The cumulative impact of these various contributory factors may markedly exacerbate UI symptoms.[13,14]

Multiple additional causes of UI and VD may exist that are not readily reversible. In elderly men, prostatic enlargement and treatments related to prostate cancer may result in significant VD and UI. Pelvic surgery and radiation can contribute to both sphincteric weakness as well as detrusor overactivity.[15] In women, multiparity and the development of pelvic organ prolapse are risk factors for UI, [16] as is a history of radiation therapy for either gynecologic or colorectal malignancies. For both sexes, a vast array of neurologic conditions are strongly correlated with UI and VD. These may include cerebrovascular accidents, spinal cord disease, multiple sclerosis, and Parkinson’s disease.[17]

Table 1: Causes of Transient Urinary Incontinence

Etiology	Notes
Delirium/confusional state	Any underlying illness or medication; incontinence resolves when underlying cause treated or offending agent removed
Infection (UTI)	Can exacerbate or cause incontinence
Atrophic urethritis/vaginitis	Vaginal epithelial dryness and friability; may respond to topical estrogen
Pharmaceuticals	See **Table 3** for specific agents
Psychologic disorders	Depression, cognitive impairment, psychogenic polydipsia may cause or exacerbate incontinence
Excess urine output	Large fluid intake, diuretics, and metabolic disorders (e.g. diabetes); increased nocturnal urine output secondary to mobilization of peripheral edema (e.g. congestive heart failure)
Restricted mobility	Acute conditions such as pain related to injury or chronic conditions such as arthritis, orthostatic hypotension, generalized debilitated state.
Stool impaction/constipation	Can be associated with fecal and urinary incontinence

Reference 12

4. Urologic Conditions and Clinical Types of Incontinence

Table 2: Urodynamic Findings Associated with Urinary Incontinence

Urodynamic finding(s)	Associated clinical urinary incontinence
Detrusor overactivity with normal contractility	Urgency
Detrusor hyperactivity with impaired contractility (DHIC)	Urgency
Intrinsic sphincter deficiency (ISD)	Stress
Bladder outlet obstruction (BOO)	Urgency, (OVERFLOW)
Underactive or areflexic detrusor (DUA)	Stress or Urgency (e.g. Detrusor Overactivity with Impaired Contractility, DHIC)
Reference 18	

General descriptions of lower urinary tract pathology as measured on urodynamics testing associated with incontinence are depicted in **Table 2**. Broadly, the two main types of incontinence are stress urinary incontinence (SUI) and urgency urinary incontinence (UUI). SUI results from failure of the urethral sphincter and bladder neck (outlet), whereby increases in abdominal pressure override outlet resistance with resulting leakage. Urgency urinary incontinence (UUI) manifests as leakage arising from uninhibited bladder contractions that cannot be suppressed. UUI may or may not be associated with an underlying neurologic condition and is often idiopathic. “Mixed urinary incontinence” refers to the presence of both UUI and SUI. Overflow incontinence secondary to obstruction and/or poor emptying from detrusor underactivity is always a consideration in the geriatric population.

Patient education materials describing general symptoms and causes of urinary incontinence are available through the **Urology Care Foundation**.

5. Diagnosis and Evaluation

5.1 Men

The evaluation of elderly male patients with urinary symptoms should begin with a detailed medical history and comprehensive physical exam. It is important that the medical history assess for symptoms and onset as well as medical conditions that may contribute to lower urinary tract dysfunction (e.g. diabetes, neurologic conditions), increased urine output (e.g. heart failure), or result in functional impairment that limits access to the restroom (e.g. frailty). An assessment of medications is critical (see **Table 3** for list of medications that can affect continence). **The physical exam should include a thorough genitourinary exam, including a digital rectal exam (DRE) to assess prostate size, overt abnormalities suspicious for cancer, stool burden, and sphincter tone, as well as a focused neurological assessment**. Urinalysis (UA) should be obtained to screen for hematuria, urinary tract infection (UTI), and the presence of glucose. The use of prostate specific antigen (PSA) testing is beyond the scope of this section, but in men with a greater than a 10-year life expectancy, it is reasonable to discuss the relevance of PSA screening as part of shared decision making. (see **AUA guideline Early Detection of Prostate Cancer**). Depending on the type of incontinence suspected, a postvoid residual (PVR) may be exceptionally helpful either used alone, in combination with uninstrumented uroflowmetry, or as part of a complete multichannel urodynamics (UDS) study. UDS is often useful to help quantify the degree of detrusor overactivity and assess for the presence of bladder outlet obstruction, detrusor underactivity, or altered bladder compliance. [19]

In general, UDS should be employed judiciously, reserved for situations when clinical decision-making is in doubt, and results of UDS are likely to impact care (see "**Adult Urodynamics: AUA/SUFU Guideline**").

Table 3: Medications Impacting Continence

Medication Class	Examples	Potential Impact on Continence
Sedatives	Long-acting benzodiazepines (e.g. diazepam, flurazepam)	Sedation, delirium, immobility
Alcohol		Polyuria, frequency, urgency, sedation, delirium, immobility
Anticholinergics	Dicyclomine, disopyramide, sedating antihistamines (e.g. diphenhydramine)	Urinary retention, constipation, delirium
Medications with anticholinergic effects		
Antipsychotics	Thioridazine, haloperidol	Anticholinergic effects, sedation, rigidity, immobility
Antidepressants (tricyclic)	Amitriptyline, nortriptyline, desipramine	Anticholinergic effects, sedation
Anti-Parkinsonian	Trihexyphenidyl, benztropine mesylate (not L-dopa or selegiline)	Anticholinergic effects, sedation
Narcotics	Opiates	Urinary retention, constipation, sedation, delirium
Alpha-adrenergic antagonists	Prazosin, terazosin, doxazosin	Urethral relaxation may exacerbate stress incontinence in women

Alpha-adrenergic agonists	Nasal decongestants (e.g. pseudoephedrine, phenylephrine)	Urinary retention in men
Calcium channel blockers	Dihydropyridines (e.g. amlodipine, nifedipine, nicardipine)	Urinary retention; increased nocturnal urinary output from fluid retention
Diuretics	Furosemide, bumetanide (not thiazides)	Polyuria, frequency, urgency
NSAIDs	Indomethacin, COX-2 inhibitors	Increased nocturnal urinary output due to fluid retention
Thiazolidinediones	Rosiglitazone, pioglitazone	Increased nocturnal urinary output due to fluid retention
Anticonvulsants/analgesics	Gabapentin, pregabalin	Increased nocturnal urinary output due to fluid retention
Parkinson agents (select)	Pramipexole, ropinirole	Increased nocturnal urinary output due to fluid retention
ACE-inhibitors	Captopril, enalapril, lisinopril	Drug-induced cough worsening stress incontinence
Certain chemotherapy agents	Platinum-based, taxanes, epothilones	Urinary retention from neuropathy
References 20, 21		

5.2 Women

The work-up of elderly female patients with urinary symptoms begins with a complete medical history and physical exam. The same elements of medical history that identify conditions or circumstances impacting continence described above are also of importance in women. In addition, particular attention should be paid to obstetric and gynecologic history. For example, a history of prolonged labor, multi-parity, or forceps-assisted delivery may predispose women to developing relevant pelvic floor disorders such as SUI or pelvic organ prolapse (POP). Pelvic examination may reveal atrophic changes, the presence of concomitant POP, or the presence of SUI. **Often a standing exam can unmask pelvic organ prolapse and/or urinary incontinence which is not evident in the supine position**. Urinalysis should be standard. The decision to perform UDS should be determined on a case-by-case basis but may be especially helpful in the presence of underlying neurogenic VD, in patients with diabetes, and in patients who have previously undergone surgery for POP or UI.[22]

6. Treatment

Treatments for UI and VD can be broadly divided into 4 categories: behavioral, physiotherapeutic, pharmacologic, and surgical. In general, every attempt should be made to reverse the underlying pathology with as little risk to the patient as possible, particularly in the frail elderly patient population.

Diagnosis and Treatment of Non-Neurogenic Overactive Bladder (OAB) in Adults: an AUA/SUFU Guideline (2019).

6.1 Behavioral Modification

Behavioral modification may consist of fluid restriction, dietary modification (avoiding bladder irritants such as caffeinated beverages), and alterations in voiding habits, e.g. double and timed voiding schedules.[23,24] Behavioral strategies are especially effective for individuals without cognitive impairment. Patients with dementia may require additional strategies such as cueing from caregivers to manage intake and voiding behaviors.

6.2 Physiotherapy

Physical therapy has demonstrated mixed results in various studies.[23,24] Physiotherapy can include simple exercises, as well as more advanced therapies such as biofeedback and electrical stimulation. Results appear to be enhanced when physiotherapy is carried out by experienced therapists. Patients must have the capacity to participate in therapy, the means to afford treatment and make it to treatment sessions, and the capability of continuing exercises after guided treatment is completed. These criteria may limit this as a treatment option for many patients, particularly in the frail elderly.

6.3 Medications

Medical therapy may involve prostate-directed treatment in men (i.e. alpha-blockers, 5-alpha

reductase inhibitors, PDE5-inhibitors) or bladder-directed therapies in men and women.

In men, bother from symptoms such as weak stream or hesitancy or the presence of incomplete bladder emptying as indicated by elevated PVR or pressure-flow studies may suggest the potential for benefit from alpha-blockade combined with 5-alpha reductase inhibitor use when exam or imaging findings suggest significant prostatic enlargement. The AUA guideline " **Management of Benign Prostatic Hyperplasia**" represents the most up to date guideline from the AUA on use of medical therapy for BPH. The recently published guideline "**Benign Prostatic Hyperplasia: Surgical Management of Benign Prostatic Hyperplasia/Lower Urinary Tract Symptoms (2018, amended 2019, 2020, amended again in 2021)**" contains the most updated recommendations regarding surgical management.

The defining symptoms of OAB include urgency, frequency, and UUI and frequently represent the most debilitating symptoms in men and women. The primary urodynamic finding associated with OAB is detrusor overactivity, although it is not universally present. Medical therapy for OAB, detailed in **Table 4**, are “bladder directed” therapies that inhibit detrusor sensory and motor activation (i.e. antimuscarinics) or promote storage (i.e. beta-3 agonists)

Antimuscarinics (also known as anticholinergics) and beta-3 agonists are the mainstay in medical management of OAB. The most predominant bothersome side effect of antimuscarinics is dry mouth, which contributes to decreased patient compliance and a high rate of medication discontinuation. Furthermore, antimuscarinics should be used with caution or completely avoided in the presence of certain conditions more common in the elderly, such as glaucoma (particularly acute angle), impaired gastric emptying, constipation, cognitive impairment, peptic ulcer disease, or significantly impaired bladder emptying. The beta-3 adrenergic agonists, mirabegron and vibegron, have a reduced profile of bothersome side effects while maintaining similar efficacy to antimuscarinics. [25] However, mirabegron, approved by the United States Food and Drug Administration (USFDA) in 2012 for the management of OAB, is associated with a risk of hypertension, requiring particular caution in patients with poorly-controlled blood pressure. Vibegron, the most recently approved drug for OAB by the USFDA in 2020, does not have the same warning of hypertension but needs to be used with caution in patients also taking digoxin. [26,27]

Evidence suggesting poorer cognition and increased risk of dementia with anticholinergic medication is a concern[28,29,30] suggesting that beta 3 adrenergic receptor agonists may be the preferred initial medical therapy of choice in elderly adults in the absence of contraindications or prohibitive cost.

For male patients the use of alpha blockers to reduce prostatic resistance may be an effective primary or adjuvant therapy to determine whether there would be additional benefit from OAB-directed therapy.[31]Where the need for OAB therapy exists but intolerance of actual or theoretical side effects exists, it may be appropriate to move advanced therapies earlier in the treatment algorithm.

Table 4: Oral Medications in the Treatment of OAB

Medication	Brand Name	Structure	Class	Dosing*	Percentage with side effect of dry mouth
Oxybutynin IR	Ditropan	Tertiary amine	AM**	7.5-20 mg daily (2.5-5 mg PO tid-qid)	87%[32]
Oxybutynin ER	Ditropan XL	Tertiary amine	AM**	5-30 mg once daily	68%[32]
Oxybutynin patch	Oxytrol	Tertiary amine	AM**	q72 hours	7%[33]
Oxybutynin gel	Gelnique	Tertiary amine	AM**	3% or 10%, one application daily	12.1% (3% gel)[34], 6.9% (10% gel)[35]
Darifenacin	Enablex	Tertiary amine	AM^^	7.5-15 mg once daily	20% (7.5 mg), 35% (15 mg)[36]
Fesoterodine	Toviaz	Tertiary amine	AM^	4-8 mg once daily	22% (4 mg), 34% (8 mg)[37]
Solifenacin	Vesicare	Tertiary amine	AM**	5-10 mg daily	11% (5 mg), 26% (10 mg)[38]
Tolterodine	Detrol	Tertiary amine	AM**	2 mg twice daily	30%[39]
Tolterodine LA	Detrol LA	Tertiary amine	AM^	4 mg daily	23%[39]

Trospium	Sanctura	Quaternary amine	AM^	20 mg twice daily	11%[40]
Trospium XR	Sanctura XR	Quaternary amine	AM^	60 mg once daily	9%[40]
Mirabegron	Myrbetriq	n/a	B3	25-50 mg once daily	1.9% (25 mg), 0.5-1.6% (50 mg), 2.1% (100 mg)[41,25]
Vibegron	Gemtesa	n/a	B3	75 mg once daily	1.7% (75 mg)[27]

Adapted from Resnick NM. Urinary incontinence. Lancet 1995;346:94-9 and Ballert KN, Biggs GY, Nitti VW. Antimuscarinic Agents; AUA Update Series, Volume 27, Lesson 16; 2008.

6.4 Advanced Therapies

Advanced therapies (**Table 5**) for OAB are generally utilized when medical therapy fails due to lack of efficacy, bothersome side effects, contraindications, or prohibitive cost. The association of medical management in the elderly with dry mouth, constipation, blurred vision and cognitive/mental status changes may justify moving directly to advanced therapies in the appropriate circumstances.[42]

The two general forms of advanced therapies include chemodenervation (e.g. botulinum toxin) and neuromodulation. OnabotulinumtoxinA is indicated for the treatment of symptoms of idiopathic OAB and neurogenic lower urinary tract dysfunction. [43] Neuromodulation strategies include posterior tibial nerve stimulation (PTNS) and sacral nerve stimulation (SNS).

Recent data also show that "frail" adults ≥ 60 years of age experience significant improvement in OAB symptoms after undergoing second and third-line therapies for OAB, comparable to the benefits experienced by their less frail counterparts. [44,45]

For more information on advanced therapies, see the Core Curriculum document entitled "**Overactive Bladder: Evaluation and Management**" and the "**Diagnosis and Treatment of Non-Neurogenic Overactive Bladder (OAB) in Adults: an AUA/SUFU Guideline (2019)**."

Table 5: Alternative Therapies in the Management of OAB

Treatment 2nd Line	Dosing/Regimen	Response rate	Patient counseling points
Onabotulinum toxin-A	100 U injected directly into detrusor	68.9% vs. 29.2% (placebo)[46]	Risk of UTI, urinary retention, need for repeat administration
Treatment 3rd Line	**Dosing/Regimen**	**Response rate**	**Patient counseling points**
Sacral neuromodulation	1 to 2 procedures for trial and device installation	up to 82% success at 5-years[47,48]	Cost, need for further revision
Posterior tibial nerve stimulation	30 minutes weekly x 12 weeks; monthly maintenance therapy	60-80% cure or improvement[49,50,51]	Time-intensive, unclear durability, unclear benefit versus medical therapy
Rare alternatives			
• Condom catheter • Suprapubic catheter • Augmentation cystoplasty • Urinary diversion			

6.5 Surgery

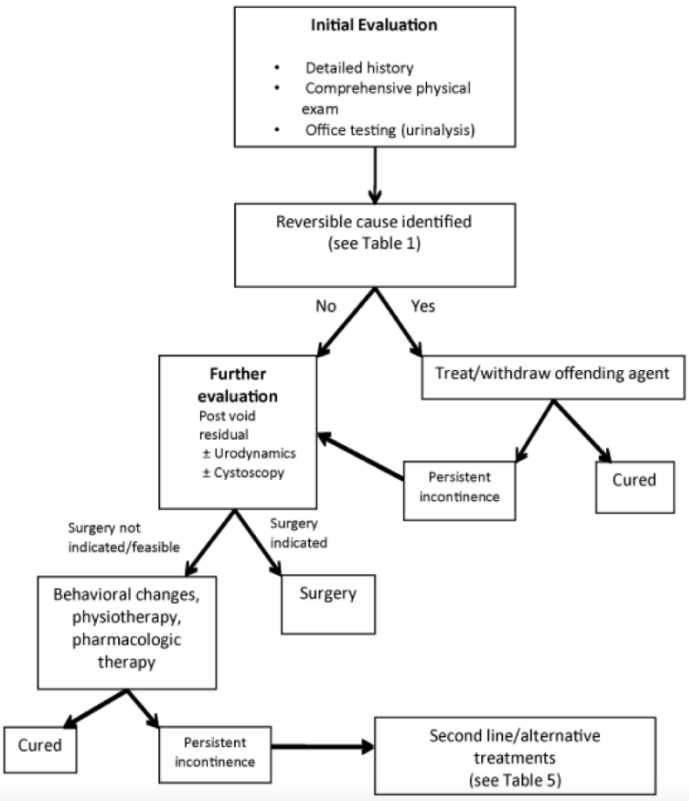

Figure 1: Treatment Algorithm for Incontinence in the Geriatric Patient

Surgical management is generally reserved for patients who fail conservative management and for whom no other options are feasible .

6.5.1 Men

For men who have undergone radical prostatectomy, both artificial urinary sphincters as well as male sling procedures have proven benefit for SUI due to intrinsic sphincter deficiency (see **Surgery for Male SUI**) and **Incontinence after Prostate Treatment: AUA/SUFU Guideline (2019)**.

6.5.2 Women

For women with SUI or stress-predominant mixed urinary incontinence, midurethral slings, pubovaginal slings, retropubic suspensions, and cystoscopic injection of urethral bulking agents have demonstrated efficacy, even in the elderly. [52] (see **Stress Urinary Incontinence: Surgery (Female)**) For select women who have symptomatic pelvic organ prolapse and require surgical correction, a concomitant sling may improve the likelihood of continence but at the risk of sling-related surgical complications and/or voiding dysfunction. [53]

AUA guidelines for evaluation and surgical management of female SUI are **available**.

7. Clinical Care Pathway

An algorithm for the approach to older adults with UI and VD is illustrated in **Figure 1**. It must be emphasized that **each patient requires an individualized assessment; however, this algorithm provides a useful template for the general assessment and subsequent treatment of patients with UI and VD**.

8. Summary

Incontinence should not be considered normal at any age. **Even in the presence of frailty, cognitive decline, or restricted mobility, UI should be evaluated and treatment offered**. Such urinary symptoms can often be dramatically improved or completely resolved. Elderly patients require a multifactorial approach to their urologic care, but with thorough and appropriate diagnostic testing and assessment, targeted treatment plans can be developed, and outcomes optimized.

9. Abbreviations

UI: urinary incontinence
VD: voiding dysfunction
UUI: urgency urinary incontinence
SUI: stress urinary incontinence
DRE: digital rectal examination
UA: urinalysis
PSA: prostate specific antigen
UTI: urinary tract infection
UDS: urodynamics
OAB: overactive bladder
POP: pelvic organ prolapse

Presentations

GERIATRICS: UI and VOIDING DYSFUNCTION Presentation 1

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