Urinary Incontinence
In Elderly Women

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Objectives

- Recognize the age related lower urinary tract changes
- Appreciate unique aspects of geriatric voiding problems
- Distinguish among various forms of incontinence and nocturia
- Steps in the evaluation and a variety of management strategies
- Criteria for referral
The Burden of Urinary Incontinence

- Very common among the elderly. 44–57% of women 40-60 years old. 75% for women > 75 years old.
- UI presents physical, psychological, and social burdens that can range from mildly bothersome to debilitating.
- 6% of nursing home admissions of women are directly attributable to UI management.
- The costs of UI care averaged $19.5 billion in 2004.

Process of Micturation

**Dual control of urination:**

1. Autonomic nervous system control
   - Nerve coming from the spinal cord and go directly to the bladder
   - When bladder gets fuller, signals are sent to the brain

2. Central nervous system
   - Voluntary control to choose when to void

⇒ Both can be altered by aging or neurological disease
When the bladder has about 10oz (300cc) of urine, the brain gets a signal = an URGE.

If not convenient then sphincter is tightened (voluntary) which allows the bladder to further relax.
“I’ve reached that age where I’ve given up on Mind Over Matter and am concentrating on Mind Over Bladder.”
Genitourinary Changes with Aging

**INCREASED**
- Post void residual < 100 cc
- Detrusor activity
- Nocturnal Urinary Output
- Bacteriuria 20%

**DECREASED**
- Ability to postpone voiding
- Total bladder capacity
- Detrusor contractility
- Ability to concentrate urine (apoptosis) of long nephrons
- Vaginal and urethral epithelial thickness
Aging and Continence

• Most elderly people remain continent in spite of age associated LUT changes
• Increasing research reveals that much of geriatric voiding dysfunction is “beyond the bladder”
• Cortical & sub-cortical control over bladder function
• Mostly inhibitory control that requires intact attention, working memory, executive functions
• Mobility, dexterity influence on continence
• Almost always multifactorial
Risk Factors for UI

- Pregnancy
- Childbirth
- Hysterectomy
- Morbid obesity
- Advancing age
- Family history
- Functional impairment
- Cognitive impairment
- Smoking (Chronic cough)
- Caffeine
- Constipation
- Depression
- Exercise
- UTI
- Delirium
- Comorbid medical condition (DM, Stroke)
- Decrease fluid intake

Reference: BMJ
Impact of Drugs on Continence and LUTS in Elderly

- Nocturia
- Nifedipine
- "Glitazones"
- NSAIDs/COX2
- Gabapentin
- Pregabalin

- Constipation
- Calcium blockers
- Anticholinergics
- Narcotics

- Mobility
- Antipsychotics
- Antidepressant

- Mentation
- Sedative hypnotics
- Benzos
- Anticholinergics

- Stress UI
- ACE inhibitors

- LUT function
- Decrease contractility
- Anticholinergics
- Calcium blockers

- Sphincter tone
- Alpha agonists
- Sphincter tone
- Alpha blockers
- Diuretics
Types of Incontinence

- TRANSIENT VS CHRONIC
- Stress
- Urge
- Mixed Urge and Stress
- Overflow
- Functional
Transient Incontinence

- Delirium
- Infection
- Atrophic vaginitis or urethritis
- Pharmaceuticals
- Psychological disorders
- Endocrine Disorders
- Restricted mobility
- Stool impaction
Types of Urinary Incontinence

**Urge**
Involuntary loss of urine accompanied by urgency resulting from abnormal bladder contractions
Prevalence ↑ with age

**Stress**
Involuntary loss of urine on effort, physical exertion or sneezing or coughing
Most prevalent type (19-64)

- **Mixed symptoms**
  - combination of stress and urge incontinence
  - 33% of older women reports mixed UI

Overactive Bladder Syndrome

**Urgency**
- Sudden, compelling desire to urinate, that is difficult to defer

**Nocturia**
- 1 or more visits to toilet during sleeping hours

**Frequency**
- 8 or more visits to the toilet per 24 hours

**+/− Urge Incontinence**
- Sudden & involuntary loss of urine accompanied by or immediately preceded by urgency

Reference: Annals
Spectrum of OAB

- Overactive Bladder
  - Frequency
    - Daytime
    - Nighttime Urgency

- SUI = stress urinary incontinence
- UUI = urge urinary incontinence

Overflow Incontinence

- Involuntary leakage of urine associated with urinary retention (over distention of bladder)
- Due to bladder outlet obstruction
  - Urethral stricture, tumor, severe organ prolapse
- Detrusor underactivity
  - Diabetes, post op or surgery related, medication, multiple sclerosis, cauda equina etc.
- Symptoms:
  - Frequent or constant dribbling, urge or stress incontinence, Nocturia, weak stream, straining, ↑PVR
Functional Incontinence

• Impaired Mobility
• Impaired dexterity
• Impaired cognition
• Environmental
• Psychological
Nocturia

If sleep does not serve an absolutely vital function, then it is the biggest mistake the evolutionary process ever made.¹

Nocturia is the Leading Cause of Sleep Disturbance in Older Adults

How often do the following disturb your sleep?

n=1424; aged 55–84

- Nocturia
- Physical pain
- Care-giving
- Health concerns
- Cough
- Night-time heartburn
- Headache
- Money problems
- Family problems
- Uncomfortable bed

Prevalence (%) of self-reported causes of disturbed sleep

National Sleep Foundation. Annual Sleep in America Poll (2003);
Bliwise et al. Sleep Med 2009;10:7–8
Nocturia

- Definition: voiding during (nocturnal) sleep time - preceded and followed by sleep (ICS guidelines)
- Normal nocturia ≤ 1
- Scientific problems:
  - How to define sleep time
  - Is patient awakened by the need to void?
  or
  - Do patient void because they are awake?

1. van Kerrebroeck et al Neurol and Urodyn 2002; 21:179-83
What Triggers Nocturia?

- 50 men and women
  - mean number of nocturia events = 2.6
- Nocturia awakening attributed to urge or not?
  - 78% nocturia voids were preceded by urge to void
  - In the remainder, the patient awakened for some reason, then voided out of habit or convenience before going back to sleep

The etiology and treatment of these two groups is likely to be different

What Degree of Nocturia is Important?

- Results from multiple studies of mortality, fractures and QoL all shows >2 voids / night is a threshold for significant negative impact from nocturia.
- One void per night is less likely to have serious consequences.
## Prevalence >2 Voids / Night

- Meta analysis of 43 studies

<table>
<thead>
<tr>
<th>Gender</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men (20-40 years)</td>
<td>2-17%</td>
</tr>
<tr>
<td>Women (20-40 years)</td>
<td>4-18%</td>
</tr>
<tr>
<td>Men (&gt;70 years)</td>
<td>29-59%</td>
</tr>
<tr>
<td>Women (&gt;70 years)</td>
<td>28-62%</td>
</tr>
</tbody>
</table>

Bosch and Weiss. *J Urol* 2010;184(2): 440-446
Nocturia is a Multifactorial Condition

Nocturnal polyuria

Medications

Detrusor overactivity

Reduced bladder capacity

Comorbid disease CHF/ DM/ CKD

Primary polydipsia

Estrogen deficiency

Excessive PM caffeine and ETOH intake

Sleep disorders
# Potential Factors Underlying Nocturia

<table>
<thead>
<tr>
<th>Urological evaluation reveals:</th>
<th>Nocturnal polyuria</th>
<th>Reduced nocturnal bladder capacity</th>
<th>24-hour polyuria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition:</strong></td>
<td>Nocturnal urine volume &gt;20–30% of total 24-hour urinary volume (dependent on age)</td>
<td>Urine production within normal limits; increased frequency, small voided volumes</td>
<td>24-hour urinary output exceeding 40 mL/kg body weight</td>
</tr>
</tbody>
</table>
| **Possible causes:**         | • Impaired circadian rhythm of AVP secretion  
• Congestive heart failure  
• Renal insufficiency  
• Excessive evening fluid/caffeine intake  
• Diuretic medication  
• Estrogen deficiency  
• Sleep apnea  
• Venous insufficiency  
• Edema  
• Hypoalbuminemia | • Overactive bladder  
• Bladder outlet obstruction (including benign prostatic enlargement)  
• Infection  
• Interstitial cystitis  
• Bladder hypersensitivity  
• Calculi  
• Cancer  
• Detrusor overactivity (e.g. multiple sclerosis) | • Poorly-controlled diabetes mellitus (type 1 or type 2)  
• Diabetes insipidus  
• Polydipsia |

Nocturnal Polyuria

- >33% of total urine volume produced while asleep
  - Changes in atrial natriuretic peptide, ADH secretion
- Consider occult sleep apnea
  - 30-40% will have significant OSA
- CHF and venous insufficiency
- Therapeutic options
  - Limit evening fluids/behavioral modification
  - Evening loop diuretics
  - DDAVP therapy
  - Dried fruits?
How will I get evaluated?

“How Hello, incontinence helpline – can you hold?"
Screening and Diagnosing UI

- The first Step: *Ask, Ask, Ask*

- “Do you have a problem with urinary incontinence (of your bladder) that is bothersome enough that you would like to known more about how it could be treated?”
Key History Components

- Frequency
- Urgency
- Hematuria
- Recurrent UTIs
- Nocturia
- Symptom severity (daily pad usage)
- Vaginal bulge
- Bowel habits
- Fluid intake (Caffeine and ETOH intake)
- Expectation of the treatment

Reference: BMJ
HISTORY

- Past Gyn/ Obstetrics Hx:
  Mode of delivery, birth weight, # of delivery.
- Medical history:
  Constipation, DM, HTN, neurological or disc prolapse, CHF
- Past Surgical history:
  Pelvic or abdominal surgeries
- Medications
  Prescribed and OTC
The Prescribing Cascade

Nifedipine for HTN

Edema, constipation, impaired bladder emptying

Nocturia, ↑ urgency, some UI

OAB!

Add antimuscarinic

↑ constipation  Add laxative....
### Bladder Diary

**Froedtert & Medical College of Wisconsin**

**Geriatrics WISH Clinic**

(414) 805-2068

<table>
<thead>
<tr>
<th>Time</th>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
<th>Column 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:00 AM - 7:00 AM</td>
<td>Did you urinate in the toilet? Record amount</td>
<td>Was the urge to urinate present? “Yes” (Large, Moderate, Small) or “No”</td>
<td>Did you have a leaking episode? “Yes” (Large, Moderate, Small) or “No”</td>
<td>Activity at the time of leakage</td>
<td>Amount and type of fluid intake</td>
</tr>
<tr>
<td>7:00 AM - 8:00 AM</td>
<td></td>
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<tr>
<td>8:00 AM - 9:00 AM</td>
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<tr>
<td>9:00 AM - 10:30 AM</td>
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<tr>
<td>10:00 AM - 11:00 AM</td>
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</tr>
<tr>
<td>11:00 AM - 12:00 PM</td>
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<tr>
<td>12:00 PM - 1:00 PM</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Name:**

**Date:**
Physical Examination

- Functional, Cognitive and Neurological exam
- Abdominal examination
- Pelvic and Rectal examination
  - Atrophy, pelvic organ prolapse, perineal sensation, rectal tone
- Cough stress test
- Cotton swab test ( "Q-Tip Test for urethral hypermobility"
- Presence of lower extremity edema


Investigations

- Blood work (BUN, creatinine, glucose, calcium) is recommended if compromised renal function is suspected or if polyuria (in the absence of diuretics) is present.
- UA and PVR
- Urine cytology is not recommended in the routine evaluation of incontinence.
- Renal ultrasound
When to refer?
Most UI can be treated by primary care providers

- Failure to improve with current measures
- Elevated PVR volume
- Hematuria without infection on urinalysis
- Recurrent symptomatic UTI
- Pelvic bladder, vaginal, or urethral pain
- UI with new neurological symptoms
- Hx. Of pelvic surgery, Irradiation.
- Symptomatic prolapse
When to do Urodynamics?

- Not essential for a basic work up
- Urodynamic may help distinguish between pure stress UI, urgency UI, and mixed UI
- No statistically significant differences in continence, improvement, or treatment failure were found between groups of women who did or did not have a baseline urodynamics diagnosis
- It is used for differential diagnosis, especially for patients considering surgical treatment

Treatment Options

- Behavioral therapy
- Medication
- Combined therapy: behavioral and pharmacologic therapy
- Minimally invasive therapies
  - Botulinum A-toxin
  - Neuromodulation
- Surgery
Behavioral Therapy

- Avoid extreme of fluid intake (No too much and no too little)
- Avoid caffeine and alcohol.
- Timed void.
- Prevent constipation instead of treating it
- Clothing
- DME in bathroom
- Weight loss

• Pelvic floor muscle training , aka Kegel exercise.

Weight Loss to Treat Urinary Incontinence in Overweight and Obese Women

RCT of intensive 6 month weight loss VS structured educational program in 338 obese women with 10 or more episodes of UI a week found a 47% reduction in UI episodes in the weight loss group vs 28% reduction in the controls at 6 months (P<0.001)
Pelvic Floor Exercise

- Helps strengthen the muscles of the pelvic floor and to contract them in isolation to inhibit detrusor contractions

- Kegel exercise
  (8-10 contractions 3 times a day)

AUG guideline:
- **First line therapy** for stress and mixed UI!!
INTONE PELVIC FLOOR MUSCLE EXERCISER
SUI treatment that’s conservative and effective.

Rewrite the story in SUI treatment with Poise® Impressa® Bladder Supports

The 1st FDA-cleared OTC device for the temporary management of SUI
With Poise Impressa

Leak score during physical activity

![Bar chart showing leak score during physical activity with subcategories for cough, laugh, sneeze, jump, lift, walk, run, and gym. The chart compares pre-study, mid-study, and post-study results.]

† p<0.001, pre- vs. post-study

Subscale
Comparative Effectiveness of Nonpharmacological Interventions

For Stress and Mixed UI:

- PFMT alone versus PFMT combined with either biofeedback, bladder training, or supervision
  Strength of Evidence = High
- PFMT alone versus PFMT combined with either intravaginal electrical stimulation or intravaginal devices
  Strength of Evidence = Moderate

For Urgency UI

- Bladder training alone versus bladder training plus PFMT
  Strength of Evidence = High

“Each capsule contains your medication plus a treatment for each of its side effects.”
Distribution of Cholinergic and Adrenergic Receptors

- **M** = muscarinic
- **N** = nicotinic
- **α** = $\alpha_1$ and $\alpha_2$-adrenergic
- **β** = $\beta_3$-adrenergic

**Detrusor muscle (M$_2$ 80%; M$_3$ 20%; β)**

**Mucosa and submucosa (M$_2$, M$_3$)**

**Bladder neck (α)**

**Pelvic floor (N)**

**Urethra (α)**
Pharmacological Interventions for UI

- Pharmacological interventions are used for urgency UI and mixed UI.
- The use of drug treatment for stress UI is rare and is considered “off-label.”

<table>
<thead>
<tr>
<th>Drug name</th>
<th>Starting dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darifenacin (Enablex)</td>
<td>7.5 mg PO daily</td>
</tr>
<tr>
<td>Fesoterodine (Tiovaz)</td>
<td>4 mg PO daily</td>
</tr>
<tr>
<td>Oxybutynin (Ditropan)</td>
<td>5 mg PO BID-TID</td>
</tr>
<tr>
<td>Solifenacin (Vesicare)</td>
<td>5 mg PO daily</td>
</tr>
<tr>
<td>Tolterodine (Detrol)</td>
<td>2 mg PO daily</td>
</tr>
<tr>
<td>Trospium (Sanctura)</td>
<td>20 mg PO BID</td>
</tr>
</tbody>
</table>

B3-Adrenoceptor Agonists

- Mirabegron (Myrbetriq) 25 mg PO Daily
- FDA approved in 2012
- Potential Side Effects:
  - Elevated Blood Pressure
  - Urinary Retention
  - Angioedema
  - Nasopharyngitis
- Expensive (~ $300/month)

Reference: BMJ
Oxybutynin Transdermal System (Oxytrol)

- Apply every fourth day
  - Avoids first-pass metabolism,
- Fewer systemic side effects
  - Dry mouth and constipation = placebo
- 17% incidence of skin reactions
  - Contact dermatitis
  - Erythema resolves
  - Pruritus, use moisturizer and rotate location
Oxybutinin Topical Chloride Gel (Gelnique)

- Once daily gel formulation
- Similar systemic side effect profile to patch
- Less local skin reaction
So which med to use for the treatment of urinary incontinence?

- No Differences
  - All decrease UI ~70%, ~25% cure rate

- Efficacy
  - Dry mouth: oxybutynin worst
  - Constipation: darifenacin, solifenacin worst
  - Least: Oxytrol patch (but rash in 15%)

4th International Consultation on Incontinence, 2008
Shamliyan TA et al, Ann Int Med 2008
Anticholinergic Medications

• Annoying side effects: dry mouth, constipation
• Elderly: increase vulnerability to toxicity. Cognitive SE
• There are 600 known anticholinergic meds
• Increase anticholinergic load overall
• Low efficacy in clinical practice
• Adherence is shockingly low: 10% at one year
• Use if behavioral treatment fails, monitor closely and carefully.
Conclusions About Benefits and Adverse Effects

- Nonpharmacological interventions (notably, PFMT or bladder training) lessen the severity of urgency, stress, and mixed UI, and promote continence in patients with stress and mixed UI, with low risk of adverse effects.

- Drug treatments for urgency UI show similar small benefits but may be differentiated by their adverse effects profiles.

- Withdrawal from drug treatment is typically due to adverse effects. Dry mouth and constipation are common.

Conclusions About Benefits and Adverse Effects

- The long-term safety of drugs for UI has not been evaluated in clinical trials, but serious adverse effects have been associated with their use (e.g., among the elderly and in combination with other commonly prescribed drugs).
- Diagnosis by urodynamic evaluation is not associated with better outcomes after non-surgical treatments.
- Currently available validated tools (voiding diaries, scales measuring perception of improvement and quality of life) are effective for measuring success with treatment targets that are valued by women with UI.
Onabotulinum toxin A
(Requires Referral to Specialist)

- FDA approved in 2013 for the treatment of:
  - overactive bladder symptoms in adults 18 years and older when oral medications are ineffective or contraindicated
  - overactive bladder symptoms due to neurologic disease when anticholinergic medications are ineffective or contraindicated
- Take Home Message: Not first line therapy for UI. Due to the risk of urinary retention, only patients who are willing and able to initiate catheterization post-treatment, if required, should be considered for treatment!!

Reference: BMJ
Sacral Neuromodulation (Requires Referral to Specialist)

- Electrodes are placed into the S3 nerve foramen (office setting vs OR)
- Systematic review found that 67-80% of patients achieve continence or greater than 50% improvement in urge UI symptoms
- Excellent option for women who are unwilling to accept the risk of urinary retention

Reference: BMJ
Posterior Tibial Nerve Simulation (Requires Referral to Specialist)

- Small needle placed superior to the medial malleolus to stimulate the posterior Tibial nerve peripherally to modulate the sacral nerve through S2-S4 nerves
- Office procedure
  - 12 weekly office visits (30 minutes each)
- Third-line therapy for highly motivated cognitively intact patients

Reference: BMJ
Insufficient Evidence For Interventions

- Pessaries:
- Soy-enriched diet
- Acupuncture
Treating female urinary incontinence

**UUI**
- Urgency Urinary Incontinence
- **Lifestyle interventions**
  - Reduce fluids, caffeine, carbonated drinks
  - Timed voiding
  - Manage constipation
  - Reduce BMI to below 25
  - Pelvic floor muscle training

**SUI**
- Stress Urinary Incontinence

**Pharmacology**
- Wide angle glaucoma
- Frail, elderly
- **Anticholinergics**
  - oxybutynin
  - trospium
  - tolterodine
  - solifenacin
  - flefoterodine
  - darifenacin
  - propiverine (UK only)
- **Beta 3 agonist**
  - myfibrin

**Surgery**
- Poor surgical candidate / averse to surgery
  - Injectable bulking agents
  - Burch colposuspension
  - Fascial slings
  - Midurethral synthetic slings

**Minimally invasive techniques**
- OnabotulinumtoxinA injection
- Sacral neuromodulation
- Posterior tibial nerve stimulation

**Flowchart**
- Poor efficacy or side effects
  - 2 or more treatments failed?
  - Reformulate as patch / gel or change drug
  - Yes
  - No

- No
  - In UK?
  - Yes
  - Duloxetine
  - Incontinence pessaries

- Yes

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Lauren N Wood, and Jennifer T Anger BMJ
2014;349:bmj.g4531
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Sometimes I feel that I have the worst job in the world!

Ya...Right!
References


Burden of UI

- References: