CANADIAN UNDERGRADUATE UROLOGY CURRICULUM

Incontinence

A Message from CanUUC

This educational material is intended to supplement medical student knowledge on urological health and medical practices. We are committed to promoting inclusion across all our materials. We acknowledge that some language used within this content may include terminology from source materials and research studies, which has been maintained to reflect the scientific context in which information was gathered.

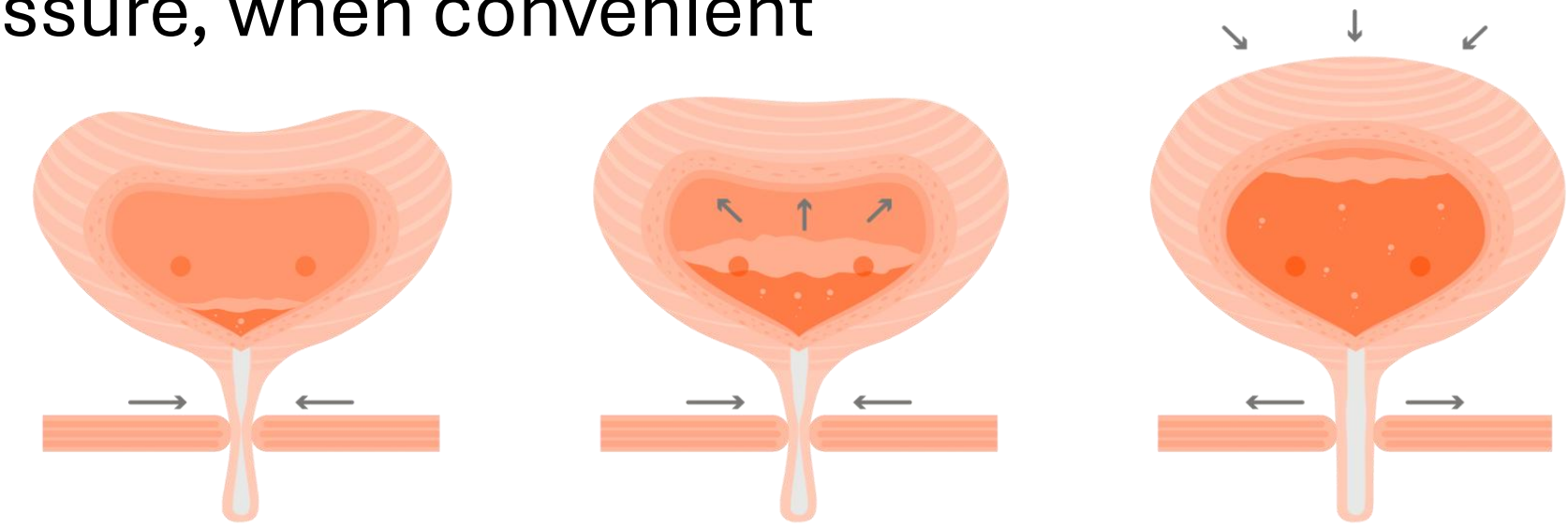
Wherever possible, we aim to use language that is respectful of all individuals, recognizing gender diversity, variations in sex characteristics, and the importance of inclusive terminology.

Learning Objectives

- Describe the normal neurological regulation of bladder and sphincter control.
- Define stress, urge, mixed, overflow and total incontinence.
- Outline the basic management plan (including history and physical examination) of an incontinent patient.
- Describe the medical and surgical treatment options for stress incontinence.
- Describe the medical treatment options for urge incontinence.
- List the reversible causes of urinary incontinence.

What is Needed for Normal Bladder Function?

1. **Filling -** Efficient and low pressure
2. **Storage -** Low pressure, with perfect continence
3. **Emptying -** Periodic complete urine expulsion, at low pressure, when convenient



a) Empty bladder

b) Filling of the bladder

c) Emptying of the bladder

https://www.apogepha.de/en/urology/urogenital-system/bladder/

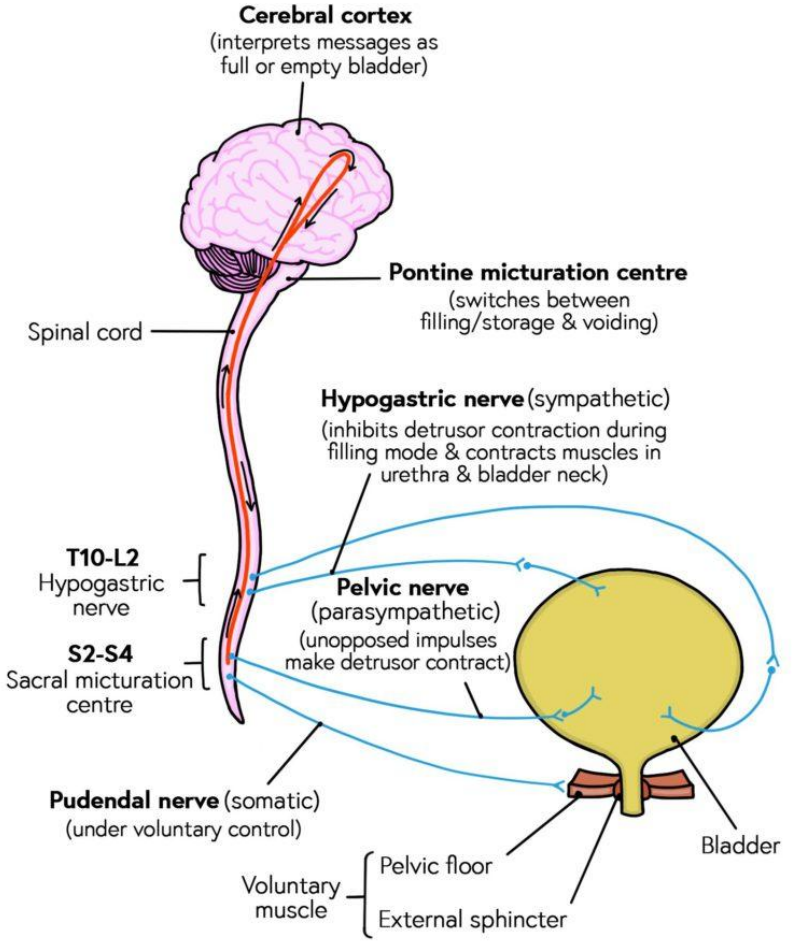
Innervation of the Bladder

Bladder innervation

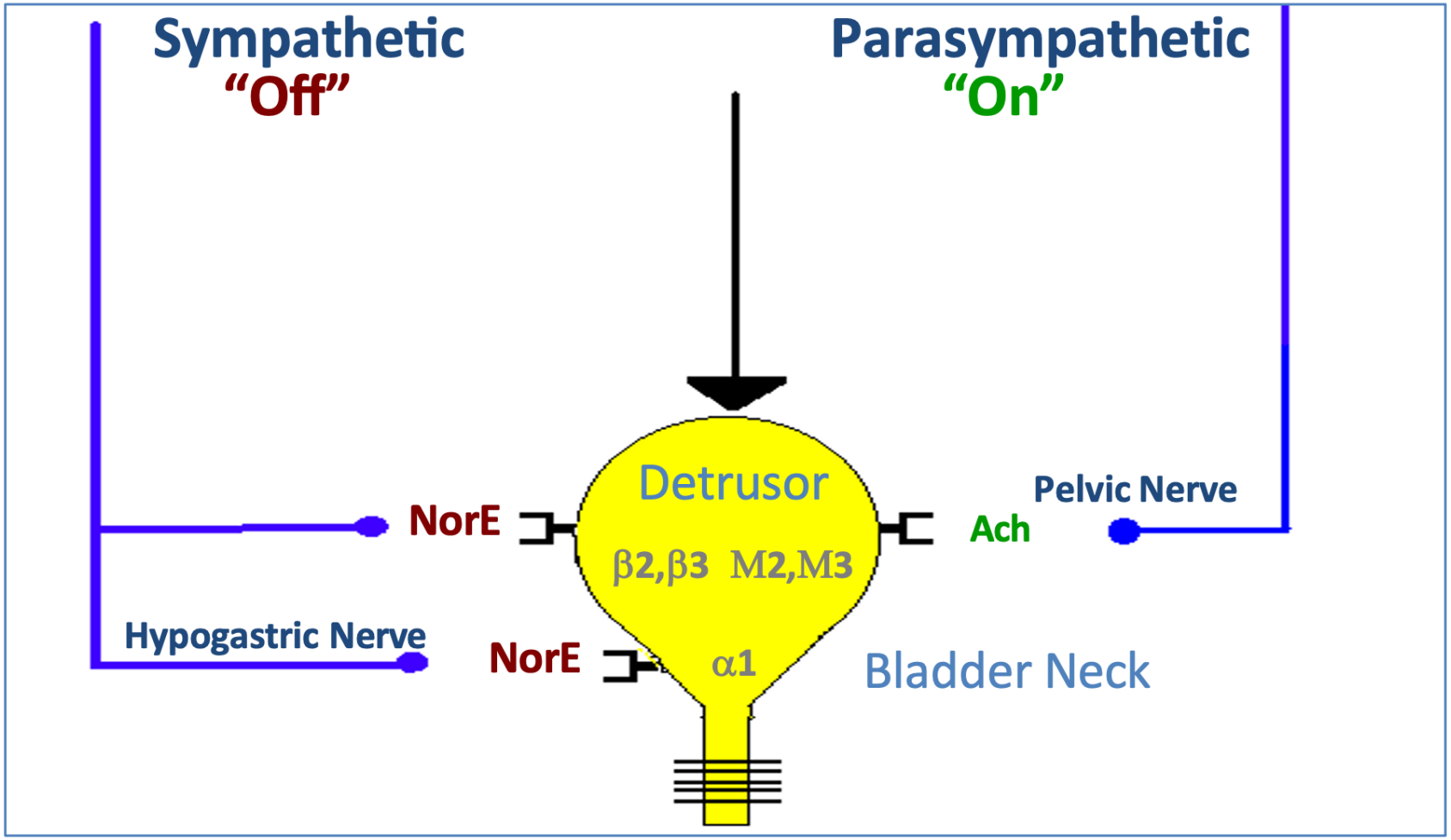
- Sympathetic (Hypogastric nerve)
- Parasympathetic (Pelvic Nerve)
- Somatic (Pudendal Nerve)

Common disorders classification:

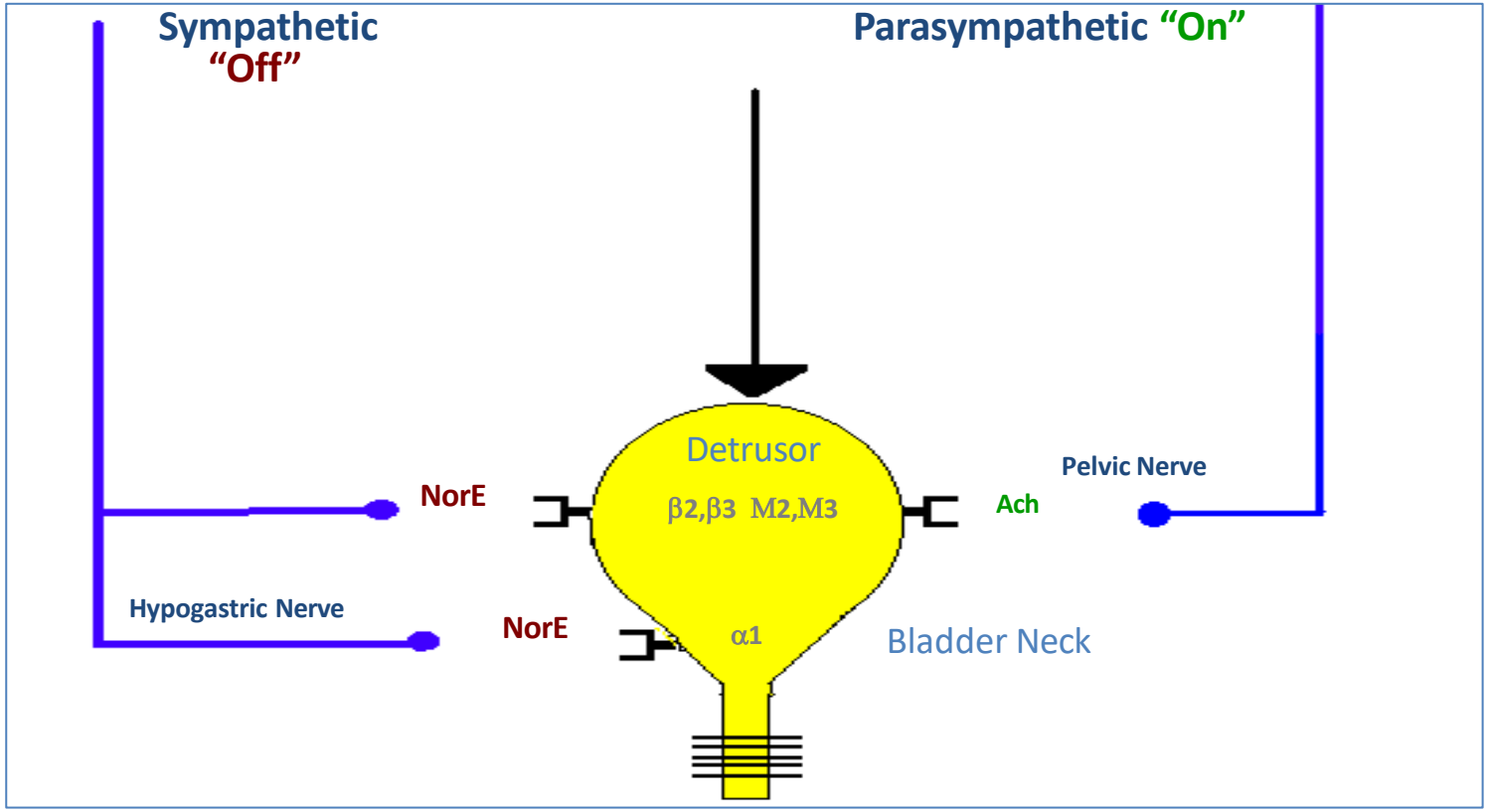
- Stress Urinary Incontinence
- Urge Incontinence/Overactive Bladder
- Neurogenic Bladder



Normal Bladder Function: Bladder Filling



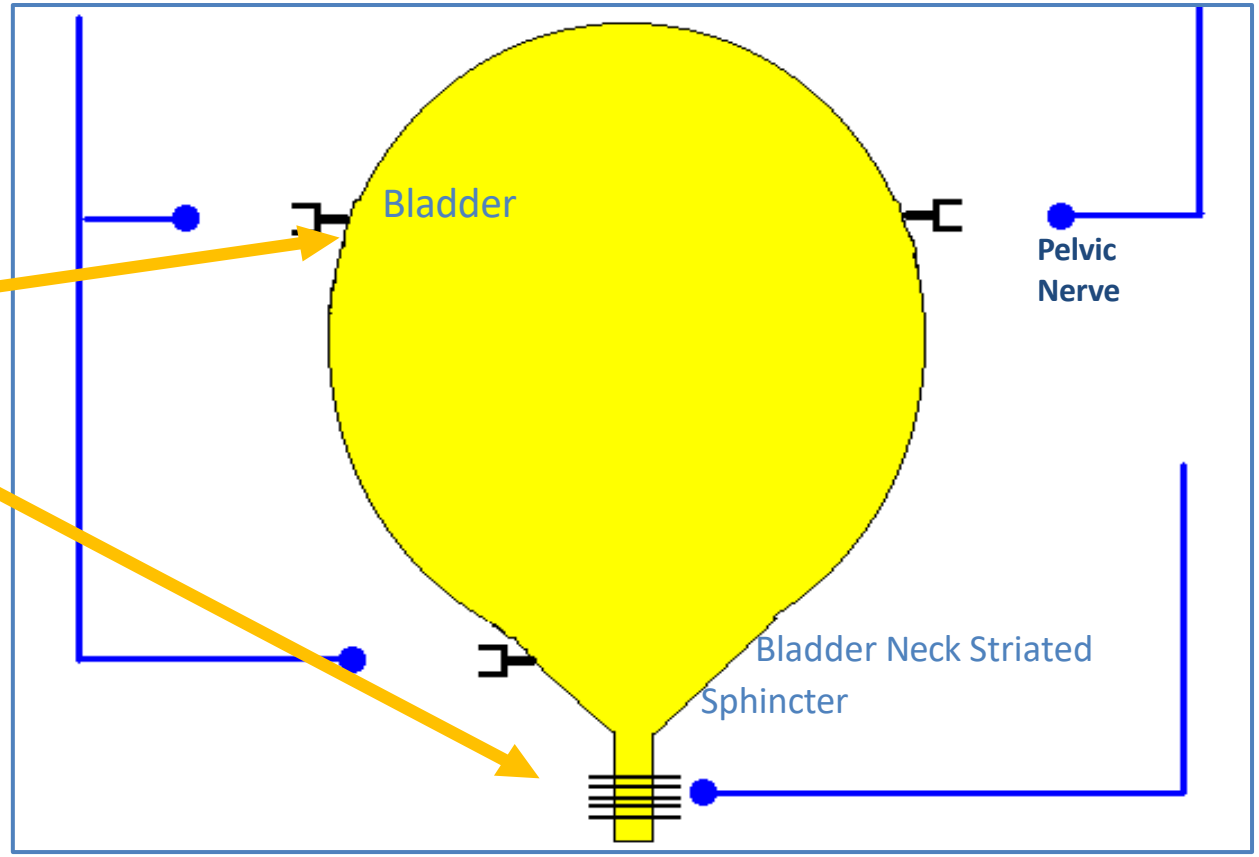
Normal Bladder Function: Bladder Emptying



Voiding Dysfunction: Functional Classification

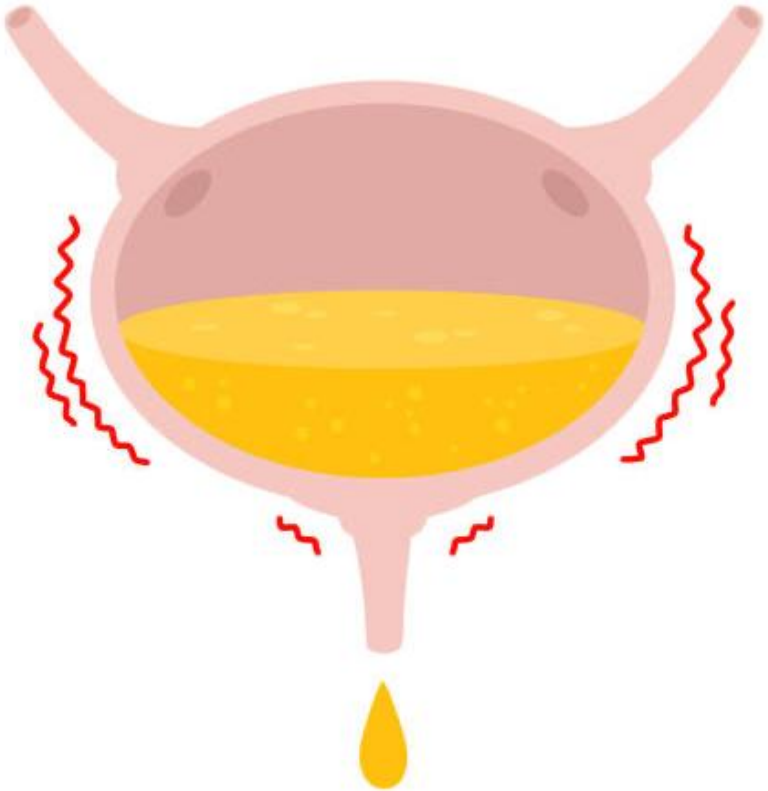
Classification:

- Failure to Store
  - » Bladder
  - » Outlet
- Failure to Empty
  - » Bladder
  - » Outlet



Urinary Incontinence

"the complaint of any involuntary loss of urine."



https://www.istockphoto.com/vector/overactive-bladder-urinal-overflow-gm1829959774-550693246

Types of Incontinence

- **Stress incontinence:** Loss of urine with exertion or sneezing or coughing.
- **Urge incontinence:** Leakage accompanied by or immediately preceded by urinary urgency.
- **Mixed incontinence:** Loss of urine associated with urgency and also with exertion, effort, sneezing, or coughing.
- **Overflow incontinence:** Leakage of urine associated with urinary retention.
- **Total incontinence:** the complaint of continuous leakage.
- **Functional incontinence:** Relates to a physical, intellectual or environmental issues that can be a contributing cause of incontinence in a person with normal bladder function.

Incontinence Terms

- **Frequency:** voiding too often
- **Urgency:** sudden compelling desire to pass urine which is difficult to defer
- **Nocturia:** waking one or more times per night to void

Classifying Incontinence: History

Stress Incontinence

- *Involuntary loss of urine with coughing or sneezing, or physical exertion*
- "Do you leak when you cough, sneeze, laugh, lift, walk, run, jump?"

Urgency Incontinence

- *Involuntary loss of urine associated with or immediately preceded by urgency*
- "Do you get that feeling like you "really" have to pee before you leak?

Mixed Incontinence - both

Incontinence History: Other Key Points

- Use and number of incontinence pads
- Lower urinary tract symptoms (LUTS)
- Presence of neurologic disease
- History of pelvic surgery or radiotherapy
- Obstetrical history
- Functional status
- Bowel and sexual function
- Medication history
- **Impact on quality of life**

Physical Examination

- **General examination**
  - Edema, Neurologic Abnormalities, Mobility, Cognition, Dexterity
- **Abdominal examination**
  - Assess for palpable or distended bladder
- **Pelvic exam**
  - Is prolapse contributing?
- Digital Rectal Examination
- Cough test
  - Is there urine loss?

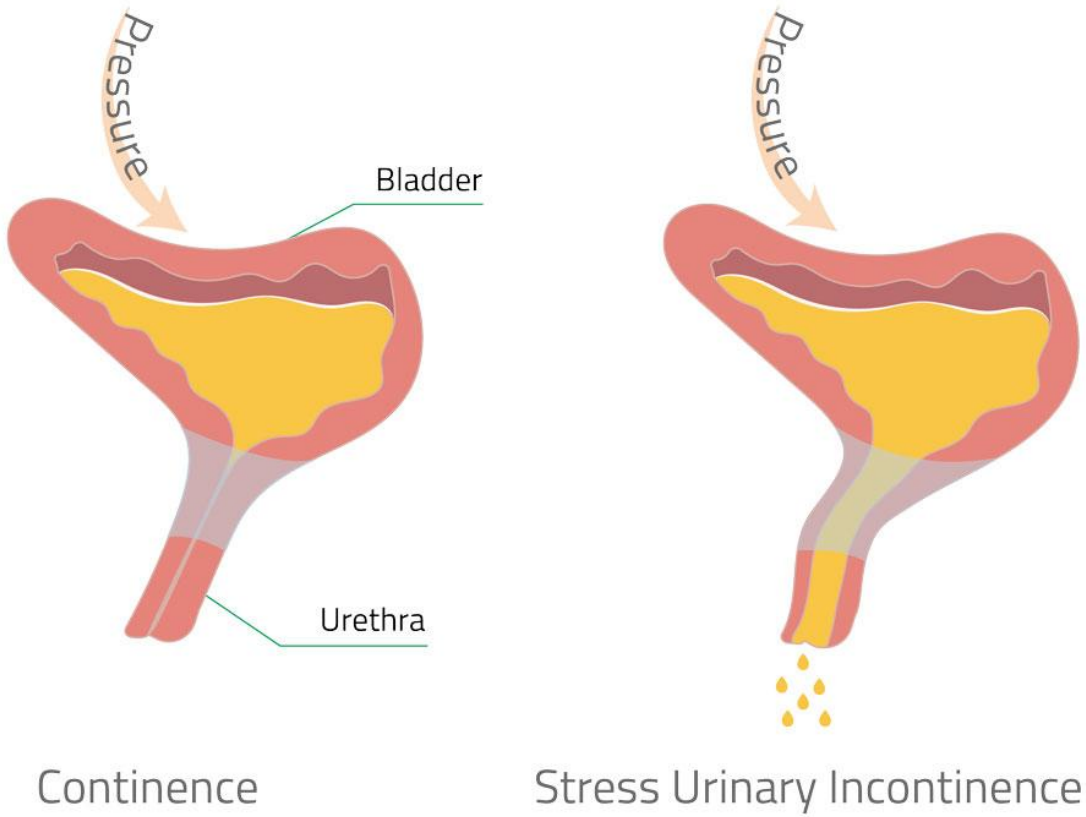
Incontinence: Investigations

- Urinalysis
- Urine Culture
- Voiding Diary
  - Type of incontinence
  - Number of episodes
  - Volume of leakage (number of pads, etc)

https://www.shutterstock.com/image-vector/urine-analysis-doctor-gloves-holds-jar-2124864398

Stress Urinary Incontinence (SUI)

Stress Urinary Incontinence (SUI)



https://www.yua.com/what-is-stress-urinary-incontinence-sui/

Stress Urinary Incontinence: Risk Factors

- **Childbirth**: Pelvic floor damage and urethral dysfunction often arise from vaginal deliveries.
- **Aging**: Leads to neuromuscular compromise and loss of urethral closure strength.
- **Obesity**: Increases abdominal pressure, weakening pelvic support structures.
- **Estrogen Loss**: Post-menopausal estrogen decline affects pelvic tissue integrity.
- **Chronic Cough & Smoking**: Abdominal straining and lung disease elevate pressure on the bladder and urethra.

Stress Urinary Incontinence: Pathophysiology

- **Intrinsic Sphincter Deficiency (ISD)**: Failure of the urethra to coapt and maintain closure independently of its supporting tissues.
- **Urethral Hypermobility**: Loss of anatomic support prevents proper pressure transmission during activities like coughing, leading to leakage.

Stress Incontinence: Initial Management

- Risk Reduction:
  - Weight loss
  - Smoking cessation
  - Topical estrogen
- Behavioral techniques:
  - Kegel exercises, Pelvic floor physiotherapy
    - Initial treatment for stress urinary incontinence
    - Designed to strengthen pelvic floor muscles
    - Also helpful for urge incontinence

Access to Pelvic Floor Physiotherapy in Canada

- **Public insurance**

  Some provinces provide limited public coverage, but programs often face long wait times and are concentrated in urban centers, leading to inequitable access for rural and remote communities

- **Private care**

  Most Canadians must seek pelvic health physiotherapy through private clinics, with out-of-pocket cost creating a barrier to access

Stress Incontinence: When to refer to urology?

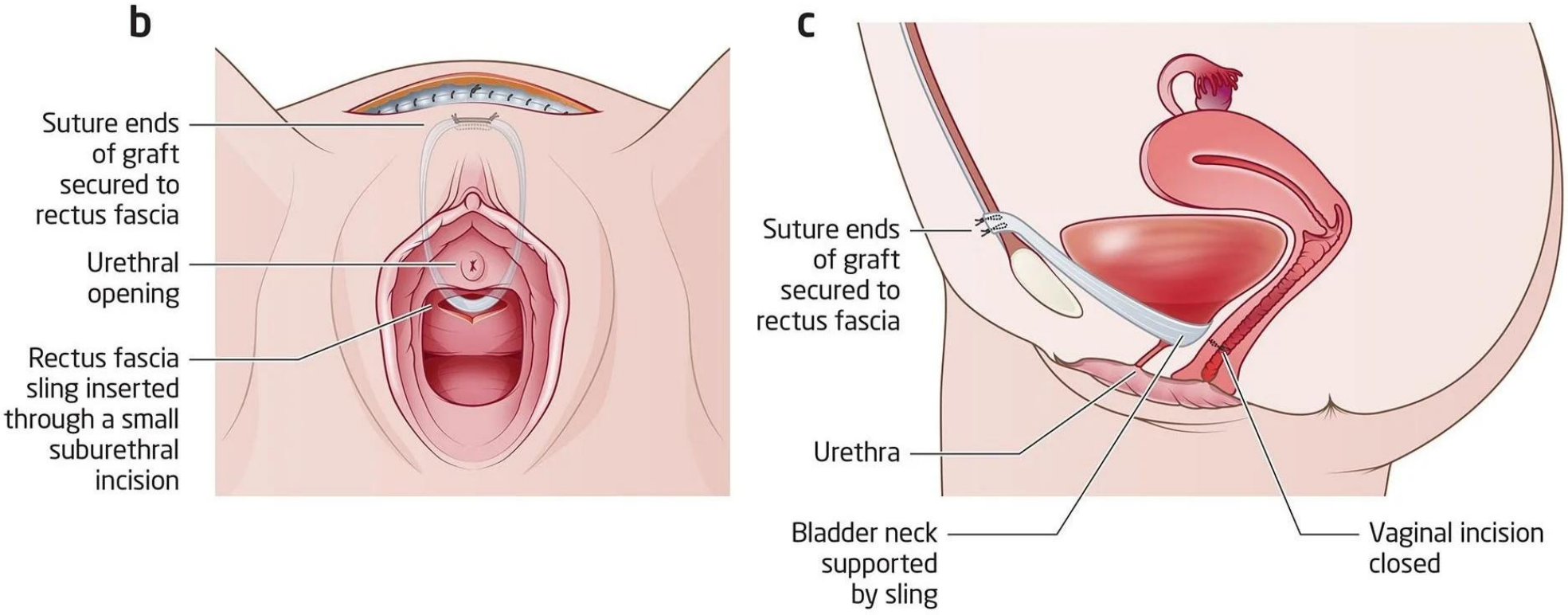
- If incontinence causes significant decrease in quality of life
- Failed previous SUI treatment
- Failed Kegel exercises/pelvic floor physiotherapy

Stress Incontinence: Other Treatment Options

- Pelvic Floor Biofeedback
- Pessary
  - Intravaginal insert to reduce prolapse & support the urethra
- Urethral Bulking Agents: (Bulkamid, etc.)
  - Minimally invasive
  - Less durable than surgery
- Surgery
  - Urethral sling
  - Effective and durable

Stress Incontinence Surgery

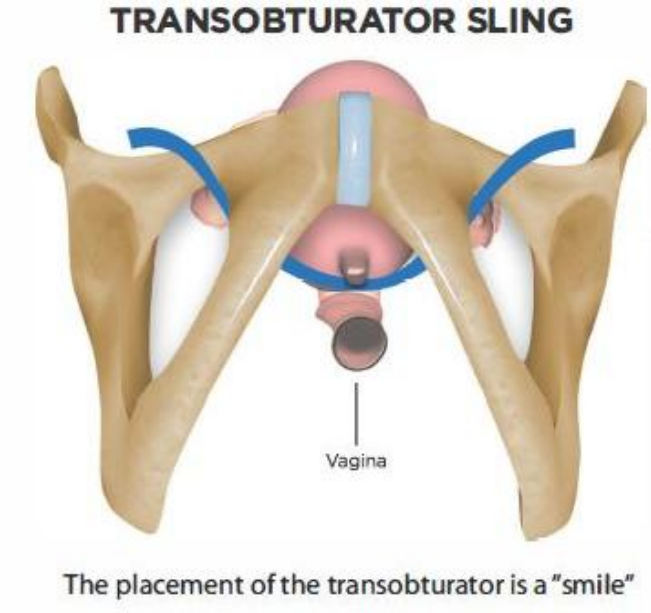
- Pubovaginal sling with rectus fascia



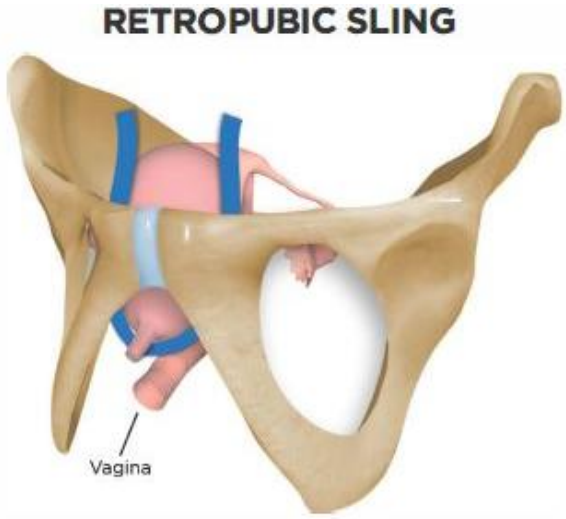
https://www.drchinyong.com.au/stress-incontinence-surgery-options

Stress Incontinence Surgery

- Synthetic Mid-urethral Slings
  - Day surgery
  - 20-30 minutes
  - Risks:
    - Bleeding
    - Infection
    - Too tight/retention
    - Mesh complications
      - Chronic pain, erosion/extrusion, etc
  - Off work ~2-4 weeks
  - No restrictions after 4 weeks



The placement of the transobturator is a "smile"



The placement of the retropubic sling is like a U

https://bpgyn.com/education-docs/mid-urethralsling-for-stress-urinary-incontinence/

Stress Incontinence Surgery: Does it Work?

- Success: 80-85%
- Not all bladders are the same
- Treats stress incontinence, not OAB
- 30% of women will have improvements in OAB symptoms
- Retention: 2-3%

Male Stress Urinary Incontinence General Overview

- **Common Causes**: Often follows prostate surgery (e.g., radical prostatectomy), radiation therapy, or pelvic trauma.
- **Risk Factors**: Includes previous pelvic surgery, pelvic fracture urethral injury (PFUI), neurological conditions, and radiation.
- **Impact**: SUI significantly affects quality of life, leading to emotional distress and higher rates of depression, especially after prostate cancer treatment.
- **Conservative Options (limited role)**: Pelvic floor muscle training (PFMT), absorbent pads, external devices (e.g., clamps), and catheters.

Male Stress Urinary Incontinence Surgical Options

- **Artificial Urinary Sphincter (AUS)**: Gold standard for severe SUI, consisting of a urethral cuff, control pump, and pressure-regulating balloon.
- **Male Sling**: Suitable for mild to moderate SUI; uses mesh to provide urethral support and improve continence.
- **Bulking Agents**: Injection therapy with limited success; not commonly recommended for male SUI.
- **Adjustable Balloon Therapy**: ProACT device consists of two balloons implanted at the bladder neck, offering adjustable continence support.

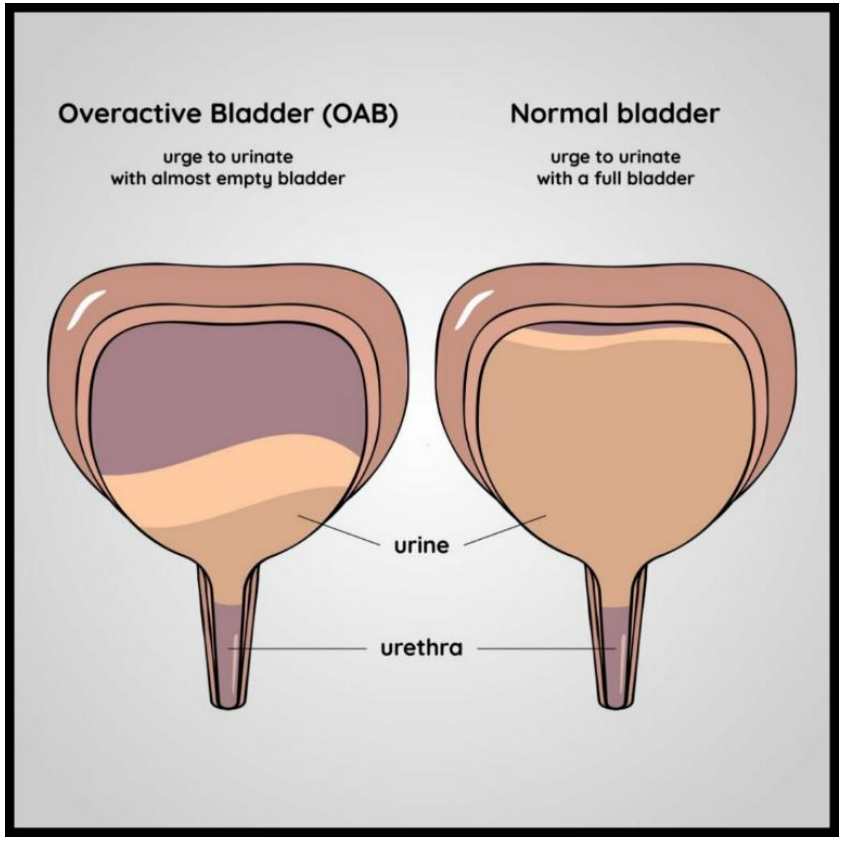
Urge Urinary Incontinence (UUI) / Overactive Bladder (OAB)

Urge Urinary Incontinence (UUI) / Overactive Bladder (OAB)

- Urge Incontinence:
  - Involuntary leakage of urine accompanied by or immediately preceded by urinary urgency
- OAB:
  - A symptom complex of urgency, with or without urge incontinence, usually with frequency and nocturia

Overactive Bladder: Definitions

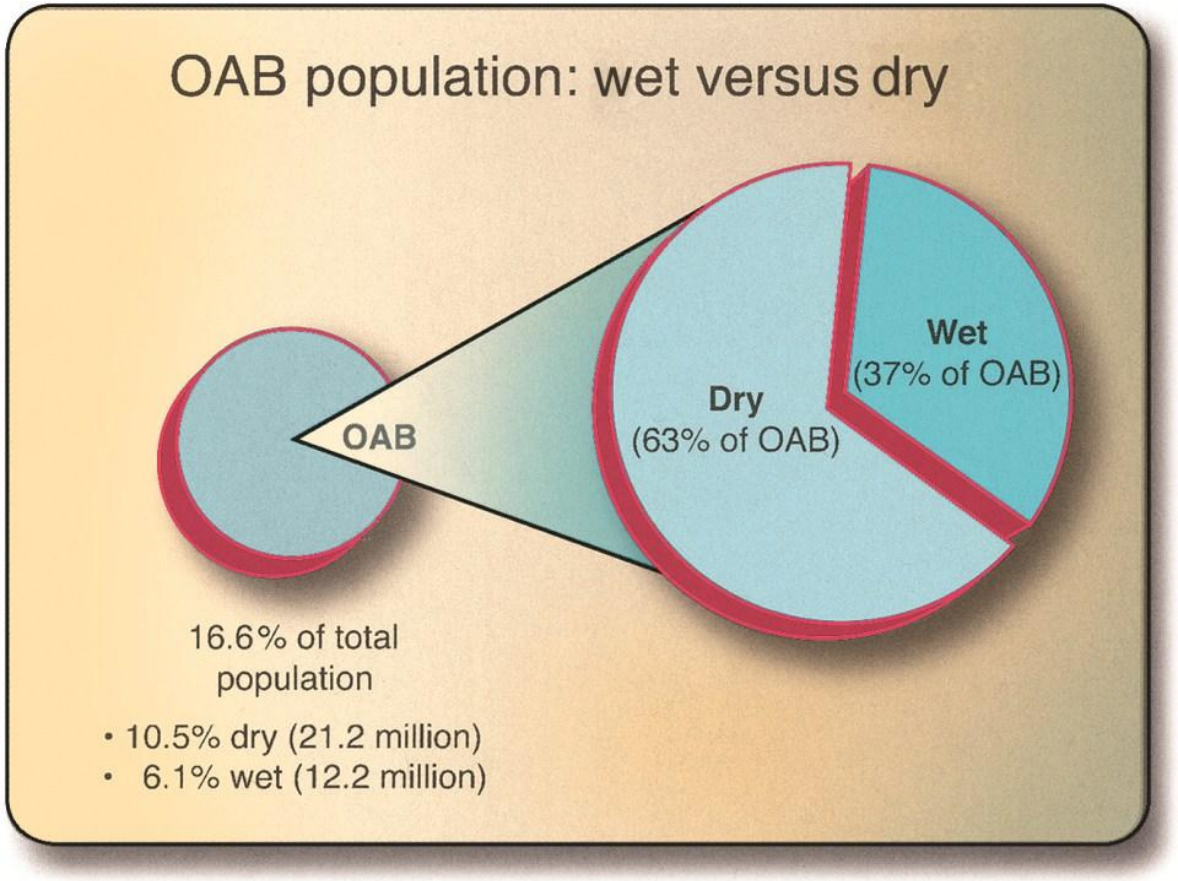
- **Frequency:** voiding too often
- **Urgency:** sudden compelling desire to pass urine which is difficult to defer
- **Urge incontinence:** involuntary loss of urine associated with or immediately preceded by urgency
- **Nocturia:** waking one or more times per night to void



https://urologic.institute/service/overactive-bladder/

Overactive Bladder Prevalence

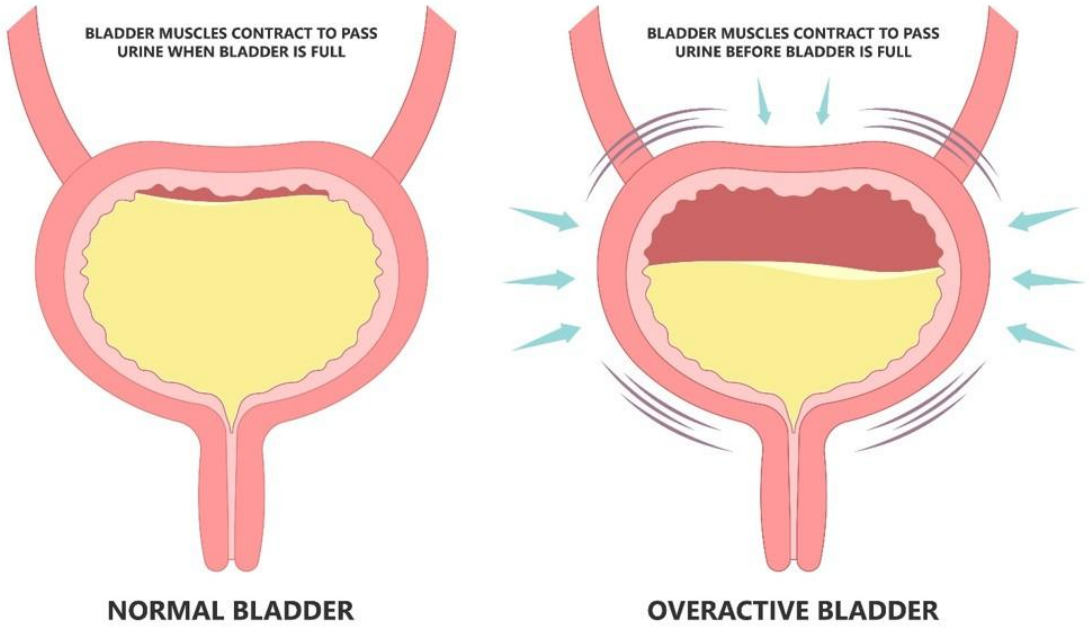
- Incontinent (Wet) versus Continent (Dry)



Stewart W et al. Prevalence of OAB in the US: results from theNOBLE program. Poster presented at WHO/ICI; July, 2001; Paris, France.

Overactive Bladder: Etiology

- Inappropriate contraction (or sensation) of detrusor muscle during bladder filling
- Idiopathic
  - No identifiable cause
  - ?related to aging (unclear mechanism)
- Neurogenic
  - Stroke, Parkinson's disease, MS, Alzheimer's disease, brain tumor, spina bifida



https://www.cmuh.cmu.edu.tw/HealthEdus/Detail_EN?no=6994

Overactive Bladder: History

- How often do you void during the day?
  - Give examples: q1hr, q2-3hr, etc.
- When you gotta go, do you gotta go?
- How many times do you get out of bed to void?
- Do you leak urine?
- Do you have to wear pads? Change clothes?
- Do you have a strong or slow stream?
- Feel like you empty?

OAB/Urge Incontinence: Initial Treatment

- Most cases of OAB can be diagnosed and treated by primary health care providers.
- Treat OAB and urge incontinence the same.
- Treat for 6-8 weeks and reassess
- Consider voiding diary (frequency volume chart for 3 days)

Overactive Bladder: Treatment Options

- First line therapy:
  - Behavioral therapy
- Second line therapy:
  - Medication (Anti-cholinergics, B3- Agonists)
  - Combined therapy
- Third line therapy:
  - Minimally invasive therapy
  - Surgery

OAB Treatment: Behavioral Therapy

Patients should implement the following program at home:

- Regular pelvic floor muscle exercises
- Specified voiding schedule aimed at avoiding emergencies
- Fluid management (typically reduction)
- Reduce caffeine, alcohol, spicy food consumption and cigarette smoking

OAB Treatment: Anti-cholinergic Medications

First line treatment :

• Oxybutynin IR	Generic oxy
• Tolterodine IR	Detrol Detrol
• Tolterodine ER	LA Ditropan
• Oxybutynin ER	XL Oxytrol
• Oxybutynin TDS	Uromax
• Oxybutynin ER	Enablex
• Darifenacin	Vesicare
• Solifenacin	Trosec Toviaz
• Trospium	
• Fesoterodine	

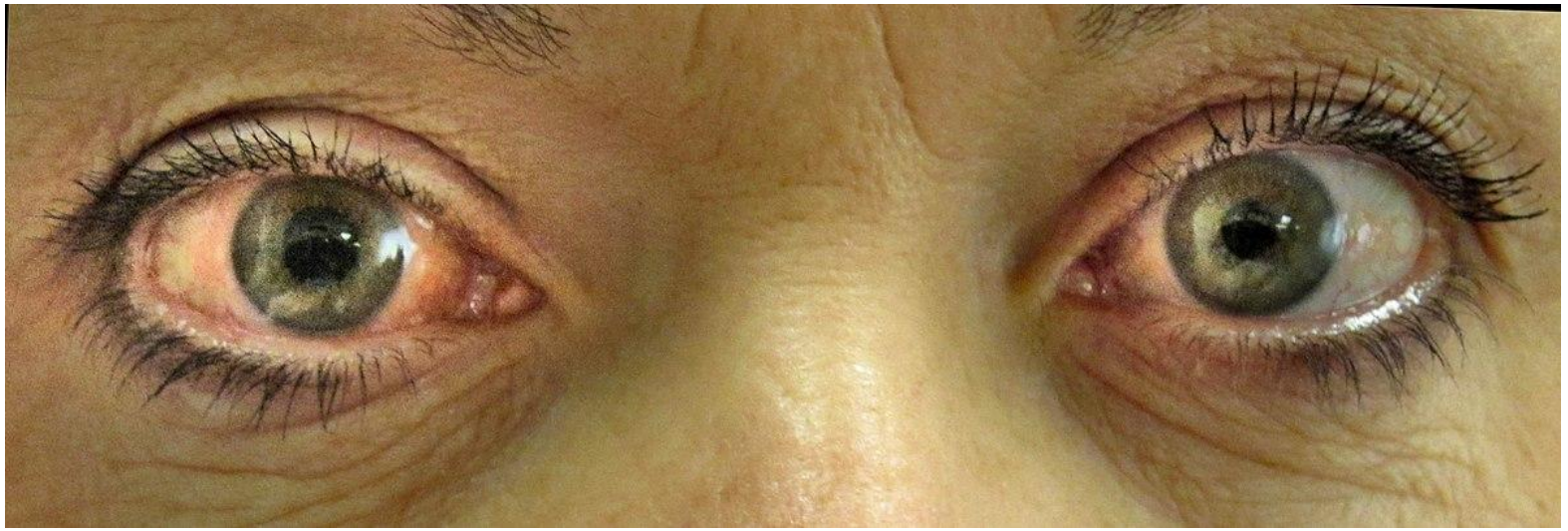
Other

• Myrbetriq	Mirabegron

Anti-Cholinergic Medications and Glaucoma

What do you do?

- Okay if open angle glaucoma
- Maybe okay for closed angle glaucoma if treated.
- *If not sure, ask for the ophthalmologist*



OAB Treatment: Follow-up Appointment

- Review urinalysis and culture
- Compare voiding diaries
- Ask “Did the treatment work?”
- Any side effects (dry mouth, dry eyes, constipation, cognitive impairment)?
- Switch to/add another anti-cholinergic medication
- Increase dose

https://www.vecteezy.com/free-vector/rx-bottle

When should you refer to a urologist?

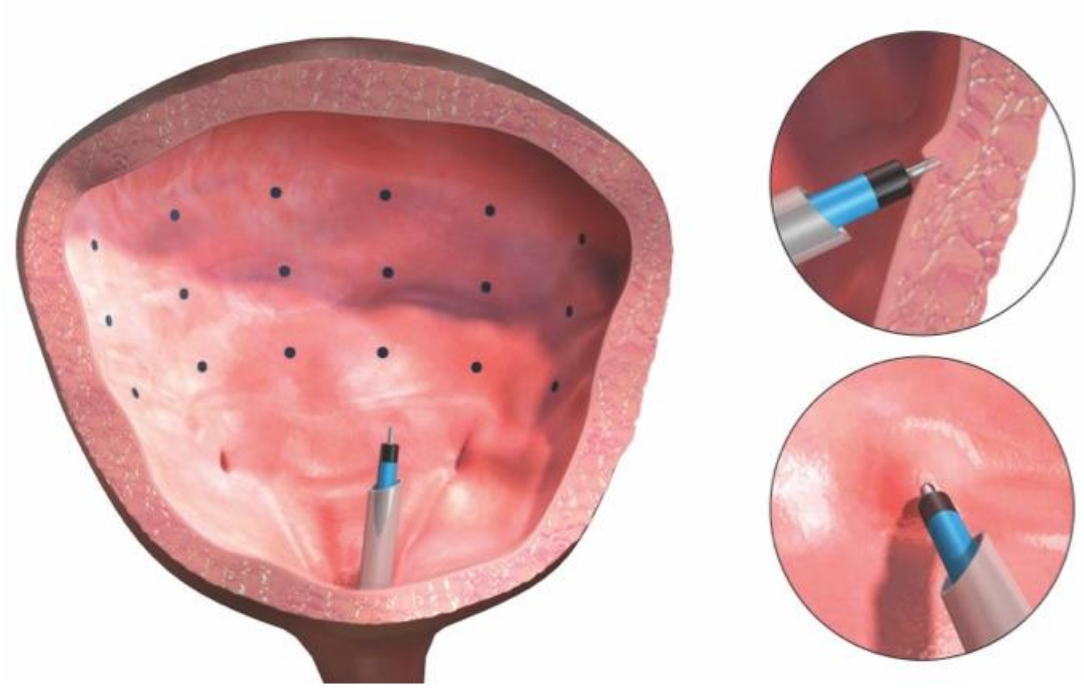
1. Uncertain diagnosis/no clear treatment plan
2. Unsuccessful therapy for OAB – after 2-3 meds?
3. Neurological disease
4. Stress incontinence concurrently
5. Hematuria without infection
6. Persistent symptoms of poor bladder emptying
7. History of previous radical pelvic or anti-incontinence surgery

What to include in the referral?

- Urinalysis & Urine Culture
- Previous urologic/pelvic surgery
- Type of incontinence (UUI, SUI, mixed)
- Attempted treatments
- ? Voiding diary

Refractory OAB

- >3 failed medical treatments
- Treatment Options:
  - Intravesical Onabotulinum toxin A
  - Sacral or peripheral nerve stimulation
  - Bladder augmentation (rarely)



https://www.botoxone.com/oab

OAB/UUI: Key Clinical Points

- Educate and reassure the patient
- No anti-cholinergic is better than another
- Efficacy and side effects vary from individual to individual
- OK to try different medications
- Realistic expectations – not a cure
- Be careful in geriatric patients
  - Trosec 20 mg daily or bid, Detrol 2mg or 4mg, Enablex, Vesicare, Fesoterodine, Mirabegron

Other Types of Incontinence

Total Incontinence

The complaint of continuous leakage

- This may be indicative of an abnormal communicating tract between urinary tract and other organ (commonly with the vagina)
  - i.e. vesicovaginal fistula
- Inquire about past surgical history, radiation therapy
- Needs referral and further investigation

Overflow Incontinence

Leakage of urine due to chronic urinary retention

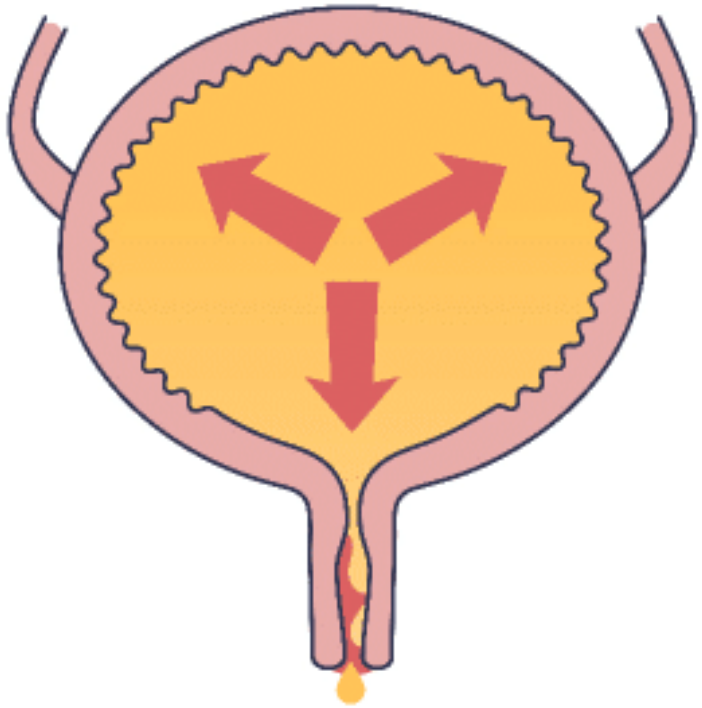
Usually related to bladder outlet obstruction

- BPH or urethral stricture

May also be related to a weak or “hypotonic” bladder

Treatment:

- Relief of urinary obstruction
- Self-catheterization (if due to weak bladder)

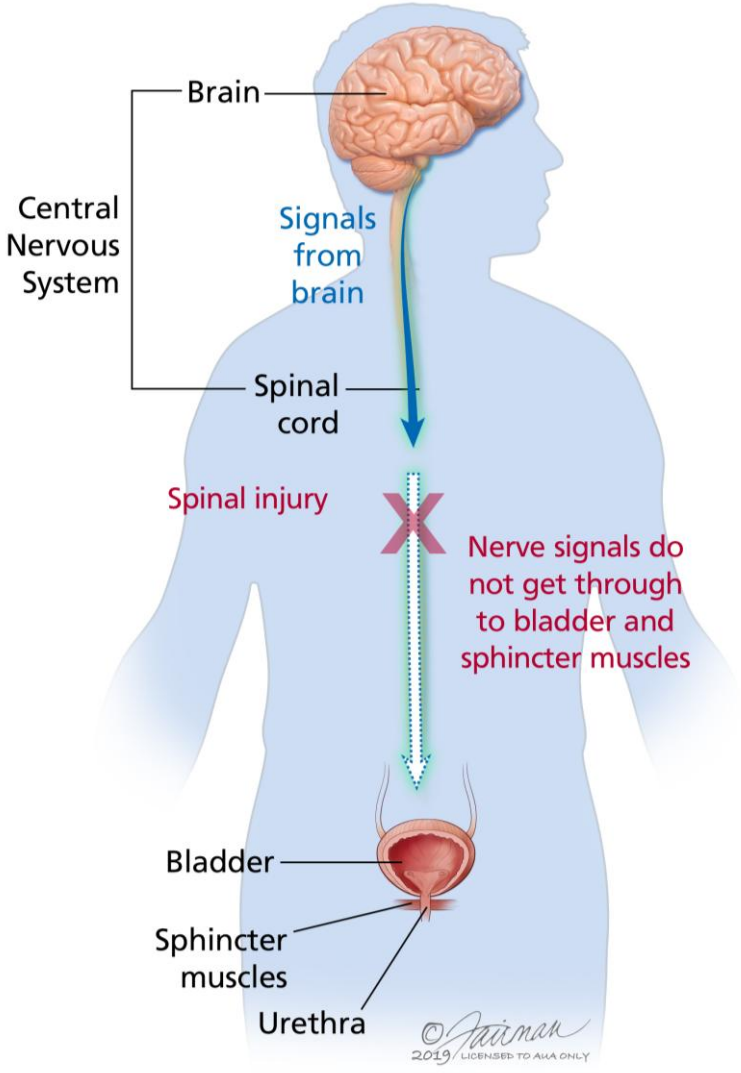


https://integrativeurology.com/conditions/incontinence/

Neurogenic Bladder

Failure of bladder function with loss of innervation

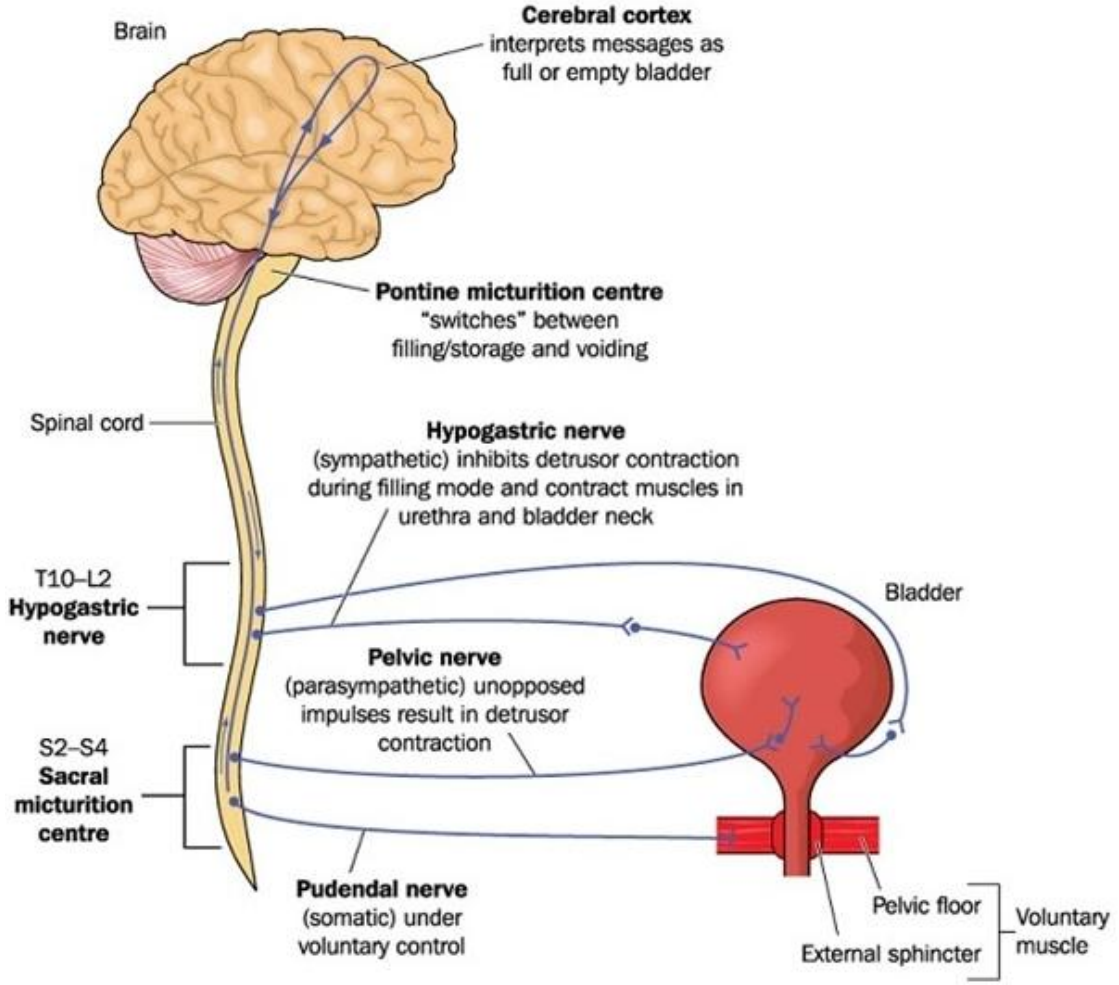
- Normal bladder:
  - Holds 350-500mL
  - Senses fullness
  - Low pressure
  - Empties >80% efficiency



https://www.urologyhealth.org/urology-a-z/n/neurogenic-bladder

Neurogenic Bladder: Classification

- Innervation:
  - Parasympathetic (S2-4) – empties bladder (bladder contracts, sphincter relaxes)
  - Sympathetic (T10-L2) – fills bladder (bladder relaxes, sphincter contracts)
- Classification:
  - Upper motor neuron (lumbar and higher)
  - Lower motor neuron (sacral and lower)



https://www.news-medical.net/health/Neurogenic-Bladder-Tests-and-Diagnosis.aspx

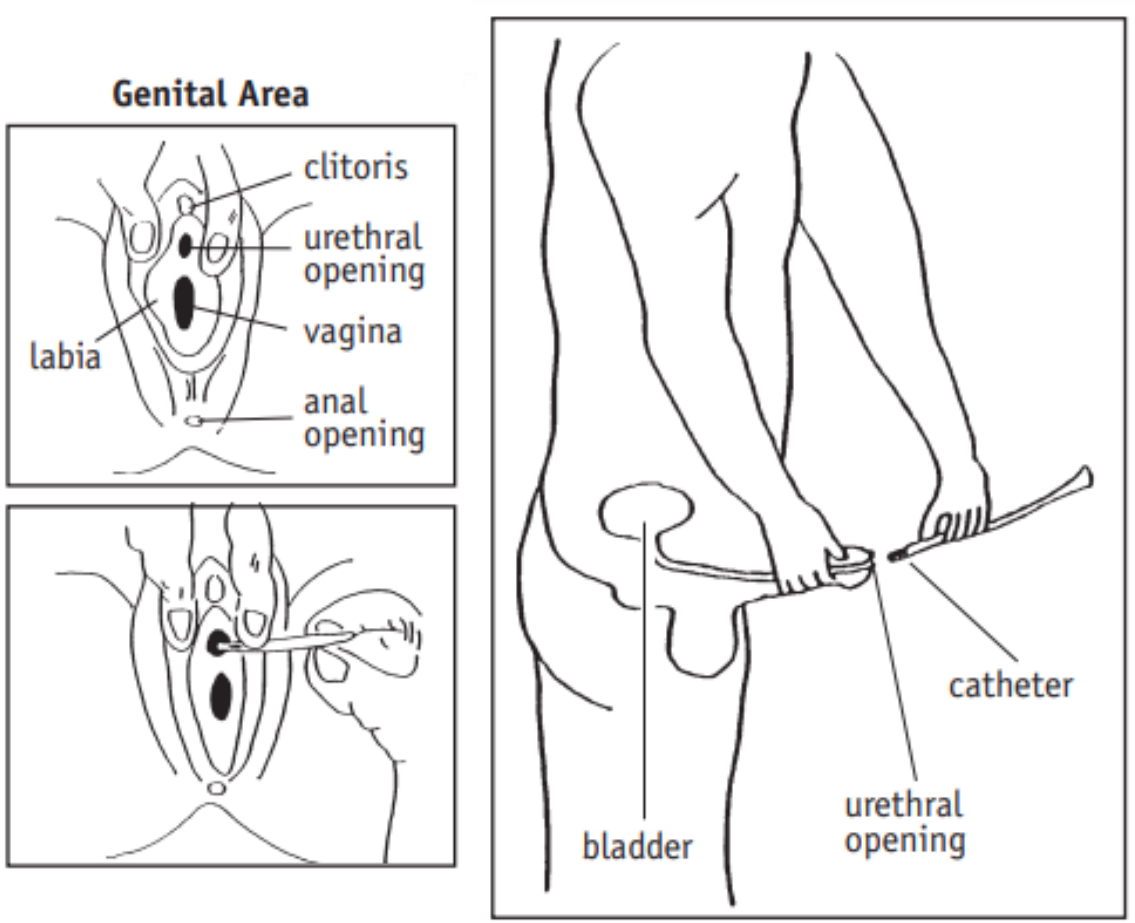
Neurogenic Bladder

- Upper motor lesion:
  - Detrusor overactivity – Above pons
  - Detrusor overactivity & dis-coordinated sphincter – Spinal cord (thoracic & lumbar)
- Treatment

  1. Lower bladder pressure and treat urge incontinence with anticholinergics, intradetrusor botox
  2. Empty bladder with intermittent self catheterization
  3. Augment bladder with surgery if high pressures persist

Neurogenic Bladder

- Lower motor lesion
  - Sacral or lower
  - Detrusor atony/areflexia
- Treatment
  - Treat with Clean Intermittent Catheterization (CIC)



https://www.shieldhealthcare.com/community/spinal-cord-injury/2016/03/21/10-steps-for-self-catheterization/

Neurogenic Bladder: Autonomic Dysreflexia

- May occur in patients with a spinal cord injury above T6
- Massive sympathetic release in response to stimulation below spinal cord lesion
- Hypertension, headaches, bradycardia, flushing
- **THIS IS A POTENTIALLY LIFE-THREATENING EVENT**
  - Identify and stop main contributor: empty bladder, treat constipation, alleviate pain…
  - Treat with alpha-blockers, sublingual nifedipine

Urinary Incontinence in Geriatric Populations – A General Overview

Underlying Reversible Causes of Incontinence in the Elderly

- **PPRAISED**
  - P – Pharmacologic (diuretics, narcotics, etc)
  - P – Psychological
  - R – Restricted mobility
  - A – Atrophic vaginitis/urethritis
  - I – Infection* (UTI)
  - S – Stool impaction
  - E – Endocrine (DM)/excess urinary output
  - D – Delirium (impaired cognition)

* Avoid treating asymptomatic bacteriuria

Urinary Incontinence in the Elderly: Risk Factors

- **Frailty**: Increased risk of UI with frailty; associated with mobility, strength, and cognitive decline.
- **Dementia**: Strong link between UI and dementia, especially with cognitive impairments like attention and memory loss.
- **Comorbidities**: Conditions such as diabetes, COPD, heart failure, and mobility impairments exacerbate UI.
- **Polypharmacy**: Medications affecting the bladder (e.g., diuretics, anticholinergics) can increase the risk of UI.

Age-Related Changes and UI in the Elderly

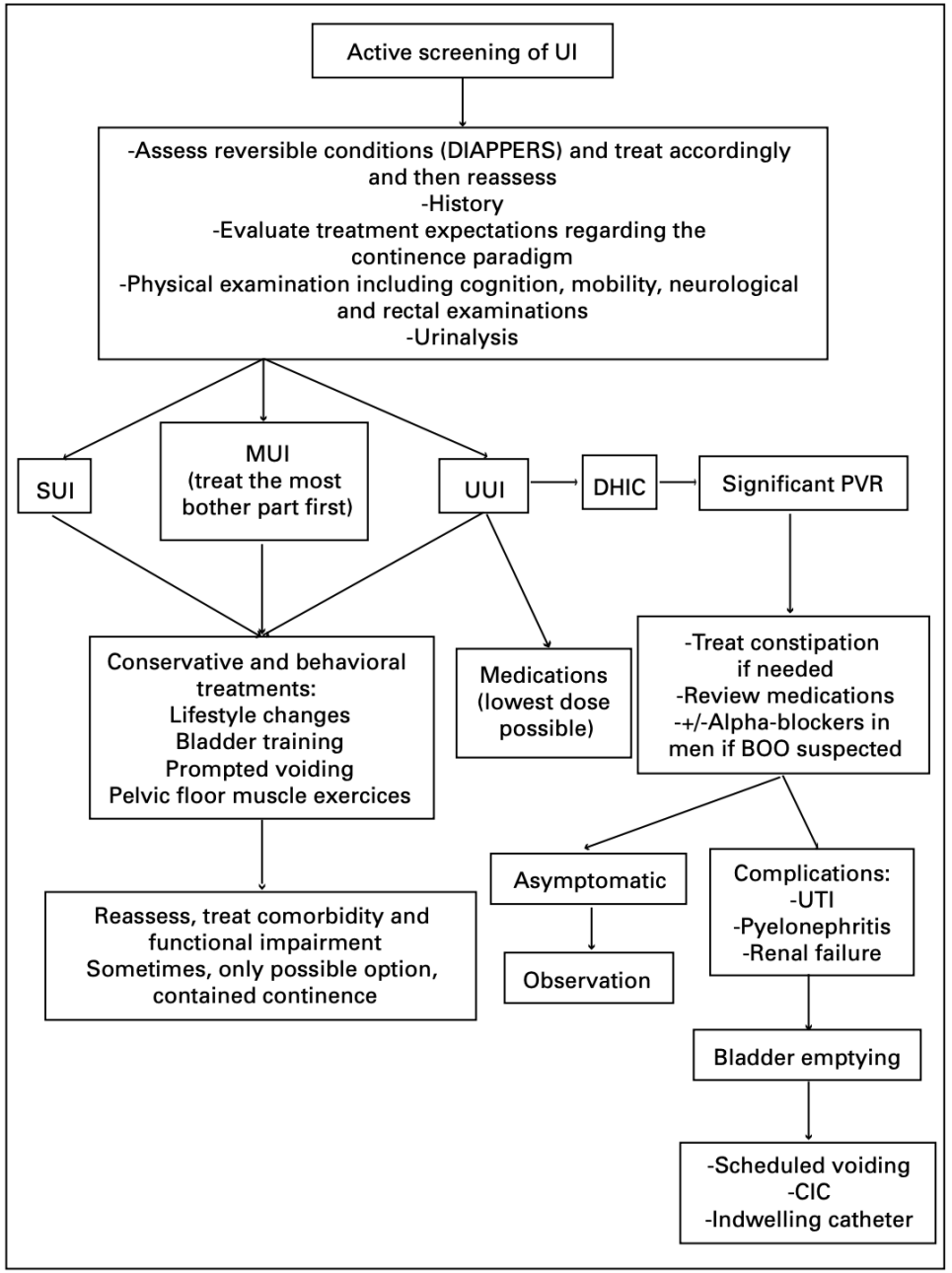
- **Bladder Function**: Decreased bladder capacity and sensation contribute to incontinence.
- **Detrusor Overactivity**: Increases urgency and frequency of UI in elderly patients.
- **Muscle Degeneration**: Urethral sphincter weakness leads to stress and urgency UI.
- **Nighttime UI**: Increased nighttime urine production and reduced bladder control cause nocturia and nighttime incontinence.

Management and Surgical Options for UI in Frail Elderly

- **Conservative Approaches**: Behavioral interventions like pelvic floor muscle training and prompted voiding are effective.
- **Lifestyle Modifications**: Cautious fluid management, weight loss, and addressing contributing factors (e.g., constipation, diabetes).
- **Surgical Interventions**: Mid-urethral slings are effective for stress incontinence; outcomes are favorable even in well-selected older adults.
- **Botulinum Toxin Injections**: Can be used for detrusor overactivity but may carry risks like post-void residual urine in frail elderly.

- **Caution**: Anticholinergics may worsen cognitive decline, and frail individuals should be carefully monitored.

CUA Guidelines for Management of urinary incontinence in elderly



Urinary Incontinence: Take Home Points

- Urinary incontinence is quite common
- Basic evaluation
- Classify incontinence on history
- Urinalysis, Urine C&S
- Voiding Diary
- Always try conservative therapies (lifestyle modifications, timed voiding, pelvic floor muscle training…) before pharmacologic/surgical treatment.