CASE STUDIES IN UROLOGY-
PRIMARY CARE FOCUS

Dale Robertson, DO
FINANCIAL DISCLOSURE

- I have nothing to disclose
- This slide is for sale
OBJECTIVES

- To discuss common urologic issues encountered by primary care physicians
- A case study format to help familiarize physicians with common presenting complaints of urologic issues
- Summarize urology/AUA guidelines and apply them the case presentations in a meaningful and useful way
CASE #1
ASYMPTOMATIC MICROSCOPIC HEMATURIA

- 64 y/o male presents for his annual visit. He denies any symptoms or complaints. Routine office urinalysis shows +3 blood on dipstick. He denies voiding symptoms and no recent trauma, vigorous workout or injury.
- PMHx: Hypertension
- PSHx: Left Inguinal Repair 2001
- NKDA
- Meds: Coreg
- Social Hx: Denies tobacco use. Social alcohol use.
- Family Hx: No known cancers in family.
WHAT NEXT?
WORK-UP- AMH

- Physical Exam including thorough genitourinary exam:
  - No abnormality, no evidence of recent trauma
  - Normal DRE w/ no tenderness, no nodules
- Formal Urinalysis w/ microscopy
  - > 3 RBC’s per high power field is the definition of AMH
- Referral to Urology
- Optional testing to initiate:
  - CT Urogram: CT Abdomen/Pelvis with delayed images (BMP and urine pregnancy in females prior)
  - Urine Cytology
  - Urine Culture
  - PSA in males
  - BMP
UROLOGY WORK-UP: AMH

- If age >35 y/o or any smoking history:
  - considered high risk
- Renal Function Testing (BMP)
- Upper tract imaging:
  - CT Urogram preferred, MR Urogram, Renal US w/ retrograde pyelograms
- PSA in males (Considered optional testing)
- Urine culture
- Cystoscopic examination of bladder
- Urine cytology/urine markers (NMP-22, UroVysion FISH)- NOT recommended as a routine part of evaluation for patients with AMH
In patients with persistent micro hematuria following a negative work up, or those with other risk factors for CIS ie irritative voiding symptoms, current or past tobacco use, or chemical exposure Urine cytology may prove helpful in workup and diagnosis
**Diagnosis, Evaluation and Follow-up of AMH**

- **AMH**
  - (≥ 3 RBC per HPF on UA with microscopy)
  - Repeat UA after treatment of other cause(s)
  - History & Physical Assess for other potential AMH causes
    - (e.g., infection, menstruation, recent urologic procedures)
  - Concurrent nephrologic work up if proteinuria, red cell morphology or other signs indicate nephrologic causes.
  - Treatment
    - Follow up as indicated by diagnosis. Re-evaluate for MH after resolution of identified condition.
  - Renal Function Testing
    - Cystoscopy
    - Imaging (CTU)
  - Follow up with at least one UA/micro yearly for at least two years
  - Release from care

- If unable to undergo CTU, less optimal imaging options include:
  - MR Urogram
  - Retrograde pyelograms in combination with non-contrast CT, MRI, or US

- Follow persistent MH with annual UA. Consider nephrologic evaluation. Repeat anatomic evaluation within three to five years* or sooner, if clinically indicated.

*The threshold for re-evaluation should take into account patient risk factors for urological pathological conditions such as malignancy.

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QUESTIONS?
WORK UP OF AMH
Our 64 y/o male was referred to Urology
CT Urogram was non-diagnostic of genitourinary disease
Urine Culture negative
PSA 1.4ng/dL (more on PSA screening later)
Office cystoscopic exam identified a 2.5 cm papillary appearing pedunculated mass
ISOLATED PAPILLARY LESION

Stage?
Grade?
Two distinct diseases:
- Non Muscle-Invasive Bladder Cancer (NMIBC)
- Muscle-Invasive Bladder Cancer (MIBC)

NMIBC usually treated with endoscopic resection followed by intravesical chemotherapy or immunotherapy
- Mitomycin-C: an antibiotic typically placed in bladder at time of resection w/ 2 hours dwell time
  - Primarily used for low grade Ta cancer to decrease the rate of recurrence
- BCG: Tuberculosis toxoid typically placed in bladder via catheter 2-3 weeks after resection then weekly for 6 total weeks
  - Primarily used for T1 or high grade bladder cancer

MIBC usually treated with neoadjuvant intravenous chemotherapy followed by radical cystectomy and urinary diversion
CASE #2
LOWER URINARY TRACT SYMPTOMS

- 62 y/o male presents for routine annual visit. Patient notes that he feels he has been urinating more frequently and that he has to get up “multiple” times per night. Asks if he should keep taking the “free samples of prostrate medicine he ordered off TV”
- PMHx: HTN, HLD
- PSHx: Carpal Tunnel Release
- Meds: Lisinopril, Simvastatin
- SocHx: No tobacco, occasional alcohol
- FamHx: CAD, no Hx of GU malignancy, father passed away from MI at age 62
WHAT NEXT?
INITIAL EVALUATION

- Physical exam including thorough genitourinary exam
  - Circumcised penis, patent meatus, testicles descended bilaterally without mass or tenderness.
  - DRE reveals a moderately enlarged 2+ prostate with bogginess, no evidence of hard nodules.
- AUA Symptom Index Score (Questionnaire) or International Prostate Symptom Score (I-PSS)
  - Patient score of 15
- Urinalysis
- PSA* (more on this later)
UROLOGY WORK-UP

- Full History and Physical Exam
- Post Void Residual (Bladder Scan)
  - Patients PVR was 65mL
- Frequency/Volume Chart (Voiding Diary)
  - Patient has Nocturia x3, voids every 1.5 hours during the day
- Urinalysis
  - Small leukocyte esterase, otherwise negative
Figure 1.1. Basic management of lower urinary tract symptoms (LUTS) in men (adapted with permission from Abrams 2009). AUA-SI, American Urological Association Symptom Index; DRE, digital rectal exam; PSA, prostate-specific antigen.
QUESTIONS?
## AUA Symptom Index

<table>
<thead>
<tr>
<th>AUA Symptom Score</th>
<th>Not at all</th>
<th>Less than 1 time in 5</th>
<th>Less than half the time</th>
<th>About half the time</th>
<th>More than half the time</th>
<th>Almost always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Over the past month, how often have you had a sensation of not emptying your bladder completely after you finished urinating?</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2. Over the past month, how often have you had to urinate again less than two hours after you finished urinating?</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3. Over the past month, how often have you found you stopped and started again several times when you urinated?</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4. Over the past month, how often have you found it difficult to postpone urination?</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5. Over the past month, how often have you had a weak urinary stream?</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6. Over the past month, how often have you had to push or strain to begin urination?</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>7. Over the past month, how many times did you most typically get up to urinate from the time you went to bed at night until the time you got up in the morning?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Symptom Score

---

### Notes
- For each symptom, score 0 if the symptom is not at all severe, 1 if it is a little severe, 2 if it is somewhat severe, 3 if it is moderately severe, 4 if it is quite severe, and 5 if it is extremely severe.
- Sum the scores for all symptoms to get the total symptom score.
# INTERNATIONAL PROSTATE SYMPTOM SCORE

## Table: International Prostate Symptom Score (I-PSS)

<table>
<thead>
<tr>
<th>Patient Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of birth:</td>
</tr>
<tr>
<td>Date completed:</td>
</tr>
</tbody>
</table>

### In the past month:

<table>
<thead>
<tr>
<th>Item</th>
<th>Not at All</th>
<th>Less than 1 in 5 Times</th>
<th>Less than Half the Time</th>
<th>About Half the Time</th>
<th>More than Half the Time</th>
<th>Almost Always</th>
<th>Your score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Incomplete Emptying</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>How often have you had the sensation of not emptying your bladder?</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Frequency</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>How often have you had to urinate less than every two hours?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Intermittency</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>How often have you found you stopped and started again several times when you urinated?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Urgency</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Weak Stream</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>How often have you had a weak urinary stream?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Straining</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>How often have you had to strain to start urination?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>1 Time</th>
<th>2 Times</th>
<th>3 Times</th>
<th>4 Times</th>
<th>5 Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Nocturia How many times did you typically get up at night to urinate?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

### Total I-PSS Score

Score: 1-7: Mild 8-19: Moderate 20-35: Severe

### Quality of Life Due to Urinary Symptoms

- Delighted
- Pleased
- Mostly Satisfied
- Mixed
- Mostly Dissatisfied
- Unhappy
- Terrible

If you were to spend the rest of your life with your urinary condition just the way it is now, how would you feel about that?

<table>
<thead>
<tr>
<th>Delighted</th>
<th>Pleased</th>
<th>Mostly Satisfied</th>
<th>Mixed</th>
<th>Mostly Dissatisfied</th>
<th>Unhappy</th>
<th>Terrible</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
I-PSS questionnaire asks one extra question

- Disease specific quality of life question
- “If you were to spend the rest of your life with your urinary condition, just the way it is now, how would you feel about that?”
- SCORE of 0 to 6
  - 0= delighted
  - 6= terrible

This question has been validated as an important predictor in patient long-term satisfaction and has been shown to accurately assess the patient’s perceived quality of life.
INITIAL TREATMENT

- Behavioral Modification
  - Double voiding
  - Timed voiding
  - Avoidance of caffeine, alcohol and other diuretics (take diuretics during the day if primary concern is nocturia)
  - Night-time/evening fluid restriction.
Herbal medications—increasing in popularity

- Most common asked about: **SAW PALMETTO**
  - Derived from *Serenoa repens*
  - Randomized controlled trial examined 369 men with LUTS due to BPH treated with placebo vs. saw palmetto demonstrated no difference with active treatment
- **beta-sitosterols** from the *Hypoxis rooperi* plant
- **pygeum** from the *Prunus africana* plant.
- There is no convincing evidence that **pumpkin seed** (*Cucurbita pepo*) or **stinging nettle** (*Urtica dioica*) are effective for BPH

**Bottom line**-
- not regulated by FDA
- have significant interactions with other medications
- And free usually doesn’t actually mean free

**HERBAL MEDICATION- “free samples”**
Figure 1.2. Detailed management of persistent, bothersome lower urinary tract symptoms (LUTS) after basic management (adapted with permission from Abrams 2009).

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COMBINATION THERAPY

- Alpha-blockers and 5-ARIs may be used in combination to augment therapeutic effect.
  - Finasteride and terazosin have been examined in combination in the VA Cooperative Study and the Prospective European Doxazosin and Combination Therapy (PREDICT) Trial.
  - Finasteride and alfuzosin have also been studied in combination.
  - Finasteride and doxazosin have been studied in the largest combination therapy trial, the Medical Therapy of Prostatic Symptoms (MTOPS) study.
For patients with either: mild symptoms (IPSS ≤ 8) or moderate to severe symptoms without significant bother, a strategy of watchful waiting is reasonable assuming no evidence of recurrent infection, bladder stones, urinary retention, or renal compromise.
For patients with **moderate to severe symptoms with significant bother**, physicians should engage in a discussion with patients regarding treatment options.

- Patients may choose from medical therapy or surgical therapy.
- **For those with small prostates (<30g), initial therapy with α-blockers is reasonable**
  - should symptoms not improve sufficiently, the addition of an anti-cholinergic is beneficial.
- **For patients with larger prostates (≥30g), combination therapy with an α-blocker and 5α-reductase inhibitor should represent the first line of treatment.**
  - An anti-cholinergic may be added for further symptom control if necessary.
- The use of PDE5i should still be considered cautiously but may be beneficial in reducing urinary symptoms, particularly in patients with concomitant ED, although it would have little impact on objective measures such as flow rate or prostate volume.
BPH SURGICAL OPTIONS - MANY WAYS TO ACCOMPLISH THE SAME GOAL

- **Minimally Invasive Therapies**
  - Transurethral needle ablation (TUNA)
  - Transurethral microwave thermotherapy (TUMT)

- **Surgical Therapies**
  - Open or Laparoscopic prostatectomy
  - Transurethral holmium laser ablation of the prostate (HoLAP)
  - Transurethral holmium laser enucleation of the prostate (HoLEP)
  - Holmium laser resection of the prostate (HoLRP)
  - Photoselective vaporization of the prostate (PVP)
  - Transurethral incision of the prostate (TUIP)
  - Transurethral vaporization of the prostate (TUVP)
  - Transurethral resection of the prostate (TURP)
First line treatment is Behavioral and Medical Therapy

No proven benefit to Complimentary and Alternative Medicines (CAM’s)- I advise my patients to take a look at what they are spending on these agents and compare it to their co-pay

Surgical therapy can be offered initially, but often occurs following progressive symptoms despite Behavioral/Medical therapy.
  - Multiple surgical options
  - Urologist and Patient to individualize treatment plan
GREENLIGHT (PVP)
TURP
CASE #3
PROSTATE SPECIFIC ANTIGEN

- 57 y/o African American male comes to the office for a yearly health screening. During the exam he asks whether or not he should get his PSA tested as he heard that “you’re not supposed to check them anymore, right?”
- PMHx: HTN, Obesity
- PSHx: Appendectomy
- Meds: Lisinopril/HCTZ
- FamHx: Father died of Prostate Cancer at age 66, Mother has DM
- SocHx: Sedentary lifestyle, tobacco for a few years while in the military, no alcohol or drugs
WHAT NEXT?
INITIAL WORK-UP

- **History**
  - Any family history of prostate cancer?
  - Any lower urinary tract symptoms?
  - Any recent trauma or manipulation of the prostate

- **Physical Examination**
  - Full exam including a DRE

- **Laboratory data**
  - Initial screening PSA (Risks/Benefits should be discussed)
  - Urinalysis
HISTORY AND PHYSICAL EXAMINATION
- Rule out any infectious source or history
- Digital rectal exam to evaluate for nodules/irregularities of prostate
- Family history

Further testing (after discussing risks/benefits with patient)
- Repeat PSA
- Cystoscopy
- TRUS - evaluation of PSA density
- Prostate Needle Biopsy
- Other labs
  - PCA3
  - Prostate Health Index (PHI)
  - Total/Free PSA
  - PSA velocity
  - 4K score
PCP work-up
- After discussing the risks/benefits of screening, the patient decided to obtain a PSA/DRE
- PSA obtained and was 5.1 ng/mL (no other prior baseline)
- DRE done and questionable irregularity felt along right base of prostate
- No history of trauma/instrumentation
- referred to Urology

Urology work-up
- Review of labs performed
- Repeat PSA showed 5.15 ng/mL 6 weeks after prior PSA
- Patient decided to undergo TRUS with prostate needle biopsy
- Pathology came back Adenocarcinoma of the Prostate
  - Gleason 3+4 =7, 3 out of 12 cores
# TABLE 3: D’Amico et al risk stratification for clinically localized prostate cancer

<table>
<thead>
<tr>
<th>Risk Level</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk</td>
<td>Diagnostic PSA &lt; 10.0 ng/mL and highest biopsy Gleason score ≤ 6 and clinical stage T1c or T2a</td>
</tr>
<tr>
<td>Intermediate risk</td>
<td>Diagnostic PSA ≥ 10 but &lt; 20 ng/mL or highest biopsy Gleason score = 7 or clinical stage T2b</td>
</tr>
<tr>
<td>High risk</td>
<td>Diagnostic PSA ≥ 20 ng/mL or highest biopsy Gleason score ≥ 8 or clinical stage T2c/T3</td>
</tr>
</tbody>
</table>

PSA = prostate-specific antigen
QUESTIONS?
CONDITIONS THAT ELEVATE PSA

- Prostate Cancer
- Benign prostatic enlargement (BPH)
- Infections (prostatitis, bacterial cystitis)
- Manipulation or trauma (cystoscopy, prostatic massage, prostate biopsy, EXTENSIVE AMBULATION OR CYCLING)
  - *Prostate exam does not appear to appreciably alter PSA
- Ejaculation (within a few days of PSA lab draw)
CONDITIONS THAT CAN REDUCE PSA

- 5 alpha-reductase inhibitors (finasteride, dutasteride)
  - Reduce by approximately 50% at 9-12 months after starting
- Low serum testosterone
- Prostate surgery
- Radiation therapy
  - *often elevates PSA immediately after, however, long term causes reduction

- *Free PSA
  - Is reduced in hemodialysis/peritoneal dialysis patients
  - Do not use this lab in these patients
# PSA NORMAL RANGES

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Asian</th>
<th>Caucasian</th>
<th>African-American</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-49</td>
<td>0-2.0 ng/mL</td>
<td>0-2.5 ng/mL</td>
<td>0-2.0 ng/mL</td>
</tr>
<tr>
<td>50-59</td>
<td>0-3.0 ng/mL</td>
<td>0-3.5 ng/mL</td>
<td>0-4.0 ng/mL</td>
</tr>
<tr>
<td>60-69</td>
<td>0-4.0 ng/mL</td>
<td>0-4.5 ng/mL</td>
<td>0-4.5 ng/mL</td>
</tr>
<tr>
<td>70-79</td>
<td>0-5.0 ng/mL</td>
<td>0-6.5 ng/mL</td>
<td>0-5.5 ng/mL</td>
</tr>
</tbody>
</table>
Guideline Statement 1: The Panel recommends against PSA screening in men under age 40 years. (*Recommendation; Evidence Strength Grade C*)

- In this age group there is a low prevalence of clinically detectable prostate cancer, no evidence demonstrating benefit of screening and likely the same harms of screening as in other age groups.

Guideline Statement 2: The Panel does not recommend routine screening in men between ages 40 to 54 years at average risk. (*Recommendation; Evidence Strength Grade C*)

- For men younger than age 55 years at higher risk (e.g. positive family history or African American race), decisions regarding prostate cancer screening should be individualized.
Guideline Statement 3: For men ages 55 to 69 years the Panel recognizes that the decision to undergo PSA screening involves weighing the benefits of preventing prostate cancer mortality in 1 man for every 1,000 men screened over a decade against the known potential harms associated with screening and treatment. For this reason, the Panel strongly recommends SHARED DECISION MAKING for men age 55 to 69 years that are considering PSA screening, and PROCEEDING BASED ON A MAN’S VALUES AND PREFERENCES. (Standard; Evidence Strength Grade B)

- The greatest benefit of screening appears to be in men ages 55 to 69 years.
Guideline Statement 4: To reduce the harms of screening, a routine screening interval of two years or more may be preferred over annual screening in those men who have participated in SHARED DECISION MAKING and decided on screening. As compared to annual screening, it is expected that screening intervals of two years preserve the majority of the benefits and reduce overdiagnosis and false positives. (Option; Evidence Strength Grade C)

Additionally, intervals for rescreening can be individualized by a baseline PSA level.
Guideline Statement 5: The Panel does not recommend routine PSA screening in men age 70+ years or any man with less than a 10 to 15 year life expectancy. (Recommendation; Evidence Strength Grade C)

- Some men age 70+ years who are in excellent health may benefit from prostate cancer screening.
CONCLUSIONS

- The AUA recommends that men between 55-69 be screened after having a shared decision making process with the patient.

- The interval between screening may be moved to 2 years with minimal risk of missing more disease while potentially lessening potential adverse events.
A recent study (July 19, 2016) published in the journal Prostate Cancer and Prostatic Disease conducted by Dr. Schaeffer and colleagues at Northwestern University found that between the years 2004-2013 the number of new cases of prostate cancer with metastatic disease increased by 72% with the most dramatic increase being amongst men between the ages of 55-69 (increase 92%)
CASE #4
ERECTILE DYSFUNCTION

- 67y/o male comes to the office for a general visit. The nurse tells you that the patient won’t say why he is here, but that he “has some questions” for the doctor. After skirting around the issue he states, “Doc, the real reason I came is I can’t get it up anymore. What can you tell me about this Viagra?”
- PMHx: DM, CAD, HLD
- PSHx: Cardiac catheterization with stent, colonoscopy
- Meds: Metoprolol, ASA, Plavix, Nitroglycerin PRN
- SocHx: No tobacco, alcohol or illicit drug use. Patient was recently fired from his long-time job as a maintenance man.
- FamHx: CAD, negative for GU malignancy
WHAT NEXT?
PCP WORK-UP

- **Detailed History**
  - Includes sexual, medical and psychosocial histories
  - PMHx: cardiovascular disease (including hypertension, atherosclerosis, or hyperlipidemia), diabetes mellitus, depression, and alcoholism, sleep disorder, prostatitis, thyroid disease, neurological disease

- **Focused Physical Exam**
  - Abdomen, penis, testicles, secondary sexual characteristics and lower extremity pulses

- **Laboratory data**
  - Morning total testosterone
  - +/- prolactin
  - Hgb A1c
  - Serum lipids/cholesterol
  - CBC
  - Cr
  - Thyroid function tests (if indicated)
  - Urinalysis
UROLOGY WORK-UP

- **Detailed History and Physical**
  - Detailed social history to identify any stressors
  - Medication review
  - Full genitourinary physical exam looking for
    - Penile plaques or defects, atrophic testicles, etc.

- **Additional testing such as repeat testosterone level measurement, vascular and/or neurological assessment, and monitoring of nocturnal erections, may be indicated in select patients.**

- **Laboratory data**
  - Morning total testosterone (repeat)
  - +/- prolactin (pending work-up)
  - Urinalysis
ALGORITHM 1

Presence of sexual problems?  
Yes
   
Erectile dysfunction?  
Yes
   
Detailed medical, sexual, and social history
Focused physical examination
Laboratory evaluation: screen for unrecognized systemic disease\*, testosterone/ prolactin.
   
Abnormal
   
Hormonal cause likely
   
Treat associated medical conditions.
Modify medication regimen.

Persistent erectile dysfunction

Psychogenic cause likely
   
and/or
   
Trial of therapy (education, oral medications, intraretral medications, vacuum constriction device, etc.)
   
Consider sex therapy/psychiatric referral.

Neurogenic cause likely

Vasculogenic cause likely
   
or
   
Check luteinizing hormone/follicle-stimulating hormone.
   
High
   
Consider testosterone replacement therapy.

Low testosterone

Normal-low
   
Pituitary imaging

High prolactin
   
Evaluate medical causes.

Referral:
Patient requests more extensive evaluation.
Refractory to primary care therapy

\*—Screening panel: complete blood count, urinalysis, renal function, lipid profile, fasting blood sugar, and thyroid function.
†—First-morning, free testosterone level.
ALGORITHM 2

1. Ask About ED ≥ 25 Years Old
   - Workup CV Risk Factors
     1. BP
     2. FBS
     3. FLP
     4. Obesity
     5. Metabolic syndrome
     6. Insulin resistance
   - Treat CV Risk Factors Per Guidelines
     1. HTN
     2. DM
     3. Hyperlipidemia
     4. Tobacco use
     5. Diet/exercise
   - Refractory or Severely Abnormal Results
     - Refer to Specialist

2. Yes
   - H and P to Assess
     1. CV risk factors
     2. CV disease
   - Workup Vascular Disease
     1. CAD: ETT for ED & DM; ≥ 3 risk factors; angina or equivalent symptoms
     2. Cerebrovascular: carotid ultrasound for symptoms
     3. Peripheral: A/B index for symptoms
   - Abnormal Test Results
     - Treat Vascular Disease or Refer to Cardiologist

3. Workup ED
   - 1. Testosterone for symptomatic men
   - 2. PSA age appropriate
   - Treat ED
     1. PDE5 inhibitor, constriction band, or VSD
     2. Treat CV risk factors
     3. Follow up compliance and education
   - Refractory to Optimal Treatment
     - Refer to Urologist
     1. Injection therapy
     2. Penile implant
     3. Peyronie's disease
QUESTIONS?
The attainment and maintenance of a firm erection requires good arterial inflow of blood as well as efficient reduction of venous outflow.
# SHIM QUESTIONNAIRE

**SEXUAL HEALTH INVENTORY FOR MEN (SHIM)**

**PATIENT NAME:**

**TODAY'S DATE:**

**PATIENT INSTRUCTIONS**

Sexual health is an important part of an individual's overall physical and emotional well-being. Erectile dysfunction, also known as impotence, is one type of very common medical condition affecting sexual health. Fortunately, there are many different treatment options for erectile dysfunction. This questionnaire is designed to help you and your doctor identify if you may be experiencing erectile dysfunction. If you are, you may choose to discuss treatment options with your doctor.

Each question has several possible responses. Circle the number of the response that best describes your own situation. Please be sure that you select one and only one response for each question.

**OVER THE PAST 6 MONTHS:**

<table>
<thead>
<tr>
<th>Question</th>
<th>Very Low</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
<th>Very High</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How do you rate your confidence that you could get and keep an erection?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. When you had erections with sexual stimulation, how often were your erections hard enough for penetration (entering your partner)?</td>
<td>No Sexual Activity</td>
<td>Almost Never or Rarely</td>
<td>A Few Times (much less than half the time)</td>
<td>Sometimes (about half the time)</td>
<td>Most Times (much more than half the time)</td>
</tr>
<tr>
<td>3. During sexual intercourse, how often were you able to maintain your erection after you had penetrated (entered) your partner?</td>
<td>Did Not Attempt Intercourse</td>
<td>Almost Never or Never</td>
<td>A Few Times (much less than half the time)</td>
<td>Sometimes (about half the time)</td>
<td>Most Times (much more than half the time)</td>
</tr>
<tr>
<td>4. During sexual intercourse, how difficult was it to maintain your erection to completion of intercourse?</td>
<td>Did Not Attempt Intercourse</td>
<td>Extremely Difficult</td>
<td>Very Difficult</td>
<td>Difficult</td>
<td>Slightly Difficult</td>
</tr>
<tr>
<td>5. When you attempted sexual intercourse, how often was it satisfactory for you?</td>
<td>Did Not Attempt Intercourse</td>
<td>Almost Never or Never</td>
<td>A Few Times (much less than half the time)</td>
<td>Sometimes (about half the time)</td>
<td>Most Times (much more than half the time)</td>
</tr>
</tbody>
</table>

Add the numbers corresponding to questions 1-5.

The Sexual Health Inventory for Men further classifies ED severity with the following breakpoints:

- **1-7** Severe ED
- **8-11** Moderate ED
- **12-16** Mild to Moderate ED
- **17-21** Mild ED
ED MANAGEMENT

- Identification of organic comorbidities and psychosexual dysfunctions
  - both should be appropriately treated

- The patient and, when possible, his partner should be informed of the relevant treatment options and their associated risks and benefits.

- The choice of treatment should be made jointly by the physician, patient, and partner, when possible, taking into consideration patient preferences and expectations and the experience and judgment of the physician.
Lifestyle Modifications
- avoiding smoking,
- maintaining ideal body weight
- engaging in regular exercise

Treatment of ED in patients with cardiovascular disease is complicated by a small increase in the risk of myocardial infarction (MI) related to sexual activity in these patients independent of the method of treatment.
ED AND CARDIOVASCULAR DISEASE

- Patients at **high risk** should not receive treatment for sexual dysfunction until their cardiac condition has stabilized.
- Patients at **low risk** may be considered for all first-line therapies.
  - The majority of patients treated for ED are in the low-risk category
  - Defined as those who have asymptomatic coronary artery disease and less than three risk factors for coronary artery disease (excluding gender); controlled hypertension; mild, stable angina; a successful coronary revascularization; uncomplicated past MI; mild valvular disease; or CHF (left ventricular dysfunction and/or New York Heart Association class I).
- Patients whose risk is **indeterminate** should undergo further evaluation by a cardiologist before receiving therapies for sexual dysfunction.
ED TREATMENT

**NONSURGICAL**
- **Phosphodiesterase Type 5 (PDE5) Inhibitors**
  - PDE5 inhibitors are contraindicated in patients who are taking organic nitrates.
  - Avanafil (Stendra), Sildenafil (Viagra), Vardenafil (Levitra/Staxyn), Tadalafil (Cialis)
- **Alprostadil intra-urethral suppositories (MUSE)**
- **Intracavernous injection (ICI) with alprostadil, papaverine, or phentolamine or combinations (BiMix, TriMix, etc.)**
  - Must warn about Priapism
- **Vacuum erection device (VED)**

**SURGICAL**
- **Penile Prosthesis**
  - Non-inflatable (malleable or semi-rigid)
  - 2-piece inflatable
  - 3-piece inflatable
Pros: one time up-front expense
Cons: patients often complain of numb/cold penis, decreased sensation
MUSE & INTRACAVERNOSAL INJECTION

- Intra-urethral suppository

- Intracavernous injection
PENILE PROSTHESIS

- Non-Inflatable
  - Malleable
  - Semi-Rigid

- 2-Piece Inflatable

- 3-Piece Inflatable
CASE #5
FREQUENCY/URGENCY

- 71yo female with a history of frequency and urgency. She does wear 1-2 adult briefs during the day as she sometimes “gets an urge” and can’t make it to the restroom. Nocturia 3-4x per night. She was started on a “water pill” some time ago that made things worse.
- PMHx: HTN, Obesity, OA, Hx of MI
- PSHx: Cardiac stent x3 vessels, tonsillectomy as a child, C-section x 1 (2 other vaginal births), Hysterectomy
- Meds: Lisinopril-HCTZ, Celebrex, aspirin, Plavix
- SocHx: No history of tobacco, alcohol or drug use
- FamHx: CAD, DM; Mother seemed to “leak a lot” when she got older
WHAT NEXT?
Thorough History
- Include identifying common risk factors for OAB
- Primary symptoms? - urgency, frequency, nocturia, hesitancy, etc.
- Medications?
- PSHx - any pelvic surgeries?
- Neurological disease? (MS, CVA, Parkinson's, numbness/weakness, etc.)
- Obstetrical history? - GPA (gravida/para/abortions), type of delivery
- Fluid consumption? - type and amount
- Determine if patient is uncomplicated vs complicated OAB

Physical exam
- Pelvic in female, DRE/prostate in male
- Neurological exam
- Extremity exam (ie, any edema?)

Urinalysis
OUR PATIENT

- Found to have frequency, urgency and nocturia
- No gross bulges at vaginal opening, mild signs of atrophic vaginitis, vaginal cuff intact
- UA negative for nitrite/LE
- + Vaginal birth x2, Prior Pelvic surgery
- Does not drink a lot of fluid during the day as she tries to prevent “wet” episodes
UROLOGY WORK-UP

- Any complicated patients should be referred to urology
- Full History and Physical
- Further additional testing depending on co-existing symptoms or comorbidities:
  - Cystoscopy
  - Renal ultrasound
  - Urine cytology (Hematuria or increased cancer risk)
  - Bladder tumor markers
  - Post void residual (patients w/ obstructive voiding symptoms)
  - Urodynamic testing
  - Voiding diary
  - Urine culture
  - Symptom questionnaire
COMPLICATED OAB patients have one of the following:

- Poor response to OAB medications
- Extremely severe OAB symptoms
- Young age
- Gross hematuria
- Recurrent UTI
- Significant pelvic prolapse
- Fecal incontinence
- Constipation
- History of pelvic cancer, pelvic surgery or pelvic radiation
- Neurological disease
- Impaired mobility
- Poorly controlled diabetic or medical complications from diabetes
OVERACTIVE BLADDER

Diagnosis & Treatment Algorithm: AUA Guideline on Non-Neurogenic Overactive Bladder in Adults.

History and Physical: Urinalysis
- Signs/symptoms of OAB, (-) urine microscopy

Diagnosis unclear or additional information needed
- +/- urine culture, post-void residual, bladder diary, and/or symptom questionnaires

Patient education:
- Normal urinary tract function
- Benefits/risks of treatment alternatives
- Agree on treatment goals

Follow-up for efficacy and adverse events
- In extremely rare cases, consider urinary diversion or augmentation cystoplasty

Behavioral Treatments
- (consider adding anti-muscarinic if partially effective)

Treatment goals met
- Patient desires treatment and/or treatment is in patient’s best interests

Treatment goals not met; Patient desires further treatment and/or further treatment in patient’s best interests

Anti-muscarinics with active management of adverse events (e.g., dry mouth, constipation); consider dose modification or alternate anti-muscarinic if effective but adverse events are intolerable

Reassess and/or refer; consider urine culture, post-void residual, bladder diary, symptom questionnaires, other diagnostic procedures as necessary for differentiation

Consider in carefully-selected patients
- (multiple therapies may be tried but they should not be combined)

FDA-Approved:
- Sacral neuromodulation (SNS) or
- Percutaneous tibial nerve stimulation (PTNS)

Non-FDA-Approved:
- Intradetrusor onabotulinumtoxinA

The complete OAB Guideline is available at www.AUAnet.org/Guidelines.

This resource is supported by an educational grant from Astellas Scientific and Medical Affairs, Inc.
QUESTIONS?
**OAB TREATMENT**

- **First Line**
  - **Behavioral Therapy**—is equally or more effective than medication for reducing frequency, nocturia and urinary incontinence***
    - Voiding diary
    - Timed (Scheduled) voiding
    - Bladder training (bladder retraining or bladder drill)
    - Pelvic floor muscle training (PFMT)
      - Should be offered for 1st line therapy for stress, urge and mixed incontinence
    - Fluid management
    - Dietary management
      - Avoid bladder irritants: caffeine, alcohol, spicy or acidic foods
    - Avoid constipation
    - Stop smoking
    - Weight loss
    - Elevate legs/compression stockings
      - If LE edema, to help mobilize fluid prior to bed and decrease nocturia
  - Consider adding Anti-muscarinic if Behavioral Therapy only partially effective
  - Adequate trial (8-12 weeks) of Behavioral therapy needed
Second line therapies

- **Anticholinergic medication**
  - Competitively inhibit muscarinic Ach receptors, which reduces detrusor overactivity
  - May improve voiding symptoms in 1 week, but maximal benefit achieved by 3 months
  - >50% of patients stop taking within 3 months because of ineffectiveness, side effects or cost.
  - **Side Effects**
    - Dry mouth = most common * (Extended releases formulation have lower dry mouth than immediate release formulation)
    - Constipation, blurry vision, headache, dizziness, drowsiness, tachycardia (rare), urinary retention (rare), cognitive impairment (caution in elderly, also rare), impaired perspiration

- **Adrenergic Agonists**
  - Beta 3 subtype is most abundant and primary receptor in the bladder
  - Stimulation leads to relaxation of detrusor smooth muscle
  - **Mirabegron (Myrbetriq)**—beta-3 selective agonist
  - VERY low rate of dry mouth and constipation (no different than placebo)

- **Vaginal Estrogen**
  - Post-menopausal female
## Table 2. Antimuscarinic Agents Available in the U.S. for the Management of OAB

<table>
<thead>
<tr>
<th>Generics (Trade Name)</th>
<th>Initial Dosage</th>
<th>Maximum Dosage</th>
<th>Hepatic/Renal Adjustment</th>
<th>Metabolism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxybutynin IR (Ditropan)</td>
<td>5 mg orally bid to tid</td>
<td>5 mg orally 4x daily</td>
<td>No</td>
<td>CYP3A4 to N-deethyl-oxybutynin&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Oxybutynin ER (Ditropan XL)</td>
<td>5-10 mg orally daily</td>
<td>30 mg/day</td>
<td>No</td>
<td>CYP3A4 to N-deethyl-oxybutynin&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Oxybutynin patch (Dystrof) (available OTC)</td>
<td>1 patch (3.9 mg/day)</td>
<td>TD twice weekly</td>
<td>NA</td>
<td>Less CYP3A4 involvement</td>
</tr>
<tr>
<td>Oxybutynin gel&lt;sup&gt;b&lt;/sup&gt; (Gelitique)</td>
<td>3%c: apply 3 pumps (84 mg): topically daily</td>
<td>10%/1 stethet (100 mg): topically daily</td>
<td>NA</td>
<td>Less CYP3A4 involvement</td>
</tr>
<tr>
<td>Tolterodine IR (Detrol)</td>
<td>1.2 mg orally bid</td>
<td>2 mg orally bid</td>
<td>CrCL &lt;30 mL/min: 1 mg bid Not recommended in Child-Pugh Class C</td>
<td>CYP2D6 to 5-hydroxymethyl-tolterodine&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Tolterodine ER (Detrol LA)</td>
<td>2-4 mg orally daily</td>
<td>4 mg/day</td>
<td>CrCl 10-30 mL/min: 2 mg daily Not recommended: CrCl &lt;10 mL/min or in Child-Pugh Class C</td>
<td>CYP2D6 to 5-hydroxymethyl-tolterodine&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Darifenacin (ErICLEA)</td>
<td>7.5 mg orally daily</td>
<td>15 mg orally daily</td>
<td>7.5 mg daily for Child-Pugh Class B</td>
<td>CYP3A4 and CYP2D6 to inactive metabolites</td>
</tr>
<tr>
<td>Solifenacin (Vesicare)</td>
<td>5 mg orally daily</td>
<td>10 mg/day</td>
<td>CrCl &lt;30 mL/min and Child-Pugh Class B: 5 mg daily</td>
<td>CYP3A4 to 4R-hydroxy-solifenacin&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Trospium (Sanctura)</td>
<td>20 mg orally bid</td>
<td>20 mg bid</td>
<td>CrCl &lt;30 mL/min: 20 mg daily Not recommended in Child-Pugh Class C</td>
<td>Liver non-CYP to inactive metabolites</td>
</tr>
<tr>
<td>Trospium ER (Sanctura XR)</td>
<td>60 mg orally daily</td>
<td>60 mg/day</td>
<td>Not recommended: CrCl &lt;30 mL/min</td>
<td>Liver non-CYP to inactive metabolites</td>
</tr>
<tr>
<td>Fesoterodine (Toviaz)</td>
<td>4 mg orally daily</td>
<td>8 mg/day</td>
<td>CrCl &lt;30 mL/min: 4 mg daily Not recommended in Child-Pugh Class C</td>
<td>Nonspecific esterases to 5-hydroxymethyl-tosteroside; and CYP3A4 and CYP2D6 to inactive metabolites</td>
</tr>
</tbody>
</table>

<sup>a</sup> Apply to clean, dry, intact skin on abdomen, thighs, or upper arm/shoulders and rotate site daily to avoid irritation.

<sup>b</sup> Active metabolite.

<sup>c</sup> CCL: creatinine clearance; ER: extended release; IR: immediate release; LA: long acting; min: minutes; NA: not applicable; OAB: overactive bladder; TD: transdermal; XL: extended release; XR: extended release.

Source: References 5, 27, 29, 57.
ANTIMUSCARINIC SITES OF ACTION

Important Sites of Action for Antimuscarinics

CNS

- Iris/ciliary body
- Lacrimal gland
- Salivary glands
- Gallbladder
- Stomach
- Colon
- Bladder (detrusor muscle)

Safety and tolerability

- Reduce involuntary bladder contractions
- Reduce OAB symptoms including:
  - Micturition Frequency
  - Nocturia
  - Urgency
  - Urinary incontinence

Quality of life
Third line therapy

- Minimally invasive options
  - Neuromodulation
    - Peripheral tibial nerve stimulation (PTNS)
    - Sacral neuromodulation (SNS or InterStim)
  - Onabotulinum toxin A intradetrusor injection

- Invasive surgical options
  - Bladder augmentation
    - Autoaugmentation
    - Enterocystoplasty
  - Urinary diversion

SURGICAL OPTIONS
Our patient was taught behavioral modifications including bladder training and was referred to PT for pelvic floor muscle training.

Antimuscarinic therapy was initiated starting with Oxybutynin 5mg BID then switched to Myrbetriq 25mg secondary to side effects.

Despite patient compliance with therapy, symptoms persisted and she was referred to Urology.

Urology performed Urodynamics:
- Detrusor overactivity confirmed
- Patient desired further intervention
  - Intradetrusor BoTox injection
  - PTNS
  - Sacral neuromodulation
URODYNAMIC READING
OVERACTIVE BLADDER

Intradetrusor BoTox Injection

Peripheral Tibial Nerve Stimulation (PTNS)

Sacral neuromodulation (SNS)
47yo female with a 3 day history of burning on urination. The burning has become worse. She also noted this morning a foul odor from her urine. She tells you, “I am pretty sure I have another bladder infection...I get them ALL the time!”

- PMHx: Osteopenia
- PSHx: C-section x 1
- Meds: Vitamin D/Calcium supplement
- SocHx: Occasional alcohol, denies tobacco or illicit drugs
- FamHx: Negative for GU malignancies
WHAT NEXT?
PRIMARY CARE EVALUATION

- **History**
  - voiding symptoms, sexual history, genitourinary history – specifically history of previous UTI
- **Physical examination**
  - including pelvic examination
- **Urinalysis**
  - dipstick for leukocyte esterase and nitrites
  - microscopy for white blood cells
- **Culture**
  - not mandatory in women with previous culture documented uncomplicated UTI
- **Optional Tests**
  - in patients with a suspected diagnosis of complicated UTI or who fail appropriate antimicrobial therapy
  - Bladder volume measurement
  - Ultrasound
  - IV urogram
  - CT scan
OUR PATIENT

- History of Prior UTI’s (5 documented in records over the past year)
- UA nitrite +, sent for culture
- No evidence of abnormality on physical examination, including normal pelvic exam
- Bladder scan reveals a post void residual of 23mL
- Patient given 3 day Rx for Cipro 500mg BID
- Referred to Urology secondary to recurrent UTI’s
UROLOGY EVALUATION

- Thorough History and Physical
  - Vaginal exam does reveal a mild grade I cystocele on valsalva, otherwise normal
  - Patient had 5 confirmed culture + UTI’s in past year

- Urinalysis
  - Nitrite Negative
  - Culture from previous UTI’s reviewed
    - E. coli, Resistant to Nitrofurantoin

- Other tests
  - Office cystoscopy performed, no abnormalities found
QUESTIONS?
Further investigations are important if a patient is believed to have a complicated UTI suggested by a history of:

- calculi
- obstruction (upper or lower urinary tract)
- neuropathic bladder
- recent genito-urinary surgery or catheterization
- unusual organisms (such as tuberculosis, fungus or urea splitting organisms)
- immunocompromised patients
- diabetic patients
- patients with renal failure
- patients who do not respond to appropriate antimicrobial therapy after five to six days of treatment
DEFINITIONS

- **Contamination**: Organisms are introduced during collection or processing of urine. No health care concerns.
- **Colonization**: Organisms are present in the urine, but are causing no illness or symptoms (asymptomatic bacteriuria). Depending on the circumstances, significance is variable, and the patient may not need treatment.
- **Infection (UTI)**: The combination of a pathogen(s) within the urinary system and human host symptoms and/or inflammatory response to the pathogen(s). Treatment and management needed.
- **Uncomplicated UTI**: Infection in a healthy patient with normal GU tract.
- **Complicated UTI**: Infection associated with factors that increase chance of acquiring bacteria and decrease efficacy of therapy. Also requires one or all of following:
  - Male
  - Pregnancy
  - Abnormal GU tract (BPH, stone, bladder 'tic, neurogenic bladder, etc)
  - Immunocompromised host
  - Multi-drug resistant bacteria
- **Recurrent UTI**: Occurs after documented infection that had resolved.
- **Reinfection UTI**: A new event with reintroduction of bacteria into GU tract.
- **Persistent UTI**: A new event with reintroduction of bacteria into GU tract.
UTI RISK FACTORS

- **Reduced urine flow**
  - outflow obstruction, prostatic hyperplasia, prostatic carcinoma, urethral stricture, foreign body (calculus)
  - neurogenic bladder
  - inadequate fluid uptake

- **Promote colonization**
  - sexual activity - increased inoculation
  - spermicide - increased binding
  - estrogen depletion - increased binding
  - antimicrobial agents - decreased indigenous flora

- **Facilitate Ascent**
  - catheterization
  - urinary incontinence
  - residual urine with ischemia of bladder wall
Collection method. Analysis of the urine is critical in determining the likelihood of infection. The method of urine collection is important to distinguish between contamination and true infection.

- There are 3 commonly used methods of collection:
  - a) clean catch midstream voided urine
  - b) catheterized urine
  - c) suprapubically aspirated urine.

- The most variable of these three is the midstream voided urine, especially in females, where contamination of urine by vaginal or perineal organisms is common during collection.

- Voided urines that are sterile or contain high colony counts (>100,000) of a single bacteria correlate well with urine obtained by other methods.
Urinalysis.

- A positive chemical (dipstick) leukocyte esterase is 64 - 90% specific and has a similar level of sensitivity for UTI.
- The finding of nitrite positivity on urine dipstick, indicating the conversion of nitrate to nitrite by gram negative bacteria (not gram positive), is very specific but only about 50% sensitive for a urinary tract infection.
- The finding of elevated white blood cells in the urine (pyuria) is the most reliable indicator of infection (>10 WBC/hpf on spun specimen) is 95% sensitive but much less specific for a UTI.
DIFFERENTIAL DIAGNOSIS

- Herpes genitalis (HSV)
- Urethritis
- N. Gonorrhoeae
- Chlamydia
- Trichomonas
- Vaginitis
- Prostatitis
- Nephrolithiasis
- Trauma
- GU tuberculosis
- GU neoplasm
- Intra-abdominal abscess
- Sepsis - source other than GU system
A proposed management algorithm for premenopausal women presenting with uncomplicated UTI (reprinted with permission)*

First UTI Episode

Physician Diagnosis
Culture

Empiric Antimicrobial Therapy

Recurrence of UTI

Life Style Changes
Cranberry juice/extract

Recurrent UTI

>4 UTI/year

<4 UTI/year

Constellations of UTIs

Low dose Antimicrobial Prophylaxis

Episodic UTIs

Post-coital Antimicrobial Prophylaxis

Patient initiated Antimicrobial Therapy

1. Lifestyle changes - discontinue spermicides, feminine hygiene products, toileting practices
2. Culture for breakthrough UTI; change antibiotic
3. Patient initiated therapy for breakthrough UTI
4. Culture if no response by 48 hours; change antibiotic
Uncomplicated UTI (cystitis, some pyelonephritis):
- 3 day course of oral TMP/SMX is 95% effective; 7 days is no more effective.
- If TMP/SMX resistance is > 10 - 20% (U.S. West coast, Europe), use fluoroquinolones.
- Higher percentages of resistance to TMP/SMX also implies possible resistance to ampicillin, cephalosporins, tetracycline.

Other uncomplicated UTI:
- A full 7 - 10 day antibiotic course should be used in patients with: diabetes, symptom duration before treatment of > 7 days, pregnancy, age >65 years, or past history of pyelonephritis or UTI with resistant organisms

Complicated UTI (acute pyelonephritis):
- Empiric parenteral treatment after culture with: Ampicillin plus aminoglycoside or Ampicillin/ Vancomycin (for beta-lactam allergy) plus aminoglycoside or third-generation cephalosporin (if no enterococcus)
- Adjust antibiotics according to culture results
- Blood cultures positive in 20 - 40% of patients
- Switch from parenteral to oral therapy at 48 hours after clinically well
- Treat for 14 days.
## SUMMARY OF TREATMENT

### FIRST LINE TREATMENT OF uUTI

<table>
<thead>
<tr>
<th>Antimicrobial</th>
<th>TMP/SMX</th>
<th>Nitrofurantoin</th>
<th>Fluoroquinolones</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Efficacy</strong></td>
<td>95%</td>
<td>85-90%</td>
<td>95%</td>
</tr>
<tr>
<td><strong>Indications in uUTI</strong></td>
<td>Effective against most uropathogens</td>
<td>Narrow spectrum: efficacious against <em>E. coli</em> and <em>Staphylococcus saprophyticus</em></td>
<td>Broad spectrum, effective against most uropathogens</td>
</tr>
<tr>
<td><strong>Effect on flora</strong></td>
<td>Eradicate uropathogens in fecal and vaginal flora</td>
<td>No effect on fecal or vaginal flora</td>
<td>Eradicates uropathogens in fecal and vaginal flora</td>
</tr>
<tr>
<td><strong>Side effects</strong></td>
<td>Significant side effects</td>
<td>Few side effects if duration short: potential serious complications with long-term use</td>
<td>Excellent side-effect profile</td>
</tr>
<tr>
<td><strong>Resistance</strong></td>
<td>Increasing resistance</td>
<td>Little resistance over 50 years, not increasing.</td>
<td>Limited, but increasing resistance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose</th>
<th>100 mg QID</th>
<th>Noroxin 400mg BID</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMP 160mg/SMX 800mg BID</td>
<td>Macrocystalline formulation 100mg BID</td>
<td>Ciprofloxacin 250mg BID (or modified release 500mg OD)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ofloxacin 300mg BID</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Levofloxacin 250mg OD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gatifloxacin 400mg OD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration of therapy</th>
<th>3 days</th>
<th>7 days</th>
<th>3 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMP/SMX = trimethoprim/sulfamethoxazole; OD = once daily; BID = twice daily; QID = four times daily</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Re-infection**
- A test of cure should be undertaken by repeat culture in pregnancy, pyelonephritis, and complicated or relapsing UTI.
- Re-infection is the relatively rapid recurrence of a UTI with the same or different organism after cure has been documented.
- Each infectious episode should be treated separately.
- Consider 6 - 12 months of antibiotic prophylaxis (once a day oral intake of TMP/SMX or nitrofurantoin at 1/3 to ½ of a daily treatment dose.
- For patients with recurrent cystitis related to coitus, consider self-administered single-dose antibiotics post-coital treatment.

**Relapsing infection**
- Failure to clear or completely eradicate the pathogen despite a reasonable treatment course.
- Should trigger a urologic investigation that includes imaging to define possible anatomical causes and prolonged therapy in the meantime.

**Asymptomatic bacteriuria**
- Generally, does not need treatment, except in pregnancy.
- Treatment is not indicated in the elderly (20 - 40% incidence) and patients on catheterization (90% incidence).
Antimicrobial strategies for the prevention of recurrent UTI:

- Physician-directed episodic antimicrobial therapy
- Low dose prophylactic antimicrobial therapy
  - TMP-SMX (or TMP alone), nitrofurantoin, cephalexin or fluoroquinolones.
- Post-coital prophylactic antimicrobial therapy
  - taken as a single dose, effectively reduces the incidence of reinfection
- Patient-initiated antimicrobial therapy
  - Women can “self diagnose” their own UTIs, and if they immediately initiate self-treatment with three days of fluoroquinolone (or other) antibiotics, they can reduce their reinfection rate by almost 90%
  - prescribe antimicrobials that the patient can take for three days when she is sure she is developing another UTI
  - women can accurately diagnose a bacterial cystitis in 85-95% of occurrences
  - success rate (cure of UTI) is achieved in over 90%
A 43-year-old male presents to your office with a chief complaint of "sudden onset of left flank pain" that began last night. The pain radiates to the groin. He has had nausea and one episode of vomiting. No fevers or chills. No prior history of pain like this. He noted some pink colored urine this morning.

- **PMHx:** HLD, Gout, DM, Obesity
- **PSHx:** Joint aspiration, Gastric Bypass
- **Meds:** Simvastatin, Allopurinol, Glucophage
- **SocHx:** Denies tobacco, alcohol or illegal drugs. Works for the state doing road construction
- **FamHx:** CAD, thinks his father has had a kidney stone, but can’t remember
WHAT NEXT?
- **History and Physical**
- **Laboratory data**
  - CBC (WBC)
    - WBC 11.8
  - BMP (evaluate creatinine)
    - BUN 24, Cr 0.8
  - UA with Urine Culture
    - Large blood, nitrite negative, large leukocyte esterase, 30 protein
- **Radiology**
  - Abdominal XR
  - Ultrasound (+/- if available to r/o hydronephrosis)
  - **Non-contrast helical CT of the Abdomen/Pelvis**
    - Gold Standard
    - Over 95% sensitive
    - CT done shows a 0.4cm right distal stone with mild hydronephrosis; no perinephric stranding
History and Physical

Repeat Laboratory data (if necessary)
  - UA, CBC, BMP

Imaging
  - Old imaging reviewed
  - Repeat imaging if patient feels stone was passed

If FAILED medical expulsive therapy
  - Cystoscopy/Stent (if UA + or vital signs hint infection)
  - Nephrostomy tube
  - Cystoscopy/Ureteroscopy/Laser Lithotripsy
  - ESWL
  - PCNL
UROLITHIASIS

Management of acute renal colic

- Helical CT abdomen/pelvis
  - CT confirms renal/ureteral stone
    - Urgent intervention required
      - Obstructed infected upper tract
        - Impending renal deterioration
        - Intractable pain, nausea, vomiting
          - Patient preference
          - Non-urgent pathway
    - Non-urgent pathway
  - CT shows no renal/ureteral stone
    - Non-urgent pathway
    - Consider non-urolologic causes
      - Assess likelihood of spontaneous stone passage
        - Observation
          - Consider metabolic stone risk
        - Intervention required
          - Assess stone composition, location, size
            - Upper tract anatomy, patient preference
              - Uric acid stone
                - Dissolution therapy
                - Consider metabolic stone risk
              - Non-uric acid stone
                - Urologic intervention
                - Consider metabolic stone risk
QUESTIONS?
Our patient attempted medical expulsive therapy and conservative management for 4 weeks. Patient was still having intermittent flank pain and was referred to urology. After discussing the options, the patient elected ureteroscopy with laser lithotrispy for definitive management of his stone disease.
ACUTE TREATMENT
- Depends on size, location, laboratory data, vital signs and pain control
- Ureteral Colic
  - Goal is PAIN control
  - Ketorolac tromethamine (Toradol), NSAIDS, narcotic/acetaminophen combination, alpha blocker/calcium channel blocker
- Needs for IMMEDIATE urological intervention
  - Suspected urinary tract infection – may lead to life-threatening sepsis if urinary tract obstruction is not relieved
  - High-grade obstruction
  - Solitary functioning kidney
  - Significant acute renal insufficiency as determined by serum creatinine
  - Pre-existing renal insufficiency
  - Persistent pain not relieved by oral analgesics
  - Persistent nausea/vomiting not controlled with antiemetic agents
DEFINITIVE TREATMENT

EXPECTANT MANAGEMENT
- Most stones <6mm in size can be managed expectantly and treated outpatient with oral hydration and analgesics
- Drink large quantities of fluid
- Strain the urine, and save any stone fragments.
- 4-6 weeks should be allowed for stone passage.
- Alpha Blocker (Flomax, Rapaflo, etc) or Calcium Channel Blocker (Nifedipine 30mg extended release)
- ***FOLLOW-UP IMAGING MANDATORY***
  - Minimal KUB and Renal Ultrasound

Uric Acid Stones
- Seen on CT, but NOT on XR
- Treated with urine alkalization (potassium citrate or sodium bicarbonate)
  - Goal of urine pH >6.5
- Refer to urology if stone does not pass (seen on repeat imaging, labs elevated, pain not resolved, etc)
Any patient that is “high risk” for developing recurrent stones
- Large stone burden
- Recurrent stone formers
- Nephrocalcinosis
- Pediatric stone formers
- Unusual stone composition (cystine, uric acid, etc.)
- Stones from urinary infection (Staghorn/struvite)
- Family Hx of stones
- Genetic/Medical/Anatomical anomalies that increase stone risk (Crohn’s, gout, cystinuria, RTA, PCKD, hyperparathyroidism, etc.)
- Solitary Kidney
- Professions—pilots, bus drivers, truck drivers (stone pain can cause danger to other people)
METABOLIC WORK-UP

- Stone composition from any recovered stones
- Urinalysis including pH (Culture as necessary)
- BMP, calcium, uric acid
  - If calcium elevated, obtain PTH
- 24 hour urine test on RANDOM DIET
  - Measures:
    - pH
    - Total volume
    - Calcium, oxalate, citrate, uric acid, sodium, potassium and creatinine
  - Will often give recommendations
- >97% of the time, metabolic etiology can be found
- **Oral fluid intake**
  - Enough to produce at least 2.5 liters of urine per day
  - Ideal fluids have HIGH citrate content (lemonade, orange juice)
  - Limit carbonated beverages or ones that contain phosphoric acid (Colas)

- **Low Sodium diet** (<2300mg/day)

- **Reduce potential renal acid load (PRAL)**
  - Low intake of animal protein (meat)—0.8 to 1.0 g protein/kg body mass/day
  - High intake of fruits and vegetables

- **Low oxalate diet**
  - Avoid dark leafy greens (Kale, Spinach), Chocolate, Black Tea, etc.

- **Moderate Calcium intake** (1000-1200mg/day)

- **Avoid high doses of Vitamin C and Vitamin D**

- **High fiber** (fruits and vegetables)

- **Weight loss**
Extracorporeal shock wave lithotripsy (ESWL)
- Contraindications to ESWL include pregnancy, urinary tract infection, anticoagulation, and stones >2.5 cm in size.

Ureteroscopy
- Performed on outpatient basis in most cases
- 95% success rate to be stone free
- Often have to leave ureteral stent (removed later in office)
- Use laser fibers, stone baskets, etc.

Percutaneous nephrolithotomy (PCNL)
- For stones >2cm or Staghorn Calculi
- Invasive procedure, requires hospitalization
- 85% stone free

Open stone surgery
- Rarely done

Laparoscopic surgery
ESWL

Shock waves break up kidney stones

Small pieces pass through urinary tract
PCNL

- Incision site
- Kidney stones
- Hollow tube
- Stones removed