



## EM CASES SUMMARY

### Episode 94 – UTI Myths & Misconceptions

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#### UTI MYTHS AND MISCONCEPTIONS

- **UTI is a lab diagnosis**
- **Treat asymptomatic bacteriuria**
- **Routinely image pyelonephritis**
- **Cranberry juice prevents UTI**
- **Phenazopyridine is effective**
- **Use cipro for cystitis**
- **Positive urine culture = UTI**

In 2014, the CDC reported that UTI antibiotic treatment was avoidable at least 39% of the time. Why? Over-diagnosis and treatment results from the fact that asymptomatic bacteriuria is very common in all age groups, urine cultures are frequently ordered without an appropriate indication, and urinalysis results are often misinterpreted. Think of the last time you prescribed antibiotics to a patient for suspected UTI – what convinced you that they had a UTI? Was it their story? Their exam? Or was it the urine dip results the nurse handed to you before you saw them? Does a patient’s indwelling catheter distort the urinalysis? How many WBCs/hpf is enough WBCs to call it a UTI? Can culture results be trusted if there are epithelial cells in the specimen? Can a “dirty” urine in an obtunded elderly patient help guide management?

#### History taking in patients who present with suspected UTI

While there is no *single* clinical symptom, sign or lab test that is accurate enough to rule in or rule out a UTI, certain symptoms *in combination* greatly increase the likelihood of a UTI. Even though only about half of patients who present with dysuria and frequency have a UTI, if you add the absence of symptoms suggesting vaginitis or cervicitis (vaginal irritation, bleeding, and discharge) the likelihood increases to over 90% with a +LR =24.6. Other helpful historical features include a self diagnosed UTI which has a +LR = 4 and urine cloudy appearance which has a specificity of 96% for UTI.

#### Which patients with a clinical presentation consistent with a lower UTI require a work-up for UTI?

Urine tests are not required for the majority of patients with suspected *lower* UTI (cystitis) as it is a *clinical* diagnosis and the urine tests can be misleading.

Urinalysis is most useful for *intermediate-risk* patients. Urine tests are not necessary for low-risk patients (they probably don't have a UTI), nor for the patient with a convincing clinical presentation (you will treat regardless).

**Indications for urine tests for suspected lower UTI include:**

- Immunocompromised patients
- History of multiple courses of antimicrobial therapy
- History of antibiotic resistance
- History of multiple drug allergies

**Pearl:** *UTI is a clinical diagnosis, not a laboratory one.*

**Microscopy vs dipstick in UTI myths and misconceptions**

Microscopy is slightly more accurate than dipstick, but remember to put the results into context of the clinical picture.

*So the dipstick shows...*

- Pyuria OR nitrites – sensitivity up to 94%, but poor specificity
- Pyuria AND nitrites – specificity ~100%, but poor sensitivity

If we use the dipstick in isolation, we end up overtreating 47% and undertreating 13% of UTIs.

*So the microscopy shows...*

- >5 WBC per hpf, and
- >5 RBC per hpf

If we use microscopy in isolation, we end up overtreating 44% and undertreating 11% of UTIs.

**How to interpret epithelial cells and bacteria on urine microscopy**

The classic teaching is that <5 epithelial cells per hpf represents an uncontaminated sample. However, while a 'contaminated' sample may negatively affect the ability to obtain a reliable culture, it does not affect the accuracy of the dip or microscopy to the same degree. While bacteria seen on microscopy is predictive of a positive culture, it is *not* necessarily diagnostic of a UTI as the positive culture could represent a contaminant or asymptomatic bacteriuria.

**A few more nuances to know about urine tests for UTI**

- Nitrites are not produced by *S. saprophyticus*, *Pseudomonas* or *enterococci*, so negative nitrites does not rule out UTI
- In neutropenic/leukopenic patients, urine WBCs may be artificially low
- Pyuria may result from dehydration, advanced age, AKI, STI, appendicitis, diverticulitis etc and so have poor specificity for UTI

## Does the method of urine collection matter?

Midstream clean catch has traditionally been considered the standard for non-invasive urine collection, but many studies show that there is no difference between this method and simply asking the patient to urinate into a container. The latter has little if any effect on the urinalysis, and an insignificant effect on the culture.

## Indications for urine cultures for suspected UTI

The indications for urine cultures include some of the same indications for urinalysis *plus*:

- Patient is not responding to initial antibiotics
- Recurrent UTI
- Suspect upper UTI (Pyelonephritis)

Note a 5% urine culture false positive rate (due to asymptomatic bacteriuria), and a 25% false negative rate (due to antibiotic use or sample over-dilution).

## Which patients require antibiotics for asymptomatic bacteriuria?

According to the IDSA, asymptomatic bacteriuria is not linked to long-term adverse outcomes, and treatment does not decrease the rate of symptomatic UTI. Antibiotics for asymptomatic bacteriuria should only be considered in:

- Pregnant patients (however the very low rates of complications may not justify antibiotic use and future guidelines may recommend *not* routinely treating pregnant patients with asymptomatic bacteriuria)
- Patients undergoing an invasive urologic procedure

**Pitfall:** *Treating non-pregnant patients with asymptomatic bacteriuria with antibiotics. Asymptomatic bacteriuria is very common in all age groups and is often misdiagnosed as a UTI.*

For catheterized patients, the decision to treat is again a *clinical* one no different than the uncatheterized patient. It is not clear in the literature if catheterized patients are at a higher or lower risk for UTI and there is no evidence for prophylactic antibiotic treatment in patients with indwelling urinary catheters. It is important to remember that nearly 100% of patients with an indwelling catheter are colonized within 2 weeks of placement with 2-5 organisms and that there is no relationship between the level of pyuria and UTI in people with indwelling catheters. Candida is a very common finding in catheterized patients. Do *not* treat with anti-fungals unless the patient is neutropenic or has risk factors for systemic candidiasis. Conservative management for most will suffice, which includes replacement/removal of catheter and observation.

**Pearl:** *Do not routinely treat catheterized patients found to have pyuria or candida in their urine*

## Approach to the altered, elderly patient with a suspicious urine sample

Unfortunately, there is little guidance in the literature when to treat these patients for UTI, but our experts suggest:

- If there is no clinical instability or specific signs/symptoms of UTI, observe for 24-48 hours without antibiotics
- Search for other causes of altered level of awareness

## Which patients with lower UTI symptoms require a workup for sexually transmitted infections (STI)?

There are two approaches to STI screening in the ED:

1. Screen *all* sexually active women <25 years old as per CDC guidelines with vaginal/cervical swabs because asymptomatic pelvic inflammatory disease can lead to chronic complications.
2. Selectively screen only patients at high risk for STI, who have symptoms consistent with STI, or if UTI symptoms persist for >48hrs after initiating appropriate antibiotics.

**Pearl:** *A patient performed self vaginal swab is more accurate than physician performed self vaginal/cervical swabs for gonorrhea and chlamydia.*

## Indications for imaging in patients suspected of pyelonephritis

Imaging is *not* routinely required for patients suspected clinically of pyelonephritis.

Imaging is indicated for those patients suspected of perinephric abscess, septic nephrolithiasis, or emphysematous pyelonephritis (these patients typically present with either severe pain and/or severe sepsis/septic shock) as well as those who have not responded to treatment >48-72hrs and to look for alternative diagnoses in the patient in which you do not have a very high pretest probability.

In a prospective, observational study of adults with febrile UTI from eight EDs in the Netherlands, a decision instrument was derived and validated which reduced radiologic imaging by 40% after implementation. The following 3 factors predicted ultrasound or CT findings with a NPV of 93% and urgent urological disorders (pyonephrosis or abscess) with a NPV of 99%, and in the validation study, the NPV for clinically relevant radiologic findings was 89% and for urgent urologic disorders was 100%.

1. History of urolithiasis,
2. Urine pH  $\geq 7.0$ , and/or
3. Renal insufficiency (estimated glomerular filtration rate  $\leq 40$ )

## General principles and considerations in choosing antibiotics for UTI

- Choose a narrow spectrum antibiotic when possible.
- Choose the antibiotic with the safest side effects profile.

- The majority of women (73% in one study) with lower UTI will be symptom free within 3 days with ibuprofen alone.
- Always take into consideration local resistance patterns. In interpreting your local biogram, the IDSA guidelines recommend that for lower UTI choose an antibiotic that is estimated to be at least 80% effective in your region and for upper UTI choose an antibiotic that is estimated to be at least 90% effective.

### First line antibiotics for lower UTI (cystitis)

#### Lower UTI (cystitis)

SMX/TMP po × 3 days *or*  
 Trimethoprim po × 3 days *or*  
 Nitrofurantoin po × 5 days *or*  
 Cephalexin po x 5 days *or*  
 Fosfomycin 3g as a single dose po

Note that the antibiotic choice should reflect its ability to eradicate *E.coli*, the most common bacteria found in 70-95% of lower UTIs, rather than more infrequently colonized bacteria such as *pseudomonas*, which is found predominantly in patients with upper UTI and immunocompromised patients or those with genitourinary anatomical abnormalities. Fluoroquinolones such as ciprofloxacin that are susceptible to *pseudomonas* should be avoided for treatment of lower UTI for this reason and because resistance to ciprofloxacin is increasing in many communities.

Note also that 3-5 days duration of therapy is sufficient for the vast majority of lower UTI.

While Fosfomycin is listed as first line, our experts recommend its use only after a failed first line antibiotic or for multidrug resistance

lower UTI. Single dose Fosfomycin is equivalent to 7 days of nitrofurantoin and 3 days of TMP-SMX for UTI cure and is also effective against ESBL and VRE.

In pregnant patients the first line antibiotic for lower UTI is cephalexin. Nitrofurantoin is recommend for pregnant patients only in their 3rd trimester.

### First line antibiotics for upper UTI (pyelonephritis)

#### Outpatient pyelonephritis:

Fluoroquinolones

- Ciprofloxacin 500 mg PO BID for 7d **or**
- Levofloxacin 750 mg PO daily for 5d

If fluoroquinolone resistance is thought to be >10%: B-lactams (Amoxicillin/Clavulanic acid (e.g. Clavulin or Augmentin) 875 mg PO q12hr for 14d) **or**  
 Cephalexin 500mg PO q6h for 14d

#### Inpatient pyelonephritis:

- Ciprofloxacin 400 mg IV q12h for 10-14d **or**
- Levofloxacin 750 mg IV q24h for 5d

If fluoroquinolone resistance is thought to be >10%:

- 3rd generation cephalosporin (ceftriaxone 1 g IV q24h **or** cefepime 1 g IV q12h **or** cefotaxime 1-2 g IV q8h **or** ceftazidime 2 g IV q8h) **or**
- Ampicillin 1-2 g IV q6h **plus** gentamicin IV 1.5 mg/kg q8h

### **Pyelonephritis with septic shock**

It is important to cover *enterococcus* as well as *E.coli*.  
Ampicillin 1-2 g IV q6h **plus** gentamicin IV 1.5 mg/kg q8h **or**  
Vancomycin 1g IV **plus** gentamicin IV 1.5 mg/kg q8h

### **Does anything prevent recurrent UTIs?**

Increased water intake, direction of wiping and voiding post intercourse have *not* been supported by evidence to prevent recurrent UTIs.

Evidence from clinical trials does *not* support the use of cranberry products (juice, powder or tablets) for the prevention of UTIs. Consumption of large quantities of cranberry juice may result in an interaction with warfarin and raise INR.

### **Are urinary anesthetics such as phenazopyridine (pyridium) recommended?**

There is weak evidence for phenazopyridine as an urinary anesthetic. It was taken off the market in Canada because of side effects such as hemolysis in patients with G6PD and methemoglobinemia.

### **Take home points for UTI Myths and Misconceptions**

- UTI is a *clinical* diagnosis, not a laboratory one. Dysuria plus urinary frequency in the absence of symptoms of STI is diagnostic.
- Most patients with a clinical picture consistent with a lower UTI do not require urine tests.

- The indications for urine tests for suspected lower UTI include immunocompromised patients, history of multiple courses of antimicrobial therapy, history of antibiotic resistance and history of multiple drug allergies.
- While bacteria seen on microscopy is predictive of a positive culture, it is *not* necessarily diagnostic of a UTI as the positive culture could represent a contaminant or asymptomatic bacteriuria.
- A common pitfall is treating non-pregnant patients with asymptomatic bacteriuria with antibiotics. Asymptomatic bacteriuria is very common in all age groups and is often misdiagnosed as a UTI.
- Do *not* routinely treat catheterized patients found to have pyuria or candida in their urine.
- A common pitfall is to assume that the cause of altered level of awareness in an elderly is a UTI upon finding pyuria or bacteriuria on urinalysis leading to premature closure and missing a more serious diagnosis.
- Imaging is *not* routinely required for patients suspected clinically of pyelonephritis.
- Cranberry juice, direction of wiping and voiding post intercourse are not effective in preventing recurrent UTIs
- 3-5 days duration of therapy is sufficient for the vast majority of lower UTI

*Drs Helman, Morgenstern and Morris have no conflicts of interest to declare.*

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