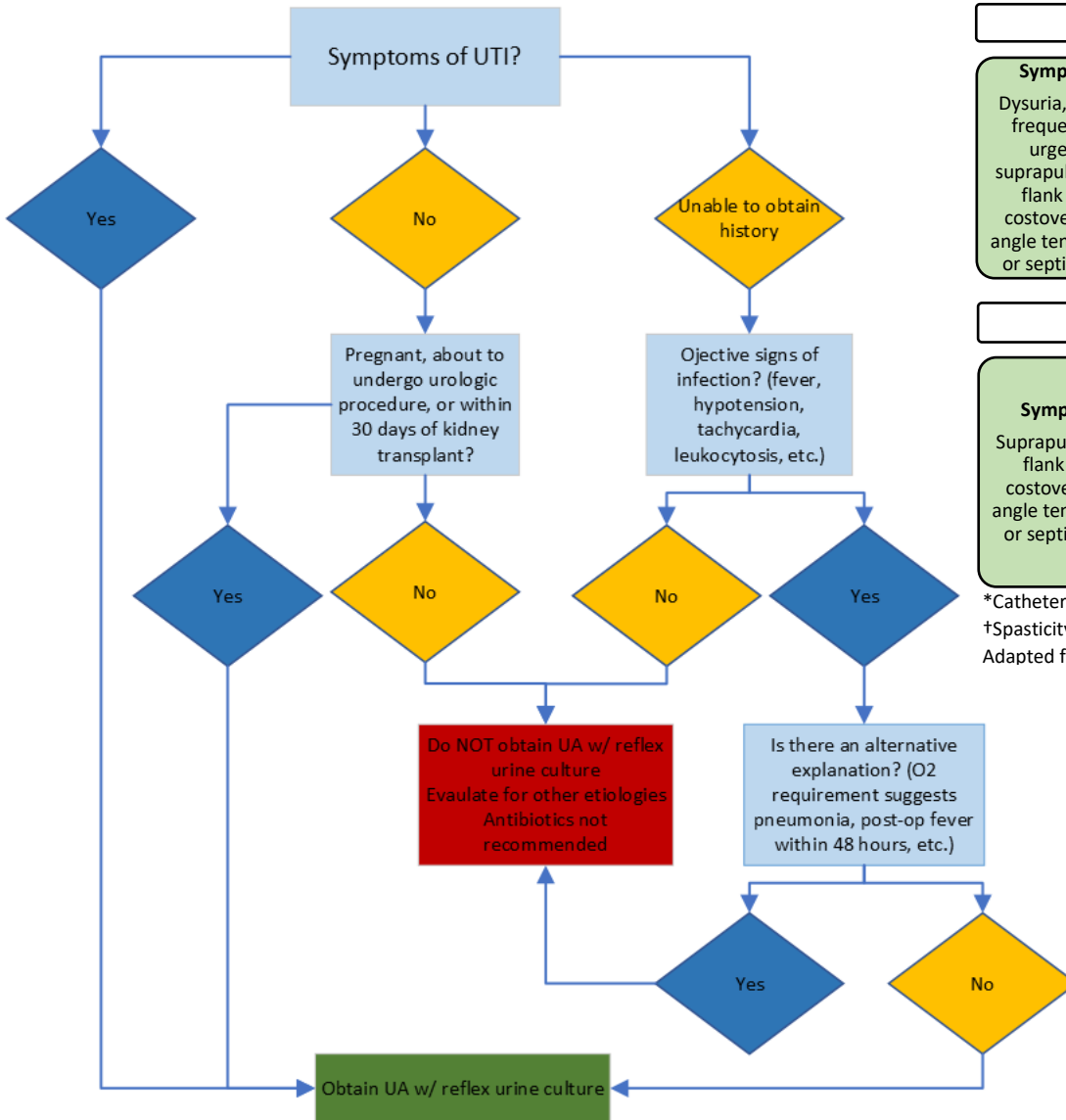


# VASP Urinary Tract Infections – Inpatient Management

This guidance document is meant to provide general recommendations and does not supersede clinical decision making.

## I. Diagnosis

### Ordering a Urinalysis with Reflex Urine Culture



### Signs & Symptoms of Urinary Tract Infections

Patients without urinary catheters		
<b>Symptoms</b> Dysuria, urinary frequency or urgency, suprapubic pain, flank pain, costovertebral angle tenderness, or septic shock	<b>May be symptoms</b> Fever, leukocytosis, or hypotension with no other known cause	<b>NOT symptoms</b> Altered mental status, change in urine color, sediment, or smell
Patients with urinary catheters*		
<b>Symptoms</b> Suprapubic pain, flank pain, costovertebral angle tenderness, or septic shock	<b>May be symptoms</b> Fever, leukocytosis, or hypotension with no other known cause, delirium†	<b>NOT symptoms</b> Change in urine color, sediment, or smell

\*Catheter refers to foley catheters and suprapubic catheters  
 †Spasticity or autonomic dysreflexia in patients w/ spinal cord injury  
 Adapted from Claeys et al.<sup>3</sup>

### Interpretation of Urinalysis and Urine Culture

- Neither a UA nor urine culture are diagnostic for a UTI.
- Bacteria can represent asymptomatic bacteriuria, colonization, or infection.
- Pyuria is evidence of genitourinary tract inflammation and is often present with catheter use and asymptomatic bacteriuria; **pyuria is not an indication for treatment.**
- Squamous cells on the urinalysis suggest contamination and therefore the urine culture results may not be accurate.
- Leukocyte esterase indicates WBCs in the urine and is NOT diagnostic for a UTI.
- Nitrite indicates the presence of bacteria and is NOT diagnostic for a UTI.
- S. aureus* in the urine is concerning for disseminated infection; blood cultures should be drawn due to high risk for *S. aureus* bacteremia.
- Candida* in the urine usually represents colonization and does not need treatment if there are no signs/symptoms of a UTI.

### Key Points

- UA with reflex urine culture should only be obtained when there is significant suspicion for a UTI based on patient symptoms.
- Neither a UA (including pyuria) nor urine culture (including multi-drug resistant organisms) are diagnostic for a UTI.
- UA with reflex urine culture is NOT recommended automatically in the workup of fever or sepsis.
- For patients with indwelling catheters, urine should be collected AFTER replacement of the catheter; do not draw cultures from urine drainage bag.
- At VUMC, urine cultures are available only upon reflex of UA with  $\geq 5$  WBC unless the patient meets one of the following exclusion criteria:  $< 25$  months of age, currently pregnant, complex urologic history at high risk for UTI, neutropenic (ANC  $< 100$  or total WBC  $< 500$ ).

## II. Treatment

Clinical Syndrome	Treatment	Comments
<p><b>Asymptomatic Bacteriuria (ASB)</b></p> <p>ASB <b>should not be treated (see exceptions listed)</b>, regardless of pyuria or isolation of bacteria on urine culture (including resistant organisms)</p>	<p>Treatment should be adjusted based on culture and susceptibilities (including recent previous cultures).</p> <p>Treatment is recommended in pregnancy, prior to urologic procedures, and in kidney transplant recipients within 30 days.</p> <p><u>Pregnancy</u></p> <ul style="list-style-type: none"> <li>• 1<sup>st</sup> line (regardless of trimester)               <ul style="list-style-type: none"> <li>○ Amoxicillin 500 mg PO TID or 875 mg PO BID x 5-7 days (<b>if susceptibility confirmed</b>)</li> <li>○ Cephalexin 500 mg PO BID-QID x 5-7 days</li> </ul> </li> <li>• 2<sup>nd</sup> line               <ul style="list-style-type: none"> <li>○ Nitrofurantoin monohydrate 100 mg PO BID (if CrCl &gt;30 mL/min) x 5 days</li> <li>○ TMP/SMX 1 DS tablet (800/160 mg) PO BID x 3 days (<b>if susceptibility confirmed</b>)</li> <li>○ Fosfomycin 3 g PO x 1 (for <i>E. coli</i> and <i>E. faecalis</i> ONLY)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Nitrofurantoin is typically avoided in the first trimester.</li> <li>• TMP/SMX is typically avoided in the first trimester and after 32 weeks.</li> <li>• Urologic procedures require ≤24 hours of prophylaxis.</li> <li>• Fosfomycin is restricted to ID approval.</li> <li>• Nitrofurantoin should only be used for <i>E. coli</i> and susceptible gram-positive organisms.</li> <li>• <a href="#">Adjust doses based on renal function.</a></li> </ul>
<p><b>Uncomplicated Cystitis</b></p> <p>(otherwise healthy, nonpregnant women without obstruction, catheter, fever, or flank pain)</p>	<p>Treatment should be adjusted based on culture and susceptibilities (including recent previous cultures).</p> <p><u>Empiric</u></p> <ul style="list-style-type: none"> <li>• Nitrofurantoin monohydrate 100 mg PO BID (if CrCl &gt;30 mL/min) x 5 days</li> <li>• Cephalexin 500 mg PO BID x 5-7 days</li> <li>• Amoxicillin-clavulanate 875/125 mg PO BID x 5-7 days</li> <li>• TMP/SMX 1 DS tablet (800/160 mg) PO BID x 3 days (<b>if susceptibility confirmed</b>)</li> <li>• IV (if patient cannot take PO meds): Ceftriaxone 1-2g IV daily x 3 days</li> </ul> <p><u>Alternatives</u></p> <ul style="list-style-type: none"> <li>• Amoxicillin 500 mg PO TID or 875 mg PO BID x 5-7 days (<b>if susceptibility confirmed</b>)</li> <li>• Ciprofloxacin 250 mg PO BID x 3 days or levofloxacin 250 mg PO daily x 3 days (<b>if susceptibility confirmed</b>)</li> <li>• Fosfomycin 3g PO x 1 (for <i>E. coli</i> and <i>E. faecalis</i> ONLY)</li> </ul> <p><u>Transition from IV to PO should be considered for patients who meet the following criteria:</u> able to tolerate enteral medications, signs of clinical improvement (defervesced, afebrile, down-trending WBC, etc.)</p> <ul style="list-style-type: none"> <li>• Days of IV therapy count towards overall treatment duration.</li> </ul>	<ul style="list-style-type: none"> <li>• Fluoroquinolones should be reserved for more serious infections than uncomplicated cystitis, and only after susceptibility results are confirmed given high rates of resistance.</li> <li>• Fosfomycin is restricted to ID approval.</li> <li>• Nitrofurantoin should only be used for <i>E. coli</i> and susceptible gram-positive organisms.</li> <li>• <a href="#">Adjust doses based on renal function.</a></li> </ul>
<p><b>Complicated Cystitis Without Sepsis or Bacteremia</b></p> <p>(Urinary catheter present or removed within the last 48 hours, urologic abnormality, recent instrumentation, obstruction)</p>	<p>Treatment should be adjusted based on culture and susceptibilities (including recent previous cultures).</p> <p><u>Empiric</u></p> <ul style="list-style-type: none"> <li>• Oral               <ul style="list-style-type: none"> <li>○ Nitrofurantoin monohydrate 100 mg PO BID (if CrCl &gt;30 mL/min) x 7 days</li> <li>○ Cephalexin 500 mg PO QID x 7 days</li> </ul> </li> <li>• IV (if patient cannot take PO meds): Ceftriaxone 1-2g IV daily x 3 days</li> </ul> <p><u>Alternatives</u></p> <ul style="list-style-type: none"> <li>• Amoxicillin-clavulanate 875/125 mg PO BID x 7 days</li> <li>• TMP/SMX 1 DS tablet PO (800/160 mg) BID x 7 days (<b>if susceptibility confirmed</b>)</li> <li>• Amoxicillin 500 mg PO TID or 875 mg PO BID x 7 days (<b>if susceptibility confirmed</b>)</li> <li>• Ciprofloxacin 500 mg PO BID x 5 days or levofloxacin 750 mg PO daily x 5 days (<b>if susceptibility confirmed</b>)</li> <li>• Fosfomycin 3g PO every 48 hours x 3 doses (for <i>E. coli</i> and <i>E. faecalis</i> ONLY)</li> </ul> <p><u>Transition from IV to PO should be considered for patients who meet the following criteria:</u> able to tolerate enteral medications, signs of clinical improvement (defervesced, afebrile, down-trending WBC, etc.)</p> <ul style="list-style-type: none"> <li>• Days of IV therapy count towards overall treatment duration.</li> </ul>	<ul style="list-style-type: none"> <li>• Fluoroquinolones are not first-line due to increasing rates of <i>E. coli</i> resistance and high propensity for collateral damage.</li> <li>• Fosfomycin is restricted to ID approval.</li> <li>• Nitrofurantoin should only be used for <i>E. coli</i> and susceptible gram-positive organisms.</li> <li>• <a href="#">Adjust doses based on renal function.</a></li> </ul>

<p><b>Complicated UTI with Sepsis or Bacteremia, Pyelonephritis</b> (includes upper tract infection)</p>	<p>Treatment should be adjusted based on culture and susceptibilities (including recent previous cultures).</p> <p><u>Empiric Therapy</u></p> <ul style="list-style-type: none"> <li>• Ceftriaxone 2g IV daily</li> <li>• Critically ill: piperacillin-tazobactam 4.5g IV x 1 followed by 3.375g IV Q8h or cefepime 2g IV q8h</li> </ul> <p><u>Step down to PO agent based on susceptibilities:</u></p> <ul style="list-style-type: none"> <li>• Without Bacteremia <ul style="list-style-type: none"> <li>○ Ciprofloxacin 500 mg PO BID or Levofloxacin 750 mg PO daily x 7 days total</li> <li>○ TMP/SMX 8-10 mg/kg/day TMP PO divided every 6-12 hours x 7 days total</li> <li>○ Oral beta-lactams x 10-14 days total</li> </ul> </li> <li>• With Bacteremia <ul style="list-style-type: none"> <li>○ High dose cephalexin 1g PO QID x 7 days total (<b>only if cefazolin MIC ≤2</b>)</li> <li>○ Ciprofloxacin 500 mg PO BID or Levofloxacin 750 mg PO daily x 7 days total</li> <li>○ TMP/SMX 8-10 mg/kg/day TMP PO divided every 6-12 hours x 7 days total</li> </ul> </li> </ul> <p>If IV is continued for the entire course, duration should be limited to 7 days total.</p> <p><u>Transition from IV to PO should be considered for patients who meet the following criteria:</u> able to tolerate enteral medications and signs of clinical improvement (defervesced, afebrile, down-trending WBC, etc.)</p> <ul style="list-style-type: none"> <li>• Days of IV therapy count towards overall treatment duration.</li> </ul>	<ul style="list-style-type: none"> <li>• If there is concern for <i>Enterococcus</i> spp. piperacillin-tazobactam is the preferred empiric agent.</li> <li>• MRSA coverage is NOT usually indicated unless the patient has a history of MRSA UTI or has recent procedure or instrumentation.</li> <li>• Fluoroquinolones are not recommended for empiric therapy due to increasing rates of <i>E. coli</i> resistance.</li> <li>• This guidance does NOT include treatment for prostatitis or perinephric abscess; please consult ID for assistance if needed.</li> <li>• Day 1 (of 7) is the first day of active antibiotic therapy.</li> <li>• <a href="#">Adjust doses based on renal function.</a></li> </ul>
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