

VANDERBILT  UNIVERSITY
MEDICAL CENTER

Vanderbilt Adult Antimicrobial Stewardship Program

Urinary Tract Infections – Inpatient Management

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

I. Diagnosis

Refer to the Agile MD Pathway “VASP Urinary Tract Infections – Inpatient Management” for diagnostic recommendations

	VASP Urinary Tract Infections - Inpatient Management	VUH Inpatient Pathways
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Diagnostic Considerations

- **Neither a UA nor urine culture is diagnostic for a UTI.** Bacteria can represent asymptomatic bacteriuria, colonization, or infection.
 - UA with reflex urine culture should only be obtained when there is significant suspicion for a UTI based on patient symptoms (see below).
 - UA with reflex urine culture is NOT recommended automatically in the workup of fever or sepsis.
 - **Pyuria** is evidence of genitourinary tract inflammation and is often present with catheter use and asymptomatic bacteriuria.
 - **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.
 - At VUMC, urine cultures are available ONLY upon reflex of UA when ≥ 5 WBC are present 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)
- **S. aureus** in the urine is concerning for disseminated infection; blood cultures should be drawn due to risk for *S. aureus* bacteremia.
- **Candida spp.** in the urine usually represents colonization and does not need treatment if there are no signs/symptoms of a UTI.
- For patients with indwelling catheters, urine should be collected AFTER replacement of the catheter; do NOT draw cultures from urine drainage bag.

Signs & Symptoms of Urinary Tract Infections

Patients without urinary catheters			Patients with urinary catheters*		
Symptoms Dysuria, urinary frequency or urgency, suprapubic pain, flank pain, costovertebral angle tenderness, or septic shock	May be symptoms Fever, leukocytosis, or hypotension with no other known cause	NOT symptoms Altered mental status, change in urine color, sediment, or smell	Symptoms Suprapubic pain, flank pain, costovertebral angle tenderness, or septic shock	May be symptoms Fever, leukocytosis, or hypotension with no other known cause, delirium†	NOT symptoms 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.³

II. Treatment

General Treatment Considerations

- Previous cultures from the last 3-6 months should inform empiric therapy selection.
- Treatment should be adjusted based on culture and susceptibilities.
- **Antimicrobial Considerations:**
 - Adjust doses based on renal function using the [Antimicrobial Dosing Guidance](#).
 - **Fluoroquinolones** are NOT recommended for empiric therapy due to increasing rates of *E. coli* resistance and high propensity for collateral damage. Reserve for use when there are no suitable alternatives.
 - **Fosfomycin** is restricted to ID approval and should ONLY be used for *E. coli* and *E. faecalis*.
 - **Nitrofurantoin** should ONLY be used for *E. coli* and susceptible gram-positive organisms. Avoid if CrCl <30mL/min.
 - When IV therapy is initiated, transition from **IV to PO** should be considered for patients who meet the following criteria:
 - Able to tolerate enteral medications
 - Signs of clinical improvement (defervesced, down-trending WBC, etc.)
- **Durations of Therapy:**
 - Recommendations are overall treatment durations that should account for both IV and PO days of therapy.
- This guidance does NOT include treatment for prostatitis or perinephric abscess; please consult ID for assistance if needed.

Clinical Syndrome	Treatment	Comments
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<p>Asymptomatic Bacteriuria (ASB)</p>	<p>ASB should NOT be treated regardless of pyuria or isolation of bacteria on urine culture (including resistant organisms) unless one of the following exceptions is met:</p> <ul style="list-style-type: none"> • Pregnancy • Prior to urologic procedures • Kidney transplant recipients within 30 days <p><u>Pregnancy:</u> 1st line (regardless of trimester)</p> <ul style="list-style-type: none"> • Amoxicillin 500 mg PO TID x 5 days • Cephalexin 500 mg PO BID x 5 days <p>2nd line</p> <ul style="list-style-type: none"> • Nitrofurantoin monohydrate 100 mg PO BID x 5 days • TMP-SMX 1 DS tablet (800/160 mg) PO BID x 3 days • Fosfomycin 3 g PO x 1 	<ul style="list-style-type: none"> • Nitrofurantoin is typically avoided in the first trimester. • TMP-SMX is avoided in the first trimester and after 32 weeks. •
<p>Uncomplicated UTI (nonpregnant female or male patients with infection confined to the bladder and without obstruction, catheter, fever, bacteremia, or flank pain)</p>	<p><u>Empiric Therapy</u></p> <ul style="list-style-type: none"> • Nitrofurantoin monohydrate 100 mg PO BID x 5 days • Cephalexin 500 mg PO BID x 5 days • Amoxicillin-clavulanate 875/125 mg PO BID x 5 days • If patient cannot take PO meds: Ceftriaxone 2g IV daily x 3 days <p><u>Alternatives (confirm susceptibility)</u></p> <ul style="list-style-type: none"> • Amoxicillin 500 mg PO TID x 5 days • TMP-SMX 1 DS tablet (800/160 mg) PO BID x 3 days • Ciprofloxacin 500 mg PO BID or Levofloxacin 500 mg PO daily x 3 days • Gentamicin or Tobramycin 5 mg/kg IV x 1 • Fosfomycin 3g PO x 1 	<ul style="list-style-type: none"> • Fluoroquinolones should be reserved for complicated UTIs. Susceptibility must be confirmed. • If IV is continued for the entire course, duration can be limited to 3 days total. • A single dose of an aminoglycoside does not require a pharmacy consult or levels. Use actual body weight for non-obese patients and adjusted body weight for obese patients. Avoid if CrCl <30 mL/min.
<p>Complicated UTI (infection beyond the bladder in female or male patients, including pyelonephritis, febrile UTI, sepsis, bacteremia from urinary source, and catheter-associated UTIs)</p>	<p><u>Empiric Therapy</u></p> <ul style="list-style-type: none"> • Ceftriaxone 2g IV daily • <i>Pseudomonas</i> or MDRO Risk Factors: <ul style="list-style-type: none"> ○ Piperacillin-tazobactam 4.5g IV q8h ○ Cefepime 2g IV q8h ○ 	<ul style="list-style-type: none"> • If there is concern for <i>Enterococcus</i> spp., piperacillin-tazobactam is preferred. • <i>Pseudomonas</i> or MDRO Risk Factors: Recent isolation (within 6 months) of <i>Pseudomonas</i> or organism resistant to ceftriaxone, hospitalization with IV antibiotic use in last 90 days, immunocompromised (chemotherapy in last 6 months, neutropenia, SOT or BMT on immunosuppressive therapy, prednisone >20 mg/day or equivalent, HIV with CD4 <200, DMARD, etc.) • MRSA coverage is NOT usually indicated unless the patient has a history of MRSA UTI or recent procedure or instrumentation. • Total duration of therapy is generally 7 days. Day 1 is first day of active antibiotic therapy.
<p>Stepdown to PO Therapy for Complicated UTI (confirm susceptibilities)</p> <p><u>Without</u> bacteremia or pyelonephritis:</p> <ul style="list-style-type: none"> • Cephalexin 500 mg PO q6h x 7 days • Amoxicillin-clavulanate 875/125 mg PO BID x 7 days • Amoxicillin 500 mg PO TID x 7 days • TMP-SMX 1 DS tablet (800/160 mg) PO BID x 7 days • Levofloxacin 500 mg PO daily x 5 days • Ciprofloxacin 500 mg PO BID (750 mg BID for <i>Pseudomonas</i>) x 5 days <p><u>With</u> bacteremia or pyelonephritis: Refer to the Guidance on Oral Options for Uncomplicated Bacteremia</p> <ul style="list-style-type: none"> • Regimens recommended for bacteremia may also be used to treat cUTI due to susceptible organisms in patients without bacteremia 		

III. Continuous Prophylaxis for Recurrent Infection

General Prophylaxis Considerations

- Need to weigh risk/benefit of continuous antibiotic prophylaxis due to increased antibiotic resistance, risk for toxicity, *C. difficile*, and lack of demonstrable efficacy.
- Consider for women experiencing ≥ 2 symptomatic UTIs over 6 months or ≥ 3 over 12 months.
- Follow up with Urology and/or Infectious Diseases to reevaluate periodically.

Non-Antibiotic Options (First line)	Antibiotic Options (If non-antibiotic options fail)
Hydration	<u>Preferred</u> Cephalexin 250 mg PO daily
Methenamine – contraindicated in mild to severe renal and severe hepatic impairment, avoid if indwelling foley, ineffective for bacteria with alkaline environment (e.g. <i>Proteus</i> , <i>Pseudomonas</i>) as well as <i>Klebsiella aerogenes</i> ; requires acidic urine (ideally pH <5.5), can give with vitamin C to decrease pH	<u>Alternatives</u> TMP-SMX 80 mg/400 mg PO daily or 3x/week Nitrofurantoin 50-100 mg PO daily at bedtime
Azo Bladder Control Supplement – shown improvement in frequency of urination, dysuria, and quality of life	
Cranberry Supplement – efficacy is controversial, but minimal adverse effects	
D-mannose – low quality data to support for prevention of UTIs; most active against <i>E. coli</i> and <i>K. pneumoniae</i> ; no significant ADE	
Topical Estrogen – need to have risk/benefit discussion given rare but serious risk of thromboembolism, breast cancer, ovarian cancer, osteoporosis, etc.	
Probiotics – low quality data; no significant adverse effects for most patients	

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