**Guideline Goal**

The goal of this guideline is to provide general indications/criteria for ordering urine cultures and potentially reduce unnecessary cultures. This guideline includes reflex testing to ensure urine culture tests are ordered only when appropriate and facilitate antimicrobial stewardship efforts.

**Key Points**

- UTI is the most common reason for antimicrobial use in older adults, and inappropriate use of antibiotics leads to the development of multidrug-resistant organisms (MDROs).
- Use the algorithm and criteria below to guide appropriate diagnostic test selection (urinalysis, urinalysis with reflex to culture, or urinalysis and culture).
- Use criteria outlined on page 2 to guide initiation of empiric antibiotics. If patient is asymptomatic and has no indwelling urinary catheter, antimicrobial therapy is not recommended.

---

**Clinical Pearls**

- The following should be considered “significant” thus should complete a full course of therapy
  - “Clean catch” specimens growing ≥100,000 CFU’s
  - “Straight cath” specimen growing ≥10,000 CFU’s
- Cultures with lesser growth may warrant additional consideration for non-infectious etiologies
- Pregnant women should be screened for bacteriuria early in pregnancy and treated if culture results are positive (See Appendix B)

---

**Preoperative Surgical Screening**

Consider only in the instance of high-risk surgery including: Cardiac surgery, Neurosurgery, or Urologic surgery/procedures

---

**Suspected UTI or CAUTI**

(See Appendix A for common signs & symptoms)

---

**Does the patient have any of the following?**

- Vaginal pain, bleeding and/or discharge
- Symptoms/signs of acute pyelonephritis (flank, pain, fever, etc.)
- History of catheter associated infections
- Co-morbidities that place patient at higher risk for complicated infection
- Recurrent UTI’s; especially with antimicrobial-resistant organisms.
- Symptoms/signs of STI’s (sexually-transmitted infections)
- Male gender

---

**Uncomplicated UTI**

May Treat Empirically with or without urinalysis, NO Culture Needed

(See Treatment Considerations on page 2)

---

**Is the Patient High-Risk: Pregnant, Transplant, Immunocompromised or Immunosuppressed meeting one or more of a following?**

- Neutropenia with ANC ≤ 500 cells/uL
- HIV with a CD4 count < 200 cells/mm³
- Receipt of chemotherapy within previous 2 weeks for active malignancy
- Administration of immunosuppressive agents (e.g. azathioprine, cyclosporine, tacrolimus, sirolimus, and mycophenolate)
- Administration of corticosteroid dose equivalent to 20 mg prednisone for at least 1 month

---

**Order Urinalysis with Reflex to Culture**

If urinalysis meets any ONE of the following, the Lab will automatically reflex to culture:

- ≥ Moderate Leukocyte Esterase
- WBC > 5/HPF
- Bacteria present with squamous cells ≤ 2+
- Nitrite positive with squamous cells ≤ 2+

*Squamous cells are a marker of contamination*

---

**Order Urinalysis AND Culture**

---

**Does the patient have any of the following?**

---

**Order and collect appropriate urine testing**

(See also “How to Collect a Clean Urine Sample” Male or Female)

---

**See Treatment Recommendations (page 2)**
Empiric Treatment Considerations

- Antimicrobial therapy is NOT recommended if patient is asymptomatic and has no indwelling catheter,
- Antimicrobial therapy is recommended if
  - Patient is symptomatic (any population)
  - Culture results are pending or positive AND either one of the following:
    - Asymptomatic, high-risk population
    - Impending urologic, neurosurgery, or cardiac surgery
- See Appendix A for common symptoms of a UTI/CAUTI
- See Appendix B for recommendations during pregnancy
- See Appendix C for OSUWMC Emergency Department Antibiogram for E. coli Urine Isolates

Determine location/severity of UTI (this will determine duration of therapy)

<table>
<thead>
<tr>
<th>Severity</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncomplicated</td>
<td>Patient with a structurally and neurologically normal urinary tract</td>
</tr>
</tbody>
</table>
| Complicated | Patient with a functional or anatomical abnormality of the urinary tract
  - Men
  - Urinary catheter in place
  - Genitourinary tract obstruction
  - Immunosuppressed or Immunocompromised |
| Pregnancy | See Appendix B: During pregnancy, mixed gram-positive bacteria, Lactobacilli, and Staphylococcus (other than S. saprophyticus) are typically presumed contaminants. |

Unless guided by current or prior urine culture results, consider these empiric options in order of preference based on overall susceptibility from OSUWMC antibiograms (commonly used antibiotic dosing recommendations based on renal function):

<table>
<thead>
<tr>
<th>Renal Function</th>
<th>1. Cephalexin (Keflex®) (PO)</th>
<th>2. Cefazolin (Ancef®) (IV)</th>
<th>3. Ceftriaxone (Rocephin®) (IV)</th>
<th>4. Nitrofurantoin (Macrodex®) (PO)</th>
<th>5. Sulfamethoxazole / Trimethoprim (Bactrim DS®) (PO)</th>
<th>6. Levofloxacin (Levaquin*) (PO/IV)</th>
<th>7. Ciprofloxacin (Cipro*) (PO/IV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CrCl &gt;50</td>
<td>500 mg PO q12h</td>
<td>1 g IV q8h</td>
<td>1 gm IV q24h</td>
<td>CrCl &gt; 50: 100 mg q12h</td>
<td>1 DS tab (800/160) q12h</td>
<td>250 mg q24h</td>
<td>PO: 250-500 mg q12h</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 g IV q12h</td>
<td>250 mg q24h</td>
<td></td>
<td>IV: 400 mg q12h</td>
</tr>
<tr>
<td>CrCl 30-50</td>
<td>500 mg PO q12h</td>
<td>1 g IV q8h</td>
<td>1 gm IV q24h</td>
<td>DO NOT USE</td>
<td>1 DS tab (800/160) q12h</td>
<td>250 mg q24h</td>
<td>PO: 250-500 mg q12h</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>250 mg q24h</td>
<td></td>
<td>IV: 400 mg q12h</td>
</tr>
<tr>
<td>CrCl 10-29</td>
<td>500 mg PO q12h</td>
<td>1 g IV q8h</td>
<td>1 gm IV q24h</td>
<td>DO NOT USE</td>
<td>1 DS tab (800/160) q24h</td>
<td>250 mg q48h</td>
<td>PO: 250-500 mg q24h</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>250 mg q48h</td>
<td></td>
<td>IV: 400 mg q24h</td>
</tr>
<tr>
<td>Intermittent</td>
<td>500 mg PO q24h</td>
<td>1 g IV q24h</td>
<td>1 gm IV q24h</td>
<td>DO NOT USE</td>
<td>1 DS tab (800/160) q24h</td>
<td>250 mg q48h</td>
<td>PO: 250-500 mg q24h</td>
</tr>
<tr>
<td>Hemodialysis /</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>250 mg q48h</td>
<td></td>
<td>IV: 400 mg q24h</td>
</tr>
<tr>
<td>CrCl &lt;10</td>
<td>500 mg PO q24h</td>
<td>1 g IV q24h</td>
<td>1 gm IV q24h</td>
<td>DO NOT USE</td>
<td>1 DS tab (800/160) q24h</td>
<td>250 mg q48h</td>
<td>PO: 250-500 mg q24h</td>
</tr>
<tr>
<td>Continuous</td>
<td>500 mg PO q12h</td>
<td>1 g IV q12h</td>
<td>1 gm IV q24h</td>
<td>DO NOT USE</td>
<td>1 DS tab (800/160) q24h</td>
<td>250 mg q24h</td>
<td>PO: 250-500 mg q12h</td>
</tr>
<tr>
<td>Replacement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>IV: 400 mg q12h</td>
</tr>
<tr>
<td>Therapy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Recommended Duration (Duration should be guided by the specific clinical situation and the response to therapy)

<table>
<thead>
<tr>
<th></th>
<th>Uncomplicated</th>
<th>Complicated</th>
<th>Pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 days</td>
<td>10 days</td>
<td>4-7 days</td>
</tr>
<tr>
<td></td>
<td>3 days</td>
<td>10 days</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>3 days</td>
<td>10 days</td>
<td>4-7 days</td>
</tr>
<tr>
<td></td>
<td>5 days</td>
<td>10 days</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>3 days</td>
<td>10 days</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>3 days</td>
<td>10 days</td>
<td>NA</td>
</tr>
</tbody>
</table>

Notes

- IV if enteral access not available or concern for altered absorption
- IV if additional coverage is necessary beyond urinary tract (e.g., pneumonia) or for less frequent dosing if IV access/compatibility is of concern
- DO NOT USE IF CrCl < 50 mL/min

Use PO formulation, if enteral access is available and there is no concern for altered absorption (i.e., high dose pressors or tube feeding)
Clinical Considerations

The following pathogens are not considered common urinary pathogens:

- **Candida species:** In most patients, isolation of *Candida* represents colonization. When possible, consider the removal of catheter as this may resolve candiduria. Treatment of candiduria should be considered for: symptomatic patients, patients with neutropenia, patients with renal allografts, patients who will undergo a urologic procedure. If treatment is indicated, treat for 7-14 days.1

- **Enterococcus:** Often represents colonization or contamination; consider not treating unless patient is symptomatic and corresponding urinalysis shows inflammation OR in high-risk populations. Preferred therapies may include *penicillin, ampicillin, amoxicillin,* or *nitrofurantoin.* For VRE, *fosomycin* may be indicated and susceptibilities must be requested/released. This agent also may work for ESBL or CRE in the urine.

- **Staphylococcus aureus:** If isolated from urine, unless there are other indicators of contamination MUST consider blood cultures, as often Staphylococcal bacteriuria is secondary to bacteremia.

- **Gardnerella vaginalis:** Gardnerella is the most common cause of bacterial vaginosis (BV), but may cause a UTI. If there are significant CFUs in culture and UA also shows inflammation, treat with *metronidazole* 500 mg PO/IV BID for 7 days is indicated.

References


Quality Measures

Within inpatient units and EDs, the following tests should account for >85% of urine tests for UTI/CAUTI workup:

- Urinalysis total with reflex to culture
- Urinalysis total AND culture
- Urine cultures ordered independent of UA

Guidelines, Policies & Protocols

- OSUWMC Urinary Urethral Catheter Removal Protocol
- CAUTI Task Force

Reviewed by P&T Antibiotic Subcommittee

Guideline Approved

April 16, 2018. 3rd Edition

Disclaimer

Clinical practice guidelines and algorithms at The Ohio State University Wexner Medical Center (OSUWMC) are standards that are intended to provide general guidance to clinicians. Patient choice and clinician judgment must remain central to the selection of diagnostic tests and therapy. OSUWMC’s guidelines and algorithms are reviewed periodically for consistency with new evidence; however, new developments may not be represented.

Copyright © 2018, The Ohio State University Wexner Medical Center. No part of this publication may be reproduced in any form without permission in writing from The Ohio State University Wexner Medical Center.
Appendix A. Common Signs and Symptoms of a UTI or CAUTI

- Clinical sepsis without evident alternative source
- Costovertebral angle or suprapubic pain or tenderness
- Shaking, chills/rigors
- New onset of altered mental status without alternative cause
- Urinary urgency and/or frequency*
- Hematuria
- Difficulty emptying bladder
- Dysuria, suprapubic or flank pain*
- Increased spasticity or autonomic dysreflexia in patients with spinal cord injury
- Fever > 100.4° F (38.0 C) without alternative source

*Patients with indwelling urethral catheters MAY NOT exhibit these classic symptoms

Appendix B. Common treatment options for Urinary Tract Infections and Asymptomatic Bacteriuria during Pregnancy

<table>
<thead>
<tr>
<th>Gestational Period</th>
<th>Recommended options (should be tailored to urine culture susceptibilities when possible)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Trimester</td>
<td><strong>First Line therapies (in order of preference):</strong></td>
</tr>
<tr>
<td></td>
<td>• Cephalexin 250-500mg PO Q6H (most commonly used)</td>
</tr>
<tr>
<td></td>
<td>• Amoxicillin 500mg PO q8h or 875mg PO q12h</td>
</tr>
<tr>
<td></td>
<td>• Amoxicillin-clavulanic acid 875mg PO q12h</td>
</tr>
<tr>
<td></td>
<td>• Ampicillin 250mg PO q6h</td>
</tr>
<tr>
<td></td>
<td><em>If above agents are clinically contraindicated (e.g. severe allergy) or pathogen is not susceptible, may consider use of the following:</em></td>
</tr>
<tr>
<td></td>
<td>• Nitrofurantoin 100mg q12h</td>
</tr>
<tr>
<td></td>
<td>• <strong>Trimethoprim-sulfamethoxazole 1 DS tablet q 12h</strong></td>
</tr>
<tr>
<td>Second or Third Trimester</td>
<td><strong>First Line therapies (in order of preference):</strong></td>
</tr>
<tr>
<td></td>
<td>• Cephalexin, amoxicillin, amoxicillin-clavulanic acid ampicillin as above</td>
</tr>
<tr>
<td></td>
<td>• Trimethoprim-sulfamethoxazole 1 DS tablet q12h</td>
</tr>
<tr>
<td></td>
<td>o Avoid use near delivery time (38-42 weeks of gestation)</td>
</tr>
<tr>
<td></td>
<td>• Nitrofurantoin 100mg q12h</td>
</tr>
<tr>
<td></td>
<td>o Avoid use near delivery time (38 – 42 weeks of gestation) as data suggest an increased risk of hemolytic anemia in the infant. This may be linked to mothers with G6PD deficiency.</td>
</tr>
</tbody>
</table>

Appendix C. 2016 OSUWMC UH/Main Emergency Department Antibiogram for E. Coli Urine Isolates

<table>
<thead>
<tr>
<th>Organism</th>
<th>Location</th>
<th># of Isolates</th>
<th>% Susceptible</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cefazolin</td>
</tr>
<tr>
<td>E.coli</td>
<td>All</td>
<td>497</td>
<td>93</td>
</tr>
<tr>
<td>E.coli ESBL</td>
<td>All</td>
<td>28</td>
<td>NA</td>
</tr>
</tbody>
</table>