### Adult Urinary Tract Infection (UTI) Guideline

#### Definitions

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<th>Condition</th>
<th>Definition</th>
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<td>Asymptomatic Bacteriuria (ASB)</td>
<td>Presence of bacteriuria (defined as having urine culture with &gt;10^5 CFU/ml) in the absence of any urinary tract symptoms</td>
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<tr>
<td>Uncomplicated Cystitis</td>
<td>Presence of typical lower urinary tract symptoms (dysuria, frequency, urgency, hematuria) AND lack of upper tract symptoms in an otherwise healthy pre-menopausal female</td>
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| Complicated Cystitis               | **Complicated:** Above symptoms with any underlying condition or factors which increases risk of treatment failure  
  - Male sex  
  - Poorly controlled diabetes  
  - Pregnancy  
  - Symptoms ≥7 days prior to seeking care  
  - Hospital acquired infection  
  - Renal failure  
  - Urinary tract obstruction  
  - Presence of indwelling urethral catheter, stent, nephrostomy tube or urinary diversion  
  - Recent urinary tract instrumentation  
  - Functional or anatomic abnormality of the urinary tract  
  - Renal transplantation  
  - Immunocompromised status (e.g. chronic high dose corticosteroids ≥20mg/day of prednisone, neutropenia, advanced HIV infection) |
| Pyelonephritis                     | Presence of upper urinary tract symptoms such as fever, costovertebral angle (CVA) tenderness, nausea, vomiting, and signs of severe sepsis |
| Catheter-Associated UTI (CA-UTI)   | Patients with indwelling bladder urinary catheter through urethra > 2 days, who presents with urinary tract symptoms and a positive urine culture |
**Algorithm**

Suspicion for UTI

- Fever or sepsis with no signs and symptoms for UTI
  - Look for other sources (SSI, decub ulcer infection, pneumonia, intra-abdominal infection, etc)
  - Yes: Most likely not
  - No: Yes

- Signs and symptoms of UTI (dysuria, frequency, urgency, suprapubic or flank pain/tenderness)
  - Obtain urinalysis (UA) and urine culture order set and start empiric treatment
    - UA > 10 WBC/hpf**
      - Yes: Urine culture will be performed by micro lab
        - Positive urine culture: Start, continue or change antibiotics per susceptibility
        - Negative urine culture: Re-evaluate symptoms
          - Persistent: Continue antibiotics
          - Resolved: Discontinue antibiotics if initiated
    - UA < 10 WBC/hpf
      - Yes: Most likely not UTI (consider other diagnosis)
        - Urine culture will NOT be performed by micro lab***
        - No*: Look for other sources

- Non-specific symptoms (confusion, malaise)
  - Yes
  - No:
    - UA < 10 WBC/hpf
      - Yes: Most likely not
      - No: No*

*If patient has non-specific symptoms and is clinically stable consider holding empiric antibiotic treatment until UA and urine culture results return

**Pyuria has high negative predictive value (96%) and low positive predictive value (37%)

***Exclusion Criteria:
- Pregnancy
- Renal Transplant
- Pediatrics (Age<12)
- Neutropenia
- Urologic Intervention
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<tr>
<th>Category</th>
<th>Screening Plan</th>
<th>Diagnosing / Interpretation</th>
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</table>
| Asymptomatic Bacteriuria (ASB) | • For patients who do not have any lower or upper urinary tract symptoms do NOT screen unless  
  o Pregnant  
  o Undergoing transurethral resection of prostate (TURP) or any other urological procedure with risk of mucosal bleeding  
  o Renal transplant patient  
  o Neutropenic | • Interpretation of the Urinalysis – Positive if there is presence of  
  o Leukocyte esterase: white blood cells in the urine  
  o Bacteria: presence indicates infection  
  o WBC: >10 WBC/hpf indicates pyuria  
    o Pyuria negative predictive value 96%  
    o Pyuria positive predictive value 37%  
  o Nitrite: positive indicates presence of bacteria that reduce nitrate |
| Uncomplicated Cystitis         | • No screening required                                                                                                                   |                                                                                                           |
| Complicated Cystitis           | • Obtain urinalysis with reflex to urine culture if patient has symptoms of UTI  
  • **Specimen collection**: Sample should be collected midstream |                                                                                                           |
| Pyelonephritis                 |                                                                                                                                |                                                                                                           |
| Catheter-Associated UTI (CA-UTI)| • Obtain urinalysis with reflex to urine culture if patient has symptoms of UTI  
  • If catheter present for >2 weeks, replace catheter prior to obtaining urine culture | • Interpretation of the urine culture  
  o Positive cultures (non CA-UTI patients): clean catch specimen with pyuria and \( \geq 10^5 \) CFU/ml of one or more bacterial species  
  o Positive cultures (CA-UTI patients): catheterized specimen with \( >10^3 \) CFU/ml of one or more bacterial species  
    • Pyuria and bacteriuria can be present due to catheter and are not an indication for treatment without symptoms  
  o Contamination: \( >20 \) squamous cells/hpf, presence of \( \geq 3 \) bacterial species in urine |
<table>
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<tr>
<th>Category</th>
<th>Common organisms</th>
<th>First-line for empiric treatment</th>
<th>Alternative Agents</th>
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</table>
| **Uncomplicated Cystitis**| *E. coli*                                                                         | Nitrofurantoin 100mg PO BID x 5 days For patients CrCl>30ml/min | - Cefalexin 500mg PO Q12H x 5 days<sup>a</sup>  
- TMP/SMX 160/800mg PO Q12H x 3 days<sup>a</sup> |
| **Complicated Cystitis**  | *E. coli, Klebsiella, Proteus, Other Enterobacteriaceae*                          | Nitrofurantoin 100mg PO BID x 7 days For patients CrCl>30ml/min | - Cefalexin 500mg PO Q12H x 7 days<sup>a</sup>  
- TMP/SMX 160/800mg PO Q12H x 7 days<sup>a</sup>  
- Levofoxacin 250mg PO Q24H x 5 days<sup>a</sup> |
| **Pyelonephritis**        | *E. coli, Klebsiella, Serratia, Citrobacter, Other Enterobacteriaceae* *P. aeruginosa* Enterococcus | Outpatient:  
- Ciprofloxacin 500mg PO BID x 7 days<sup>a</sup>  
Inpatient-Community acquired:  
- Ceftriaxone 1g IV daily  
Inpatient-Hospital acquired:  
- Piperacillin/tazobactam 3.375g IV Q6H<sup>h</sup>  
Inpatient-History of ESBL infection:  
- Meropenem 1g IV Q8H<sup>h</sup>  
- Amikacin 15 mg/kg IV Q24H<sup>h</sup>  
Duration: 7-14 days  
Use the shortest duration (7 days) if patient is clinically improving | Inpatient-Community acquired:  
Penicillin allergy (IgE-mediated):  
- Gentamicin 5mg/kg IV Q24H<sup>h</sup>  
Penicillin allergy + acute renal failure:  
- Levofoxacin 500mg IV daily<sup>a</sup>  
Penicillin allergy (Not IgE-mediated):  
- Cefepime 1g IV Q8H<sup>h</sup>  
Penicillin allergy (IgE-mediated):  
- Gentamicin 5mg/kg IV Q24H<sup>h</sup>  
Penicillin allergy + acute renal failure:  
- Levofoxacin 500mg IV daily<sup>a</sup>  
Duration: 7-14 days  
Use the shortest duration (7 days) if patient is clinically improving |
| **CA-UTI**                | *E. coli, Klebsiella, Serratia, Citrobacter, Enterobacter* *P. aeruginosa*  
Gram positive cocci (including coagulase negative staphylococci) Enterococcus species | Removal of urinary catheter if possible  
Antibiotic treatment same as pyelonephritis | Removal of urinary catheter if possible  
Antibiotic treatment same as pyelonephritis |
<table>
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<tr>
<th>Pregnancy</th>
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</table>
| • *E. coli*  
• Group B streptococcus, *Staphylococcus saprophyticus*  
• Klebsiella, Enterobacter  
• Enterococcus |

### Asymptomatic bacteriuria or acute cystitis:
- *Amoxicillin* 500mg PO Q8H#  
- *Cephalexin* 500mg PO Q12H#  
- Duration: 3-7 days  

### Pyelonephritis:
- *Ceftriaxone* 1g IV Q24H  
- Duration: 7-14 days  
- Use the shortest duration (7 days) if patient is clinically improving

### Asymptomatic bacteriuria or acute cystitis:
- *TMP/SMX* 160/800mg PO Q12H x 3 days (avoid in 1st and 3rd trimester)#  
- *Nitrofurantoin* 100mg PO Q12H x 5 days (avoid in 1st and 3rd trimester)

### Pyelonephritis:
- *Gentamicin* 5mg/kg IV Q24H¶  
- Duration: 7-14 days  
- Use the shortest duration (7 days) if patient is clinically improving

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**IgE-mediated** = immediate reactions including anaphylaxis, urticarial, angioedema, shortness of breath, etc  
**ESBL** = extended spectrum β-lactamase  
# = requires renal dose adjustment  
¶ = dose based on ideal body weight. For obese patients, use adjusted body weight

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**References**


Approved by P&T Committee 4/2018