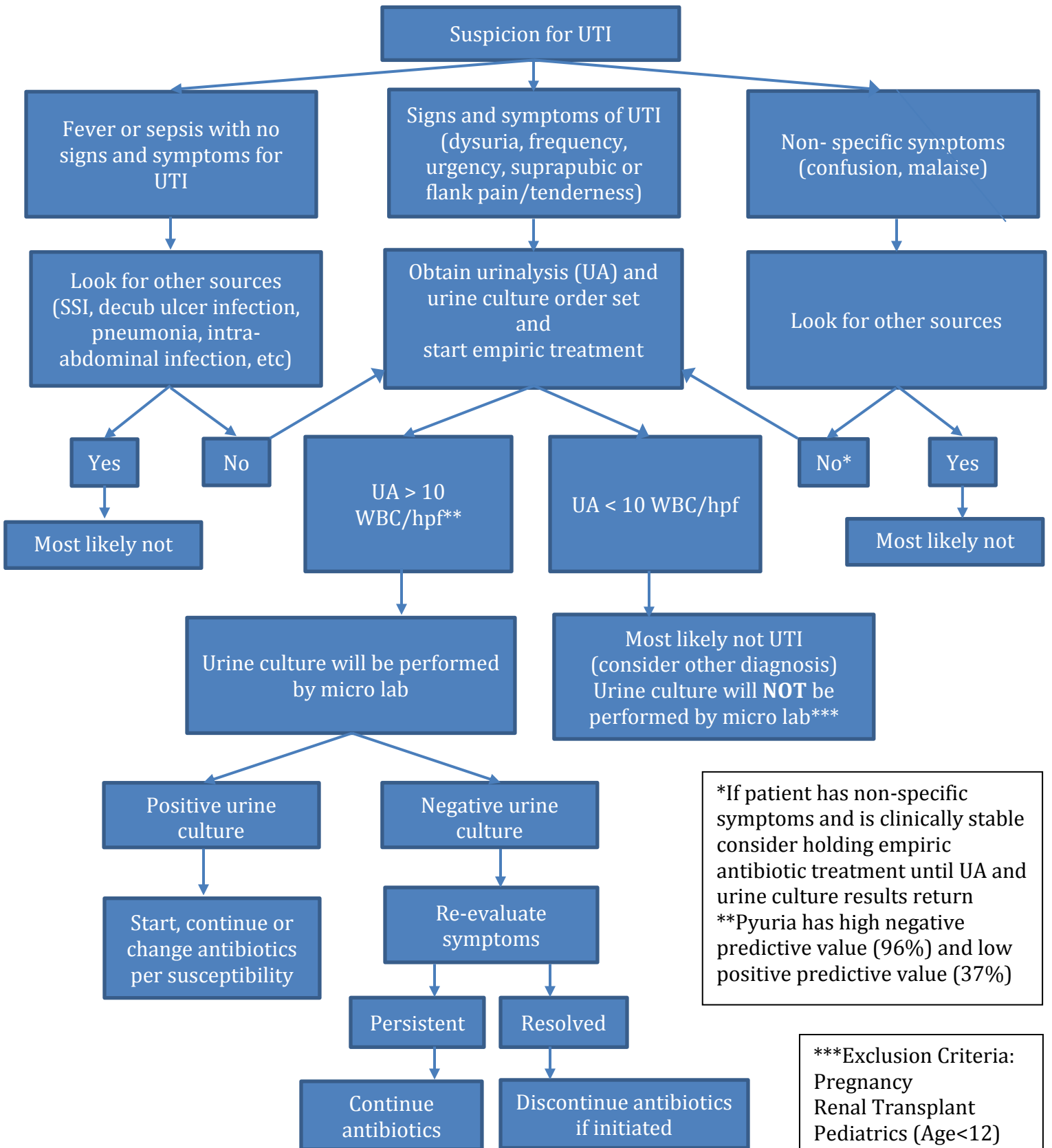


## Adult Urinary Tract Infection (UTI) Guideline

### Definitions

<b>Asymptomatic Bacteriuria (ASB)</b>	Presence of bacteriuria (defined as having urine culture with $>10^5$ CFU/ml) in the absence of any urinary tract symptoms
<b>Uncomplicated Cystitis</b>	Presence of typical lower urinary tract symptoms (dysuria, frequency, urgency, hematuria) <b>AND</b> lack of upper tract symptoms in an otherwise healthy pre-menopausal female
<b>Complicated Cystitis</b>	<p><b>Complicated:</b> Above symptoms with any underlying condition or factors which increases risk of treatment failure</p> <ul style="list-style-type: none"> <li>• Male sex</li> <li>• Poorly controlled diabetes</li> <li>• Pregnancy</li> <li>• Symptoms <math>\geq 7</math> days prior to seeking care</li> <li>• Hospital acquired infection</li> <li>• Renal failure</li> <li>• Urinary tract obstruction</li> <li>• Presence of indwelling urethral catheter, stent, nephrostomy tube or urinary diversion</li> <li>• Recent urinary tract instrumentation</li> <li>• Functional or anatomic abnormality of the urinary tract</li> <li>• Renal transplantation</li> <li>• Immunocompromised status (e.g. chronic high dose corticosteroids <math>\geq 20</math>mg/day of prednisone, neutropenia, advanced HIV infection)</li> </ul>
<b>Pyelonephritis</b>	Presence of upper urinary tract symptoms such as fever, costovertebral angle (CVA) tenderness, nausea, vomiting, and signs of severe sepsis
<b>Catheter-Associated UTI (CA-UTI)</b>	Patients with indwelling bladder urinary catheter through urethra $> 2$ days, who presents with urinary tract symptoms and a positive urine culture

## Algorithm



\*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

## Diagnosis

Category	Screening Plan	Diagnosing / Interpretation
<b>Asymptomatic Bacteriuria (ASB)</b>	<ul style="list-style-type: none"> <li>• For patients who do not have any lower or upper urinary tract symptoms do <u>NOT</u> screen unless               <ul style="list-style-type: none"> <li>○ Pregnant</li> <li>○ Undergoing transurethral resection of prostate (TURP) or any other urological procedure with risk of mucosal bleeding</li> <li>○ Renal transplant patient</li> <li>○ Neutropenic</li> </ul> </li> </ul>	
<b>Uncomplicated Cystitis</b>	<ul style="list-style-type: none"> <li>• No screening required</li> </ul>	
<b>Complicated Cystitis</b>	<ul style="list-style-type: none"> <li>• Obtain urinalysis with reflex to urine culture if patient has symptoms of UTI               <ul style="list-style-type: none"> <li>• <b>Specimen collection:</b> Sample should be collected midstream</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Interpretation of the Urinalysis – Positive if there is presence of</b> <ul style="list-style-type: none"> <li>○ <b>Leukocyte esterase:</b> white blood cells in the urine</li> <li>○ <b>Bacteria:</b> presence indicates infection</li> <li>○ <b>WBC:</b> &gt;10 WBC/hpf indicates pyuria               <ul style="list-style-type: none"> <li>○ <b>Pyuria negative predictive value 96%</b></li> <li>○ <b>Pyuria positive predictive value 37%</b></li> </ul> </li> <li>○ <b>Nitrite:</b> positive indicates presence of bacteria that reduce nitrate</li> </ul> </li> </ul>
<b>Pyelonephritis</b>		
<b>Catheter-Associated UTI (CA-UTI)</b>	<ul style="list-style-type: none"> <li>• Obtain urinalysis with reflex to urine culture if patient has symptoms of UTI</li> <li>• If catheter present for &gt;2 weeks, replace catheter prior to obtaining urine culture</li> </ul>	

## Treatment

Category	Common organisms	First-line for empiric treatment **De-escalate antimicrobial therapy after urine culture susceptibilities are available**	Alternative Agents
Uncomplicated Cystitis	<i>E. coli</i>	Nitrofurantoin 100mg PO BID x 5 days For patients CrCl>30ml/min	<ul style="list-style-type: none"> <li>Cephalexin 500mg PO Q12H x 5 days<sup>#</sup></li> <li>TMP/SMX 160/800mg PO Q12H x 3 days<sup>#</sup></li> </ul>
Complicated Cystitis	<i>E. coli</i> , Klebsiella, Proteus, Other Enterobacteriaceae	Nitrofurantoin 100mg PO BID x 7 days For patients CrCl>30ml/min	<ul style="list-style-type: none"> <li>Cephalexin 500mg PO Q12H x 7 days<sup>#</sup></li> <li>TMP/SMX 160/800mg PO Q12H x 7 days<sup>#</sup></li> <li>Levofloxacin 250mg PO Q24H x 5 days<sup>#</sup></li> </ul>
Pyelonephritis	<ul style="list-style-type: none"> <li><i>E. coli</i>, Klebsiella, Serratia, Citrobacter, Other Enterobacteriaceae</li> <li><i>P. aeruginosa</i></li> <li>Enterococcus</li> </ul>	<p><b>Outpatient:</b></p> <ul style="list-style-type: none"> <li>Ciprofloxacin 500mg PO BID x 7 days<sup>#</sup></li> </ul> <p><b>Inpatient-Community acquired:</b></p> <ul style="list-style-type: none"> <li>Ceftriaxone 1g IV daily</li> </ul> <p><b>Inpatient-Hospital acquired</b></p> <ul style="list-style-type: none"> <li>Piperacillin/tazobactam 3.375g IV Q6H<sup>#</sup></li> </ul> <p><b>Inpatient-History of ESBL infection:</b></p> <ul style="list-style-type: none"> <li>Meropenem 1g IV Q8H<sup>#</sup></li> <li>Amikacin 15 mg/kg IV Q24H<sup>#¶</sup></li> </ul> <p><b>Duration: 7-14 days</b> Use the shortest duration (7 days) if patient is clinically improving</p>	<p><b>Inpatient-Community acquired:</b></p> <p><u>Penicillin allergy (IgE-mediated):</u></p> <ul style="list-style-type: none"> <li>Gentamicin 5mg/kg IV Q24H<sup>#¶</sup></li> </ul> <p><u>Penicillin allergy + acute renal failure:</u></p> <ul style="list-style-type: none"> <li>Levofloxacin 500mg IV daily<sup>#</sup></li> </ul> <p><b>Inpatient-Hospital acquired</b></p> <p><u>Penicillin allergy (Not IgE-mediated):</u></p> <ul style="list-style-type: none"> <li>Cefepime 1g IV Q8H<sup>#</sup></li> </ul> <p><u>Penicillin allergy (IgE-mediated):</u></p> <ul style="list-style-type: none"> <li>Gentamicin 5mg/kg IV Q24H<sup>#¶</sup></li> </ul> <p><u>Penicillin allergy + acute renal failure:</u></p> <ul style="list-style-type: none"> <li>Levofloxacin 500mg IV daily<sup>#</sup></li> </ul> <p><b>Duration: 7-14 days</b> Use the shortest duration (7 days) if patient is clinically improving</p>
CA-UTI	<ul style="list-style-type: none"> <li><i>E. coli</i>, Klebsiella, Serratia, Citrobacter, Enterobacter</li> <li><i>P. aeruginosa</i></li> <li>Gram positive cocci (including coagulase negative staphylococci)</li> <li>Enterococcus species</li> </ul>	<ul style="list-style-type: none"> <li>Removal of urinary catheter if possible</li> <li>Antibiotic treatment same as pyelonephritis</li> </ul>	<ul style="list-style-type: none"> <li>Removal of urinary catheter if possible</li> <li>Antibiotic treatment same as pyelonephritis</li> </ul>

<p><b>Pregnancy</b></p>	<ul style="list-style-type: none"> <li>• <i>E. coli</i></li> <li>• Group B streptococcus, <i>Staphylococcus saprophyticus</i></li> <li>• Klebsiella, Enterobacter</li> <li>• Enterococcus</li> </ul>	<p><b>Asymptomatic bacteriuria or acute cystitis:</b></p> <ul style="list-style-type: none"> <li>• Amoxicillin 500mg PO Q8H<sup>#</sup></li> <li>• Cephalexin 500mg PO Q12H<sup>#</sup></li> <li>• Duration: 3-7 days</li> </ul> <p><b>Pyelonephritis:</b></p> <ul style="list-style-type: none"> <li>• Ceftriaxone 1g IV Q24H</li> <li>• Duration: 7-14 days</li> <li>• Use the shortest duration (7 days) if patient is clinically improving</li> </ul>	<p><b>Asymptomatic bacteriuria or acute cystitis:</b></p> <ul style="list-style-type: none"> <li>• TMP/SMX 160/800mg PO Q12H x 3 days (avoid in 1<sup>st</sup> and 3<sup>rd</sup> trimester)<sup>#</sup></li> <li>• Nitrofurantoin 100mg PO Q12H x 5 days (avoid in 1<sup>st</sup> and 3<sup>rd</sup> trimester)</li> </ul> <p><b>Pyelonephritis:</b></p> <ul style="list-style-type: none"> <li>• Gentamicin 5mg/kg IV Q24H<sup>#¶</sup></li> <li>• Duration: 7-14 days</li> <li>• Use the shortest duration (7 days) if patient is clinically improving</li> </ul>
<p><b>IgE-mediated</b> = immediate reactions including anaphylaxis, urticarial, angioedema, shortness of breath, etc  <b>ESBL</b> = extended spectrum β-lactamase  <b>#</b> = requires renal dose adjustment  <b>¶</b> = dose based on ideal body weight. For obese patients, use adjusted body weight</p>			

## References

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