QUICK REFERENCE GUIDE FOR AMBULATORY TREATMENT OF URINARY TRACT INFECTIONS IN ADULTS

When to Order a Urinalysis (UA) and Urine Culture (UCx): Asymptomatic bacteriuria (ASB) is often treated unnecessarily, accounting for a substantial burden of unnecessary antimicrobial use. National guidelines recommend against testing for ASB, except in select circumstances. In the absence of signs or symptoms attributable to a urinary tract infection (UTI), patients with a positive UCx and/or pyuria on UA should not be treated with antibiotics irrespective of high bacterial colony count, or a multi-drug resistant organism. Therefore urine testing should only be obtained for appropriate reasons. A negative UA makes a UTI very unlikely to be the cause of the patient’s symptoms, but a positive UA does not diagnose a UTI. Urinary symptoms are needed to diagnose a UTI. The following is an effective strategy for how and when to order a UA and/or UCx.

Does your adult patient have any of the following without alternate explanation?ab?
- Fever >38°C (100.4°F) or rigors without alternative cause
- Urgency, frequency, dysuria
- Suprapubic pain or tenderness
- Costovertebral pain or tenderness
- New onset mental status changes with systemic signs of potential infection (i.e. leukocytosis)
- Acute hematuria (gross hematuria, red urine)
- Spasticity or autonomic dysreflexia in patients with spinal cord injury

Is my patient abc ...
- healthy woman
- without h/o recurrent or recent UTI
  - with classic UTI symptoms
  - without concern for complicated UTI or pyelonephritis?

Yes → Do NOT order urine testing (UA or UCx)

No → Order UA with reflex UCx if indicatedd

It is reasonable to treat empirically for UTI while awaiting UCx results

Do NOT order urine testing (UA or UCx)

Treat empirically for uncomplicated UTI

a Exceptions to this recommendation include patients that are pregnant or undergoing a urologic procedure. Clinical judgement should be used for patients with baseline cognitive/functional impairment presenting with new functional decline or falls with systemic signs of potential infection (i.e. leukocytosis) and without an alternative etiology. Rule out the possibility of a sexually transmitted infection or vaginitis.

b These ambulatory guidelines do not apply to severe sepsis, or patients with more severe presentations of illness, including hypotension, or ≥2 SIRS criteria (SIRS Criteria: Heart rate >90 bpm, respiratory rate >20
In healthy women with classic signs and symptoms of a UTI, urine testing (UA or UCx) are not necessary, and the patient may be treated empirically. However, patients at risk for drug-resistant bacteria, patients with underlying health conditions putting them at risk for more serious illness, if suspicion for upper tract UTI is present (fever, flank pain), or patients with recurrent UTIs should have a UA and UCx sent. In addition, a negative UCx does not rule out a UTI in a patient with classic symptoms. Use clinical judgement and patient response to determine if antibiotics should be continued.

A UCx will only be performed if a UA result indicates an inflammatory response, and therefore possible asymptomatic bacteriuria should not be treated, regardless of pyuria, bacterial density, or isolation of resistant organisms.

Treatment is recommended in the following circumstances:
- Pregnancy
- Prior to urologic procedures

**The Beers Criteria recommends avoiding use in geriatric patients >65 with a CrCl < 30 mL/min.**

<table>
<thead>
<tr>
<th>Clinical Setting</th>
<th>Empiric Therapy (should take recent previous cultures into account)</th>
<th>Duration</th>
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</table>
| **Asymptomatic Bacteriuria**<sup>1</sup> | In most circumstances, asymptomatic bacteriuria should not be treated, regardless of pyuria, bacterial density, or isolation of resistant organisms. Treatment is recommended in the following circumstances: - Pregnancy - Prior to urologic procedures | Treatment of Asymptomatic Bacteriuria in PREGNANCY | - Surgical prophylaxis guidelines provide recommendations on antimicrobial prophylaxis prior to genitourinary operation - Available evidence does not support screening for, and treatment of, asymptomatic bacteriuria prior to implantation of prosthetic orthopedic, cardiac devices, or neurosurgical procedures/devices. - Pregnancy:  
  - Urine culture should be sent and treatment adjusted based on susceptibilities. Follow-up urine cultures should be obtained for test of cure.  
  - Contraindicated throughout pregnancy: Fluoroquinolones and doxycycline  
  - Avoid in first 8 weeks of pregnancy: TMP/SMX |
| No symptoms of UTI (listed below), without alternative explanation:  
- Fever >38°C or rigors without alternative cause  
- Urgency, frequency, dysuria  
- Suprapubic pain or tenderness  
- Costovertebral pain or tenderness  
- New onset mental status changes with systemic sign of potential infections (leukocytosis)  
- Acute hematuria  
- Spasticity or autonomic dysreflexia in patients with spinal cord injury | Nitrofurantoin 100 mg po BID (contraindicated if CrCl <30 mL/min)**  
Alternatives:  
Cephalexin* 500 mg po BID  
Or  
Fosfomycin 3 gm po x 1 dose (less preferred due to cost)  
*Adjust dose based on renal function | Cephalexin: 7 days  
Nitrofurantoin: 5 days  
Fosfomycin: 1 dose |
| **Uncomplicated Lower Tract Urinary Tract Infection (Cystitis)**<sup>4</sup> | Empiric therapy should take into account recent previous cultures  
Preferred:  
Nitrofurantoin 100 mg po BID (contraindicated if CrCl <30 mL/min)**  
Alternatives:  
Cephalexin* 500 mg po BID  
Or  
TMP/SMX* 1DS tab po BID  
Or  
Fosfomycin 3 gm po x 1 dose (consider cost)  
*Adjust dose based on renal function | Nitrofurantoin: 5 days  
Cephalexin: 3-7 days  
TMP/SMX: 3 days  
Fosfomycin: 1 dose |

**Notes:**
- Surgical prophylaxis guidelines provide recommendations on antimicrobial prophylaxis prior to genitourinary operation.
- Available evidence does not support screening for, and treatment of, asymptomatic bacteriuria prior to implantation of prosthetic orthopedic, cardiac devices, or neurosurgical procedures/devices.
- Pregnancy:
  - Urine culture should be sent and treatment adjusted based on susceptibilities. Follow-up urine cultures should be obtained for test of cure.
  - Contraindicated throughout pregnancy: Fluoroquinolones and doxycycline
  - Avoid in first 8 weeks of pregnancy: TMP/SMX

**Empiric Therapy:**
- Nitrofurantoin: 100 mg po BID (contraindicated if CrCl <30 mL/min)**
- Cephalexin* 500 mg po BID
- Fosfomycin 3 gm po x 1 dose (consider cost)

**Duration:**
- Treatment of Asymptomatic Bacteriuria in PREGNANCY:  
  - Cephalexin: 7 days  
  - Nitrofurantoin: 5 days  
  - Fosfomycin: 1 dose
- **Preferred:**
  - Nitrofurantoin 100 mg po BID
  - Cephalexin* 500 mg po BID
  - Fosfomycin 3 gm po x 1 dose

**Comments:**
- Surgical prophylaxis guidelines provide recommendations on antimicrobial prophylaxis prior to genitourinary operation.
- Available evidence does not support screening for, and treatment of, asymptomatic bacteriuria prior to implantation of prosthetic orthopedic, cardiac devices, or neurosurgical procedures/devices.
- Pregnancy:
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  - Contraindicated throughout pregnancy: Fluoroquinolones and doxycycline
  - Avoid in first 8 weeks of pregnancy: TMP/SMX.

**Notes:**
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<tr>
<td><strong>Complicated Lower Urinary Tract Infection (Cystitis)</strong></td>
<td><strong>Preferred:</strong> Nitrofurantoin 100 mg po BID (contraindicated if CrCl &lt;30 ml/min)**</td>
<td>Nitrofurantoin: 7 days</td>
<td>• Remove urinary catheter whenever possible</td>
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<td><strong>Alternatives:</strong> Cephalexin* 500 mg po QID OR TMP/SMX* 1 DS tab po BID OR Fosfomycin 3gm po q48h x 3 doses (less preferred due to cost)</td>
<td>Cephalexin: 7 days</td>
<td>• Nitrofurantoin and Fosfomycin should be avoided if pyelonephritis is suspected</td>
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<td>*Adjust dose based on renal function</td>
<td>TMP/SMX: 7 days</td>
<td>• Recommend urinalysis with urine culture before treatment</td>
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<td>Fosfomycin: 3 doses</td>
<td>• Fluoroquinolones are no longer recommended as 1st-line agents due to high rates of <em>E. coli</em> resistance and propensity for collateral damage (resistance, <em>C. difficile</em> infection)4,5,6. Use should be reserved when other options are not feasible; if no other options, use ciprofloxacin* 250 mg po BID for 7 days or levofloxacin 250* mg po daily for 5-7 days.</td>
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**Pregnancy:**
- Urine culture should be sent and treatment adjusted based on susceptibilities. Follow-up urine cultures should be obtained for test of cure.
- Follow empiric therapy recommendations, but avoid the noted agents below.
  - Contraindicated throughout pregnancy: Fluoroquinolones and doxycycline
  - Avoid in first 8 weeks: TMP/SMX

**The Beers Criteria recommends avoiding use in geriatric patients >65 with a CrCl < 30 mL/min.**
### Uncomplicated Pyelonephritis
(healthy non-pregnant female)

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<tr>
<td>TMP/SMX* 1 DS tab po BID AND Ceftriaxone 1g IM x 1 dose</td>
<td>TMP/SMX: 7-14 days (7 days can be appropriate for women &lt;65 years old with no comorbidities). May extend to 14 days if persistent symptoms</td>
<td>Urine culture and susceptibility testing should be obtained</td>
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<td>Alternative:</td>
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<tr>
<td>Levofloxacin* 750mg po qday (or Ciprofloxacin 500mg po BID) AND Ceftriaxone 1g IM x 1 dose</td>
<td>Beta-lactams: 10-14 days</td>
<td>Fluooroquinolones may cause tendinopathy and tendon rupture especially among patients who are older (&gt;60 yo), malnourished, and on oral glucocorticoids. They may also lead to potentially fatal arrhythmias in patients with QT interval prolongation, electrolyte abnormalities, clinically significant bradycardia, and in patients receiving antiarrhythmic medications.</td>
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<tr>
<td>Augmentin 875-125 mg po BID AND Ceftriaxone 1g IM x 1 dose</td>
<td>Levofloxacin: 5-7 days</td>
<td>Consider admitting patients to be hospitalized if endorse persistently high fevers &gt; 38.4C, unable to maintain oral hydration or take oral medications, have a history of resistance to oral options, suspected urinary tract obstruction or concerns regarding patient adherence.</td>
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<tr>
<td>*Adjust dose based on renal function</td>
<td>Ciprofloxacin: 7 days</td>
<td>Consider referral to infusion center for administration of initial IV/IM agent</td>
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### Complicated Pyelonephritis
(Male, urinary catheter present or removal within the last 48 hrs, recent GU instrumentation, anatomic abnormality or obstruction, pregnancy or other significant co-morbid conditions such as uncontrolled diabetes or immunosuppression)

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<td>TMP/SMX* 1 DS tab po BID AND Ceftriaxone 1g IM x 1 dose</td>
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<td>Urine culture and susceptibility testing should be obtained</td>
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<tr>
<td>Levofloxacin* 750mg po qday (or Ciprofloxacin 500mg po BID) AND Ceftriaxone 1g IM x 1 dose</td>
<td>Oral Beta-lactams: 14 days</td>
<td>Consider admitting patients to be hospitalized if endorse persistently high fevers &gt; 38.4C, unable to maintain oral hydration or take oral medications, have a history of resistance to oral options, suspected urinary tract obstruction or concerns regarding patient adherence.</td>
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<tr>
<td>Augmentin 875-125 mg po BID AND Ceftriaxone 1g IM x 1 dose</td>
<td>Fluoroquinolone: 7 days, if meet the following criteria:</td>
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<tr>
<td>*Adjust dose based on renal function</td>
<td>• Not neutropenic, HIV with CD4&lt;200, or HCST/SOT</td>
<td>Pregnancy: follow empiric therapy recommendations, but avoiding listed agents below</td>
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### Prostatitis
Patients typically present with frequency, urgency, urinary incontinence, poor stream, hesitancy, fever and a tender, edematous prostate on exam. Suspect prostatitis

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<tr>
<td>TMP/SMX* 1 DS tab po BID OR Ciprofloxacin* 500 mg po BID (or Levofloxacin 500mg po qday)</td>
<td>4-6 weeks</td>
<td>Antimicrobial choice should be adjusted based on urine culture and susceptibility testing. Fluoroquinolones or TMP/SMX are preferred over beta-lactams due to better prostate penetration</td>
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</tbody>
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* TMP/SMX:
  - 7-14 days
  - (7 days can be appropriate for women <65 years old with no comorbidities). May extend to 14 days if persistent symptoms

* Oral Beta-lactams:
  - 10-14 days

* Fluoroquinolones:
  - 7 days, IF meet the following criteria:
    - Not neutropenic, HIV with CD4<200, or HCST/SOT
    - Hemodynamically stable (at day 7), been afebrile ≥ 48 hours (at day 7)
    - No urinary diversion, recent urologic surgery, anatomic abnormalities, or relapsed infection
    - Non-pregnant
  - May consider continuing parenteral agents until susceptibilities confirmed

* Pregnancy: follow empiric therapy recommendations, but avoiding listed agents below
  - Contraindicated throughout pregnancy: Fluoroquinolones and doxycycline
  - Avoid in first 8 weeks of pregnancy: TMP/SMX

* Beta-lactams carry a higher risk of treatment failure.
| in men with relapse UTI with same pathogen. | *Adjust dose based on renal function | especially among patients who are older (>60 yo), malnourished, and on oral glucocorticoids. They may also lead to potentially fatal arrhythmias in patients with QT interval prolongation, electrolyte abnormalities, clinically significant bradycardia, and in patients receiving antiarrhythmic medications. |

*Renal Dosing Recommendations:  
[https://pharmwebsp.med.umich.edu/AC/Antimicrobial%20Use%20Guidelines/Antimicrobial%20Dosing%20Guidelines/Antimicrobial_dosing_recommendations_4-9-2014.pdf](https://pharmwebsp.med.umich.edu/AC/Antimicrobial%20Use%20Guidelines/Antimicrobial%20Dosing%20Guidelines/Antimicrobial_dosing_recommendations_4-9-2014.pdf)
REFERENCES:


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The recommendations in this guide are meant to serve as treatment guidelines for use at Michigan Medicine facilities. If you are an individual experiencing a medical emergency, call 911 immediately. These guidelines should not replace a provider’s professional medical advice based on clinical judgment, or be used in lieu of an Infectious Diseases consultation when necessary. As a result of ongoing research, practice guidelines may from time to time change. The authors of these guidelines have made all attempts to ensure the accuracy based on current information, however, due to ongoing research, users of these guidelines are strongly encouraged to confirm the information contained within them through an independent source.

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