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 (see below) 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.

### Diagram

1. **Does your adult patient have any of the following without alternate explanation**?
   - Fever >38°C (100.4°F) or rigors without alternative cause
   - Urgency, frequency, dysuria
   - Suprapubic pain for 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

   **Yes**

   - **Is my patient a**?
     - 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 (Urinalysis (UA) or UCx)**

   **No**

   - **Order UA with reflex UCx if indicated**

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

   **No**

### Notes

- **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 breaths per minute, temperature <36°C (96.8°F), white blood count <4,000 cells/mm³, temperature >38°C (100.4°F), white blood count >12,000 cells/mm³).
- **c** 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.
- **d** A UCx will only be performed if a UA result indicates an inflammatory response, and therefore possible infection. Notable UA results include: detectable nitrites, leukocyte esterase, and bacteria. This progression is a strategy to decrease unnecessary antibiotic treatment in samples indicative of colonization and not infection.
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| Asymptomatic Bacteriuria | 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  
**Preferred:**  
**Nitrofurantoin** 100 mg PO BID (contraindicated if CrCl <30 mL/min)**  
**Alternatives:**  
**Cephalexin*** 500 mg PO BID OR  
**Fosfomycin** 3 g PO x1 dose (less preferred due to cost)  
*Adjust dose based on renal function  
**The Beers Criteria recommends avoiding use in geriatric patients >65 years with a CrCl <30 mL/min |  
- 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 3, 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 |
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| Uncomplicated Lower Tract Urinary Tract Infection (Cystitis)                     | Preferred: Nitrofurantoin 100 mg PO BID (contraindicated if CrCl <30 mL/min)**       | Nitrofurantoin:   | • Fluoroquinolones are no longer recommended as 1st-line agents due to high rates of E. coli resistance and propensity for collateral damage (resistance, C. difficile infection)\(^4,5,6\). Use should be reserved when other options are not feasible; if no other options, use ciprofloxacin* 250 mg PO BID or levofloxacin* 250 mg PO daily for 3 days.  

|                                                                                 | Alternatives: Cephalexin* 500 mg PO BID OR TMP-SMX* 1 DS tab PO BID OR Fosfomycin 3 g PO x1 dose (consider cost) | Cephalexin: 3-7 days | • Pregnancy:  
|                                                                                 |                                                                                                     | TMP-SMX: 3 days    | o Urine culture should be sent and treatment adjusted based on susceptibilities. Follow-up urine cultures should be obtained for test of cure.  

|                                                                                 |                                                                                                     | Fosfomycin: 1 dose | o Contraindicated throughout pregnancy: Fluoroquinolones and doxycycline  

|                                                                                 |                                                                                                     |                   | o Avoid in first 8 weeks of pregnancy: TMP-SMX                                                                                         |

*Adjust dose based on renal function  
**The Beers Criteria recommends avoiding use in geriatric patients >65 years with a CrCl <30 mL/min
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| Complicated Lower Urinary Tract Infection (Cystitis)                           | Preferred: Nitrofurantoin 100 mg PO BID (contraindicated if CrCl <30 mL/min)** | Nitrofurantoin: 7 days | • Remove urinary catheter whenever possible  
• Nitrofurantoin and fosfomycin should be avoided if pyelonephritis is suspected  
• Recommend urinalysis with urine culture before treatment  
• Fluoroquinolones are no longer recommended as 1st-line agents due to high rates of *E. coli* resistance and propensity for collateral damage (resistance, *C. difficile* 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.  
• Pregnancy:  
  o Urine culture should be sent and treatment adjusted based on susceptibilities. Follow-up urine cultures should be obtained for test of cure.  
  o Follow empiric therapy recommendations, but avoid the noted agents below.  
  o Contraindicated throughout pregnancy: Fluoroquinolones and doxycycline  
  o Avoid in first 8 weeks: TMP-SMX                                                                 |
<p>|                                                                              | Alternatives: Cephalexin* 500 mg PO QID OR TMP-SMX* 1 DS tab PO BID OR Fosfomycin 3 g PO q48h x3 doses (less preferred due to cost) | Cephalexin: 7 days   |                                                                                                                                             |
|                                                                              | *Adjust dose based on renal function                                  | TMP-SMX: 7 days      |                                                                                                                                             |
|                                                                              | **The Beers Criteria recommends avoiding use in geriatric patients &gt;65 years with a CrCl &lt;30 mL/min | Fosfomycin: 3 doses  |                                                                                                                                             |</p>
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| Uncomplicated Pyelonephritis<sup>4</sup> (healthy non-pregnant female) | Preferred: **TMP-SMX**<sup>*</sup> 1 DS tab PO BID + **Ceftriaxone** 1 g IM x1 dose | **TMP-SMX:** 7-14 days  (7 days can be appropriate for women <65 years with no comorbidities). May extend to 14 days if persistent symptoms | • Urine culture and susceptibility testing should be obtained  
• Fluoroquinolones may cause tendinopathy and tendon rupture especially among patients who are older (>60 years), 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.  
• Consider admitting patients to be hospitalized if endorse persistently high fevers >38.4°C, 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.  
• Consider referral to infusion center for administration of initial IV/IM agent |
<p>|                          | Alternative: <strong>Levofoxacin</strong>&lt;sup&gt;*&lt;/sup&gt; 750 mg PO daily (or <strong>Ciprofloxacin</strong> 500 mg PO BID) + <strong>Ceftriaxone</strong> 1 g IM x1 dose OR <strong>Amoxicillin-clavulanate</strong> 875-125 mg PO BID + <strong>Ceftriaxone</strong> 1 g IM x1 dose | <strong>Beta-lactams:</strong> 10-14 days |                                                                 |
|                          | *Adjust dose based on renal function                                | <strong>Levofoxacin:</strong> 5-7 days |                                                                 |
|                          |                                                                     | <strong>Ciprofloxacin:</strong> 7 days |                                                                 |</p>
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<td><strong>Complicated Pyelonephritis</strong>&lt;br&gt; (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)</td>
<td>Preferred: <strong>TMP-SMX</strong> 1 DS tab PO BID + <strong>Ceftriaxone</strong> 1 g IM x1 dose</td>
<td>TMP-SMX: 14 days &lt;br&gt; Oral Beta-lactams: 14 days &lt;br&gt; Fluoroquinolone: 7 days, IF meet the following criteria: &lt;br&gt; - Not neutropenic, HIV with CD4 &lt;200, or HCST/SOT &lt;br&gt; - Hemodynamically stable (at day 7), been afebrile ≥48 hours (at day 7) &lt;br&gt; - No urinary diversion, recent urologic surgery, anatomic abnormalities, or relapsed infection &lt;br&gt; - Non-pregnant &lt;br&gt; *Adjust dose based on renal function&lt;br&gt; May consider continuing parenteral agents until susceptibilities confirmed</td>
<td>• Urine culture and susceptibility testing should be obtained &lt;br&gt; • Consider admitting patients to be hospitalized if endorse persistently high fevers &gt;38.4°C, 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. &lt;br&gt; • <strong>Pregnancy</strong>: follow empiric therapy recommendations, but avoiding listed agents below &lt;br&gt; o <strong>Contraindicated throughout pregnancy</strong>: Fluoroquinolones and doxycycline &lt;br&gt; o <strong>Avoid in first 8 weeks of pregnancy</strong>: TMP-SMX &lt;br&gt; • Beta-lactams carry a higher risk of treatment failure.</td>
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<td>Prostatitis</td>
<td>Preferred: TMP-SMX* 1 DS tab PO BID OR Ciprofloxacin* 500 mg PO BID (or Levofloxacin 500 mg PO daily)</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. • Fluoroquinolones may cause tendinopathy and tendon rupture especially among patients who are older (&gt;60 years), 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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*Renal Dosing Recommendations

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REFERENCES:

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