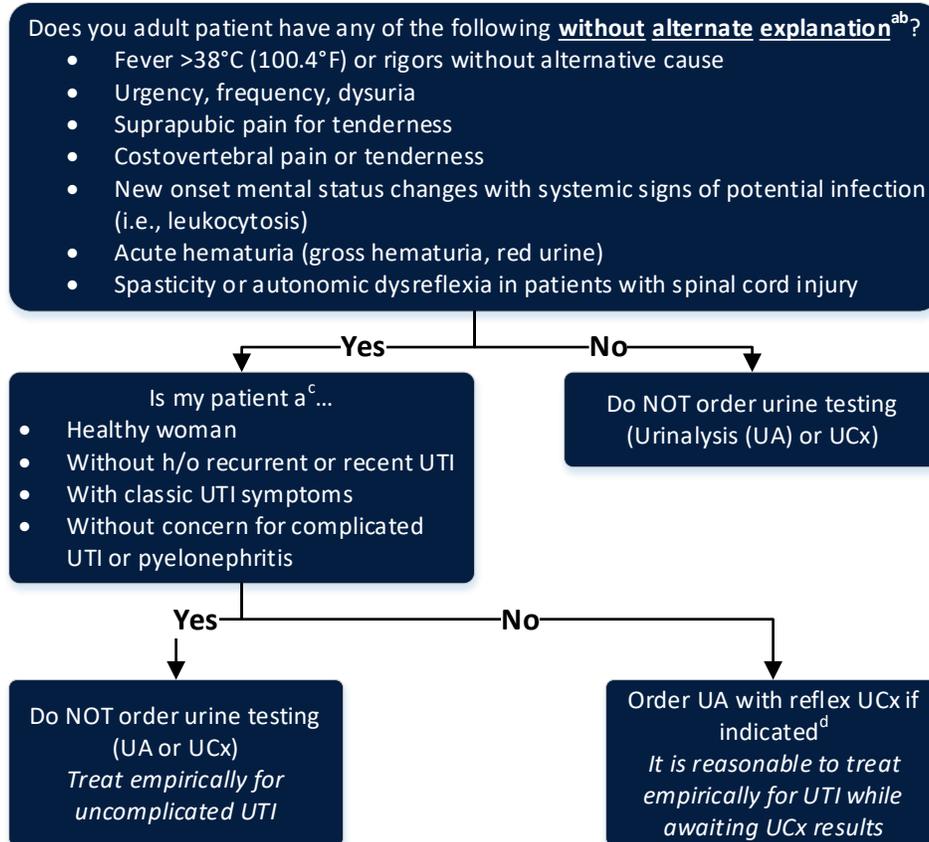




QUICK REFERENCE GUIDELINE FOR AMBULATORY TREATMENT OF URINARY TRACT INFECTIONS IN ADULTS

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 circumstances¹. 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.



^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.²

Table of Contents

Asymptomatic Bacteriuria	Uncomplicated Lower Tract UTI (Cystitis)	Complicated Lower Tract UTI (Cystitis)
Uncomplicated Pyelonephritis	Complicated Pyelonephritis	Prostatitis

Clinical Setting	Empiric Therapy (Should take recent previous cultures into account)	Duration	Comments
<p>Asymptomatic Bacteriuria¹</p> <p>No symptoms of UTI (listed below), without alternative explanation:</p> <ul style="list-style-type: none"> - 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 	<p>In most circumstances, asymptomatic bacteriuria should not be treated, regardless of pyuria, bacterial density, or isolation of resistant organisms.</p> <p>Treatment is recommended in the following circumstances:</p> <ul style="list-style-type: none"> - Pregnancy - Prior to urologic procedures <p><u>Treatment of Asymptomatic Bacteriuria in PREGNANCY</u></p> <p><u>Preferred:</u></p> <p>Nitrofurantoin 100 mg PO BID (contraindicated if CrCl < 30 mL/min)**</p> <p><u>Alternatives:</u></p> <p>Cephalexin* 500 mg PO BID OR</p> <p>Fosfomycin 3 g PO x1 dose (less preferred due to cost)</p> <p>*Adjust dose based on renal function</p> <p>**The Beers Criteria recommends avoiding use in geriatric patients > 65 years with a CrCl < 30 mL/min</p>	<p>Treatment of Asymptomatic Bacteriuria in PREGNANCY</p> <p>Nitrofurantoin: 5 days</p> <p>Cephalexin: 7 days</p> <p>Fosfomycin: 1 dose</p>	<ul style="list-style-type: none"> ● 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 orthopedic³, cardiac devices, or neurosurgical procedures/devices. ● Pregnancy: <ul style="list-style-type: none"> ○ Urine culture should be sent and treatment adjusted based on susceptibilities. Follow-up urine cultures should be obtained for test of cure. ○ <u>Contraindicated throughout pregnancy:</u> <ul style="list-style-type: none"> ▪ Fluoroquinolones and doxycycline ○ <u>Avoid in first 8 weeks of pregnancy:</u> <ul style="list-style-type: none"> ▪ TMP-SMX

Clinical Setting	Empiric Therapy (Should take recent previous cultures into account)	Duration	Comments
<p>Uncomplicated Lower Tract Urinary Tract Infection (Cystitis)⁴</p> <p>(Non-pregnant female without obstruction, catheters, or co-morbid conditions except well-controlled diabetes mellitus)</p>	<p><u>Preferred:</u> Nitrofurantoin 100 mg PO BID (contraindicated if CrCl < 30 mL/min)**</p> <p><u>1st alternatives:</u> TMP-SMX* 1 DS tab PO BID</p> <p>2nd alternative: Fosfomycin 3 g PO x1 dose (consider cost) OR Cephalexin* 500 mg PO BID</p> <p>3rd alternative: Ciprofloxacin* 750 mg PO BID OR Levofloxacin* 750 mg PO daily</p> <p>*Adjust dose based on renal function</p> <p>**The Beers Criteria recommends avoiding use in geriatric patients > 65 years with a CrCl < 30 mL/min</p>	<p>Nitrofurantoin: 5 days</p> <p>TMP-SMX: 3 days</p> <p>Ciprofloxacin / levofloxacin: 3 days</p> <p>Fosfomycin: 1 dose</p> <p>Cephalexin: 7 days</p>	<ul style="list-style-type: none"> ● Fosfomycin is less effective than nitrofurantoin and should only be used if a contraindication to nitrofurantoin exists ● Fosfomycin should only be used for <i>E. coli</i> or <i>Enterococcus faecalis</i>. It may be considered on a case-by-case basis depending on the severity of symptoms, allergies, resistance profile, and remaining oral options ● Fluoroquinolones are not recommended as 1st-line agents due to high rates of <i>E. coli</i> resistance and propensity for collateral damage (resistance, <i>C. difficile</i> infection)^{4,5,6}. Use should be reserved when other options are not feasible ● Pregnancy: <ul style="list-style-type: none"> ○ Urine culture should be sent and treatment adjusted based on susceptibilities. Follow-up urine cultures should be obtained for test of cure. ○ <u>Contraindicated throughout pregnancy:</u> <ul style="list-style-type: none"> ▪ Fluoroquinolones and doxycycline ○ <u>Avoid in first 8 weeks of pregnancy:</u> <ul style="list-style-type: none"> ▪ TMP-SMX

<p>Complicated Lower Urinary Tract Infection (Cystitis)⁵</p> <p>(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)</p>	<p><u>Preferred:</u> Nitrofurantoin 100 mg PO BID (contraindicated if CrCl < 30 mL/min)**</p> <p><u>1st alternatives:</u> TMP-SMX* 1 DS tab PO BID</p> <p><u>2nd alternative:</u> Fosfomycin 3 g PO x1 dose (consider cost) OR Cephalexin* 1000 mg PO TID</p> <p><u>3rd alternative:</u> Ciprofloxacin 750 mg PO BID OR Levofloxacin 750 mg PO daily</p> <p>*Adjust dose based on renal function</p> <p>**The Beers Criteria recommends avoiding use in geriatric patients > 65 years with a CrCl < 30 mL/min</p>	<p>7 days (1 dose for fosfomycin)</p>	<ul style="list-style-type: none"> ● Empiric therapy should take prior antimicrobial susceptibility into account ● Recommend urinalysis with urine culture before treatment ● Nitrofurantoin and fosfomycin should be avoided if pyelonephritis is suspected (see Pyelonephritis) ● Fosfomycin is less effective than nitrofurantoin and should only be used if a contraindication to nitrofurantoin exists ● Fosfomycin should only be used to treat <i>E. coli</i> or <i>Enterococcus faecalis</i> and can be considered on a case-by-case basis depending on the severity of symptoms, allergies, resistance profile, and remaining oral options ● Remove urinary catheter whenever possible ● Antimicrobial choice should be adjusted based on urine culture and susceptibility testing ● Fluoroquinolones are not recommended as 1st-line agents due to high rates of <i>E. coli</i> resistance and propensity for collateral damage (resistance, <i>C. difficile</i> infection)^{4,5,6}. Use should be reserved when other options are not feasible ● Pregnancy: <ul style="list-style-type: none"> ○ 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. ○ <u>Contraindicated throughout pregnancy:</u> <ul style="list-style-type: none"> ▪ Fluoroquinolones and doxycycline ○ <u>Avoid in first 8 weeks:</u> <ul style="list-style-type: none"> ▪ TMP-SMX
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Clinical Setting	Empiric Therapy (Should take recent previous cultures into account)	Duration	Comments
<p>Uncomplicated Pyelonephritis⁴ (healthy non-pregnant female with no indwelling device)</p>	<p><u>Preferred:</u> TMP-SMX* 1 DS tab PO BID + Ceftriaxone 1 g IM x1 dose</p> <p><u>Alternative:</u> Levofloxacin* 750 mg PO daily (or Ciprofloxacin 750 mg PO BID) + Ceftriaxone 1 g IM x 1 dose</p> <p>*Adjust dose based on renal function</p>	<p>TMP-SMX: 7-14 days</p> <p>(7 days can be appropriate for women <65 years with no comorbidities). May extend to 14 days if persistent symptoms</p> <p>Levofloxacin / ciprofloxacin: 7 days</p>	<ul style="list-style-type: none"> • 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

Clinical Setting	Empiric Therapy (Should take recent previous cultures into account)	Duration	Comments
<p>Complicated Pyelonephritis</p> <p>(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)</p>	<p><u>Preferred:</u> TMP-SMX* 1 DS tab PO BID + Ceftriaxone 1 g IM x1 dose</p> <p><u>Alternatives:</u> Levofloxacin* 750 mg PO daily (or ciprofloxacin 750 mg PO BID) + Ceftriaxone 1 g IM x 1 dose</p> <p>*Adjust dose based on renal function</p>	<p>7 days, IF meet the following criteria:</p> <ul style="list-style-type: none"> • Not neutropenic, HIV with CD4 < 200, or HCST/SOT • been afebrile ≥ 48 hours (at day 7) • No urinary diversion, recent urologic surgery, anatomic abnormalities, or relapsed infection • Non-pregnant <p>If the above criteria are not met: 14 days</p>	<ul style="list-style-type: none"> • Urine culture and susceptibility testing should be obtained • Consider admitting patients to be hospitalized if endorse persistently high fevers > 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 • Pregnancy: follow empiric therapy recommendations, but avoiding listed agents below <ul style="list-style-type: none"> ○ <u>Contraindicated throughout pregnancy:</u> <ul style="list-style-type: none"> ▪ Fluoroquinolones and doxycycline ○ <u>Avoid in first 8 weeks of pregnancy:</u> <ul style="list-style-type: none"> ▪ TMP-SMX • Beta-lactams carry a higher risk of treatment failure.

Clinical Setting	Empiric Therapy (Should take recent previous cultures into account)	Duration	Comments
<p>Prostatitis</p> <p>Patients typically present with frequency, urgency, urinary incontinence, poor stream, hesitancy, fever and a tender, edematous prostate on exam. Suspect prostatitis in men with relapse UTI with same pathogen.</p>	<p><u>Preferred:</u> TMP-SMX* 1 DS tab PO BID OR Ciprofloxacin* 500 mg PO BID (or Levofloxacin 500 mg PO daily)</p> <p><u>Alternative for patients with <i>E. coli</i> or <i>E. faecalis</i> in consultation with ID:</u> Fosfomycin 3 g PO daily x1 week followed by 3 g PO q48h x6-12 weeks</p> <p>*Adjust dose based on renal function</p>	<p>4-6 weeks</p>	<ul style="list-style-type: none"> • 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 (>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. • Insurance coverage and cost should be considered prior to prescribing fosfomycin especially in cases where extended duration is necessary.

*[Renal Dosing Recommendations](#)

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

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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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