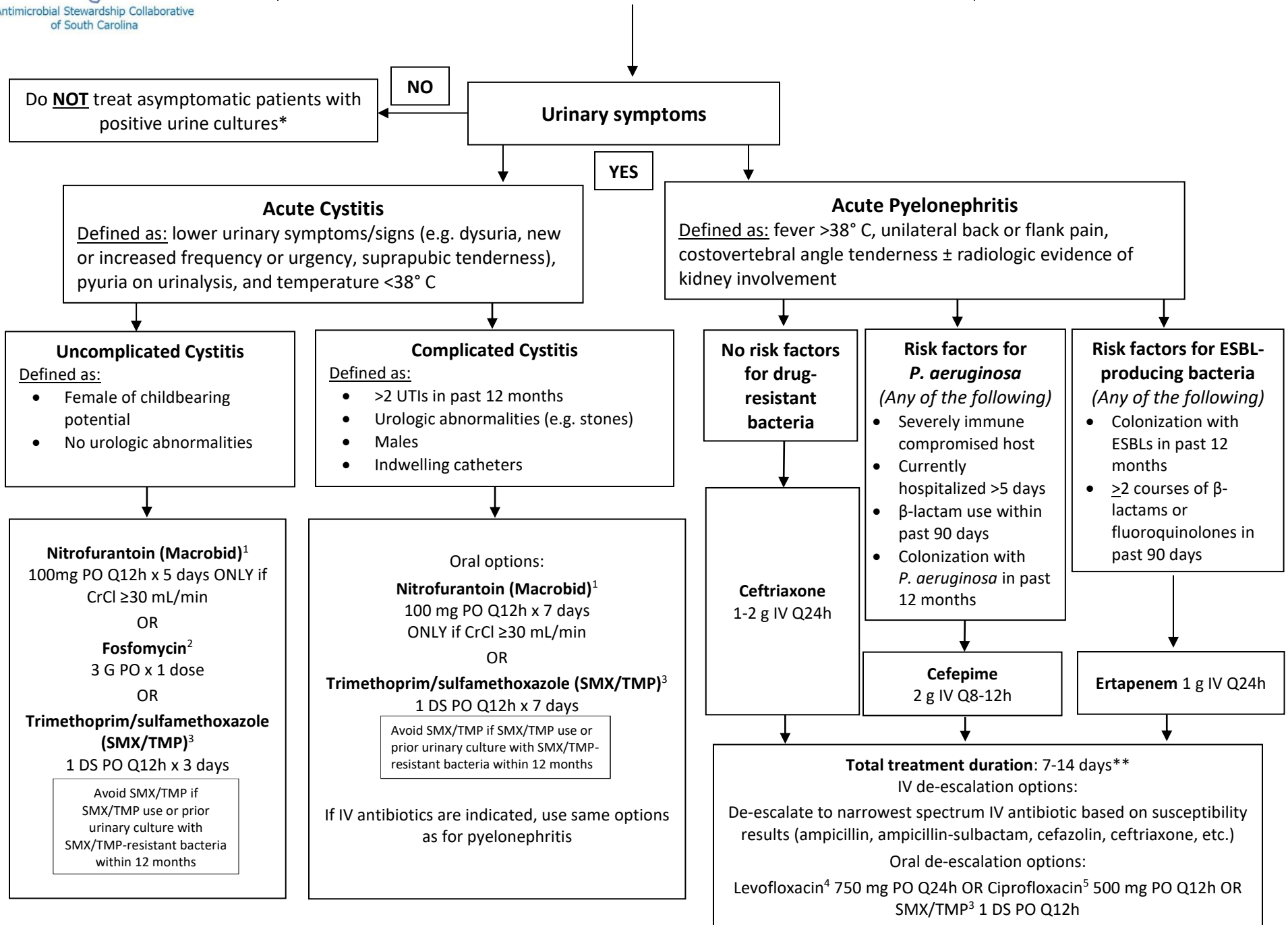




Antimicrobial Stewardship Collaborative of South Carolina

# Guidelines for Acute Cystitis and Pyelonephritis: Inpatient Management in Adults



<sup>1</sup>Nitrofurantoin should be AVOIDED in patients with creatinine clearance <30 mL/min.

<sup>2</sup>Fosfomycin is not recommended as a first-line therapy in patients with complicated disease. If used for complicated disease, should repeat Q72h for 2-3 doses.

<sup>3</sup>SMX/TMP can be used in patients with decreased renal function. If CrCl <30 mL/min, reduce dose to 1 SS PO Q12h. SMX/TMP should be used with caution in pregnant females.

<sup>4</sup>If CrCl <20-49 mL/min, administer 750 mg Q48h, and if < 20 mL/min, administer 750 mg followed by 500 mg Q48h.

<sup>5</sup>If CrCl <30 mL/min, administer 250 mg Q12h.

### **Definitions:**

- Severely immune compromised host: chemotherapy, neutropenia, transplant recipient, treatment with high dose steroids (20mg of prednisone equivalents daily for >2 weeks) or other immunosuppressive medications within one month.
- A prior course of antibiotics should be at least 24h or longer; short-term perioperative antibiotics do not qualify as a course.
- >2 courses of  $\beta$ -lactams or fluoroquinolones have to be at least 3 days apart; concurrent or sequential therapy is considered one course.

### **Diagnosis:**

- Urinalysis and urine culture should be obtained prior to initiating antibiotics in patients with recurrent infections, urologic abnormalities, pregnancy, and in males.
- Urinalysis, urine culture, and blood cultures should be obtained prior to initiating antibiotics in all patients in the emergency room or hospital with acute pyelonephritis.
- For patients with indwelling catheters in place for >2 weeks from onset of symptoms, catheter should be replaced prior to obtaining urinalysis and urine culture. If possible, catheter should be discontinued, and a culture of a voided midstream urine specimen should be obtained.
- Consider imaging in males and patients with recurrent urinary infections.
- Presence of pyuria on urinalysis without symptoms does not indicate a urinary tract infection. Absence of pyuria is indicative that a urinary tract infection is not present with the exception of acute pyelonephritis with complete uretic obstruction.
- Patients with non-specific symptoms:
  - Change in urine color, odor, or turbidity are typically due to dehydration and not indicators for urinalysis or urine culture.
  - Behavioral changes including worsening mental or functional status do not on their own indicate a urinary tract infection. These patients should be monitored and encouraged to have increased fluid intake, if possible. Other causes of mental status change should be assessed including constipation, dehydration, electrolyte abnormalities, medications (e.g. narcotics, etc.), liver failure, renal failure, blood sugar issues, sleep deprivation, stroke, and other infections.
- Urine cultures should not be done after treatment of cystitis or pyelonephritis to document cure.

### **Treatment:**

#### **Asymptomatic Bacteriuria**

\*Treatment of asymptomatic bacteriuria is strongly discouraged because antibiotics may lead to harmful effects to patient (e.g. *Clostridium difficile* infection, induction of antimicrobial resistance, etc.) that cannot be justified based on lack of any treatment benefits. The only exceptions are: pregnant women and before transurethral resection of the prostate or other urologic procedures for which mucosal bleeding is anticipated.

#### **Acute Cystitis**

- Fluoroquinolone (ciprofloxacin, levofloxacin) use is strongly discouraged for the treatment of acute cystitis because the risk of harmful adverse effects (e.g. *C. difficile* infection; tendonitis; neurotoxicity; QTc prolongation; induction of antimicrobial resistance) exceeds potential benefit.
- Similarly, oral 3<sup>rd</sup> generation cephalosporins (e.g. cefdinir, cefpodoxime) should be AVOIDED due to low urinary concentrations and high risk of adverse events, including induction of antimicrobial resistance.
- If IV antibiotics are continued, transition to a less broad agent (ampicillin, cefazolin, etc.) based on culture and susceptibility data is appropriate. If IV antibiotics are used for uncomplicated cystitis, limit duration to 3 days.

### Alternative oral regimens for cystitis:

- Contraindications to first-line therapy
  - In patients with contraindications to all first-line therapies (e.g. complicated cystitis AND CrCl <30 mL/min AND SMX/TMP allergy), cephalexin 500 mg PO Q8h or amoxicillin/clavulanic acid 500 mg/125 mg PO Q12h for 7-10 days may be used.
  - Fluoroquinolones are considered only as last resort options in patients with cystitis in the absence of risk factors for fluoroquinolone resistance. May use ciprofloxacin 250 mg PO Q12h x 3 days.
- Extended-spectrum  $\beta$ -lactamase (ESBL)-producing *Enterobacteriaceae*
  - Non- $\beta$ -lactam antibiotics (nitrofurantoin, fosfomycin and SMX/TMP) often retain activity against ESBL-producing *Enterobacteriaceae* if not previously used and may be considered therapeutic options for suspected cystitis due to ESBL-producing *Enterobacteriaceae*. Fosfomycin should be given 3 G PO Q72h x 3 doses.
- Vancomycin-resistant *Enterococcus* (VRE)
  - Growth of VRE in a urine culture often indicates urinary colonization due to recent use of antibiotics, rather than a urinary infection. However, when treatment is indicated in symptomatic patients, fosfomycin retains good activity and may be considered a therapeutic option for suspected cystitis due to VRE. Fosfomycin should be given 3 G PO Q72h x 2 doses.
- **Acute Pyelonephritis**
  - **\*\*In patients with concurrent gram-negative bloodstream infection, treat for a total of 14 days. Levofloxacin 750 mg daily is the preferred oral agent for definitive therapy in susceptible bloodstream isolates.**
  - **\*\*For acute pyelonephritis without bloodstream infection, 7 days of therapy is typically appropriate for females, if fluoroquinolones are used. For males on fluoroquinolones or all patients on SMX/TMP, 14 days of therapy is preferred.**
  - If IV antibiotics are continued in the hospital, transition to a narrower spectrum agent (ampicillin, ampicillin-sulbactam, cefazolin, etc.) based on final culture and *in vitro* antimicrobial susceptibility data as appropriate.
  - Transition to oral therapy such as fluoroquinolones or SMX/TMP is appropriate based on culture and susceptibility data.
  - Use of oral 3<sup>rd</sup> generation cephalosporins (e.g. cefdinir, cefpodoxime) is highly discouraged due to low urinary concentrations and higher risk of treatment failure in comparison to fluoroquinolones and SMX/TMP.
  - Nitrofurantoin and fosfomycin should be AVOIDED in patients with suspected or documented pyelonephritis. These antibiotics do not concentrate outside the urine, including the interstitial cells of the kidney.
  - **$\beta$ -lactam allergy with pyelonephritis:**
    - In patients with minor penicillin allergies (e.g. itching, nonspecific rash), cross reactivity with 3<sup>rd</sup> and 4<sup>th</sup> generation cephalosporins is low (<3%). The benefit of  $\beta$ -lactam antibiotics outweighs the potential risk.
    - In patients with severe  $\beta$ -lactam allergies (e.g. anaphylaxis) and low risk of fluoroquinolone resistance (no prior fluoroquinolone use within past 12 months, non-residents of a nursing home or skilled nursing facility, etc.), ciprofloxacin 400 mg IV Q8-12h is recommended.

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