C.S. MOTT CHILDREN'S HOSPITAL
MICHIGAN MEDICINE

ANTIBIOTIC TREATMENT GUIDELINES FOR URINARY TRACT INFECTIONS IN CHILDREN (60 DAYS THROUGH 17 YEARS)

This guideline provides guidance for most children 60 days through 17 years of age. Management of urinary tract infections (UTI) in infants <60 days, pregnant patients, or in patients with recurrent UTIs is beyond the scope of these guidelines. Please refer to Febrile Infant Guideline for infants <60 days.

Setting	Empiric Therapy	Duration/Comments
Outpatient	1st line for adolescents (10 years or older) with cystitis only: **Nitrofurantoin*** as MacroBID (or generic equivalent) 100 mg/DOSE PO BID (flat dose) 1st line for infants and children OR if pyelonephritis is suspected; alternative for nitrofurantoin allergy: **Cephalexin*** 25 mg/kg/DOSE PO TID (max: 1 g/DOSE) Alternative for low/medium[1]-risk allergy to cephalexin[2], OR high-risk allergy[3]/contraindication[4] to beta-lactam: **TMP-SMX***[5]: 5 mg TMP/kg/DOSE PO BID (max: 160 mg/DOSE) Alternative to TMP-SMX for sulfa allergy: **Ciprofloxacin*** 10 mg/kg/DOSE PO BID (max: 500 mg/DOSE)	Duration: **Nitrofurantoin**: 5 days **Other agents**: *<6 months:* 10 days *≥6 months:* 7 days Comments Consider prior cultures and recent antibiotic use when selecting empiric therapy. Tailor therapy to culture results.
Inpatient, uncomplicated	1st line therapy: **Ampicillin*** 50 mg/kg/DOSE IV q6h (max: 1 g/DOSE) + **Gentamicin*** 7.5 mg/kg/DOSE IV q24h (max initial: 300 mg/DOSE) Alternative for low/medium[1]-risk penicillin allergy, OR high-risk allergy[3]/contraindication[4] to beta-lactam: **Gentamicin*** 7.5 mg/kg/DOSE IV q24h (max initial: 300 mg/DOSE)	Duration (IV + PO) *<6 months:* 10 days *≥6 months:* 7 days Comments Consider prior cultures and recent antibiotic use when selecting empiric therapy. Gentamicin levels are not necessary for courses <48 hours.
Inpatient, uncomplicated with renal dysfunction or kidney transplant	1st line therapy: **Ceftriaxone** 100 mg/kg once, then 50 mg/kg/DOSE IV q24h (max: 2 g/DOSE) Alternative for low/medium[1]-risk allergy to cephalosporins, OR high-risk allergy[3]/contraindication[4] to beta-lactam: **Aztreonam*** 50 mg/kg/DOSE IV q8h (max: 2 g/DOSE)	Tailor therapy to culture results and transition to oral therapy following clinical improvement, as evidenced by improving fever curve and ability to tolerate PO. See Outpatient recommendations for preferred regimens.

Setting	Empiric Therapy	Duration/Comments
Inpatient, complicated by severe sepsis, bacteremia, or perinephric/ renal abscess	Community-acquired, healthy child: **Ceftriaxone** 100 mg/kg once, then 50 mg/kg/DOSE IV q12h (max: 2 g/DOSE) + **Vancomycin** IV* Presence of central venous catheter or tracheostomy, greater than 72 hours of hospitalization in past 90 days, or immunocompromised: **Cefepime*** 50 mg/kg/DOSE IV q8h (max: 2 g/DOSE) + **Vancomycin** IV* Alternative for low/medium[1]-risk allergy to cephalosporins, OR high-risk allergy[3]/contraindication[4] to beta-lactam: **Aztreonam*** 50 mg/kg/DOSE IV q8h (max: 2 g/DOSE) + **Vancomycin** IV*	Duration (IV + PO) *<6 months:* 10 days, unless delayed improvement *≥6 months:* 7 days, unless delayed improvement Patients with bacteremia or abscess may require longer therapy; Infectious Diseases consult recommended. Comments Consider prior cultures and recent antibiotic use when selecting empiric therapy. Consider Urology consult in patients with GU abnormalities. Tailor therapy to culture results and consider transition to oral therapy following clinical improvement, as evidenced by improving fever curve and ability to tolerate PO. See Outpatient recommendations for preferred regimens.
Emergency Department	Anticipated discharge to home: • Prescribe antibiotics per Outpatient recommendations Not tolerating PO with negative sepsis screen: • Begin empiric therapy per Inpatient recommendations (select uncomplicated or renal dysfunction/transplant as appropriate) • Transition to Outpatient empiric therapy if able to discharge Positive sepsis screen and/or known bacteremia/abscess: • Begin empiric therapy per Complicated Inpatient recommendations ○ Initial ED **vancomycin** dose: 15 mg/kg once for all patients (max: 1.5 g/DOSE) • If signs/symptoms of sepsis resolve and low concern for abscess or bacteremia, transition to Uncomplicated Inpatient recommendations	

Footnotes:

* Renal adjustment may be necessary. See Pediatric Renal Dosing Guidelines.

[1] Low-risk allergies include: pruritus without rash, remote (>10 years) unknown reaction, patient denies allergy but is on record, mild rash with no other symptoms (mild rash: non-urticarial rash that resolves without medical intervention). Medium-risk allergies include: urticaria/hives with no other symptoms, severe rash with no other symptoms (severe rash: requires medical intervention [corticosteroids, anti-histamines] and/or ER visit or hospitalization). See β-lactam allergy evaluation and empiric guidance for further information.

[2] This also includes allergy to cephalosporins with a similar side-chain to cephalexin, which includes cefaclor, cefadroxil, or cefprozil. See β-lactam allergy evaluation and empiric guidance for further information.

[3] High-risk allergies include: respiratory symptoms (chest tightness, bronchospasm, wheezing, cough), angioedema (swelling, throat tightness), cardiovascular symptoms (hypotension, dizzy/lightheadedness, syncope/passing out, arrhythmia), anaphylaxis. If a patient has a high-risk allergy to penicillins, cephalosporins, or carbapenems, the only beta-lactam antibiotic that can be safely used without Allergy consult is aztreonam (**if the allergy is to ceftazidime or aztreonam, aztreonam should be avoided as well**). See β-lactam allergy evaluation and empiric guidance for further information.

[4] Previous reactions that are contraindications to further beta-lactam use (**except aztreonam, which can be used unless the reaction was to ceftazidime or aztreonam**) unless approved by Allergy: organ damage (kidney, liver), drug-induced immune-mediated anemia/thrombocytopenia/leukopenia, rash with mucosal lesions (Stevens Johnson Syndrome/Toxic Epidermal Necrosis), rash with pustules (acute generalized exanthematous pustulosis), rash with eosinophils and organ injury (DRESS – drug rash eosinophilia and systemic symptoms), rash with joint pain, fever, and myalgia (Serum Sickness). See β-lactam allergy evaluation and empiric guidance for further information.

[5] TMP-SMX = trimethoprim-sulfamethoxazole

References:

1. Gupta K, et al. International Clinical Practice Guidelines for the Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women: A 2010 Update by the Infectious Diseases Society of America and the European Society for Microbiology and Infectious Diseases. Clin Infect Dis 2011;52(5):e103–e120.
2. American Academy of Pediatrics, Subcommittee on Urinary Tract Infection. Reaffirmation of AAP Clinical Practice Guideline: The Diagnosis and Management of the Initial Urinary Tract Infection in Febrile Infants and Young Children 2–24 Months of Age.
3. National Institute for Health and Clinical Excellence. Urinary tract infection in children: NICE guideline. 2007.

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