Prescribing Guidelines for Urinary Tract Infections

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Urinary Tract Infections in Children

Urinary tract infections (UTIs) are common infections of childhood that may affect any part of the urinary tract, from the urethra to the kidneys. The following guidance will focus on treating uncomplicated UTIs with an appropriate narrow spectrum antibiotic for the shortest effective duration. Infections in children with underlying renal diseases, anatomic or functional anomalies of the urinary tract, urinary catheters, or immunocompromising conditions/therapies constitute complicated UTIs and must be approached on an individual basis.

General Management and Treatment

1. Start by obtaining an appropriate urine sample for urinalysis and urine culture. Urine culture should be performed if urinalysis is positive or if there is a high clinical suspicion for infection.
   a. Clean-catch urine specimens should be obtained in all toilet trained children. While bagged urine samples can be used for initial urinalysis, catheterization is recommended to obtain appropriate samples for urine cultures in pre-toilet trained children.
2. Decide whether empiric antibiotic therapy for presumed UTI is warranted, and prescribe the most appropriate empiric therapy for the optimal duration (see Table 1).
   a. Does the child have presumed cystitis or pyelonephritis?
      i. These symptoms suggest pyelonephritis and it is recommended to treat empirically if present: Fever, vomiting, flank pain, or costovertebral angle tenderness.
      ii. Children without signs or symptoms of pyelonephritis: Consider waiting for urine culture results to make a definitive diagnosis and optimal management.
   b. Has the child had prior culture-confirmed UTIs to guide empiric therapy?
      i. Previous urine culture results and susceptibilities may help guide the choice of empiric therapy.

Table 1: Empiric Antibiotic Therapy

Suspected Diagnosis	Age Range	Preferred Antibiotic[a]	Antibiotic Duration
Bacterial Cystitis	< 3 years	Cephalexin 25 mg/kg/dose TID (max 1,000 mg/dose) **OR** Nitrofurantoin suspension (FURADANTIN) 1.5 mg/kg/dose four times daily (max 100 mg/dose)	7 days
	3 - 11 years	Cephalexin 25 mg/kg/dose BID (max 500 mg/dose) **OR** Nitrofurantoin suspension (FURADANTIN) 1.5 mg/kg/dose four times daily (max 100 mg/dose)	3 days
	≥ 12 years	Cephalexin 25 mg/kg/dose BID (max 500 mg/dose) **OR** Nitrofurantoin macrocrystal/monohydrate (MACROBID) 100 mg BID	3 days
Febrile UTI or Pyelonephritis (Uncomplicated)	<6 months	Cephalexin 25 mg/kg/dose TID (max 1000 mg/dose)[b]	10 days
	≥6 months	Cephalexin 25 mg/kg/dose TID (max 1000 mg/dose)[b]	7 days

a. Preferred empiric antibiotic choices are based on commonly recovered pathogens, antimicrobial susceptibility patterns at Dayton Children's Hospital, and drug penetration into sites of infection.
b. Anaphylaxis with Penicillin or Cephalexin allergy consider Cefdinir (7 mg/kg/dose (max 300 mg/dose) BID; alternatively, Ciprofloxacin or Levofloxacin (table 2 for dosing)

Table 2: Culture-directed Therapy

Spectrum	Antibiotic	Dose	Frequency and Duration		
			Cystitis <3yrs old	Cystitis ≥3yrs old	Febrile UTI & Pyelonephritis[d]
Most Preferred	Nitrofurantoin	Suspension (FURADANTIN): 1.5 mg/kg/dose (max 100 mg/dose) Macrocrystal/monohydrate (MACROBID)[a]: 100 mg/dose	Suspension: QID x 7 days	Suspension: QID x 3 days Macrocrystal/ monohydrate[a]: BID x 3 days	DO NOT USE
	Amoxicillin	20 mg/kg/dose (max 875 mg/dose)	BID x 7 days	BID x 3 days	TID x 7 days
	Cephalexin	25 mg/kg/dose	TID x 7days (max 1,000 mg/dose)	BID x 3 days (max 500 mg/ dose)	TID x 7 days (max 1,000 mg/ dose)
	TMP/SMX	4 mg/kg/dose (max 160 mg/dose)	BID x 7 days	BID x 3 days	BID x 7 days
	Cefdinir	7 mg/kg/dose (max 300 mg/dose)	BID x 7 days	BID x 3 days	BID x 7 days
Least Preferred	Amoxicillin/ Clavulanate[b]	20 mg/kg/dose (max 875 mg/dose)[b]	BID x 7 days	BID x 3 days	TID x 7 days
	Ciprofloxacin	15 mg/kg/dose (max 750 mg/dose)	BID x 7 days	BID x 3 days	BID x 7 days
	Levofloxacin	10 mg/kg/dose[c]	7 days[c]	3 days[c]	7 days[c]

a. Macrocrystal/Monohydrate: only for use in patients age ≥ 12 years
b. Dose based on amoxicillin component. Use products with 7:1 ratio of amoxicillin to clavulanate.
c. Max dose 750 mg/day; Frequency: age 6 months – 4 years: BID; age > 5 years: QD
d. <6m: 10 days; ≥6m: 7 days for uncomplicated Febrile UTI/Pyelonephritis

3. Follow-up of urine culture results
   a. For follow-up management, adjust the antibiotic therapy as indicated depending on the results of the urine culture and susceptibilities (see Table 2). If the urine culture does not suggest a UTI, stop the antibiotic and consider other diagnoses.
   b. For children who improve with treatment, test-of-cure urine cultures are NOT routinely recommended.

4. For children who do not improve within 48-72 hours of appropriate antibiotic therapy, consider obtaining a renal/bladder ultrasound to evaluate for complications such as renal or perirenal abscess.

5. When to refer:
   a. Consider referral to Pediatric Urology for further evaluation of children with recurrent UTIs, abnormal renal/ bladder ultrasound results, or symptoms of voiding dysfunction when not infected (urgency, frequency, enuresis).

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