UC DAVIS HEALTH | CHILDREN'S HOSPITAL

Pediatric Urinary Tract Infection Guidelines

Diagnosis of UTI

-Diagnosis of UTI is based on both:

1) urinalysis with pyuria (WBC>5/hpf)

AND

2) urine culture with >50,000 cfu/mL pathogenic organism

(*Staphylococcus epidermidis*, *Lactobacillus* spp., *Corynebacterium* spp. are NOT pathogens)

-Treatment of asymptomatic bacteriuria (positive urine culture without symptoms or pyuria) is only indicated in pregnant women or prior to urologic procedures

-A urine culture must be collected appropriately

- Children who are not toilet trained: Cath specimen
- Children who are toilet trained: Midstream clean catch with appropriate cleaning
- Children with indwelling catheters: Catheter must be removed and a new catheter placed prior to sending the urinalysis and urine culture

-A "test of cure" urine culture is not routinely recommended following treatment.

Antibiotic Treatment Table[1]

Inpatient Treatment of UTI – PICU and Ward

Age	Antibiotic and dosing	When to transition to oral antibiotic	Duration
0-1 months	Ceftazidime 50mg/kg/dose IV q8-12h Consider meropenem (rather than ceftazidime) if child appears septic or has h/o ESBL organism (Peds ASP approval required)	When afebrile, urine culture data is available, and CSF culture finalized negative (if obtained)[3]	**Febrile UTI or pyelonephritis**: 10-14 days
>1 months* – 18 years *** Post-menstrual/ corrected**	Ceftriaxone 50mg/kg/dose IV q 24hours (max:2000mg/dose) Alternatives (Peds ASP approval required): Cefepime 50mg/kg/dose IV q8-12h if requiring ICU level of care	When afebrile, urine culture data is available, and CSF culture finalized negative (if obtained)[3]	**Uncomplicated UTI**: 5-7 days (Consider 3 day course in adolescent female) **Complicated UTI,[5] pyelonephritis, or age less than or equal to 2 months**:

gestational age (44 weeks) and normal bilirubin levels	Meropenem 20mg/kg/dose IV q8h if h/o ESBL organism If allergy to beta-lactams, consider: Levofloxacin[4] or TMP/SMX (Bactrim) depending on severity and prior cultures. These can be given orally if a child is tolerating PO.		10-14 days

Inpatient Treatment of UTI – NICU

Age	Antibiotic and dosing	When to transition to oral antibiotic	Duration
Any	Ampicillin 50mg/kg/dose IV q 8-12h AND Gentamicin[2] dosing based on post-menstrual/post-natal age Use Meropenem 20-30mg/kg/dose IV q8-12h if positive blood/CSF culture for gram negative rod or has prior history of ESBL organism. (Peds ASP approval required).	When afebrile, urine culture data is available, tolerating feeds, and CSF culture finalized negative (if obtained)[3]	**Uncomplicated UTI**: 7-10 days **Febrile UTI or pyelonephritis**: 10-14 days

Oral stepdown therapy once a patient has improved clinically:

PO antibiotic for transition (choose based on MICs)	Dose	Maximum amount per dose	Common formulations
Amoxicillin	15 mg/kg/dose PO TID (cystitis) 30mg/kg/dose PO TID (complicated/pyelo)	500mg/dose (cystitis) 1000mg/dose (complicated/pyelo)	Suspension: 125mg/5mL, 200mg/5mL, 250mg/5mL, 400mg/5mL Tablet: 125mg, 250mg, 500mg, 875mg
Amoxicillin-clavulanate (dosed by amoxicillin component)	45mg/kg/dose PO BID	875mg/dose	Suspension: 125mg/5mL, 250mg/5mL, 400mg/5mL Tablet: 250mg, 500mg, 875mg
Cephalexin	20-30 mg/kg/dose PO TID 25mg/kg/dose PO QID (pyelo)	500mg/dose (cystitis) 1000mg/dose (complicated/pyelo)	Suspension: 125mg/5mL, 250mg/5mL Capsule: 250mg, 500mg, 750mg
Trimethoprim-sulfamethoxazole (TMP-SMX; dosed by TMP component)	4-6 mg/kg/dose PO BID	160mg/dose	Suspension: 200mg(SMX)/40mg(TMX)/5mL Tablet: SMX-TMP 400mg/80mg SMX-TMP 800mg/160mg
Cefixime (not preferred for pyelonephritis)	4mg/kg PO BID	200mg/dose	Suspension: 100mg/5mL, 200mg/5mL Capsule 400mg Chewable Tablet: 100mg, 200mg
Levofloxacin[4]	Age less than 5 years: 10 mg/kg/dose PO BID Age greater than or equal to 5 years:10 mg/kg/dose PO daily	750mg/dose	Suspension: 25mg/mL Tablet: 250mg, 500mg, 750mg

1. These guidelines do not apply to treatment of children with underlying urologic abnormalities (including neurogenic bladder, Grade 4-5 vesicoureteral reflux, or other anatomic abnormalities).
2. If gentamicin is initiated, please obtain levels as per pharmacy. Recommend close monitoring of renal function. Please call the pediatric antimicrobial stewardship team if gentamicin is used for >48 hours.
3. For infants >1 month with bacteremia due to urosepsis, there is no evidence that a prolonged duration of parenteral antibiotics decreases chance of relapse. They can be transitioned to oral antibiotics once child is afebrile and repeat blood culture is negative x 48 hours. For infants <1 month, would recommend discussion with the pediatric antimicrobial stewardship team.
4. Levofloxacin is approved down to age 2 years for treatment of UTI. It has been used in children <2 years of age when there are no other oral options. For any questions, please contact the pediatric antimicrobial stewardship team.
5. Examples of complicated UTIs include UTIs in the presence of renal calculi, immunocompromised hosts, severe illness with septic shock, etc.

Imaging

-Renal/bladder ultrasound is recommended by the AAP for all children <24 months presenting with first UTI.

-VCUG is not routinely recommended with first UTI unless abnormal renal ultrasound.

-If child remains febrile for >48-72 hours on appropriate therapy, consider repeat renal ultrasound or CT scan with contrast to evaluate for perinephric abscess.

Antibiotic prophylaxis

-Antibiotic prophylaxis has not been demonstrated to decrease the incidence of renal scarring. It is thus not recommended for healthy children, unless they are diagnosed with high-grade (grade 4-5) vesicoureteral reflux.

Pediatric Nephrology and Urology consultation

-In children with complicated or recurrent UTIs, consider consultation of Pediatric Nephrology or Urology for assistance with further evaluation or treatment.

Approved by UCDH Pharmacy and Therapeutics Committee 4/2023.

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