Uncomplicated Urinary Tract Infection (UTI)
Empiric Treatment Algorithm
Children > 2 months old

Kentucky ANTIBIOTIC Awareness

Concern for a UTI

Symptoms of a UTI or one or more of the following?
- Dysuria
- Frequency
- Urgency
- Persistent fever (≥ 100.4°F)
- Absence of alternative source of infection

No → Consider alternative diagnosis, low risk for a UTI. UA and UCx **not recommended** to rule out a UTI

Yes

Collect a **Urinalysis (UA)** and **Urine Culture (UCx)** using appropriate collection methods

UA with pyruia (≥ 10 WBC/hpf) and/or bacteriuria or nitrites?

No → Consider deferring and **watching off antibiotics**. If UA has no signs of pyuria, bacteria, or nitrites, consider canceling the UCx to prevent future treatment of asymptomatic bacteriuria

Yes

Empiric **antibiotic** therapy recommended

Refer to page 2 for dosing recommendations

1st line
Cephalexin*

Alternatives
Amoxicillin-clavulanate
TMP/SMX
Ciprofloxacin
IM Ceftriaxone

Finalized UCx

Adjust antibiotics based on sensitivities
If no growth or < 10,000 cfu/mL consider discontuining antibiotic therapy

Equivocal UA: Consider treatment if UCx returns with the following:

Collection Method	Possible UTI cfu/mL	Likely UTI cfu/mL
Catheter	≥ 10,000	≥ 50,000
Clean-Catch	≥ 50,000	≥ 100,000

Don't forget to set a *Stop Date*

Total Antibiotic Duration:
- **Non-toilet trained:** 10 days
- **Toilet trained:** 7 days
- **Adolescents with cystitis:** 3 days
- **Pyelonephritis:** 10 - 14 days

***Why Cephalexin?**
- **> 90%** susceptible for *E. coli* isolates in the urine
- CLSI updated urinary breakpoints: most *E. coli* are susceptible to cephalexin, even when reported as intermediate or resistant (MIC ≤ 16)
- Highly concentrated in the urine **(~100 fold)**
- Favorable safety profile
- Low risk of *C. difficile* and collateral damage

Pediatric Urinary Tract Infection (UTI) Clinical Pearls

Definitions and Treatment Considerations

UTI Classifications

- **Cystitis:** Lower UTI, bladder inflammation
- **Pyelonephritis:** Upper UTI, inflammation of the kidneys. Generally associated with systemic s/s of infection and flank pain
- **Asymptomatic bacteriuria (ASB)**: Presence of bacteria in the urine without signs or symptoms of a UTI.

Urinalysis Findings:

- **Nitrites:** Waste product of some gram-negative *Enterobacteriaceae*
- **Leukocyte esterase**: By-product of degredation of WBCs in the urine
- **Pyuria:** WBC in the urine (≥ 10 WBC/hpf)
- **Bacteriuria:** Bacteria in the urine

- **Cefdinir** is ***not*** preferred for treatment of pediatric bacterial infections due to (1) poor pharmacokinetic (PK) characteristics; (2) high rates of resistance; and (3) broad but mismatched spectrum of coverage
- Up to 90% of **penicillin allergies** are misdiagnosed. Always clarify history of allergy and de-label if appropriate (e.g. family history without patient history). For a full allergy assessment and testing, consider referral to outpatient allergy.

Common Bacterial Pathogens

Most Common:

- *Escherichia coli* (> 80%)
- *Klebsiella pneumoniae*
- *Proteus mirabilis*

Less Common:

- *Enterococcus spp.*
- *Staphylococcus saprophyticus*
- *Enterobacter spp.*

Hospital Associated:

- *Pseudomonas spp.*
- *S. aureus* (rarely causes symptomatic UTI, isolation in urine should suggest primary infection elsewhere)

UTI Prevention / Prophylaxis

- Antibiotic prophylaxis is ***not*** routinely recommended
- Heavy antibiotic use in children leads to colonization of multi-drug resistant bacteria
- Vesicoureteral reflux (VUR): Prophylaxis is ***not*** recommended for grade I-III reflux
- High grade VUR (IV & V): Urology consult recommended

UTI Antibiotic Dosing

- **Cephalexin:** 25 mg/kg/dose oral TID (max 1,000 mg/dose)
- **Amoxicillin-clavulanate**: 20 - 40 mg amox/kg/day *divided* in 3 doses (max 1,500 mg/day)
- **TMP/SMX:** 6 - 12 mg TMP/kg/day *divided* in 2 doses (max 160 mg TMP/dose)
- **Ciprofloxacin:** 10 - 20 mg/kg/dose BID (max 750 mg/dose)
- **Ceftriaxone** 50 mg/kg IM once daily (max 2,000 mg)

References

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