A urinary tract infection (UTI) is any inflammatory change in the urinary tract from an infectious agent. UTI is common in the pediatric population, accounting for more than 1.5 million outpatient visits and 13,000 inpatient hospitalizations annually. UTI occurs in all ages, ranging in severity from lower urinary tract symptoms due to cystitis to life-threatening sepsis due to pyelonephritis.

**ASSESSMENT**

Perform a detailed history, focusing on presence, severity, and duration of fever >38°C. Perform a complete physical exam with focus on abdomen and genitals. Symptoms vary widely. Infants and young children have non-specific symptoms such as lethargy, irritability, poor feeding, emesis, diarrhea and abdominal distention. Older children complain of urinary frequency, urgency, dysuria, incontinence, gross hematuria and abdominal/flank pain. Urine qualities (color/odor) are not reliable indicators.

**MANAGEMENT/TREATMENT**

Prior to starting antibiotic therapy, obtain a urinalysis (U/A) with microscopy, with specimen collected by catheter or suprapubic aspiration in children who are not toilet trained. Confirm UTI through positive urine culture, positive U/A for pyuria, and associated symptoms. Repeat urine culture to determine treatment adequacy is not recommended unless symptoms persist.

**WHEN TO REFER**

Most children with UTIs should be referred to Cincinnati Children’s Urology for renal and bladder ultrasound (RBUS) to screen for any anatomic abnormalities in the urinary tract, and for consideration of a voiding cystourethrogram (VCUG) to screen for VUR. A referral is helpful even when the RBUS is normal.

Refer to Cincinnati Children's Emergency:

- Febrile infant <2 months of age
- Toxic appearance
- Poor oral intake/dehydration
- Failure to respond to outpatient treatment

If you have clinical questions about patients with UTI, email PedsUrology@cchmc.org.

**FAST FACTS**

- ~3.5% of all children develop UTI annually
- >80% of UTI are caused by E. coli
- nearly 10X lower risk of UTI in circumcised boys during first year of life
- ~12–30% of children with UTI will develop a recurrence
- ~15% of children who, after a single febrile UTI, will have abnormal renal and bladder ultrasound; up to 40% will have VUR, and up to 20% will have high-grade VUR

If you would like additional copies of this tool, or would like more information, please contact the Physician Outreach and Engagement team at Cincinnati Children’s.

**HPE RED FLAGS/RISK FACTORS FOR UTI**

**History/physical**

- Female gender, except during first year of life
- Age <12 months
- Caucasian
- Temperature ≥ 39°C
- Fever ≥ 2 days or longer
- Absence of other source of fever
- Prior UTI
- Uncircumcised

- Anatomic abnormalities
- Bladder/bowel dysfunction
- Neurogenic bladder
- Sexual activity
- Recent urologic instrumentation

**Family history**

- UTI in childhood
- Vesicoureteral reflux (VUR)

**Tool developed by Cincinnati Children’s physician-hospital organization (known as Tri-State Child Health Services, Inc.) and staff in the James M. Anderson Center for Health Systems Excellence. Developed using expert consensus and informed by Best Evidence Statements, Care Practice Guidelines, and other evidence-based documents as available. For Evidence-Based Care Guidelines and references, see www.cincinnatichildrens.org/evidence.**
Urinary Tract Infection (UTI)

Inclusion Criteria
- Child >2 months of age with fever >38°C of uncertain source

Empiric antibiotic therapy?
- Yes
  - Urinalysis by catheterization or SPA if <2 years of age or non-toilet trained
  - Urine culture by catheterization, or SPA if <2 years of age or non-toilet trained
  - Positive urinalysis and urine culture?
    - Yes: Initiate/adjust antibiotic therapy based on susceptibilities and complete 7–14 day course
    - No: Discontinue antibiotic therapy
- No
  - Urinalysis with dipstick and microscopy (if available) by catheterization, SPA or bag if <2 years of age or non-toilet trained
  - Positive?
    - Yes: Risk factors/red flags for UTI?
      - Yes: Monitor and re-evaluate for persistent symptoms
      - No: Option
    - No: Monitor and re-evaluate for persistent symptoms

Risk factors/red flags for UTI?
- Yes
  - RBUS
  - Abnormal RBUS, atypical clinical presentation, or 2nd febrile UTI?
    - Yes: VCUG
    - No: Educate on risk of recurrent UTI and instruct to seek medical care to ensure timely evaluation in <48 hours
- No: Option

ADDitional Management/Treatment Notes
Begin antibiotic therapy early to prevent renal involvement and subsequent scarring.
- Consider empiric antibiotic therapy for febrile infants and young children with a high index of suspicion for UTI. Second- and third-generation cephalosporins are good options. Consider Bactrim in communities without significant antibiotic resistance. Nitrofurantoin can also be considered, except for a febrile UTI due to poor tissue penetration.
- Children with recent instrumentation or on clean intermittent catheterization should only be treated with a positive urinalysis for pyuria and associated symptoms, or if they have VUR, as they may be colonized with bacteria.