

Further Evaluation

In certain cases, evaluation beyond an office history and urine culture may be appropriate for determining the cause of UTI. Upper tract infection can result in serious renal morbidity; repeated pyelonephritis can potentially lead to renal injury with subsequent renal scarring, hypertension and progressive CKD. Complete evaluation to rule out modifiable conditions is appropriate for certain groups. Based on culture-documented UTIs and clinical risk factors including the patient's age, gender and presence or absence of suspicious symptoms such as high fever or flank pain, radiographic testing may be indicated. Appropriate imaging studies may include renal ultrasound, cystogram and/or nuclear medicine renal scan. You can refer a patient to a specialist at Nationwide Children's for these procedures by calling (614) 722-6200.

The following assessment options may be informative:

- **Renal Ultrasound (RUS).** It is safe and appropriate to get a RUS while the UTI is being treated. This should also image the bladder, both full and empty.
 - o Patients with active UTI can have urinary stasis and/or transient hydronephrosis secondary to inflammation.
 - o Patients with recurrent febrile UTI may benefit from prophylactic antibiotics until the RUS is completed.
- **Voiding Cystourethrography (VCUG).** In the case of UTI, ordering a VCUG should wait until the child is no longer symptomatic. VCUG is used to assess for bladder emptying, ureteral reflux or urethral obstruction.
 - o A fluoroscopic VCUG should be used for the initial study to assess bladder anatomy and to look for urethral obstruction. Subsequently, a nuclear VCUG is sufficient for follow-up of ureteral reflux.

Guidelines for Obtaining Imaging Studies for UTI

Consensus Statements from the Sections of Urology and Nephrology at Nationwide Children's

1. Children less than 2 months of age with their first febrile UTI should undergo a renal/bladder US and VCUG.
2. Children between 2 and 24 months of age with their first febrile UTI should undergo a screening renal/bladder US only. A VCUG may be obtained if there are abnormalities on the US or on a patient-specific basis.
3. Children >2 years old with recurrent UTI should undergo a renal/bladder US.
4. Children with recurrent UTI despite preventive care and a normal renal/bladder US may benefit from a VCUG.

Referrals and Consultations

Online: NationwideChildrens.org/Urology

Phone: (614) 722-6200 or (877) 722-6220 | Fax: (614) 722-4000

Physician Direct Connect Line for 24-hour urgent physician consultations:
(614) 355-0221 or (877) 355-0221.

Laboratory Testing and Pathology Consultations

Online: NationwideChildrens.org/Lab

Phone: (614) 722-5477 or (800) 934-7575



Urinary Tract Infection Diagnosis and Management



When your child needs a hospital, everything matters.™

Urinary Tract Infections in the Pediatric Patient

Urinary tract infections are common infections of childhood that may affect any part of the urinary tract, from the urethra to the kidneys. Pediatric UTI can range from simple cystitis to severe febrile infections that, if left untreated, can lead to kidney damage and the many *sequelae* of chronic kidney disease (CKD). UTIs affect approximately 3 percent of all U.S. children each year and result in up to 1 million office visits annually. During the first year of life, boys are more likely to experience UTI, with uncircumcised boys at 10 times the risk of circumcised boys. After infancy, gender prominence reverses, with 8 percent of all girls and 2 percent of all boys experiencing UTI during childhood.

Evaluating UTI in Children

Although many find urine dipstick tests with elevated leukocyte esterase and nitrates helpful in indicating probable clinically significant amounts of urinary white cells and bacteria, **diagnosis must also include a positive urine culture.**

In infants and young children, the American Academy of Pediatrics recommends suprapubic aspiration or urethral catheterization. In older children and adolescents, a clean-catch specimen is sufficient.

- Consider patient age and gender
- Document fever (defined by the AAP as >100.4° F)
- Carefully record voiding and bowel habit history. This should include:
 - History of UTIs and whether any were febrile
 - Constipation or infrequent bowel movements
 - Abdominal or flank pain
 - Associated nausea and/or vomiting
 - Incomplete emptying
 - Irritative symptoms:
 - Urgency dysuria
 - Urinary frequency
- Document other classic symptoms such as:
 - Poor appetite
 - Lethargy
 - Hematuria

Diagnosing UTI With Urine Culture

Urine cultures can be considered positive for UTI with the cutoffs below. **In general, bagged urine culture is only helpful if it is negative; positive bagged specimens should be validated with a catheterized specimen as they are often contaminated by perineal flora.**

Voided specimen: >100,000 colonies of a single uropathogen

Catheter or suprapubic specimen: >50,000 colonies of a single uropathogen

Note: Fewer than 50,000 colonies or the presence of multiple organisms in a urine sample suggests contamination.

Treatment of UTI in Children

Treatment of UTI depends on where in the urinary tract the infection is likely present.

For uncomplicated cystitis (a lower urinary tract infection occurring in the bladder), the following treatment is recommended:

- 3-7 days of antibiotics: trimethoprim sulfamethoxazole (TMP-SMX), nitrofurantoin, cephalosporin
- Post-treatment urine culture is not needed if the symptoms have resolved

For **pyelonephritis** (an upper urinary tract infection occurring in the kidneys that can lead to scarring and long-term *sequelae*), some can be treated as outpatients but others should be hospitalized. The following treatment approach is recommended:

- Initial hospitalization if:
 - Less than 2 months old
 - Toxic-appearing infant or child
 - Unable to tolerate oral meds
 - Questionable compliance
 - Follow-up treatment: oral antibiotics once afebrile for 24-48 hours
- Outpatient pyelonephritis treatment:
 - 1-2 days of IV/IM third-generation cephalosporin
 - Follow with 10-14 days of oral antibiotics such as cephalosporins, amoxicillin and clavulanic acid, or trimethoprim-sulfamethoxazole

When to Refer:

In some cases, patients may benefit from evaluation by a specialist for UTI. These situations include but are not limited to the following:

- Non-responsive to initial antibiotic therapy
- Recurrent or severe UTI
- Presence of a congenital renal or urinary tract anomaly
- Abnormal renal or bladder imaging
- Febrile UTI in infant
- UTI with symptoms of voiding dysfunction when not infected (urgency, frequency, enuresis)

Reference:

American Urological Association. Pediatric urinary tract infections. *American Urological Association Educational Curriculum*. Accessed September 2014. AUAnet.org/education.