

Urinary Tract Infection (over 2 months of age)

Urinary Tract Infection is one of the most common bacterial infections seen in infants and children. UTI with fever indicates an upper tract infection/pyelonephritis, while cystitis is not usually accompanied by fever. It is important to diagnose and empirically treat febrile UTIs in infants and children, as delayed treatment may increase the risk of bacteremia. Risk factors associated with increased rates of UTI in young children include age, female gender, and constipation. An [evidence-based decision tool](#) has been developed to assess risk factors and help with urine result interpretation.^{1, 2, 3}

For infants less than 2 months, refer to TREKK’s [Bottom Line Recommendations for Fever in Young Infants](#).

Clinical Signs and Symptoms

- » Infants/non-verbal children may have fever without apparent source, increased crying, vomiting, poor feeding or other non-specific symptoms.
- » Children > 2 years typically have urinary symptoms such as dysuria, abdominal/back pain, new incontinence, +/- fever.
- » Infants/children with a viral syndrome (e.g., bronchiolitis) or other source of infection should NOT be routinely tested for UTI.

Recommended Testing if Clinical Signs and Symptoms

URINALYSIS (UA):

- » Obtain sample from a midstream urine. For infants, use a clean catch method^{4, 5} or a “bagged” urine specimen.
- » In and out bladder catheterization can be used if required (e.g., low urine output) but carries the risk of pain and iatrogenic UTI. If a catheter specimen is obtained, reserve some urine for culture, if needed.
- » Either Biochemistry lab urinalysis or a dipstick point of care test can be used for urinalysis.
- » If urinalysis is normal, do NOT send a urine culture, as any positive cultures are then most likely contaminants.

MICROSCOPY:

- » Urine microscopy reports WBC per High Power Field (HPF) and is useful to help support the diagnosis, especially in the setting of an equivocal urinalysis (either leukocyte esterase (LE) OR nitrites positive).

URINE CULTURE:

- » Obtain specimen from a clean catch/midstream sample, in and out catheterization or suprapubic aspiration. A bag sample should **NEVER** be sent for culture.
- » Urine cultures should be sent to the lab as soon as possible, ideally within 4 hours. If there is any delay, store the sample in a refrigerator to avoid false positives.

OTHER INVESTIGATIONS:

- » In well-appearing infants/children, bloodwork is typically not required.
- » Obtain CBC, blood culture, urea, and creatinine in any infant/child who is unwell (i.e., poor feeding, persistent irritability, vomiting). Refer to [TREKK’s Sepsis PedsPac](#) for infants/children who appear toxic and/or have signs of hypoperfusion. Perform a lumbar puncture in any infant/child with clinical signs/symptoms of meningitis (refer to [TREKK’s Meningitis BLR](#)).
- » Consider gonorrhea, chlamydia, and HSV testing if dysuria and possible/confirmed history of a sexual encounter.

Recommended Testing	UA	Microscopy	Urine culture	Blood work
> 2 months - 2 years or non-verbal with fever without source (>39°C)	Yes	Yes - if LE and/or nitrites positive	Yes - if LE and/or nitrites positive No - if UA +/- microscopy are normal	Yes - if appears unwell
Greater than 2 years, verbal, with urinary complaints and fever				Yes - if appears unwell
Greater than 2 years, verbal, with urinary complaints and no fever				No – not required in uncomplicated cystitis

Diagnosis

INTERPRETING URINALYSIS

- » A normal UA has good negative predictive value with a < 1% risk of UTI. Look for other causes of illness.
- » If positive LE and positive nitrites, send culture and start antibiotics. Microscopy is optional in this circumstance.
- » If negative LE and positive nitrites, send microscopy (if available) and culture. Defer antibiotics pending culture.
- » If positive LE and negative nitrites, send microscopy (if available) and culture. Defer antibiotics pending culture.
- » Pyuria (>5-10 WBC/HPF) usually correlates with presence of LE. Absence of pyuria is rare in UTI unless upper tract obstruction. Small amounts of pyuria alone (without nitrites or LE) can be due to any systemic inflammatory condition.

INTERPRETING URINE CULTURE

- » Urine culture results should be interpreted in the context of the clinical history and the UA/microscopy results.
- » UTIs typically have significant growth of a single uropathogen:
 - » $\geq 50 \times 10^6$ **OR** $\geq 50 \times 10^7$ colony forming units (CFU)/L from a catheter/suprapubic aspirate specimen
 - OR**
 - » $\geq 100 \times 10^6$ **OR** $\geq 100 \times 10^7$ CFU/L from a midstream urine specimen
- » The clinical diagnosis of UTI in an infant/child is supported by **BOTH** a POSITIVE urinalysis (and pyuria on microscopy, if performed) **AND** a POSITIVE culture with significant growth of a single uropathogen.
- » A smaller colony count of $< 5 \times 10^7$ CFU/L or multiple bacteria with a normal urinalysis/microscopy usually indicates contamination.

Empiric Therapy for Suspected UTI in Children > 2 Months of Age

Clinical Scenario	Antibiotic	Notes
Well-appearing, hydrated, can tolerate PO medication	Preferred: Cephalexin 75-100 mg/kg/day PO divided TID or QID (MAX 4000 mg/day, or 1000 mg/dose) -OR- TMP-SMX 6-12 mg of TMP component/kg/day PO divided BID (MAX 160 mg TMP/dose) -OR- Cefixime 8 mg/kg/day PO divided once daily (MAX 400 mg/dose)*	Discharge home with follow-up assured in 24-48 hours.
Afebrile, well adolescent with cystitis	Nitrofurantoin (as Macrobid®) 100 mg PO BID for 5 days -OR- TMP-SMX 6-12 mg of TMP component/kg/day PO divided BID (MAX 160 mg TMP/dose) for 3 days	Macrobid® must be swallowed whole and should ONLY be used in this clinical circumstance.
Unwell OR unable to tolerate oral medication	Preferred: Gentamicin or Tobramycin 7.5 mg/kg/day IV divided q24h (MAX 360 mg/day prior to levels) -OR- Ceftriaxone 50-75 mg/kg/day IV divided q24h (MAX 2000 mg/dose)	Admit to hospital or schedule return ED visit in 24 hrs (if using gentamicin, tobramycin or ceftriaxone). Use Ceftriaxone if known or suspected renal dysfunction or hearing loss.

Note: Refer to local formulary for more specific dosing information.

***Cefixime is a broad-spectrum antibiotic that is more likely to induce resistance compared to cephalexin. Cefixime, cephalexin and TMP-SMX do NOT cover extended spectrum beta-lactamase organisms.**

- » In a first febrile UTI, the most likely bacteria is *E. coli*.
- » For children with a history of previous UTIs, determine empiric therapy by the result of the most recent urine culture and sensitivities.

DURATION OF THERAPY

- » For uncomplicated afebrile cystitis in adolescents: 3-5 days (see table above)
- » For uncomplicated febrile UTI: 7 days
- » For febrile UTI in patients with a known urological structural abnormality: 10 days

Follow-up should be assured with either a Primary Care Provider, Pediatrics, Infectious Diseases or Urology depending on local practice.

- » Children who are still febrile or have persistent dysuria after 24-48 hours of appropriate therapy should be reassessed:
 - Verify culture results for bacterial sensitivities
 - Consider IV antibiotics and admission to hospital
 - Consider renal ultrasound to detect complications such as renal abscess, focal pyelonephritis/nephronia
- » At discharge, communicate to family and primary care provider that all infants > 2-12 months with a first febrile UTI should have a renal and bladder ultrasound to detect renal structural abnormalities/high grade vesicoureteral reflux.
- » Discuss modifiable risk factors for urinary tract infections such as constipation and sexual activity, when appropriate.

For a full list of references and development team members, please see the following page.

The purpose of this document is to provide healthcare professionals with key facts and recommendations for the diagnosis and treatment of UTI in children in the emergency department. This summary uses the best available knowledge at the time of publication. However, healthcare professionals should continue to use their own judgment and take into consideration context, resources and other relevant factors. The TREKK Network is not liable for any damages, claims, liabilities, costs or obligations arising from the use of this document including loss or damages arising from any claims made by a third party. The TREKK Network also assumes no responsibility or liability for changes made to this document without its consent.

Bottom Line Recommendations

Bottom Line Recommendations are short summaries for healthcare providers of the latest knowledge related to the diagnosis and management of pediatric emergency conditions. This resource is not intended to be used as a step-by-step guide. It is ideal for educational purposes and to summarize existing evidence on UTI in pediatric emergency care. Development of this resource involved a rigorous and iterative process, bringing together experts from a variety of specialties (nursing, emergency medicine, pediatric care, and pharmacy). To learn more about the development, see the References & Development Team section below.

References

1. University of Pittsburgh. [UTICalc - for children 2 to 23 months of age](#). 2023. Accessed online: July 24, 2023.
2. Montini G, Tullus K, Hewitt I. [Febrile urinary tract infections in children](#). *N Engl J Med*. 2011;365(3):239-250.
3. [Urinary tract infection in under 16s: diagnosis and management](#). London: National Institute for Health and Excellence (NICE); October 2018.
4. Kaufman J, Tosif S, Fitzpatrick P, et al. [Quick wee: a novel non-invasive urine collection method](#). *Emerg Med J*. 2017;34(1):63-64.
5. Herreros Fernández, M. L., González Merino, N., Tagarro García, A., Peáñez Seoane, B., De La Serna Martínez, M., Contreras Abad, M. T., & García-Pose, A. [A new technique for fast and safe collection of urine in newborns](#). *Archives of Disease in Childhood*, 98(1), 27–29.
6. Roberts KB, Subcommittee on Urinary Tract Infection, Steering Committee on Quality Improvement and Management. [Urinary tract infection: Clinical practice guidelines for the diagnosis and management of the initial UTI in febrile infants and children 2 to 24 months](#). *Pediatrics*. 2011;128(3):595-610.
7. Robinson JL, Finlay JC, Lang ME, Bortolussi R; Canadian Paediatric Society, Infectious Diseases and Immunization Committee, Community Paediatrics Committee. [Urinary tract infections in infants and children: Diagnosis and management](#). *Paediatr Child Health*. 2014;19(6):315-325.

Development Team

Thank you to the following **content experts** who led the development of the Urinary Tract Infection Bottom Line Recommendations:

Nicole Le Saux, MD, FRCP(C), Professor, [University of Ottawa](#), Division of Infectious Diseases. Children's Hospital of Eastern Ontario ([CHEO](#))

Gina Neto, MD, FRCPC, Medical Director and Division Chief, Emergency Medicine. Children's Hospital of Eastern Ontario ([CHEO](#))

Thank you to the [TREKK Editorial Committee](#) and the following people who supported the development of this resource:

TREKK Editorial Lead: Dr. Sarah Reid ([CHEO](#), [University of Ottawa](#))

TREKK Knowledge Broker: Mary Anne Nurmi, BA, MSc ([University of Manitoba](#))

To see our resource development process please visit our website [here](#).



This resource was made possible by the
Children's Hospital Foundation of Manitoba.
We are grateful for their support.

Please visit our website at [trekk.ca](#) for more information.
© OCTOBER 2023, TREKK; FOR REVISION 2025. VERSION 2.0