

The McMaster *at night* Pediatric Curriculum



Robinson, J, *et al.* and the Canadian Pediatric Society.
Urinary tract infection in infants and children: Diagnosis
and management. *Pediatr Child Health* 2014; 9 (6): 315-19

Robinson, J, *et al.* and the Canadian Pediatric Society.
Prophylactic antibiotic for children with recurrent urinary
tract infections. *Paediatr Child Health* 2015; 20(1)45-47

Objectives

- Develop approach to child or infant presenting with symptoms of urinary tract infection with no known underlying urinary tract pathology or risk factors for neurogenic bladder
- Develop a differential diagnosis for children presenting symptoms of UTI
- Understand common pathogens and treatment options for urinary tract infection
- Understand appropriate work up for infants or children presenting with recurrent or febrile UTI
- Discuss prevention of UTI

Background

- 7% of children two to 24 months of age presenting with fever without a source were diagnosed with a UTI
- 8% of children two to 19 years of age presenting with possible urinary symptoms were diagnosed with a UTI
- Higher rates in uncircumcised males

Two Cases

- Theo is a 3 month old male presenting with 1 day of fever of 39 degrees Celsius.
- Claire is a 5 year old female presenting with urinary frequency and secondary enuresis.

History

What would you ask?

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History

- Inquire about:
 - Fever
 - Duration
 - Elevation
 - Response to medication
 - Dysuria
 - Urinary frequency
 - Hematuria
 - Abdominal pain
 - Location, quality, severity, radiation
 - Back pain
 - Location, quality, severity, radiation
 - Secondary enuresis (if applicable)
 - Toilet training
 - Constipation
 - Vaginal itching, discharge

History - continued

- Pregnancy and birth history
- Past medical history
 - UTIs
 - Renal anomalies
 - Blood pressure
- Medications, Allergies, Immunizations
- Family History
- Social History

Physical Exam

What would you look for?

The background of the slide features a dark blue gradient. In the lower half, there is a black silhouette of a city skyline with various skyscrapers. A large, bright white full moon is positioned behind the skyline, partially obscured by the buildings.

Physical Exam

- General physical exam
- Well vs unwell
- Full set of vital signs
- Abdominal tenderness, mass
- Costo-vertebral angle tenderness
- Perineal exam (rashes, anal fissures, tags, stool in rectal vault)

Workup

What would you order?

The background of the slide features a dark blue gradient. In the lower half, there is a black silhouette of a city skyline. A large, bright white full moon is positioned behind the skyline, partially obscured by the buildings. The overall aesthetic is clean and professional.

Workup

- Untoilet trained children
 - Catheter sample
 - Suprapubic aspiration
 - Clean catch with diaper off
- Older children
 - Midstream urine
 - Perineal cleansing may not be necessary
- When to order a bagged urine sample?
 - Only when index of suspicion is low
 - Negative bagged sample rules out infection
 - Positive sample does not differentiate infection from

Orders

- Urinalysis and microscopy
- Urine culture
 - MUST be collected prior to antibiotics. A single dose of effective antibiotics will sterilize the urine
- Blood culture
 - Not necessary if the diagnosis of UTI is clear and the child is hemodynamically stable
- Re-assess if complicated UTI or on aminoglycosides for >48 hrs

Differential Diagnosis

- Pyelonephritis
- Cystitis
- Vulvovaginitis
- Vaginitis
- Urinary Obstruction
- Nephrolithiasis
- Neurogenic bladder
- Voiding dysfunction
- Glucosuria
- Appendicitis
- Gastroenteritis

Featured Diagnosis

- Urinary Tract Infection
- Bugs:
 - Klebsiella
 - E Coli
 - Enterobacter
 - Citrobacter
 - Serratia
 - Staph saprophyticus (adolescent females)
 - Enterococci (Debate!)
 - Mixed growth

Treatment Recommendations

- Febrile, non-toxic children, >3 months, no urologic abnormalities:
 - Oral antibiotics
- Hemodynamically unstable:
 - IV antibiotics
- Infants 2-3 months:
 - Consider starting with IV and transitioning to PO
- 7-10 days total

Antibiotic choice

- Choose according to local antibiogram and E. coli susceptibilities
- Narrow coverage when culture results and sensitivities are available

IV Antibiotics

TABLE 3

Antibiotics commonly used to treat urinary tract infections (UTIs) in children two months of age and older, if the isolate is susceptible

Parenteral antibiotics

Drug	Dosage per day
Ampicillin	200 mg/kg IV/day (divided every 6 h)
Ceftriaxone	50–75 mg/kg IV/IM every 24 h
Cefotaxime	150 mg/kg/day IV (divided every 6 h or 8 h)
Gentamicin	5–7.5 mg/kg IV/IM once per day
Tobramycin	5–7.5 mg/kg once per day

Oral Antibiotics

Oral antibiotics

Drug	Dosage per day
Amoxicillin	50 mg/kg/day (divided in three doses)
Amoxicillin/clavulanate	(7:1 formulation) 40 mg/kg/day (divided in three doses)
Co-trimoxazole	8 mg/kg/day of the trimethoprim component, divided in two doses (0.5 mL/kg/dose)
Cefixime	8 mg/kg/day (given as a single dose)
Cefprozil	30 mg/kg/day (divided in two doses)
Cephalexin	50 mg/kg/day (divided in four doses)
Ciprofloxacin*	30 mg/g/day (divided in two doses)

Resistant Organisms

- If child is clinically improving:
 - Repeat U/A and culture and change antibiotics only if persistent signs of UTI
- If child is NOT clinically improving:
 - Repeat U/A and culture and change antibiotics pending results of repeat

Additional Testing

- If complicated:
 - Renal ultrasound for obstruction or abscess
- Any febrile UTI in a child under 2 yrs:
 - Renal ultrasound for urinary tract abnormalities within 2 weeks of illness
- Any child with abnormal renal ultrasound, obstruction, high grade reflux, second febrile UTI under 2yrs:
 - Proceed to Voiding Cystourethrogram (VCUG)
 - Risk of radiation and UTI
 - Expense, discomfort

Antibiotic Prophylaxis

- Majority of children do not benefit from prophylaxis
 - Does not prevent renal scarring or sequelae
 - UTIs do not contribute to chronic renal failure in children with no renal anomaly
- Indicated in Grade 4-5 VUR, significant urologic abnormality
- Reassess after 6 months
- Use Septra or Macrobid
- If resistant to above, consider stopping antibiotics
- Refer to urology

Other Preventative Measures

- Management of constipation
- Regular voiding
- Proper wiping technique
- Educate parents about signs and symptoms of UTI and when to seek medical attention

Important clinical points:

- Infants with a fever $>39^{\circ}\text{C}$ for >48 hours without another source for fever on examination are highly likely to have a UTI
- It is very unlikely for a boy >3 years to have a UTI in the absence of instrumentation of the urinary tract

When is it not a UTI?

- Unlikely in males >3 yrs to have first UTI in absence of instrumentation
- Common for young girls to have vulvovaginitis secondary to irritants or poor hygiene
- UTI without fever is usually cystitis
- Treat with 2-4 d course of antibiotics with E. Coli susceptibility

Test Your Knowledge

- The following is an appropriate antibiotic choice for a stable 6 month presenting with first urinary tract infection:
 - A. Ceftriaxone
 - B. Amoxicillin
 - C. Doxycycline
 - D. Trimethoprim

The Answer

B) Amoxicillin



Summary

- UTIs are a common cause of fever without a source in children under the age of two, and those over the age of two, who have urinary symptoms.
- All of those children presenting with the above features should have the appropriate urine samples taken and tested.
- Antibiotics should be tailored to local antibiograms and treatment should be 7-10 days in duration.
- Prompt reassessment is necessary if children fail to improve or urine culture reveals a resistant organism.
- All children with a first febrile UTI under 2 yrs of age require a renal ultrasound.



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