NCC Pediatrics Continuity Clinic Curriculum
Urinary Tract Infections

Objectives

Read the summary of the AAP recommendations for diagnosis and management of pediatric UTI. Upon completion of this module, the reader should be able to:

- List reasons for admitting a patient with a UTI
- Demonstrate in role-play how a provider explains urinary catheterization and the need for the procedure in an infant or young child with suspected UTI
- Compare and contrast UTI management in infants, toddlers, school-age children, and adolescents
- List interventions for a newborn with antenatal hydronephrosis and their timing
- Name indications for renal ultrasound, VCUG, RNC, and a DMSA scan and the data obtained from each

Spend only ten minutes per patient vignette!

Case One: A 15 month old girl is brought to your office with the complaint of fever to 103 for two days and "acting fussy". She has had no other symptoms, and has a nonfocal exam. You are concerned about the possibility of UTI.

What are the conditions in your differential diagnosis?

What are some of the symptoms that may accompany UTI in an infant or toddler?

What will you do for the patient?

The UA is negative. How does this influence your thinking?

The parents are adamant about refusing a catheterization to obtain a urine culture. What will you tell them?

What conditions, if present, would argue for admission in this patient?

What medications can you use to treat her UTI, and how long should you continue her treatment? What would steer you towards parenteral versus oral antibiotics?

When should the parents see improvement? What if the child is not getting better?

What, if any, follow-up does the child require following successful treatment of her UTI?

Case Two: A 4-year-old girl comes in with urgency, frequency, & dysuria, and mom has noted some drops of blood on the toilet paper after wiping this morning. She has been afebrile and complaining of a tummyache, and has been crying and refusing to urinate since getting up this morning. (answer questions on next page)

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Case Two (continued)

What is your working diagnosis? What is the differential diagnosis?

What tests, if any, will you get in this patient? Can a clean catch specimen be used?

Should you wait for the urine culture results to come back?

What treatment options do you have, and how long should you treat?

What is the relationship between UTI and constipation?

Which children require ultrasound and VCUG following a UTI?

Case Three: A 16-year-old girl presents with dysuria, urgency & frequency for 2 days.

What other symptoms are important to ask about?

How extensive of an exam is required to treat an uncomplicated UTI? What tests, if any, would you order?

What are most likely organisms in this patient?

What is the best course of treatment for uncomplicated cystitis?

Case Four: You are working in the newborn nursery, and prior to discharging a newborn, you discover that he was diagnosed prenatally with hydronephrosis.

What are you going to recommend for this patient to follow up the prenatal finding?

Notes on imaging tests

Renal ultrasound (US): detects size and shape of kidneys, identifies ureteral dilatation or duplication, and shows gross abnormalities. US won't show scarring or vesicoureteral reflux

Voiding cystourethrogram (VCUG): establishes presence and degree of vesicoureteral reflux (VUR). Performing VCUG shortly after treatment initiation will not yield false positive results.

Radionuclide cystogram (RNC): good for detecting VUR. RNC is more sensitive and involves less radiation than VCUG, but is less frequently available. RNC will NOT detect posterior urethral valves, so it can't be done as an initial study in boys.

DMSA scan: detects pyelonephritis and renal scarring

Urinary Tract Infection Clinical Practice Guideline Quick Reference Tools

- Recommendation Summary
  — The Diagnosis, Treatment, and Evaluation of the Initial Urinary Tract Infection in Febrile Infants and Young Children
- *ICD-9-CM* Coding Quick Reference for Urinary Tract Infection
- AAP Patient Education Handout
  — *Urinary Tract Infections in Young Children*

Recommendation Summary

The Diagnosis, Treatment, and Evaluation of the Initial Urinary Tract Infection in Febrile Infants and Young Children

Recommendation 1

The presence of UTI should be considered in infants and young children 2 months to 2 years of age with unexplained fever (strength of evidence: strong).

Recommendation 2

In infants and young children 2 months to 2 years of age with unexplained fever, the degree of toxicity, dehydration, and ability to retain oral intake must be carefully assessed (strength of evidence: strong).

Recommendation 3

If an infant or young child 2 months to 2 years of age with unexplained fever is assessed as being sufficiently ill to warrant immediate antimicrobial therapy, a urine specimen should be obtained by SPA or transurethral bladder catheterization; the diagnosis of UTI cannot be established by a culture of urine collected in a bag (strength of evidence: good).

Recommendation 4

If an infant or young child 2 months to 2 years of age with unexplained fever is assessed as not being so ill as to require immediate antimicrobial therapy, there are two options (strength of evidence: good).

Option 1
Obtain and culture a urine specimen collected by SPA or transurethral bladder catheterization.

Option 2
Obtain a urine specimen by the most convenient means and perform a urinalysis. If the urinalysis suggests a UTI, obtain and culture a urine specimen collected by SPA or transurethral bladder catheterization; if urinalysis does not suggest a UTI, it is reasonable to follow the clinical course without initiating antimicrobial therapy, recognizing that a negative urinalysis does not rule out a UTI.

Recommendation 5

Diagnosis of UTI requires a culture of the urine (strength of evidence: strong).

Recommendation 6

If the infant or young child 2 months to 2 years of age with suspected UTI is assessed as toxic, dehydrated, or unable to retain oral intake, initial antimicrobial therapy should be administered parenterally and hospitalization should be considered (strength of evidence: opinion/consensus).

Recommendation 7

In the infant or young child 2 months to 2 years of age who may not appear ill but who has a culture confirming the presence of UTI, antimicrobial therapy should be initiated, parenterally or orally (strength of evidence: good).

Recommendation 8

Infants and young children 2 months to 2 years of age with UTI who have not had the expected clinical response with 2 days of antimicrobial therapy should be reevaluated and another urine specimen should be cultured (strength of evidence: good).

Recommendation 9

Infants and young children 2 months to 2 years of age, including those whose treatment initially was administered parenterally, should complete a 7- to 14-day antimicrobial course orally (strength of evidence: strong).

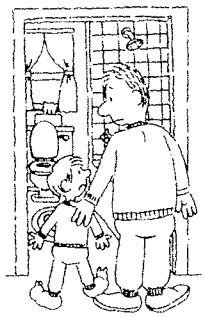
Recommendation 10

After a 7- to 14-day course of antimicrobial therapy and sterilization of the urine, infants and young children 2 months to 2 years of age with UTI should receive antimicrobials in therapeutic or prophylactic dosages until the imaging studies are completed (strength of evidence: good).

Recommendation 11

Infants and young children 2 months to 2 years of age with UTI who do not demonstrate the expected clinical response within 2 days of antimicrobial therapy should undergo ultrasonography promptly. Voiding cystourethrography (VCUG) or radionuclide cystography (RNC) is strongly encouraged to be performed at the earliest convenient time. Infants and young children who have the expected response to antimicrobials should have a sonogram performed at the earliest convenient time; a VCUG or RNC is strongly encouraged (strength of evidence: fair).

Urinary Tract Infections in Young Children



Urinary tract infections (UTIs) are common in young children. UTIs may go untreated because the symptoms may not be obvious to the child or to parents. These infections can lead to serious health problems. From this brochure, parents can learn more about urinary tract infections—what they are, how children get them, and how they are treated.

The Urinary Tract

The urinary tract makes and stores urine. It is made up of the kidneys, ureters, bladder, and the urethra (see illustration). The kidneys produce urine. Urine travels from the kidneys down two narrow tubes called the ureters to the bladder. The bladder is a thin muscular bag that stores urine until it is time to empty urine out of the body. When it is time to empty the bladder, a muscle at the the bottom of the bladder relaxes. Urine then flows out of the body through a tube, called the urethra. The opening of the urethra is at the end of the penis in boys and above the vaginal opening in girls.

Urinary Tract Infections

Normal urine has no germs (bacteria). However, bacteria can get into the urinary tract from two sources: the skin around the rectum and genitals and the bloodstream from other parts of the body. Bacteria may cause infections in any or all parts of the urinary tract, including the following:

- the urethra (called "urethritis")
- the bladder (called "cystitis")
- the kidneys (called "pyelonephritis")

UTIs are common in infants and young children. About 3 percent of girls and 1 percent of boys will have a UTI by 11 years of age. A young child with a high fever and no other symptoms, has a 1 in 20 chance of having a UTI. The frequency of UTIs in girls is much greater than in boys. Uncircumcised boys have slightly more UTIs than those who have been circumcised.

Symptoms

Symptoms of UTIs may include the following:

- fever
- pain or burning during urination
- need to urinate more often, or difficulty getting urine out
- urgent need to urinate, or wetting of underwear or bedding by a child who knows how to use the toilet
- vomiting, refusal to eat
- abdominal pain
- side or back pain
- foul-smelling urine
- cloudy or bloody urine
- unexplained and persistent irritability in an infant
- poor growth in an infant

Diagnosis

If your child has symptoms of a UTI, your pediatrician will do the following:

- ask about your child's symptoms
- ask about any family history of urinary tract problems
- ask about what your child has been eating and drinking (certain foods can irritate the urinary tract and cause similar symptoms)
- examine your child
- get a urine sample from your child

Your pediatrician will need to test your child's urine to see if there are bacteria or other abnormalities. There are several ways to collect urine from a child.

- The preferred method to diagnose a UTI is to place a small tube, called a catheter, through the urethra into the bladder. Urine flows through the tube into a special urine container.
- Another method is to insert a needle through the skin of the lower abdomen to draw urine from the bladder. This is called needle aspiration.
- If your child is very young or not yet toilet trained, the pediatrician may place a plastic bag over the genitals to collect the urine. Since bacteria can contaminate the urine and give a false test result, this method is used only to screen for infection.
- An older child may be asked to urinate into a container.

Your pediatrician will discuss with you the best way to collect your child's urine.

Treatment

UTIs are treated with antibiotics. The way your child receives the antibiotic depends on the severity and type of infection. If your child has a fever or is vomiting and unable to keep fluids down, the antibiotics may be put directly into the bloodstream or muscle using a needle. This is usually done in the hospital. Otherwise, the antibiotics can be given by mouth, as liquid or pills.

UTIs need to be treated right away for the following reasons:

- to get rid of the infection
- to prevent the spread of the infection
- to reduce the chances of kidney damage

Infants and young children with UTIs usually need to take antibiotics for 7 to 14 days, sometimes longer. Make sure your child takes all the medicine your pediatrician prescribes. Do not stop giving your child the medicine until the pediatrician says the treatment is finished, even if your child feels better. UTIs can return if not fully treated.

Follow-up

After your child finishes the antibiotics, your pediatrician may want to test another urine sample to make sure the bacteria are gone. In addition, your pediatrician will want to make sure the urinary tract is normal and that the infection did not cause any damage. Several tests are available to do this, including the following:

Kidney and bladder ultrasound: Uses sound waves to examine the bladder and kidneys.

Voiding cystourethrogram (VCUG): A catheter is placed into the urethra and the bladder is filled with a liquid that can be seen on X-rays.

Intravenous pyelogram: A liquid that can be seen on X-rays is injected into a vein and then travels into the kidneys and bladder.

Nuclear scans: Radioactive materials are injected into a vein to see if the kidneys are normal. There are many kinds of nuclear scans, each giving different information about the kidneys and bladder. The radioactive materials give no more radiation than other kinds of X-rays.

Keep in mind, UTIs are common and most are easy to treat. Early diagnosis and prompt treatment are important because untreated or repeated infections can cause long-term medical problems. Talk to your pediatrician if you suspect that your child might have a UTI.

From your doctor

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