UTI

Dr jayaprakash.k.p,asst prof,ich,govt.medical college,kottayam

What is UTI?

It is an infection affecting any of the following parts like kidney,ureter,bladder or urethra

What is prevalence of UTI?

The prevalence of UTIs varies with age. During the 1st yr of life, the male : female ratio is 2.8-5.4 : 1. Beyond 1-2 yr, there is a female preponderance, with a male : female ratio of 1 : 10. In boys, most UTIs occur during the 1st yr of life; UTIs are much more common in uncircumcised boys, especially in the 1st year of life.

Which all are the agents causing UTI?

UTIs are caused mainly by colonic bacteria. In girls, 75-90% of all infections are caused by *Escherichia coli*), followed by *Klebsiella* spp and *Proteus* spp. Adenovirus and other viral infections also can occur, especially as a cause of cystitis.

Why UTI is important?

A single UTI can damage your kidney. A scarring or damage or associated abnormalities like VUR or PUJ can cause ongoing damage to kidney

Which all are the risk factors for UTI?

Female gender	Tight clothing (underwear)
Uncircumcised male	Pinworm infestation
Vesicoureteral reflux*	Constipation
Toilet training	Bacteria with P fimbriae
Voiding dysfunction	Anatomic abnormality (labial adhesion)
Obstructive uropathy	Neuropathic bladder
Urethral instrumentation	Sexual activity
Wiping from back to front in girls	Pregnancy
Bubble bath?	

What are the clinical manifestations?

The 3 basic forms of UTI are pyelonephritis, cystitis, urthritis and asymptomatic bacteriuria.

Clinical pyelonephritis is characterized by any or all of the following: abdominal, back, or flank pain; fever; malaise; nausea; vomiting; and, occasionally, diarrhea. *Fever may be the only manifestation*. Newborns can show nonspecific symptoms such as poor feeding, irritability, jaundice, and weight loss. Pyelonephritis is the most common serious bacterial infection in infants <24 mo of age who have fever without an obvious focus. **Acute pyelonephritis can result in renal injury, termed *pyelonephritic scarring*.**

Cystitis indicates that there is bladder involvement; symptoms include dysuria, urgency, frequency, suprapubic pain, incontinence, and malodorous urine. Cystitis does not cause fever and does not result in renal injury. Malodorous urine is not specific for a UTI.

Acute hemorrhagic cystitis often is caused by *E. coli;* it also has been attributed to adenovirus types 11 and 21. Adenovirus cystitis is more common in boys; it is self-limiting, with hematuria lasting approximately 4 days

Asymptomatic bacteriuria refers to a condition in which there is a positive urine culture without any manifestations of infection. It is most common in girls. The incidence is <1% in preschool and school-age girls and is rare in boys. The incidence declines with increasing age. This condition is benign and does not cause renal injury, except in pregnant women, in whom asymptomatic bacteriuria, if left untreated, can result in a symptomatic UTI. Some girls are mistakenly identified as having asymptomatic bacteriuria, whereas they actually are experiencing day or night incontinence or perineal discomfort secondary to UTI

How does UTI occur?

Most UTIs are ascending infections. The bacteria arise from the fecal flora, colonize the perineum, and enter the bladder via the urethra. **In uncircumcised boys, the bacterial pathogens arise from the flora beneath the prepuce**. In some cases, the bacteria causing cystitis ascend to the kidney to cause pyelonephritis. Rarely, renal infection occurs by hematogenous spread, as in endocarditis or in some neonates.

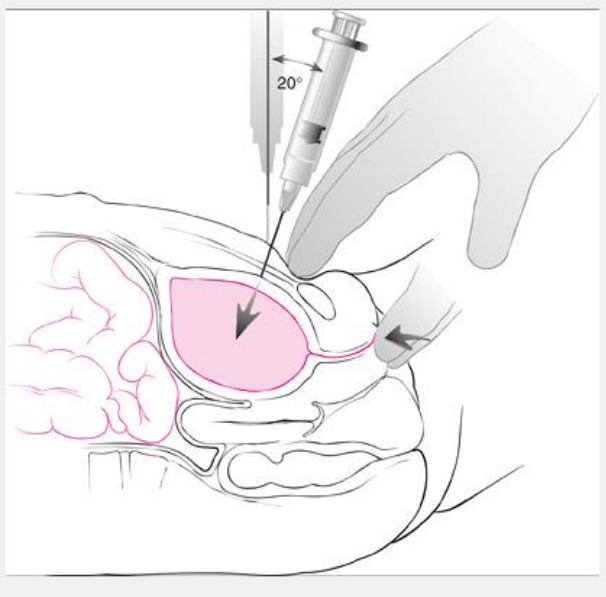
If bacteria ascend from the bladder to the kidney, acute pyelonephritis can occur. Normally the simple and compound papillae in the kidney have an antireflux mechanism that prevents urine in the renal pelvis from entering the collecting tubules. However, some compound papillae, typically in the upper and lower poles of the kidney, allow intrarenal reflux. Infected urine then stimulates an immunologic and inflammatory response. The result can cause renal injury and scarring

Children of any age with a febrile UTI can have acute pyelonephritis and subsequent renal scarring, but the risk is highest in those <2 years of age

The pathogenesis of UTI is based in part on the presence of bacterial pili or fimbriae on the bacterial surface. There are two types of fimbriae, type I and type II. Type I fimbriae are found on most strains of *E. coli.*

How do you dx UTI?

UTI may be suspected based on symptoms or findings on urinalysis, or both; *a urine culture is necessary for confirmation and appropriate therapy.* A suprapubic aspirate ideal.



In toilet-trained children, a midstream urine sample usually is satisfactory; the introitus should be cleaned before obtaining the specimen. In uncircumcised boys, the prepuce must be retracted; if the prepuce is not retractable, a voided sample may be unreliable and contaminated with skin flora.

In children who are not toilet trained, a catheterized urine sample should be obtained. Alternatively, the application of an adhesive, sealed, sterile collection bag after disinfection of the skin of the genitals can be useful only if the culture is negative or if a single uropathogen is identified. However, a positive culture can result from skin contamination, particularly in girls and uncircumcised boys

Pyuria (leukocytes in the urine) suggests infection, but infection can occur in the absence of pyuria; this finding is more confirmatory than diagnostic. Conversely, pyuria can be present without UTI.

Sterile pyuria (positive leukocytes, negative culture) occurs in partially treated bacterial UTIs, viral infections, renal tuberculosis, renal abscess, UTI in the presence of urinary obstruction, urethritis due to a sexually transmitted infection (STI), inflammation near the ureter or bladder (appendicitis, Crohn disease), and interstitial nephritis (eosinophils). Nitrites and leukocyte esterase usually are positive in infected urine.

Microscopic hematuria is common in acute cystitis, but microhematuria alone does not suggest UTI. White blood cell casts in the urinary sediment suggest renal involvement, but in practice these are rarely seen. If the child is asymptomatic and the urinalysis result is normal, it is unlikely that there is a UTI. However, if the child is symptomatic, a UTI is possible, even if the urinalysis result is negative

If the culture shows >100,000 colonies of a single pathogen, or if there are 10,000 colonies and the child is symptomatic, the child is considered to have a UTI. In a bag sample, if the urinalysis result is positive, the patient is symptomatic, and there is a single organism cultured with a colony count >100,000, there is a presumed UTI. If any of these criteria are not met, confirmation of infection with a catheterized sample is recommended.

What is the treatment?

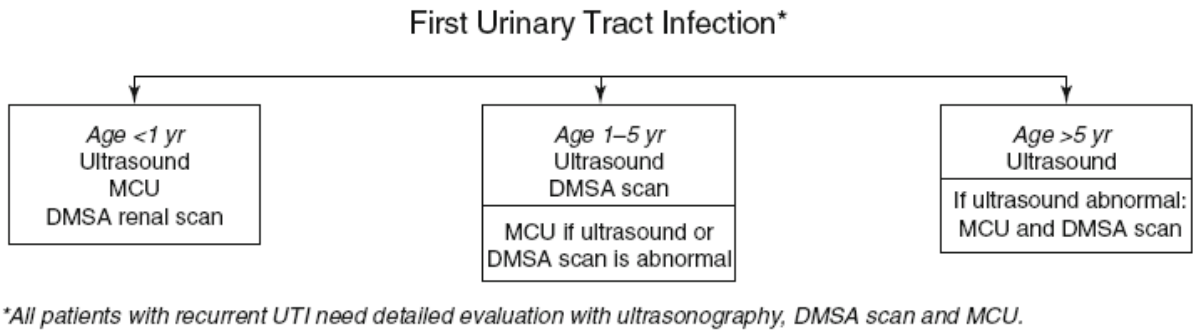
In acute febrile infections suggesting **pyelonephritis,** a 10- to 14-day course of broad-spectrum antibiotics capable of reaching significant tissue levels is preferable. Children who are dehydrated, are vomiting, are unable to drink fluids, are ≤1mo of age, or in whom urosepsis is a possibility should be admitted to the hospital for IV rehydration and IV antibiotic therapy. Parenteral treatment with ceftriaxone (50-75 mg/kg/24 hr, not to exceed 2 g) or cefotaxime (100 mg/kg/24 hr), or ampicillin (100 mg/kg/24 hr) with an aminoglycoside such as gentamicin (3-5 mg/kg/24 hr in 1-3 divided doses) is preferable. The potential ototoxicity and nephrotoxicity of aminoglycosides should be considered, and serum creatinine and trough gentamicin levels must be obtained before initiating treatment, as well as daily thereafter as long as treatment continues. Treatment with aminoglycosides is particularly effective against *Pseudomonas* spp, and alkalinization of urine with sodium bicarbonate increases its effectiveness in the urinary tract.

Oral 3rd-generation cephalosporins such as cefixime are as effective as parenteral ceftriaxone against a variety of gram-negative organisms other than *Pseudomonas,* and these medications are considered by some authorities to be the treatment of choice for oral outpatient therapy

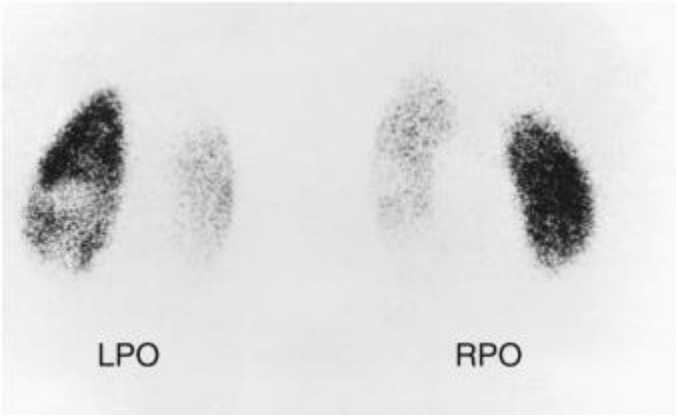
Acute cystitis should be treated promptly to prevent possible progression to pyelonephritis. If the symptoms are severe, presumptive treatment is started pending results of the culture. If the symptoms are mild or the diagnosis is doubtful, treatment can be delayed until the results of culture are known, and the culture can be repeated if the results are uncertain. If treatment is initiated before the results of a culture and sensitivities are available, a 3- to 5-day course of therapy with trimethoprim-sulfamethoxazole (TMP-SMX) or trimethoprim is effective against most strains of *E. coli.*

Antibiotic	Dose (mg/kg/day)[a]
Parenteral	
Ceftriaxone	75–100, in 1–2 divided doses IV
Cefotaxime	100–150, in 2–3 divided doses IV
Amikacin	10–15, single dose IV or IM
Gentamicin	5–6, single dose IV or IM
Co-amoxiclav (amoxicillin + clavulanate)	30–35 of amoxicillin, in 2 divided doses IV
Oral	
Cefixime	8, in 2 divided doses (or once daily)
Co-amoxiclav	30–35 of amoxicillin, in 2 divided doses
Ciprofloxacin	10–20, in 2 divided doses
Ofloxacin	15–20, in 2 divided doses
Cephalexin	50–70, in 2–3 divided doses

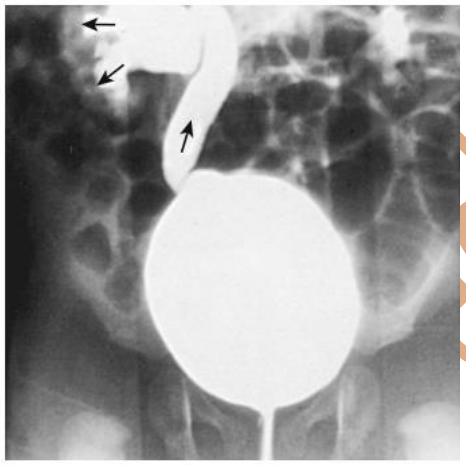
How to investigate a child with uti?



Evaluation following initial urinary tract infection – Guideline of the Indian Society of Pediatric Nephrology. Reproduced from: Vijayakumar et al. (2011) (with permission). *MCU* miction cysturethrogram



Dimercaptosuccinic acid renal scan showing bilateral photopenic areas indicating acute pyelonephritis and renal scarring. *LPO*, left posterior oblique; *RPO*, right posterior oblique



Intrarenal reflux. Voiding cystourethrogram in an infant boy with a past history of a urinary tract infection. Note the right vesicoureteral reflux with ureteral dilatation, with opacification of the renal parenchyma representing intrarenal reflux.

What is importance of recurrent uti?

Recurrence is seen in 30–50 % of children following the fi rst episode of UTI.it can damage kidney.The risk factors for recurrent UTI are:

- Girls
- Age <6 months
- Phimosis/labial adhesions

- Obstructive uropathy

• Voiding dysfunction
• Constipation
• High-grade vesico-ureteral refl ux (VUR

What is the role of chemoprophylaxis?

Preventing recurrence of infection and its complications is the crux of the debate on UTI management. Ten to 30 % of children with UTI will have at least one more episode of infection. The majority of recurrences will occur within the fi rst 12 months after the primary infection. The risks for renal damage include age less than 6 months at the initial UTI, the presence of dilating VUR, and renal damage (scarring) detected at the time of initial UTI which may be congenital in origin.

Growing evidence over the last 10 years showed that prophylactic antibiotic therapy has a limited role in UTI. Adequately powered, well-designed, placebo-controlled trials of long-term antibiotics for the prevention of urinary tract infection in children are lacking. The wide-spread clinical practice of routine antimicrobial prophylaxis is now being questioned.

• There is a concern that common urinary tract pathogens become resistant to traditional agents used for treating UTI.