Editorial

The Urological Society of India Guidelines for the management of pediatric urinary tract infection (Executive Summary)

These guidelines have been drafted by the Urological Society of India Pediatric Urinary Tract Infection (UTI) Guidelines Panel and address "Pediatric Urinary Tract Infection." The guidelines are intended for urologists to provide recommendations for the diagnosis, treatment, and imaging of infants and children presenting with first or recurrent upper or lower UTIs in Indian settings and the recommendations are updated till October 2019. These will remain valid until the next update or for a maximum period of 5 years. The guidelines should not be regarded as a rigid clinical pathway for every patient and are not intended to replace clinical judgment. This executive summary includes some salient aspects of the guidelines and the guideline statements. The complete guidelines document can be accessed from the Urological Society of India website at www.usi.org.in (https://www.usi.org.in/pediatric-uti-guidelines/).

The recommendations in these guidelines were developed after a review of the literature from National Institute for Health and Clinical Excellence guidelines, American Academy of Pediatrics (AAP) guidelines, European Society of Pediatric Urology, Urological Clinic of America, Indian Society of Pediatric Nephrology guidelines, and a search of PubMed for UTI, newborn, infants, preschool, school, child, and adolescent.[1-8] Special attention was given to publications made from the Indian subcontinent so as to make these recommendations aptly applicable to local needs and clinical circumstances.[9,10] A consensus decision was adopted when evidence was low. In these cases, all relevant papers and statements were discussed by all the authors until a consensus was achieved. The guidelines panel based its final recommendations on the best available global evidence, Indian data, as well as the socioeconomics of healthcare in India.

UTI is one of the most common bacterial infections in children. The infection may affect the upper urinary tract (referred to as pyelonephritis) or the lower urinary tract (referred to as cystitis). From a practical point of view, these two conditions are discussed together under the umbrella of UTI.[11] The high incidence, tendency to relapse, associated morbidity, and problems with the collection of an uncontaminated urine specimen present significant challenges to a clinician.[11] UTI is a significant concern for children, parents, and clinicians alike. Since UTI can present with vague clinical complaints, UTI should be considered in any infant or child presenting with fever without an obvious source of infection. Prompt diagnosis and early therapy are crucial in the prevention of long-term UTI-related complications.[12]

According to global studies, the overall prevalence of UTIs among febrile infants and young children is estimated to be approximately 4%–7%.[12,13] However, it varies according to the age, sex, race, nutritional state, state of circumcision, and other factors.[11] The prevalence also seems to be increasing over time. The average prevalence of UTIs among children reported by the AAP in 1999 was 5%.[14] Shaikh *et al.*, in their meta-analysis in 2008, reported an average prevalence rate of 7% among febrile children below 2 years of age.[15] The prevalence rate varied between 5.5 and 8.1 among the studies.[16,17]

Unfortunately, observational studies on UTIs in Indian children are very less with few available studies, showing a prevalence of 4%–5% in febrile children.[9,10] In a developing country like India with a huge population of which a significant portion is going to be made of young children, it is imperative that we have defined protocols for managing and treating UTI.

GUIDELINE STATEMENTS

Diagnostic workup

1. Proper history-taking includes questions on primary (first) or secondary (recurring) infection, febrile or nonfebrile UTIs, malformations of the urinary tract, previous surgeries, fluid intake, family history, whether there is constipation/encopresis or the presence of lower urinary tract symptoms, and sexual history in cases of adolescents
2. Fever may be the only symptom of UTI, especially in young children
3. Newborns with pyelonephritis or urosepsis can present with nonspecific symptoms (failure to thrive, jaundice, vomiting, hyperexcitability, lethargy, hypothermia, and sometimes without fever)
4. Septic shock is unusual even with high fever, unless obstruction is present or the child is otherwise compromised
5. A complete physical examination is required to exclude any other source of fever, and especially if the fever has no apparent cause, UTI should be ruled out

6. Physical examination should search for palpable bladder, palpable and painful kidney, loaded colon suggestive of constipation, stigmata of spina bifida or sacral agenesis, spine and gait abnormality, genital disorders (phimosis, labial adhesion, postcircumcision meatal stenosis, abnormal urogenital confluence, cloacal malformations, vulvitis, epididymo-orchitis, and prolapsed ureterocele), and raised temperature.

Diagnosis of urinary tract infection

1. The diagnosis should be based on the presence of both pyuria and $>10^5$ CFU/ml in a clean-catch midstream voided urine sample
2. If urine is obtained by catheterization, 1000–50,000 CFU/ml is considered positive in symptomatic patient
3. Any counts obtained after suprapubic aspiration should be considered significant.

Acute management

1. Infants and children with a high risk of serious illness should be referred urgently to the care of pediatric specialist having access to both pediatric urologist and nephrologist
2. Empiric antibiotic therapy can be started if the child is too sick even before the urine culture and sensitivity report is available
3. For lower tract (cystitis), most children can be treated with oral antibiotics as per the urine culture and sensitivity report
4. For upper tract (pyelonephritis), parenteral antibiotics should be started until the child exhibits clinical improvement, generally within 48–72 h, and is able to retain orally administered fluids and medications that is to be continued for the next 10 days
5. The total course of antibiotic therapy should be 7–14 days.

Imaging after the first urinary tract infection

1. The aim of investigations is to identify patients at high risk of renal damage, chiefly those below 1 year of age, and those with vesicoureteric reflux (VUR) or urinary tract obstruction
2. Evaluation includes ultrasonography, dimercaptosuccinic acid renal scan, and voiding cystourethrogram performed judiciously as shown in Table 1.

Prevention of recurrence

1. Children who have had a UTI should be encouraged to drink an adequate amount of liquids (~40 ml/kg/day)
2. Children who have had a UTI should have readily access to clean toilets when required and should be encouraged to avoid postponing voiding
3. Bladder bowel dysfunction and constipation should be addressed in infants and children who have had a UTI
4. In children with VUR who are toilet trained, regular and volitional low pressure voiding with complete bladder emptying is encouraged. Double voiding ensures emptying of the bladder of postvoid residual urine
5. Circumcision reduces the risk of recurrent UTI in infant boys and might therefore have benefits in patients with high-grade reflux.

Table 1: Imaging following the first febrile urinary tract infection

Age <1 year.
USG
VCUG
DMSA (in view of high chances of renal damage)
Age 1–5 years
USG
If abnormal,
VCUG
DMSA scan (Sequence either by Top down/Bottom up approach)
Age >5 years
USG only
VCUG/DMSA scan to be done selectively

USG: Ultrasonography, DMSA: Dimercaptosuccinic acid, VCUG: Voiding cystourethrogram

Antibiotic prophylaxis

1. The antibiotics used should be effective, nontoxic with few side effects and should not alter the growth of commensals or induce bacterial resistance
2. Antibiotic prophylaxis should not be routinely recommended in infants and children following the first-time UTI
3. The indications and duration of prophylaxis depend on patient's age and presence or absence of VUR
4. Antibiotic prophylaxis is recommended for patients with UTI below 1 year of age, while awaiting imaging studies, VUR (all grades in infants <2 years, dilating VUR, Grade III–V in 2–5 years), and recurrent febrile UTI (3 or more episodes in a year) even if the urinary tract is normal
5. Antibiotic prophylaxis is not advised in patients with urinary tract obstruction (e.g., posterior urethral valves), urolithiasis, and neurogenic bladder and in patients on clean intermittent catheterization. In these cases, the primary cause needs to be addressed first
6. Asymptomatic bacteriuria in infants and children should not be treated with prophylactic antibiotics
7. Breakthrough UTI usually results either from poor compliance or associated voiding dysfunction. The UTI should be treated with appropriate antibiotics
8. A change of medication being used for prophylaxis is usually not necessary
9. There is no role for cyclic therapy, where the antibiotic used for prophylaxis is changed every 6–8 weeks.

Follow-up

1. When results are satisfactory, a follow-up outpatient appointment is not routinely required
2. Parents or caregivers should be informed of the results of all the investigations in writing

3. Infants and children who have recurrent UTI or abnormal imaging results should be assessed by a pediatric urologist
4. Assessment of infants and children with renal parenchymal defects should include height, weight, blood pressure, and routine testing for proteinuria
5. Infants and children with a minor, unilateral renal parenchymal defect do not need long-term follow-up unless they have recurrent UTI or family history or lifestyle risk factors for hypertension
6. Infants and children who have bilateral renal abnormalities, impaired kidney function, raised blood pressure, and/or proteinuria (random spot protein creatinine ratio >0.2 suggesting significant proteinuria) should receive monitoring and appropriate management by a pediatric nephrologist to slow the progression of chronic kidney disease
7. Infants and children who are asymptomatic following an episode of UTI need not routinely have their urine re-tested for infection (no screening urinalysis or culture)
8. Asymptomatic bacteriuria is not an indication for follow-up.

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REFERENCES

1. National Institute for Health and Clinical Excellence. Urinary tract infection in children. London: NICE, 2007. Available from: http://guidance.nice.org. uk/CG054. [Last accessed on 2020 Dec 27].
2. Subcommittee on Urinary Tract Infection, Steering Committee on Quality Improvement and Management, Roberts KB. Urinary tract infection: Clinical practice guideline for the diagnosis and management of the initial UTI in febrile infants and children 2 to 24 months. Pediatrics 2011;128:595-610.
3. Bitsori M, Galanakis E. Pediatric urinary tract infections: Diagnosis and treatment. Expert Rev Anti Infect Ther 2012;10:1153-64.
4. Stein R, Dogan HS, Hoebeke P, Kočvara R, Nijman RJ, Radmayr C, *et al*. Urinary tract infections in children: EAU/ESPU guidelines. Eur Urol 2015;67:546-58.
5. Schmidt B, Copp HL. Work-up of pediatric urinary tract infection. Urol Clin North Am 2015;42:519-26.
6. Bagga A, Babu K, Kanitkar M, Srivastava RN; Indian Pediatric Nephrology Group Indian Academy of Pediatrics. Consensus statement on management of urinary tract infections. Indian Pediatr 2001;38:1106-15.
7. Indian Society of Pediatric Nephrology, Vijayakumar M, Kanitkar M, Nammalwar BR, Bagga A. Revised statement on management of urinary tract infections. Indian Pediatr 2011;48:709-17.
8. Montini G, Tullus K, Hewitt I. Febrile urinary tract infections in children. N Engl J Med 2011;365:239-50.
9. Vinodkumar MS, Mohan MV. Outcome of children with first episode of urinary tract infection. Int J Sci Study 2018;6:163-73.
10. Wani KA, Ashraf M, Bhat JA, Parry NA, Shaheen LB. Paediatric urinary tract infection: A hospital based experience. J Clin Diagn Res 2016;10:SC04-7.
11. Leung AK, Wong AH, Leung AA, Hon KL. Urinary tract infection in children. Recent Pat Inflamm Allergy Drug Discov 2019;13:2-18.
12. Almofarreh M, Alowaa Z, Junainah E, Alshahrani N, Alharbi M, Alkhalifahet W, *et al*. Prevalence of urinary tract infection among children. Int J Contemp Pediatr 2018;5:2356-9.
13. O'Brien K, Stanton N, Edwards A, Hood K, Butler CC. Prevalence of urinary tract infection (UTI) in sequential acutely unwell children presenting in primary care: Exploratory study. Scand J Prim Health Care 2011;29:19-22.
14. Finnell SM, Carroll AE, Downs SM, Subcommittee on Urinary Tract Infection. Technical report Diagnosis and management of an initial UTI in febrile infants and young children. Pediatrics 2011;128:e749-70.
15. Shaikh N, Morone NE, Bost JE, Farrell MH. Prevalence of urinary tract infection in childhood: A meta-analysis. Pediatr Infect Dis J 2008;27:302-8.
16. Bachur R, Harper MB. Reliability of the urinalysis for predicting urinary tract infections in young febrile children. Arch Pediatr Adolesc Med 2001;155:60-5.
17. Shaw KN, Gorelick M, McGowan KL, Yakscoe NM, Schwartz JS. Prevalence of urinary tract infection in febrile young children in the emergency department. Pediatrics 1998;102:e16.

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