Urinary Tract Infection (UTI) in Children

1. Introduction

Urinary tract infections (UTIs) are among the most common bacterial infections in children, with potential to cause significant morbidity if not identified and treated early. The clinical presentation of UTI varies widely across different pediatric age groups, often making diagnosis a challenge—especially in infants and non-verbal children.

Early and appropriate management is crucial not only to relieve symptoms but also to prevent renal scarring, hypertension, and chronic kidney disease. Timely recognition, guided by age-specific symptoms and supported by appropriate investigations, forms the cornerstone of effective care.

2. Etiology and Risk Factors

Common Pathogens:

The majority of pediatric UTIs are caused by Escherichia coli (E. coli), responsible for approximately 80–90% of cases.

Other organisms include Klebsiella, Proteus, Enterobacter, and Enterococcus species.

Risk Factors:

Age and Gender:

Boys are more affected in the neonatal period (especially uncircumcised males).

Girls are more prone after infancy due to shorter urethra.

Poor Perineal Hygiene:

Infrequent diaper changes and improper cleaning can lead to ascending infections.

Constipation:

Leads to urinary stasis and incomplete bladder emptying.

Structural Abnormalities:

Vesicoureteral reflux (VUR)

Posterior urethral valves

Ureteropelvic junction obstruction

Neurogenic Bladder:

Impaired bladder emptying in conditions like spina bifida.

Indwelling Catheters or Instrumentation:

Introduces bacteria into the urinary tract.

Family History of UTI or Renal Disease

3. Clinical Features

The symptoms of UTI in children vary significantly with age and the site of infection (upper vs lower urinary tract).

Infants and Young Children (0–2 years):

Nonspecific signs such as:

Fever without focus

Irritability, lethargy

Poor feeding or vomiting

Failure to thrive

Jaundice (in neonates)

May not present with urinary symptoms

Older Children (>2 years):

Classic symptoms such as:

Dysuria (painful urination)

Increased frequency and urgency

Suprapubic pain

Foul-smelling or cloudy urine

Enuresis (new-onset bedwetting)

Upper UTI (Pyelonephritis):

High-grade fever

Abdominal or flank pain

Vomiting

Loin tenderness

Generalized malaise

4. Diagnosis

Accurate diagnosis is crucial to ensure appropriate management and to prevent complications.

Urine Collection Methods:

Clean-catch midstream urine (preferred for toilet-trained children)

Urethral catheterization (infants)

Suprapubic aspiration (when sterile sample is required)

Investigations:

Urinalysis:

Pyuria (WBCs in urine)

Positive nitrites (suggestive of gram-negative bacteria)

Leukocyte esterase

Urine Culture:

Gold standard for diagnosis

Significant bacteriuria defined as $\geq 10^5$ CFU/mL in clean-catch specimen

Blood Tests:

CBC, CRP, ESR (in suspected pyelonephritis)

Imaging Studies:

Ultrasound KUB: First-line in all infants with UTI

MCU (Micturating Cystourethrogram): For suspected VUR

DMSA scan: To assess renal scarring or acute pyelonephritis

5. Differential Diagnosis

Since symptoms of pediatric UTI can be nonspecific, it is crucial to differentiate UTIs from other common pediatric conditions:

Conditions	Distinguishing features
Febrile illness without focus	No urinary symptoms, normal urine tests
Vulvo vaginitis	Faul smelling discharge, itching, erythema
Balanitis	Inflammation otvthe glans penis, no dysuria or frequency
Diaper rash	Localized rash with Clear borders , no fever
Dehydration	Concentreted urine, no infection signs
Appendicitis	Right lower quadrant pain, Elevated wbc , no urinary symptoms

6. Management

A. Empirical Antibiotic Therapy:

Initiate empirically after urine collection.

Tailor therapy based on urine culture and sensitivity.

Age/Severity	Preferred Route	Suggested Antibiotics
Infants <2 months	IV	Ampicillin + Gentamicin
Febrile UTI > 2 months	Oral or IV	Oral: Cefixime, Amoxicillin-clavulanate

		IV: Ceftriaxone, Cefotaxime
Afebrile cystitis	Oral	Nitrofurantoin, Trimethoprim-Sulfamethoxazole

Duration:

Lower UTI: 5–7 days

Upper UTI: 7–14 days

B. Supportive Care:

Adequate hydration

Antipyretics (e.g., Paracetamol)

Monitor for response to therapy within 48–72 hours

C. Indications for Hospitalization:

Age <2 months

Toxic appearance or poor oral intake

Vomiting or dehydration

Failure of outpatient therapy

7. Prevention and Follow-up

A. Preventive Measures:

Promote proper perineal hygiene

Treat constipation

Encourage regular bladder emptying

Ensure complete bladder evacuation

B. Antibiotic Prophylaxis:

Consider in recurrent UTI or significant VUR

Use lowest effective dose (e.g., Nitrofurantoin at bedtime)

C. Follow-Up Imaging:

After first UTI in infants: Renal USG

If VUR suspected: MCU, DMSA as advised

Recurrent UTI: Further workup for underlying anomalies

8. Conclusion & Key Points

UTI in children presents variably by age and needs prompt diagnosis.

Proper urine collection and culture are key to management.

Renal damage from repeated infections can be prevented through early treatment and appropriate follow-up.

A holistic approach including hygiene, nutrition, and in some cases, traditional support systems like Ayurveda can enhance outcomes.