**Urinary Tract Infection (UTI) in Children**

**Introduction**

Urinary tract infection (UTI) is caused by a germ (usually bacteria) in the urinary system, and it is most common in children less than 2 years old. UTI can be classified into lower urinary tract infection(cystitis) which involves the bladder and urethra and upper urinary tract infection which involves the kidney(pyelonephritis). Sometimes, some UTI it is not possible to distinguish between these 2 conditions. Around 1.7% of boys and 8.4% of girls will have urinary tract infection before their 7th birthday.

**Recurrent urinary tract infection:**

* Two or more episodes of UTI with acute upper UTI (acute pyelonephritis); or
* One episode of UTI with acute upper UTI plus one or more episodes of UTI with lower UTI (cystitis); or
* Three or more episodes of UTI with lower UTI.

**Risk factors**

* Age below one year old
* Female (Except male infant below 3 months old)
* Children with known abnormalities in urinary tract such as vesico-ureteric reflux (VUR) or duplex kidney etc.
* Child with previous UTI
* Bladder bowel dysfunction

**Signs and Symptoms**

Sometimes it is hard to tell if a child is having UTI, especially the young child and the symptoms may be nonspecific. The symptoms include,

* Fever with rigors
* Being irritable/ fussy
* Loss of appetite
* Vomiting or diarrhoea
* Cloudy or foul-smelling urine
* Crying during micturition

Older children and adolescents have signs and symptoms like adults.

* Complain of painful micturition (dysuria)
* Loin pain or suprapubic tenderness
* Frequency
* Urgency

**Investigations**

* Urinalysis (Urine dipstick testing)- Presence of pyuria with positive Nitrate / Leukocyte esterase are highly suggestive of UTI. A Urine culture needs to be obtained and antibiotics should be initiated.
* Blood test (Optional depends on clinical severity): Complete blood count to look for high white cell count, renal function test to look for renal impairment. Blood culture and sensitivity, inflammatory markers such as CRP or pro calcitonin.
* Imaging: In acute setting, imaging is usually not necessary unless the child is ill or not response to treatment and doctor is suspecting of collection of pus in the urinary tract system.
* Collection of urine culture: for non-toilet train children, urine catheterization or suprapubic catheterization remains the gold standard of diagnosis. For toilet trained children, a clean void sample is acceptable for the diagnosis of UTI.

**Principle of Management**

* Treat the infection and eradicate bacteria in the urinary tract.
* Prevent recurrent UTIs.
* Prevent renal scarring that may lead to chronic kidney disease.
* Acute Management:
  + Ill children or those who do not eat well may need hospital admission for investigations and treatment such as intravenous or oral antibiotics.
  + The duration of antibiotics depends on individual presentation, please discuss with the medical team.

**Follow Up Imaging plans**

* All children younger than 3 years old with febrile urinary tract infection should undergo an ultrasound kidney and urinary tract to detect any anatomical anomalies.
* If a child has abnormal ultrasound, doctor may arrange further testing such as micturating cystourethrogram (MCUG)
* Dimercaptosuccinic acid scintigraphy scan (DMSA) can be performed 4-6 months after the acute infection if a had serious urinary tract infection with atypical organism or recurrent urinary tract infection. (To detect renal scarring).
* Doctors may suggest antibiotics prophylaxis if a child has vesico-ureteric reflux and recurrent urinary tract infection.

**Complications**

* Overall, the prognosis of UTI in children is good.
* Late in seeking treatment may lead to severe infection such as sepsis.
* Renal scaring/damage: Around 5% of children with first time UTI (Acute pyelonephritis) have renal scarring. Renal scarring is also more common in children detected with VUR.
* A minority of the children may have renal insufficiency (renal failure) and hypertension after urinary tract infection, especially those with renal scarring.

**Prevention of urinary tract infection in children**

* Avoid constipation.
* Adequate fluid intake.
* Good hygiene.
* Avoid holding urine for a long period of time.

**Reference/Useful Information**

1. Kjell Tullus, Nader Shaikh, Urinary Tract infection in children. The Lancet 2020:395:1659-68.
2. Urinary tract infection in under 16s: diagnosis and management; NICE guideline (Updated version of July 2022).