



The RPSG

The Renal Patient Support Group

Urinary Tract Infections

Urinary Tract Infections (UTIs)



UTIs are a significant cause of morbidity in recipients of all ages.



UTIs are caused by both Gram-negative and Gram-positive bacteria and by certain fungi.



The most common causative agent is *Escherichia coli*.



In recipients with catheters, a broader range of Gram-negative bacilli, including: *Proteus*, *Klebsiella* and *Pseudomonas spp.* are frequently causative organisms.



The incidence of UTI is 3 times larger in CKD recipients who are not on dialysis, than the general population.



The assumption that recurrent UTIs in recipients with VUR lead to renal scarring and consecutive CKD.



UTI is a first symptom of cognitive anomaly of the kidneys and urine tract (CAKUT).

Epidemiology

They are bacterial infections, affecting 150 million people every year worldwide.

UTIs can be a significant cause of morbidity in all age groups.

The most common bacterial infection is in paediatrics aged <2 years.

Around 43-56% of UTIs are associated with catheterization.



UTI Classification

Uncomplicated	Complicated
<ul style="list-style-type: none">• Typically affect individuals who are healthy and have no structural or neurological urinary tract abnormalities.• These infections are differentiated into lower UTIs (cystitis) and upper UTIs (pyelonephritis)	<ul style="list-style-type: none">• UTIs associated with factors that compromise the urinary tract or host defence, including urinary obstruction, urinary retention caused by neurological disease, immunosuppression, renal failure, renal transplantation, pregnancy and the presence of foreign bodies such as catheters.



Atypical UTI: Recipients with oligiuria, abdominal or bladder mass, elevated serum creatinine, septicaemia, failure to respond to treatment with suitable antibiotics within 48h, infections with other organisms than *Escherichia coli*

Clinical Features

Presentation of UTIs can vary and range from recipients with limited clinical symptoms to urinary sepsis.

Infection of the urinary tract can affect both the lower and upper parts of the urinary tract.

Lower UTI can be defined with symptoms suggestive of cystitis (dysuria, or increased urinary frequency without fever, chills or back pain).

Upper UTI can present with symptoms suggestive of pyelonephritis (loin pain, flank tenderness, fever, rigors, or other manifestations of systemic inflammatory response).

Urosepsis may be diagnosed when clinical symptoms of infection are accompanied by signs of systemic inflammation (e.g. fever, tachycardia, tachypnoea).

Catharised recipients who do not always present with typical clinical symptoms of a UTI.



Risk Factors

- Poor urine flow (Oliguria)
- History of previous UTI
- Recurrent fever of uncertain origin
- Antenatal diagnosis of renal abnormality
- Family history of VUR or renal disease
- Constipation
- Dysfunctional voiding
- Enlarged bladder
- Abdominal mass
- Evidence of spinal lesion
- Poor growth
- High blood pressure



UTI Symptoms

Urinary Tract Affected	Signs and Symptoms
Renal (Pyelonephritis)	<ul style="list-style-type: none">• Upper back and side (flank) pain• High fever• Shaking and chills• Nausea• vomiting
Bladder (Cystitis)	<ul style="list-style-type: none">• Pelvic pressure• Lower abdomen discomfort• Frequent, painful urination• Blood in Urine
Urethra (Urethritis)	<ul style="list-style-type: none">• Burning with urination• Discharge



Diagnosis

UTI in recipients may be difficult to diagnose, especially in paediatrics aged < 2-3 years. The symptoms and signs in this age group are non-specific.

Urine tests are warranted in paediatrics with typical UTI symptoms and in cases of unexplained fever.

The modality for diagnosing a UTI is a clean voided midstream urine sample.

Urinalysis

Microscopic analysis of centrifuged urine, 5 WBCs per high-power field is a usual threshold for pyuria.

Urinalysis and urine culture can be used to diagnosis acute pyelonephritis.

Automatic counting in uncentrifuged urine, with 10 WBCs.

Microbiology Cultures



Urinalysis

Urinalysis is helpful for nitrite and leukocyte esterase, and microscopic examination for white blood cells (WBC) and bacteria.

The nitrite dipstick test represents the conversion of dietary nitrate by gram-negative bacteria and has high specificity (98%) for UTI.

Its major limitation is that it gives negative results when the bladder is emptied frequently or if the underlying pathogen is gram-positive.

Urine dipstick test is not recommended for the paediatrics who void frequently.

Leukocyte esterase has sensitivity of 87% for UTIs.

White blood cells present in the urine on microscopic examination are a useful indicator of inflammation associated with UTI.



Cultures

Urine sample is cultured to detect bacterial growth in the urine, which can be indicative of infection and can guide antibiotic therapy.

Urine should only be cultured if recipients have two or more signs of infection (especially dysuria, fever).

Significant bacteriuria is defined as 5×10^4 colony forming units (CFU) per millilitre (CFU/ml).

Recipients with positive urine culture and normal urinalysis, without symptoms, are regarded as having asymptomatic bacteriuria.



Imaging



The main objective for performing imaging following a UTI in paediatrics is to identify recipients with CAKUT, mainly VUR, who may be more susceptible to recurrent UTI and renal scarring.



Abdominal ultrasound is one of the least invasive diagnostic tool in evaluating paediatrics with UTI.



Ultrasound is indicated in all recipients with UTI aged <6 months.



Management

- The choice of antibiotic should be based on locally developed current resistance patterns of urinary pathogens.
- Parenteral treatment is required in recipients/ paediatrics who are severely ill or unable to retain oral intake.
- Parenteral antibiotics should be switched to oral as soon as clinical improvement is observed, usually within 24h-48h.
- Upper UTI treatment should last 7-10 days.
- In lower UTI treatment should be 3 days.



Management

Recurrent UTI defined as 3 or more separate episodes in one year.

Daily antimicrobial prophylaxis has been found to reduce the recurrence of UTI. The guidelines across different health conditions can be ambiguous. However, there is evidence to indicate that antibiotics are appropriate between upper and lower UTIs

There is not an ideal prophylactic agent, all antibiotics are associated with increasing resistance and occurrence of adverse effects.

Antimicrobial prophylaxis, can be used to be routinely administered in recipients with CAKUT, and literature informs that prophylaxis is effective in reducing the risk of recurrent UTIs.



Treatment



Urine tests must be performed before antimicrobial/ antibiotic treatment is introduced.



UTI treatment should always be in line with local guidelines or based on microbiology investigations.



Treatment options may include antimicrobials, including amoxicillin, cefalexin, ciprofloxacin, co-amoxiclav, pivmercilinam, and Fosfomycin.



Recipients with pyrexia should be referred and may need to be admitted to hospital.



If recipients do not respond to antibiotics within 24h, they must be admitted to hospital, owing to possibility of antibiotic resistance.



The recipient should complete full course of antibiotics/ antimicrobials even if symptoms improve.



Summary

- It is recommended that urinalysis be performed in recipients with typical UTI symptoms and in paediatrics with unexplained pyrexia.
- Urinalysis should be performed before administration of any antimicrobials.
- Both positive urinalysis and bacteriuria are necessary to diagnose of UTI.
- Recipients with positive urine culture and negative urinalysis, without symptoms, are regarded as having asymptomatic bacteriuria.
- In recipients younger than 3-months, the differentiation between upper UTI and lower UTI, generally prompts health professionals to implement guidelines, accordingly.



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