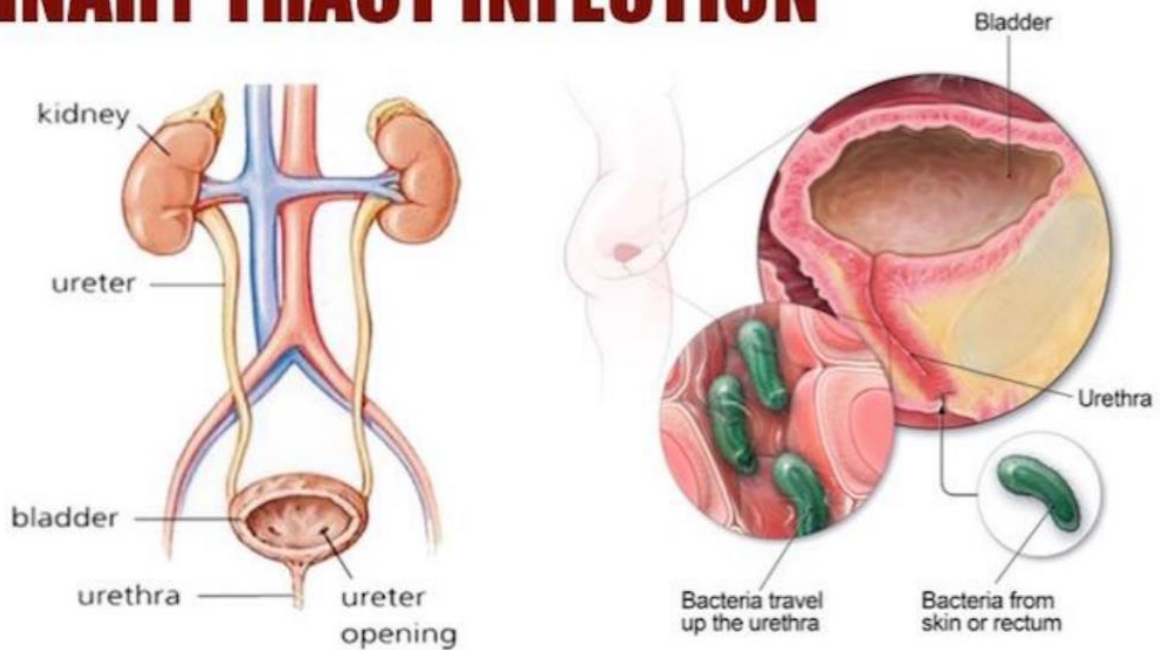


URINARY TRACT INFECTION

Definition- A urinary tract infection (UTI) is an infection from microbes. These are organisms that are too small to be seen without a microscope. Most UTIs are caused by bacteria, but some are caused by fungi and in rare cases by viruses.

A UTI can happen anywhere in our urinary tract. Our urinary tract is made up of kidneys, ureters, bladder, and urethra. Most UTIs only involve the urethra and bladder, in the lower tract. However, UTIs can involve the ureters and kidneys, in the upper tract. Although upper tract UTIs are more rare than lower tract UTIs, they're also usually more severe.

URINARY TRACT INFECTION



Urinary tract infections typically occur when bacteria enter the urinary tract through the urethra and begin to multiply in the bladder. Although the urinary system is designed to keep out such microscopic invaders, these defenses sometimes fail. So when this occurs bacteria may take hold and grow into a full-blown infection in the urinary tract.

Sign & symptoms :

Lower Urinary Tract Infection:

- Increased frequency of urination without passing much urine

- Burning with urination, Cloudy urine , Bloody urine
- Pelvic pain in women
- **Rectal pain in men**

Upper Urinary Tract Infection:

- Pain and tenderness in the upper back and sides
- Chills with unusual headache
- Fever which follow come and go pattern
- Nausea , vomiting

Cause of urinary tract infection

- Female anatomy: A woman has a shorter urethra than a man does, which shortens the distance that bacteria must travel to reach the bladder.
- Certain types of birth control
- Menopause
- Infection of the bladder (cystitis)
- Infection of the urethra (Urethritis)
- A suppressed immune system

URINARY ANTISEPTICS

Some orally administered AMAs attain antibacterial concentration only in urine, with little or no systemic antibacterial effect

Nitrofurantoin and methenamine are two such agents; infrequently used now. Nalidixic acid can also be considered to be a urinary antiseptic.

Nitrofurantoin

- It is primarily bacteriostatic, but may be cidal at higher concentrations and in acidic urine. Its activity is enhanced at lower pH.
- Many gram-negative bacteria were susceptible, but due to development of resistance, activity is now restricted largely to E. coli.
- Resistance to nitrofurantoin does not develop during continued therapy.
- No cross resistance with any other AMA is known, though it antagonizes the bactericidal action of nalidixic acid.
- Susceptible bacteria enzymatically reduce nitrofurantoin to generate reactive **intermediates which damage DNA.**

PHARMACOKINETICS:

- ✓ Nitrofurantoin is well absorbed orally
- ✓ rapidly metabolized in liver and other tissues
- ✓ less than half is excreted unchanged in urine
- ✓ plasma $t_{1/2}$ is 30–60 min.

Adverse effects :

- gastrointestinal intolerance—nausea, epigastric pain and diarrhoea.
- An acute reaction with chills, fever and leucopenia occurs occasionally.
- Peripheral neuritis and other neurological effects are reported with long-term use.

Methenamine (Hexamine)

It is hexamethylene-tetramine, which is inactive as such; decomposes slowly in acidic urine to release formaldehyde which inhibits all bacteria.

This drug exerts no antimicrobial activity in blood and tissues, including kidney parenchyma.

Acidic urine is essential for its action; urinary pH must be kept below 5.5 by administering an organic acid which is excreted as such, e.g. mandelic acid or hippuric acid or ascorbic acid.

Methenamine is administered in enteric coated tablets to protect it from decomposing in gastric juice.

Mandelic acid, given as methenamine mandelate, is excreted in urine →lowers urinary pH and promotes decomposition of methenamine.

Antibiotics used to treat Urinary tract Infections

1. Sulfamethoxazole
2. Nitrofurantoin
3. Fosfomycin
4. Amoxicillin
5. Certain cephalosporins
6. Ciprofloxacin
7. Levofloxacin
8. Ceftriaxone
9. Gentamicin
10. Tobramycin

Sulfonamides :

Dependability in acute UTIs has decreased; they are not used now as single drug. May occasionally be employed for suppressive and prophylactic therapy.

Cotrimoxazole :

Though response rate and use have declined, it may be employed empirically in acute UTI without bacteriological data, because majority of urinary pathogens, including *Chlamydia trachomatis*, are covered by cotrimoxazole.

It should not be used to treat UTI during pregnancy.

3. Quinolones

The first generation FQs, especially norfloxacin and ciprofloxacin are highly effective and currently the most popular drugs, because of potent action against gramnegative bacilli and low cost.

Ampicillin/Amoxicillin

Frequently used in the past as first choice drug for initial treatment of acute infections without bacteriological data, but higher failure and relapse rates have made them unreliable for empirical therapy.

Many E. coli strains are now ampicillin-resistant. Amoxicillin + clavulanic acid is more frequently employed.

Parenteral coamoxiclav is often combined with gentamicin for initial treatment of acute pyelonephritis

Gentamicin

Very effective against most urinary pathogens including Pseudomonas. because of narrow margin of safety and need for parenteral administration, it is generally used only on the basis of in vitro bacteriological sensitivity testing.

The newer aminoglycosides may be needed for hospital-acquired infections.

Tetracyclines

They are effective now, because most urinary pathogens have become resistant. Though broad spectrum, they are used only on the basis of sensitivity report and in Ch. trachomatis cystitis.

Prophylaxis for urinary tract infection

This may be given when:

- (a) Women of child bearing age have recurrent cystitis.
- (b) Catheterization or instrumentation inflicting trauma to the lining of the urinary tract is performed; bacteremia frequently occurs and injured lining is especially susceptible.
- (c) Indwelling catheters are placed.
- (d) Uncorrectable abnormalities of the urinary tract are present.
- e) Inoperable prostate enlargement or other chronic obstruction causes urinary stasis.

The most frequently used drugs for prophylaxis of lower UTI are:

- **Cotrimoxazole 480 mg***
- **Nitrofurantoin 100 mg***
- **Norfloxacine 400 mg***
- **Cephalexin 250 mg***

*** All drugs are given once daily at bed time.**