

Table 1: Classification of UTIs

UTI Classification	Description
Upper Tract	Infection involving the kidneys (pyelonephritis)
Lower Tract	Infection corresponding to bladder infection or cystitis

Table 2: Classification of UTIs based on Complexity

UTI Classification	Description
Uncomplicated	Infections in individuals without structural / functional abnormalities of UT that could interfere with urine flow
Complicated	Infections resulting from a predisposing lesion of the urinary tract, such as congenital abnormalities, stones, catheters.

Table 3: Common Bacteria Involved in UTIs

Bacteria	Description
Escherichia coli (E. coli)	Most common bacteria associated with UTIs
Klebsiella pneumoniae	Frequently isolated organism
Pseudomonas aeruginosa	Frequently isolated organism
Staphylococci	Frequently isolated organism

Table 4: Symptoms of Pyelonephritis and Cystitis

Symptom	Description
Pyelonephritis	Fever, flank pain, frequency, nausea, and vomiting
Cystitis	Burning on urination (dysuria), frequent urination, urgency, suprapubic pain, hematuria, and back pain

Generation	Quinolones	Activity Against	Notes
1st	Nalidixic acid	Little activity against E. coli, Proteus, Shigella, Enterobacter, Klebsiella Effective against G+ve, limited to UTIs (urinary tract antiseptic).	Not effective against Pseudomonas
	Pipemidic acid		
	Oxolinic acid		
2nd	Ciprofloxacin	More activity against G-ve bacteria	Widely used
	Ofloxacin		
	Norfloxacin		
	Enoxacin		
	Lomefloxacin		
Nadifloxacin			
3rd	Levofloxacin	good activity against Pseudomonas and anaerobic microorganisms	Widely used
	Sparfloxacin		
	Gatifloxacin		
4th	Moxifloxacin	good activity against Pseudomonas and anaerobic microorganisms	Widely used
	Prulifloxacin		
	Gemifloxacin		

Antibiotic	MOA	Spectrum	Main Uses	MOR	Common Side Effects	Notes
Trimethoprim-sulfamethoxazole (co-trimoxazole)	Inhibits bacterial folic acid synthesis	Broad	*UTIs *Respiratory infections *Skin and soft tissue infections	Common	*Allergic reactions *GI disturbances	
Cephalosporins	Inhibit bacterial cell wall synthesis	Broad	UTIs, respiratory infections, skin and soft tissue infections	Common	*Allergic reactions *GI disturbances	
Quinolones/ Fluoroquinolones	Inhibit bacterial DNA replication (by inhibiting bacterial gyrase enzyme which is a type II topoisomerase)	Broad (effective against pseudomonas)	*Complicated UTIs *Respiratory infections *Bacterial prostatitis *Cervicitis *Bacterial diarrhea (caused by shigella, salmonella and E. coli)	- Some bacterial efflux pumps can act to decrease intracellular quinolone concentration - Production of certain proteins especially by Gram-ve bacteria that can bind to DNA gyrase, protecting it from the action of quinolones - Mutations in DNA gyrase or topoisomerase which could lead to a decrease in quinolones binding affinity and hence decreasing their effectiveness	*GIT irritation *cardiac toxicity, (prolongation of QT interval) -> withdrawn because of this *photosensitivity * some may interfere with cartilage development (not recommended in children or during Pregnancy * Some reported to be carcinogens	*Chemotherapeutic agents (synthetic) *Cidal *Use reduced due to: *toxicity *development of resistance *introduction of safer new macrolides *orally effective and well absorbed but affected by food containing Ca++ and iron Mainly (particularly Ciprofloxacin & levofloxacin)

Antibiotic	MOA	Spectrum	Main Uses	MOR	Common Side Effects	Notes
Nitrofurantoin	<p>converted by bacterial reductases into many reactive intermediates leading to:</p> <ul style="list-style-type: none"> *direct Damage to bacterial DNA *disrupts RNA and protein synthesis * interfering with many bacterial Metabolic processes 	<p>G+ve & G-ve bacteria (particularly G-ve + E. coli)</p>	<p>UTIs (particularly cystitis)</p> <p>(known as UT antiseptic)</p>	<p>Rare, due to multiple sites of action (the bacteria that is sensitive to it remain sensitive forever)</p>	<p>*Pulmonary fibrosis (major)</p> <p>*GI disturbances</p>	<ul style="list-style-type: none"> •Synthetic •Bactericidal •orally effective • contraindicated in patients with G-6-PD deficiency
Fosfomycin	<p>Disrupts bacterial cell wall synthesis by inhibiting phosphoenolpyruvate synthetase and thus interferes with the production of peptidoglycan</p>	<p>Broad: *G+ve & G-ve bacteria</p>	<ul style="list-style-type: none"> *Lower UTIs (cystitis), *prostate infections * antibiotic-resistant organisms 	<p>Rapid</p>	<p>well tolerated but may lead to:</p> <ul style="list-style-type: none"> *Metallic taste, *-Stomach upset * Stuffy nose *Vaginal itching or discharge *dizziness, *back pain 	<ul style="list-style-type: none"> •Bactericidal * available in 3g oral powder dosage form for reconstitution * Use commonly restricted to only a single dose because of rapid microbial resistance