Family	Drugs		Mechanism	Therapeutic use	Pros	Cons/ side effects
Sulphonamides	**Cotrimoxazole- trimethoprim (bactrim, septrin, balakatrin)**		structural analogs and competitive antagonists of para aminobenzoic acid (PABA), prevent folic acid synthesis	UTI, RTI, Salmonella, Pneumocystis pneumonia, opportunistic infections	Effective, no resistence (cotrimoxazole)	Resistance in the general family on sulfonamides, nausa, blood dyscrasia, rashes, precipitation and stone formation
Quinolones	**Nalidixic acid**		Target bacterial DNA gyrase and topoisomerase, prevent cell division	Very old UTI antiseptic		
	Norfloxacin			Only for UTI		
	Fluorinated 4 quinolones: ciprofloxacin (CIPRO), moxifloxacin (AVELOX), gatifloxacin (TEQUIN)			Prophylaxis for meningitis	Wide range, even botulinium	Expensive, GI upset and epilepsy
UT antiseptics	**Nitrofurans (nitrofurantion)**		modify various bacterial macromolecules that affect a variety of biochemical processes (e.g., DNA and RNA synthesis, protein synthesis)	treatment and/or prophylaxis of microbial infections, primarily in the urinary tract, prophylactically post intercourse in women with chronic UTIs	No known resistance	Nausea and vomiting
	Methenamine: mandelic (mandelamine) or hippuric (hiprex, urex) acid		Hydrolized to ammonia and formaldehyde, formaldehyde denatures protein and is bactericidal. Lowering pH by acting as an acid is bacteriostatic	long- term prophylactic or suppressive therapy of recurring UTIs, maintain sterile urine after infections		
B lactams: penicillins & cephalosporines						
1) Penicillins	**Penicillins**	**Benzyl Penicillin G (natural)**	Inhibit cell wall synthesis by binding to (penicillin binding protein)	very effective against the most common and important Gram positive bacteria like Staph, Pneumococcus, and many others.		Can be inhibited by bacterial penicillinase especially S. aureus
		Procain benzyl penicillin			Painless, prolonged duration	
		Phenoxymethyl penicillin			Oral, not affected by gastric juices	
		Cloxacillin			Penicillinase resistant, effective on Staphs and S. aureus	
		Dicloxacillin				
		Fluclocillin				
	Penicillinase inhibitors	**Clavulanic acid**		With amoxicillin (Augmentin)		
		Sulbactam				
		Tazobactam				
	Broad-spectrum penicillins	**Ampicillin**	Inhibit cell wall synthesis by binding to (penicillin binding protein)	Same as regular penicillins but with widened spectrum		can cause diarrhea, due to overgrowth of normal flora, and incomplete absorption.
		Amoxicillin			Less diarrhea and more completely absorbed, longer acting	
		Azlocillin		extended spectrum, e.g. Proteus, Pseudomonas, Klebsiella, and other G-		
		Pipercillin				
		Ticarcillin				
	Antistaphylococcal (penicillinase resistant) Penicillins	**Methicillin**	Inhibit cell wall synthesis by binding to (penicillin binding protein)	Used for non MRSA/ MRSE staph spp.		Some bacteria are MRSA, MRSE
		Nafcillin		For MRSA & MRSE, severe staphylococcal infections like cellulitis, empyema, endocarditis, osteomyelitis, pneumonia, septic arthritis, and toxic shock syndrome	effective against MRSA and (MRSE).	
		Oxacillin				
		Cloxacillin		Against MRSA/MRSE		
		Dicloxacillin				
	B-Lactamase Inhibitor Combinations	**ampicillin-sulbactam**	[Unasyn]	clinical use in treating infections with known or suspected mixed bacterial flora, such as biliary infections, diabetic foot ulcers,	Note: All of the B-lactamase inhibitor combinations except amoxicillin- clavulanic acid are parenteral formulation, all combinations are excreted renaly.	
		ticarcillin-clavulanic acid	[Timentin]			
		piperacillin-tazobactam	[Zosyn]			
		amoxicillin–clavulanic acid	[Augmentin]			

All penicillins are relatively safe, but can have some adverse effects: pain of injection, abscess formation, allergic reactions: (skin rash, urticaria, anaphylaxis, rash, fever, bronchspasm, dermatitis, Stevens- Johnson syndrome)

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2) Cephalosporins	**Firtst generation**	**Cephalothin**	Inhibit cell wall synthesis by binding to (penicillin binding protein)	Rarely the drugs of first choice for any infection. Mainly used for surgical prophylaxis.	Good avtivity against G+, relatively modest against G-	Expensive, especially the newer generations, same toxicity as penicillins, cross allergic with penicillins
		Cefazolin				
	Second generation	**Cefamandole**			Increased activity against G-	
		Cefozitine				
	Third generation	**Cefoperazone**			More active against Enterobacteria-ceae, including b lactamase producing strains	
		Cefotaxime				
		Ceftriaxone				
	Fourth generation	**Cefepime**			extended spectrum of activity and stability from hydrolysis	
Aminoglycosides	**Gentamicin**		Disruption of cell membrane, and inhibition of ribosome by binding to 30s and 50s, mainly 30s	Used separately for aerobic G- mainly + staph, toxic	Postantibiotic effect	Not distributed well, do not cross the membranes, can be ototoxic & nephrotoxic
	Neomycin			Very toxic. Not given systemically, sterilize the bowel before surgery, local drops or ointment in ear, eye or skin infections		
	Tobramycin			Against aerobic G- bacteria		
	Netilmicin					
	Amikacin					
	Streptomycin			For TB only		
Tetracyclines	**Doxycycline**		bacteriostatic, Inhibition of ribosomes 30s or 50s	Given once daily for acne (doxycycline)	Wide spectrum (G+ & G-), widly distriputed	Resistance developes rapidly, side effects of doxycycline: Nausea, vomiting, diarrhea. Changes in normal flora leading to diarrhea and candida infection. Bone deposits in children, appears on teeth.
Chloramphenicol	**Chloramphenicol**		Inhibits ribosomes and protein synthesis by binding to 50s and inhibiting transpeptidation	1) Few life threatening infections. 2) Meningitis (H.inflenzae, N.meningitidis, S.pneumoniae) 3) H.influenzae related arthritis, osteomyelitis, epiglottitis especially B lactam resistant strains and B lactams hypersensitivity conditions 4) Typhoid & paratyphoid fever in developing countries. 5)Topical for eye infections. 6) Alternative to tetracycline for rickettsial diseases mainly in children younger than 8. 7) For vancomycin-resistant enterococci. 8) Infections by penicillin resistant anaerobic bacteria (B.fragilis)	Broad spectrum (G+, G- including Rickettsia, Mycoplasma, Chlamydia spp, most anaerobic bacteria including B.fragilis), very effective, very widely distributed, no significant resistance	Very toxic, gray baby syndrome, in rare cases can cause aplastic anemia. Bone marroe suppression
Macrolides	**Erythromycin**		Inhibits ribosomes and protein synthesis by binding to 50s	Same spectrum of penicillin, so substitutes in penicillin allergic patients, azithromycin is long acting, used to eradicate Helicobacter pylori.	Widely distributed in the body, even the prostate gland.	Can be given orally. Can cause nausea, vomiting, and diarrhea. Rarely can cause jaundice.
	Clathiromycin					
	Azithromycin					

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Lincomycin & clindamycin	**Lincomycin**	Inhibits ribosomes and protein synthesis by binding to 50s	Effective against Gram positive bacteria, like penicillins, Should be reserved for deep seated infections like bone infection.		misused by doctors in the treatment of simple sore throat or URTI, overuse of lincomycin caused many cases of pseudomemraneous colitis (C.difficilli)
	Clindamycin				
Vancomycin	**Vancomycin**	Vancomycin inhibits the synthesis of the cell wall in the sensetive bacteria by binding with high affinity to the D-alanyl-D-alanine terminus of cell wall	Reserved for severe Staphylococcal infection, given by slow IV infusion.Given orally for pseudomembranous colitis.		Very toxic, ototoxic & nephtotoxic
Antituberculous	**Isoniazide**	inhibit the biosynthesis of mycolic acids (cell wall component)	TB (orally)	Rapidly absorbed and widely ditributed	Causes neuropathy, especially in slow metabolizers. Can be corrected by Vitamin B6.
	Rifampin	Inhibits RNA polymerase	TB & prophylaxis for meningitis	Broad spectrum antibiotic, so misused by doctors.	Can cause red discoloration of secretions: tears, urine etc
	Streptomycin		TB (still used in some cases)		Given by injection, resulted in noncompliance. Ototoxic. Resistance developed rapidly and replaced by Izoniazide
	Pyrazinamide				
	Ethambutol				
Antivirals					
Antiherpesvirus agents	**Acyclovir**	Inhibitor of DNA synthesis by competitive inhibition of dGTP	Used mainly to treat herpes infections, in varicella use is restricted to immunocompromized patients. Available as oral tablets, IV, eye drops or cream	Wide spectrum antiviral	Nausea, vomiting, skin rashes
Antiinfluenza agents	**Amantadine (synthetic tricyclic amine)**	inhibition of the viral M2 protein, an integral membrane protein that acts as a H channel, prevents acid mediated dissociation of the ribonucleoprotein complex, inhibits ph dependent viral assembly	Antiinfluenza		
	Rimantadine (amantadine's methyl derivative)				
	Oseltamivir				
	Zanamivir				
Anti HIV agents	**Zidovudine**	Inhibits viral DNA production	Anti HIV		Expensive, nausea, vomiting, muscle pain, bone marrow suppression
	Indinavir	Protease inhibitor	Anti HIV		Expensive, nausea, vomiting, diarrhea, renal stone formation, wears off quickly after dosing
Interferons	**Interferons**	possess antiviral, immunomodulating, and antiproliferative activities, (JAK-STAT) signal transduction	Used for HCV & some leukemias		Can cause nausea, fever, malaise (flu-like symptoms)

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