

Cell wall	Penicillin	<p>-Penicillin G : IM or IV. Penicillin V : oral G+, G- cocci (neisseria meningitidis) spirochetes (treponema palladium) -Penicillinase resistant penicillin (methicillin, nafcillin , oxacillin , dicloxacillin) : just G+ -Aminopenicillin (amoxicillin, ampicillin): G+, G-(H.influenza , H.pylori, salmonella, shigella, E.coli , proteus). Penicillinase sensitive -Anti pseudomonas penicillin (piperacillin, tecarcillin) : G+, G-, anaerobes For intra abdominal infection. Penicillinase sensitive # AE : hypersensitivity reaction , hemolytic anemia , leukopenia , interstitial nephritis # Beta lactamase inhibitors : Clavulanic acid with amoxicillin or tecarcillin Sulbactam with ampicillin Tazobactam with piperacillin (tazocin)</p>	
	Cephalosporins	1 st generation	<p>Cefazolin G+ , G-(e. coli , klebsiella , proteus) For UTI or 30 min before surgery for wound infection prophylaxis</p>
		2 nd generation	<p>Cefotetan , cefoxilin G+, G-(e.coli , klebsiella , proteus, enterobacter , serracia , neisseria , H. influenza) Best cephalosporins to cover anaerobes For mild intra abdominal infection</p>
		3 rd generation	<p>Ceftriaxone, cefotaxime , ceftazidime IV empiric tx for meningitis, community acquired pneumonia, urosepsis (pyelonephritis) Doesn't cover pseudomonas except ceftazidime</p>
		4 th generation	<p>Cefepime G+ , G- (pseudomonas), anaerobes (limited) Add metronidazole in intra abdominal infection</p>
		5 th generation	<p>Ceftaroline G+(MRSA, VRSA, VRE) , G- except pseudomonas , anaerobes(good coverage) Kept for serious complicated infections</p>
		AE	5-10 % of patients allergic to penicillin will have allergy to cephalosporins
	Carbapenim	<p>Imipinem , meropenem , ertapenem , doripenem G+ , G- , anaerobes All cover pseudomonas except ertapenem All decrease threshold of seizures Contraindications: elderly, CNS pathology, epilepsy, renal insufficiency # pt with CNS tumor has high risk to get urinary infection with ESBL (extended spectrum beta lactamase) e.coli and if we give them carbapenim they will develop seizures but meropenem carries the least risk to cause seizures # Teinam = imipenem + cilastatin (dehydropeptidase inhibitor in renal tubules)</p>	
	Vancomycin	<p>Just G+ including MRSA , enterococcus AE : ototoxicity , nephrotoxicity : depending on drug's level in blood so we usually look for trough level (30 min before 4th dose , therapeutic level 10 – 20 mic/mL , if high, stop vancomycin until trough level returns to normal then readjust the dose, if low don't increase the dose to avoid resistance and getting VRSA or VRE), Red man syndrome (histamine mediated) , thrombophlebitis</p>	
	Teicoplanin	G+ including MRSA , enterococcus	
Monobactam	For pseudomonas with beta lactam allergy		

Protein synthesis	30 s	Aminoglycoside	Amikacin , gentamicin, tobramycin , neomycin, streptomycin G+ , G- , aerobes Used for serious G- infection synergistic with beta lactam AE: nephrotoxicity , ototoxicity (irreversible with amikacin) Gentamicin affects balance causing ataxia and dizziness
		Tetracycline	Tetracycline, doxycycline, minocycline For intracellular microorganisms (chlamydia , brucella , rickettsia) AE: teratogenic ,affected bone growth, irreversible teeth discoloration, photosensitivity , pill induced esophagitis Contraindicated in children younger than 8 Not given with milk , antacids, iron supplements
		Tigecycline	Very broad spectrum G+ including MRSA, VRSA, VRE , G- except pseudomonas, anaerobes High volume of distribution (lipophilic)so not good in bacteremia or infective endocarditis Used for bone and soft tissue infections, pneumonia, intra abdominal infection
	50 s	Macrolide	Azithromycin , clarithromycin , erythromycin G+ (pneumococcus) G- (H.influenza , B. pertussis) , atypical (mycoplasma, legionella, chlamydia) AE: drug drug interaction mainly with warfarin and theophylline (least interactions with azithromycin) , prolonged QT interval
		Linezolid	Route: PO , IV G+ (including MRSA, VRSA, VRE) AE: bone marrow suppression with the platelets being the first lineage affected causing reversible thrombocytopenia Monitor CBC
		Clindamycin	G+ (community acquired MRSA, MSSA) , anaerobes above the diaphragm (dental infections, aspiration pneumonia, lung abscess) AE: pseudomembranous colitis (C.diff toxin associated diarrhea)
		Chloramphenicol	Wide spectrum AE: dose independent aplastic anemia (treated with bone marrow transplant) , grey baby syndrome (hypoxia & tachycardia)
	Cell membrane	Daptomycin	G+ including MRSA, VRSA, VRE Used IV for skin , bone and soft tissue infections Not used for lung infections because it's inactivated by surfactant AE: rhabdomyolysis so monitor CPK
Colistin		G- including pseudomonas Last choice due to carbapenemase AE: neurotoxicity, nephrotoxicity	
Folic acid synthesis	TMP-SMZ	Generic names: Bactrin , Balkatrin , Septra TMP:SMZ ratio = 1:5 Dose: 10mg/kg/day, 20 kg pt >> 200 mg TMP/day (youngs) Available as SS ; single strength 80:400 or DS; double strength 160:800 (adults) Prophylactic: 1 tab SS in HIV to avoid PCP(pneumocystis jiroveci)& toxoplasmosis Therapeutic: 1 DS bid or 2 SS bid in brucellosis, UTI , PCP, stenotrophomonus AE: sulpha allergy, hemolysis in G6PD deficiency, BM suppression, contraindicated in first trimester	

Free radical and DNA changes	Metronidazole	Flagyl ; antibacterial and antiprotozoal Anaerobes below the diaphragm: intra abdominal infection Entameba histolytica , giardia lamblia , trichomonas vaginalis AE: metallic taste, neuropathy (long term effect for fistula in IBD)	
DNA gyrase	Fluoroquinolone	1 st generation	Not used anymore
		2 nd generation	Ciprofloxacin , norfloxacin , ofloxacin G+ (MSSA) G- (GI infections, UTI, skin infections) Ciprofloxacin is the best against pseudomonas
		3 rd generation	Levofloxacin G+ (enhanced activity against pneumococcus), G- Better for respiratory infections
		4 th generation	Moxifloxacin , gemifloxacin G+ (pneumococcus) , G- , anaerobes (intra abdominal infection) Not used for UTI due to its minimal excretion in urine
		AE	Not used for <18 because of cartilage damage, teratogenic, tendon rupture (common in elderly, on prednisone , or renal insufficiency) , drug drug interactions, prolonged QT interval

- Anti-pseudomonal antibiotics: anti-pseudomonal penicillins , 3rd generation cephalosporin Ceftazidime, cefepime , carbapenem except ertapenem, aminoglycoside (not monotherapy) , fluoroquinolone (ciprofloxacin) , colistin , monobactam (aztreonam)
- G+ only : penicillinase resistant penicillins ,vancomycin, teicoplanin, linezolid , clindamycin, daptomycin
- Anaerobes: anti pseudomonal penicillins , 2nd 4th 5th generations cephalosporins , carbapenem, tigecyclin , clindamycin, 4th generation fluoroquinolone
- MRSA: vancomycin, 5th generation cephalosporin ,teicoplanin,tigecyclin , linezolid , daptomycin
- <8 : no tetracycline
- < 18 : no fluoroquinolone
- CBC in linezolid
- CPK in daptomycin
- Don't use tigecyclin in bacteremia or infective endocarditis >> high volume of distribution
- Don't use daptomycin for lung infections >> inactivated by surfactant
- Don't use 4th generation fluoroquinolone for UTI >> minimally excreted in urine