

Beta-Lactams (penicillins, cephalosporins, carbapenems): contain a beta-lactam ring and exert bactericidal action by inhibiting peptidoglycan cell wall synthesis.

Penicillin allergy occurs in 0.7-10% of those treated. Anaphylaxis occurs 0.0004-0.015% of those treated. There is significant cross-reaction with cephalosporins (8-10%) and carbapenems (<1%) in the penicillin allergic: highest risk with 1st generation cephalosporins.

Other adverse reactions include D&V, nephritis, hepatotoxicity, C. difficile infection.

Penicillins:

Natural penicillins (benzylpenicillin, penicillin V): effective against non-beta-lactamase producing gram positive bacteria - mostly streptococci.

Aminopenicillins (amoxicillin): additional activity against gram negative organisms. There is widespread resistance due to beta-lactamase production which has been partially overcome by the addition of beta-lactamase inhibitors like clavulinic acid (co-amoxiclav).

Beta-lactamase-resistant penicillins (methicillin, flucloxacillin): effective in the treatment of beta-lactamase-producing bacteria such as Staphylococcus aureus.

Carboxy/ureidopenicillins (ticarcillin, piperacillin): extended action against Gram negative organisms including pseudomonas.

Cephalosporins:

First generation (cefalexin, cefazolin): excellent Gram positive cover but limited Gram negative cover.

Second generation (cefuroxime): extended Gram negative cover.

Third generation (ceftriaxone, ceftazidime, cefotaxime): extensive Gram negative cover, including pseudomonas cover with cefotaxime and ceftriaxone. In some agents such as ceftazidime gram positive cover is reduced.

Fourth generation (cefepime): very broad spectrum of cover including pseudomonas.

All have limited anaerobic cover.

Carbapenems: (meropenem, imipenem): very broad spectrum of cover.

Gram Positive Cocci		Gram Negative Bacilli			Anaerobes	
MRSA	MSSA	Streptococci	E.coli, Klebsiella	Proteus	Pseudomonas	ESCAPPM*
		Penicillin				
		Amoxicillin				
		Flucloxacillin				
		Cephazolin				
		Clindamycin				Clindamycin
		Rifampicin/Fusidic Acid				
		Vancomycin/Teicoplanin, Linezolid, Daptomycin				Metronidazole
			Trimethoprim			
			Ciprofloxacin			
			Gentamicin/Tobramycin, Aztreonam			Moxifloxacin
			Moxifloxacin			
			Cefuroxime			
			Ceftriaxone			
			Ceftazidime			
			Cefepime			
			Amoxicillin-clavulanate			Amoxicillin-clavulanate
			Ticarcillin-clavulanate, Piperacillin-tazobactam			Ticarcillin-clavulanate, Piperacillin-tazobactam
			Meropenem [†] , Imipenem [†]			
			Ertapenem [†]			Ertapenem [†]

Antibiotics in **bold** also cover Enterococcus Faecalis. For simplicity, atypical organisms are not shown.

ESBL-producing organisms are **not** susceptible to most antibiotics containing a beta-lactam ring; carbapenems[†] are the usual agent of choice.

*ESCAPPM organisms are Enterobacter spp., Serratia spp., Citrobacter freundii, Aeromonas spp., Proteus spp., Providencia spp. & Morganella morganii.