Cephalosporins ⇒ They tend to be more resistant than the penicillin to certain β-lactamases.

⇒ most of them are administrated by IV or IM (Parentral)

⇒ major elimination mechanism ⇒ renal excretion via active tubular secretion.

⇒ Cefoperazone + Ceftriaxone ⇒ Excreted Mainly in Bile.

⇒ Most 1st + 2nd generation cephalosporins don't enter CSF.

⇒ Methicillin resistant staphylococci are also resistant to cephalosporins

① First generation drugs :-

① Cephalexin (Oral) ② Cefazoline (Parental)

⇒ They are active against Gram(+) including :-
- staphylococci and common streptococci.
- also gram(-) ⇒ E. coli + Klebsiella pneumonia.

② Second generation drugs :-

⇒ have less activity for Gram(+) and extended for Gram(-).

- Cefotetan + cefoxitin ⇒ Treat infections caused by anaerobe Bacteroides Fragilis

- Cefamandole, Cefuroxime, cefaclor ⇒ Treat sinus, ear, respirator inf. caused by H. influenzae or M catarrhalis.

3rd generation drugs:

⇒ increased activity against Gram (+), and ability to penetrate the BBB, except (Cefoperazone, cef-ixime) → oral

⇒ Most active against :- ① Providencia ② Serratia marcescens ③ β-lactamase producing strains:
- H. influenza
- Neisseria.

⇒ Ceftriaxone (parental) + Cefotaxime :-
most active against penicillin-resistant pneumococci

⇒ Activity against Pseudomonas ⇒ cefoperazone
cef-tazidime
" " B-fragilis ⇒ ceftizoxime

4th generation drugs:

✱ Cefepime :- combines the Gram (+) Activity from the 1st gen agents w/ wider spectrum of G(-) than the 3rd gen.
(more resistant to β-lactamase)

⇒ Activity against :
① Enterobacter ② Haemophilus ③ Neisseria
④ and some penicillin resistant pneumococci

✱ Ceftaloine ⇒ has activity in infections caused by methicillin-resistant staphylococci.

Other Beta-lactam drugs:

⊗ Aztreonam:-

⇒ Monobactam
⇒ No activity against G+ or anaerobes.
⇒ given IV
⇒ Eliminated via renal tubular secretion.
⇒ Activity against G- rods:
① Klebsiella ② Pseudomonas ③ Serratia.

⊗ Imipenem + Doripenem + Meropenem + Ertapenem:

⇒ Carbapenems, different chemical structure than penicillines but retaint the β-ring.
⇒ Activity:
- wide activity against G+ cocci (including PRP)
- G- rods
- anerobes.

⇒ For Pseudomonal infections, used in combination w/ Aminoglycosides.
⇒ Methicillin-Resistant staphylococcus Aeureus (strains) are resistant!
Also → MRSA
⇒ Imipenem ⟶ X
Renal dehydropeptidases-1 ↙
⇒ Imipenem + Cilastatin ⟶ ✓

Beta-lactamase Inhibitors:

① Calvulanic Acid ② Sulbactam ③ Tazobactam.

⇒ used in Combination w/ Penicillines.
⇒ works against plasmids-coded Beta lactamases:
① gonococci ② streptococci ③ E.coli ④ H.Influenza.

⇒ Not good inhibitors against chromosomal β-lactamases:
① Enterobacter ② Pseudomonas ③ Serratia.

Other cell Wall or Membrane active agents:-

* Vancomycin:

⇒ Bactericidal glycoprotein
⇒ binds to d-Ala-d-Ala ⇒ Inhibits transglycosylation.
⇒ prevents elongation + cross linking of peptidoglycan.
⇒ Resistance against:
① Enterococci ② S.aureus.

⇒ Narrow spectrum of Activity:

① used against resistant (G+) to other drugs including the MRSA.
② used in Combination w/ Ceftriaxone for treatement of PRSP
③ Treatement against Clostridium difficile.

⊛ Fosfomycin:

⇒ Anti-Metabolite inhibitor of cytosolic enolpyruvate transferase.
  ↳ this action prevents the formation of N-acetylmuramic acid,
    ↳ Essential for peptidoglycan formation for the Bacteria.
⇒ Excreted via the kidney.
⇒ Urinary levels exceeds the MIC, because it's used to treat urogenital infections.

⊛ Bacitracin:

⇒ Peptide antibiotic, interferes w/ late stage of cell wall synthesis in G+ organisms.
⇒ Because it's nephrotoxic, it's rarely used and limited to topical use.

⊛ Daptomycin:

⇒ Novel cyclic lipopeptide
⇒ Spectrum same as Vancomycin, But!
  ↳ works against Resistant enterococci and staphylococci.

⇒ Eliminated via the Kidney.

⇒ Creatine phosphokinase should be monitored since it causes myopathy.