PK-PD Characteristics of Commonly used Anti-microbials

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S.No	Drug	РК	PD /Spectrum	ADRs	Dosing
1.	Ceftriaxone	Good CSF penetration. No dosage adjustment required for hepatic & renal disease	More active against Gram negative	Most common ADR is allergy. C. difficle colitis with 3rd gen.	2 gm once daily IV
	Cefotaxime	Dose reduced if CrCl<50 ml/min. No hepatic dose adjustment	More active against Gram negative		2 gm thrice daily IV
	Cefixime	Dose reduced if CrCl<60 ml/min. No hepatic dose adjustment	Activity against respiratory tract pathogens: Streptococci, H. influenza, M. catarrhalis		400 mg p.o q24h
2.	Amoxicillin - Clavulanate	Increased absorption with food. Dose adjusted if CrCl<30ml/min. No hepatic dose adjustment	RTIs, Skin & Soft tissue infections, Surgical prophylaxis, Intra- abdominal infections etc	Diarrhoea, rashes	1 gm twice daily/ 625 mg thrice daily oral 1.2 gm IVq8h
3.	Piperacillin - Tazobactam	Dose adjusted if CrCl <40 ml/min. No hepatic dose adjustment.	Anti-pseudomonal penicillin. Good activity against Klebsiella, Enterobacteriaceac e	Diarrhoea, rashes	4.5 gm thrice daily
4.	Imipenem - Cilastatin	Prolonged infusion for resistant organisms. Reduce the dose if CrCl <60 ml/min.	Broad spectrum including ESBLs. Not reliable for MRSA, VRE & E. faecium	Propensity to induce seizures	500 mg IV q6h or 1g q8h; If bacteria intermediate susceptible then1 g IV q6h
5.	Meropenem	Prolonged infusions for serious/ severe infections. Dose to be halved(or even less) if CrCl <50ml/min.	Reserve drug. Effective against Gram positive & negative.	Hypersensiti vity reactions.	1gm IV q8h; For meningitis 2 gm IV q8h
6.	Colistin	Urinary concentrations are high. Hence, preferred for UTI. Routes: IV or inhalational. Dose adjusted if CrCl < 90ml/min.	Reserve drug. Effective only in Gram negative infections.	Highly nephrotoxic.	9million units iv stat, then 4.5 million units iv over 30 minutes to 1 hour q12h

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7.	Polymyxin -B	Preferred over colistin except for UTI. Routes: IV or Intrathecal. Dose modification not required with renal insufficiency	Reserve drug. Only for extensively drug resistant infections (Acinetobacter etc).	Highly nephrotoxic	Loading dose: 2.5 mg/kg (over 2 hours) Maintenance dose: After 12 hrs 1.5 mg/kg over 1 hour) repeat q12h
8.	Vancomycin	Dose reduced if CrCl < 50 ml/min.No hepatic dose adjustment.	Effective against MRSA, Strep. viridans, Enterococcus, Cl.difficile	Nephro/oto- toxicity, flushing	15 mg/kg IV over 60 min q8–12h
9.	Amikacin	For severe / MDR infections, Extended interval dosing preferred ifCrCl < 50 ml / min.	Mainly against Gram negative including pseudomonas. Limited against Gram positive(Staphylococci & Listeria). Usually in combination with beta lactams.	Nephro/oto- toxicity	15 mg/kg IV q24h (Extended interval dosing) or7.5 mg/kg every 12 hours (Conventional dosing)
10.	Gentamicin	Routes: IV, Topical. For severe/MDR infections, high-dose extended infusion preferred. Dose reduced if CrCl < 60 ml / min.	Not recommended for Pseudomonas infections. Low therapeutic index.	Nephro/oto- toxicity	5.1 mg/kg q24h (extended interval dosing) or 1.7 mg/kg IV q8h (conventional dosing)
11.	Tobramycin	Dose reduced if CrCl < 60 ml / min.	More active against Pseudomonas & Proteus. Reserved for serious infections of Pseudomonas	Similar to amikacin	Extended interval: 5 mg/kg IV q24h Conventional: 1.7 mg/kg IV q8h
12.	Linezolid	Excellent bioavailability. Similar oral and IV dose. No dosage adjustment for renal impairment	Activity against MSSA, MRSA, VRE and Strep. pneumoniae	Reversible myelosuppr ession, lactic acidosis, peripheral neuropathy. Risk of serotonin syndrome with SSRIs.	600 mg po/IV q12h
13.	Tigecycline	Low plasma concentration s. No renal / hepatic dose adjustments required	Reserve drug. Activity against MDRs like A.baumannii, MRSA Carbapenem resistant E.coli & Klebsiella. Use in hospital - acquired pneumonia associated with higher mortality.	High incidence of nausea (20%), photosensitivity, rarely acute pancreatitis	IV: 100 mg initially, then 50 mg every 12 hours

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14.	Azithromycin	No renal / hepatic dose adjustments required. Long half-life. Once daily dosing.	High activity against respiratory pathogens. Not effective against MRSA.	QTc prolongation potential. Rarely neutropenia, thrombocyto penia etc.	500 mg daily (PO or IV)
15.	Levofloxacin	Routes: Oral, IV, Topical. Avoid concomitant multivalent cations. Dose needs to be reduced if CrCl < 50 ml/min. No hepatic dose adjustment.	Effective against Gram positive & Gram-negative bacteria. Effective against M. tuberculosis.	Potential for QTc prolongation , may exacerbate muscle weakness.	750 mg once daily PO or IV
16.	Ciprofloxacin	Routes: Oral, IV, Topical. Poor CSF penetration. Dose needs to be reduced if CrCl < 50 ml/min. No hepatic dose adjustment.	Greatest potency vs Gram negative bacilli.	Similar to levofloxacin	200-400 mg IV q8-12 h
17.	Fluconazole	High oral bioavailability. Good CSF penetration. CrCl ≤50 mL/minute: R educe dose by 50%.No hepatic dose adjustment needed but discontinue if hepatotoxicity occurs.	Effective against Cryptococci, Candida, Coccidioides.	Possible QTc prolongation, alopecia, rarely hepatotoxicity. Significant drug-drug interactions exist. (CBZ, Statins, warfarin, phenytoin etc.)	Usual dose 100-200 mg Q24h
18.	Amphotericin - B	No dosage adjustment necessary for any degree of kidney impairment. No hepatic dose adjustment.	Broad-spectrum anti-fungal (Candida, crytococcus, aspergillus, Mucorales, histoplasma, sporothrix.)	Highly Nephrotoxic Pre-hydrate the patient to reduce nephrotoxicity.	Deoxycholate (Conventional): IV: 0.3 to 1 mg/kg/day as Single infusion Liposomal: IV: 3 to 5mg/kg/d as single infusion.
19.	Caspofungin	Cannot enter CSF. No renal dose adjustment. Dose reduced in hepatic diseases (Child- Pugh Class B).Often reduced dose is sub- optimal.	Effective against Candida & Aspergillus. Preferred for invasive Candidiasis.	Remarkably non-toxic. Pruritis at infusion site may occur.	70 mg IV on day 1, then 50 mg IV q24h
20.	Voriconazole	No renal dose adjustment required. Reduce dose by 50% in hepatic diseases.	Broad-spectrum Triazole.Preferred in Invasive Aspergillosis(including Amphotericin resistant strains)	Photosensiti vity, visual disturbance rarely hepatotoxici ty can occur.	IV :6 mg/kg IV twice daily for 2 doses,then 3 to 4 mg/kg IV or orally twice daily 200 mg oral BD.

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