

Clinical Pharmacokinetics and dose optimization of anti-infectives in critical care: A review

Rachna Rohilla¹, Ritika Kondel², Nusrat Shafiq¹, and Samir Malhotra¹

¹Post Graduate Institute of Medical Education and Research

²PGIMER

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Abstract

Critically ill patients with infections present with considerable challenges in antimicrobial use due to multiple reasons such as pathophysiological alterations, comorbidities, supportive treatment and the pathogenicity of implicated organism. Fluid shifts, hyperdynamic state, altered renal clearance are the rapid changes which are often not considered while administering antimicrobials. Vital organ dysfunction with or without Multi-Organ Dysfunction Syndrome (MODS) often necessitates use of supportive management in the form of Ventilatory Support or Renal Replacement Therapy (RRT) to Extracorporeal Membrane Oxygenation (ECMO) to name a few. These supportive measures may have implication on PK-PD of administered antimicrobials. Certain patient parameters such as age, weight, comorbid illnesses like cystic fibrosis, burns or immunocompromised state can be important determinants of pharmacokinetics and pharmacodynamics (PK-PD) of antimicrobials. Issues such as bioavailability of the antimicrobial at the primary focus of infection need to be taken into consideration while making choice of antimicrobial(s) and deciding a dose. The critical pharmacodynamic parameters that need to be taken into account consider are disease state, altered bacterial susceptibility, pathogenicity and localization of the organism and host immunity while making decisions about optimized antimicrobial treatment in a critically ill patient with infection. The current review delves on these nuances with a focus on PK-PD for optimized use of antimicrobials in a critically ill patient.

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