

Review of Essential Neonatal Pharmacology for NICU Clinical Providers

Objectives

- Explain the need in neonates for pharmacotherapy dosing to adjust for physiology, maturation, and organ function in order to provide clinical benefits while minimizing the risks of adverse effects
- Describe the four phases of drug disposition and how they interrelate and exhibit unique characteristics for each drug, as well as for maturational and physiologic states of each infant
- Summarize how pharmacokinetics (PK) and pharmacodynamics (PD) studies can support approaches for handling interpatient variability for drug concentration and effects (desired or toxic), dosing implications, and therapeutic monitoring
- Recognize the role of pharmacists as key partners in supporting patient-specific aspects of therapeutic drug use in the NICU setting

Content Outline

1. Essential Neonatal Pharmacology Principles for NICU Clinical Providers
 - 1.1 Four phases of drug disposition with consideration of physiology and maturation
 - 1.1.1 Absorption
 - 1.1.2 Distribution
 - 1.1.3 Metabolism
 - 1.1.4 Excretion
 - 1.2 PK-based drug concentration curve examples of term and very preterm neonate drug exposure differences
 - 1.3 Examples and explanations for NICU drug disposition differences
 - 1.4 Drug concentration-over-time curves and PK equations to guide drug dosing
 - 1.5 Drug dose recommendations supported by pharmacokinetic studies
 - 1.6 Drug concentration-related effects evaluated by pharmacodynamic studies
 - 1.6.1 Antimicrobial PD group with exposure metric for efficacy/dosing implications
 - 1.7 Concerns regarding the risks of antimicrobial resistance and need for appropriate discontinuation of antimicrobials

Reading Material Resources

Module WB2733: Review of Essential Neonatal Pharmacology for NICU Clinical Providers is based on the resource listed below. A copy of the resource is included with the module.

Chapter 24, Essential Neonatal Pharmacology for Clinical Providers in the NICU, Wade KC and Faville E, in *Klaus and Fanaroff's Care of the High-Risk Neonate, Eighth Edition*, Elsevier, 2026, 410-419