

Precision Neonatology and Translational Therapeutics: From Evidence to Bedside Practice

Atiqur Rahman Khan*, Aafiya Naaz, Farhan Ur Rahman Khan and Rayan Ur Rahman Khan

Pediatrician and Neonatologist, Ministry of Health, Saudi Arabia

***Corresponding Author:** Atiqur Rahman Khan, Pediatrician and Neonatologist, Ministry of Health, Saudi Arabia.

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Neonatal medicine is increasingly transitioning toward precision-based care, where individualized therapeutic strategies are guided by emerging translational evidence. While survival among preterm and critically ill neonates has improved significantly, the emphasis has shifted toward optimizing long-term neurodevelopmental outcomes.

Hypoxic-ischemic encephalopathy remains a leading cause of neonatal mortality and neurodevelopmental impairment worldwide. The concept of the cardio-renal-brain axis emphasizes the role of systemic hemodynamics, renal dysfunction, and cerebral perfusion in determining neurological recovery.

Bronchopulmonary dysplasia continues to represent a major burden among very preterm infants. Early caffeine therapy has emerged as a key modulator of respiratory outcomes, improving respiratory drive and facilitating earlier extubation.

Neonatal clinical pharmacology is central to precision medicine. Individualized pharmacokinetic and pharmacodynamic approaches, along with pharmacogenomics and model-informed dosing, are expected to improve outcomes.

Preventive and developmental strategies also play a pivotal role. Maternal nutrition, antenatal care, and early neonatal interventions significantly improve outcomes.

The integration of digital health technologies and artificial intelligence into NICUs represents an important frontier. However, these must be implemented within ethical frameworks.

Despite advances, global disparities persist. Strengthening healthcare systems and promoting collaboration are essential.

In conclusion, the future of neonatology lies in precision medicine, targeted pharmacotherapy, and systems-based care [1-5].

Conflict of Interest

None declared.

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