Neonatal Blood Gas Analysis – A 360 Degree Perspective

Objectives

- Describe the aspects of neonatal physiology and common disorders that impact the interpretation of data from blood gas sampling, testing results and/or the use of noninvasive monitoring in neonates
- Review the most common types of continuous noninvasive monitoring devices used in neonates at the bedside to provide real-time approximations of blood gas values
- Summarize the fundamental knowledge about techniques of blood gas sampling, ongoing clinical assessments, technical aspects of equipment use, and the measurement or derivation of blood gas values that is critical to providing optimal patient care

Content Outline

1. Clinical and Technical Aspects and The Interpretation of Blood Gases in Neonates
   - 1.1 Blood gas physiology
     - 1.1.1 Oxygen transport and delivery to tissues
     - 1.1.2 Impact of the oxyhemoglobin dissociation curve (OCD)
     - 1.1.3 Hypoxemia versus hypoxia
     - 1.1.4 Carbon dioxide transport
     - 1.1.5 Causes of metabolic acidosis and alkalosis
   - 1.2 Techniques for obtaining blood gas samples
     - 1.2.1 Insertion, maintenance, and complications of umbilical artery catheters and other indwelling arterial catheters
     - 1.2.2 Intermittent arterial puncture
   - 1.3 Selection of methods to obtain noninvasive estimation of blood gases
     - 1.3.1 Pulse oximetry and co-oximetry
     - 1.3.2 Transcutaneous monitoring
     - 1.3.3 Capnography
   - 1.4 Blood gas analyzers-measuring principles and quality assurance
   - 1.5 Clinical interpretation of blood gases
     - 1.5.1 Components measured directly – pH, $PaCO_2$, PaO_2
     - 1.5.2 Components not measured directly – bicarbonate, BE, SaO_2
   - 1.6 Errors in blood gas measurements
   - 1.7 Assessing the accuracy of blood gas results

Reading Material Resources

Module WB2511: Neonatal Blood Gas Analysis – A 360 Degree Perspective is based on the resource listed below. A copy of the resource is included with the module.

Chapter 10 Blood Gases: Technical Aspects and Interpretation, Travers C and Ambalavanan N in Goldsmith's Assisted Ventilation of the Neonate, 7th Edition, Elsevier, (2022), 94-110