P-ISSN: 2617-9806
E-ISSN: 2617-9814

Impact Factor: RJIF 5.89
www.nursingjournal.net

International Journal of Advance Research in Nursing

Volume 8; Issue 2; July-Dec 2025; Page No. 185-186

Received: 25-06-2025
Accepted: 30-07-2025

Indexed Journal
Peer Reviewed Journal

Arterial blood gas analysis: A review on clinical significance and strategies to enhance interpretation skills among nurses

[1]Tariq Ahmad Dev and [2]Afshana Rasool

[1]Associate Professor, Rajiv Gandhi College of Nursing, Jammu, Jammu and Kashmir, India
[2]Department of Medical Surgical Nursing, Scholar M.Sc. Nursing Rajiv Gandhi College of Nursing Jammu, Jammu and Kashmir, India

Corresponding Author: Tariq Ahmad Dev

DOI: https://www.doi.org/10.33545/nursing.2025.v8.i2.C.544

Abstract
Arterial Blood Gas (ABG) analysis is an essential diagnostic tool used in clinical practice to assess a patient's oxygenation, ventilation and acid base status. It plays a crucial role in managing critically ill patients, guiding therapeutic interventions, and monitoring disease progression. This article reviews existing literature on ABG analysis and highlights its importance in nursing and medical decision making. Evidence from previous studies demonstrates that ABG interpretation helps in early detection of respiratory failure, metabolic disorders and other life threatening conditions. Literature from 2010-2025 was reviewed. The review emphasizes the need for nurses and health care professionals to possess sound knowledge and skills in ABG interpretation for improved patient outcomes. Despite its importance, research has shown a gap in knowledge and interpretation skills among health care professionals, particularly nurses. Findings suggest that structured teaching programs and simulation based learning can sigmificamty improve competency. Enhancing ABG interpretation skills is essential for improving patient outcomes, reducing complications, and ensuring evidence based clinical decion making.

Keywords: ABG analysis, arterial blood gas, nursing, oxygenation, ventilation, acid base balance

1. Introduction
ABG Analysis is a widely used diagnostic procedure in health care, particularly in critical care, emergency medicine and preoperative monitoring, it measures parameters such as Ph, $paco_2$, pao_2, Hco_3 and Sao_2 providing vital information about patients oxygenation, ventilation and acid base balance. These measurements allow clinicians to detect life threatening abnormalities such as hypoxemia, hypercapnia, metabolic acidosis, and metabolic alkalosis at an early stage. The ability to interpret ABG results accurately is essential for health care professionals, especially nurses working in intensive care units (ICUs), emergency departments and operating theatre nurses are often the first to monitor patient changes and their timely recognition of ABG abnormalities can guide immediate interventions such as ventilator settings, initiating oxygen therapy or modifying fluid and medication regimens. Despite its importance, studies have shown that many health care professionals, including nurses face challenges in ABG interpretation due to inadequate training or lack of exposure. Studies also reported that structured teaching programmes resulted in increase in correct ABG interpretations among nurses.

2. Methods
A narrative literature review was conducted. searches were performed in Google scholar, PubMed and science direct using keywords: "Arterial Blood Gas", "ABG analysis", "oxygenation", "ventilation", "acid base balance", and "nursing". Inclusion criteria were English-level studies published between 2010-2025 that discussed clinical utility, significance and need of knowledge among nurses and other health care professionals regarding ABG Analysis.

3. Clinical significance
Balzanelli 2023 emphasizes that, Globally ABG analysis is considered a gold standard for vaulting respiratory and metabolic status.it plays a pivotal role in diagnosing and managing conditions like Acute Respiratory Distress Syndrome (ARDS), Sepsis, and COVID-19 and diabetic ketoacidosis. It plays a critical role in tailoring respiratory support, such as adjusting ventilator settings, optimizing oxygen delivery and guiding fluid and electrolyte management. Abraham and co-authors 2023 concluded that when Spo_2 falls below 90%, pulse oximetry may underestimate the degree of hypoxemia in such cases, ABG analysis remains the gold standard for accurately assessing oxygenation status. ABG offers precise measurements of Pao_2,paco2,pH and HCo3 enabling targeted and timely interventions The literature revealed that fever than 50% of ICU nurses demonstrated adequate ABG interpretation skills, indicating a clear need for targeted educational interventions.

4. Clinical interpretation and Awareness

ABG interpretation involves three core areas:

- **Oxygenation (pao_2 and sao_2):** Identifies hypoxemia and guides oxygen therapy.
- **Ventilation ($paco_2$):** Detects hypercapnia or hypocapnia, informing ventilator adjustments.
- **Acid-Base Balance (pH and HCO_3):** Differentiates between metabolic and respiratory acidosis or alkalosis.

For nurses early recognition of abnormal ABG values is critical. For example, a drop in Pao_2 below 60 mmHg requires urgent oxygenation measures, while elevated $paco_2$ may signal respiratory failure, prompting immediate ventilatory support.

5. Strategies to improve ABG interpretation skills

Improving ABG interpretation competency among nurses and healthcare professionals requires structured, on-going efforts:

- Structured teaching programmes focusing on both theory and practical case studies.
- Simulation-based training to practice interpreting real-time ABG scenarios.
- Regular competency assessments in ICU and emergency units.
- Interdisciplinary case discussions to enhance clinical reasoning and teamwork.

6. Discussion

ABG analysis is more than just a laboratory test; it is a clinical decision making tool, its utility spans various specialties, from pulmonology and emergency medicine to surgery and critical care. For nurses especially in critical care units, accurate understanding and interpretation of ABG results is vital. Literature constantly shows that early ABG assessment improves patient safety, reduces complications and supports efficient use of hospital resources.

7. Conclusion

ABG analysis is an indispensable part of modern healthcare. Its ability to provide real-time data on oxygenation, ventilation and acid base balance makes it a cornerstone of emergency and critical care management. Continuous education and training in ABG interpretation are essential to ensure accurate diagnosis and timely treatment. As medical professionals we are equipped with the ability to interpret the body's message stored in the blood arteries, placing us at the intersection of science and art. We set out on a trip of interpretation with every ABG report, navigating the maze of pH, pao_2, $paco_2$ and bicarbonate to solve the secrets of internal milieu.

Conflict of Interest

Not available

Financial Support

Not available

8. References

1. Balzanelli MG, Distratis P, Aityan SK, Dipalma G, Amatulli F, Catucci O, *et al*. The importance of arterial blood gas analysis as a systemic diagnosis approach in assessing and preventing chronic diseases, from emergency medicine to the daily practice. Eur Rev Med Pharmacol Sci. 2023;27(23):11653-11663.
2. Chandran J, Jadav N, Venkataraman R, Venkataraman S. Clinical utility of arterial blood gas test in an intensive care unit: an observational study. Indian J Crit Care Med. 2021;25(2):172-176.
3. Mohammed HM, Abdelatief DA. Easy blood gas analysis: implications for nursing. Egypt J Chest Dis Tuberc. 2016;65(1):369-376.
4. Lian JX. Interpreting and using the arterial blood gas analysis. Nursing2020 Crit Care. 2010;5(3):26-36.
5. Kumari A, Choudhary R, Sharma P. A pre-experimental study to assess the effectiveness of structured teaching programme on knowledge regarding arterial blood gas analysis and interpretation among staff nurses working in selected hospitals of district Mohali, Punjab. Asian J Nurs Educ Res. 2020;10(2):235-239.
6. Sood P, Paul G, Puri S. Interpretation of arterial blood gas. Indian J Crit Care Med. 2010;14(2):57-64.

How to Cite This Article

Dev TA, Rasool A. Arterial blood gas analysis: A review on clinical significance and strategies to enhance interpretation skills among nurses. International Journal of Advance Research in Nursing. 2025;8(2):185-186.