Original Article

Assess the Knowledge Regarding ABGs Analysis among Nurses

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ABSTRACT

Background: Arterial blood gases (ABGs) provide crucial information about the respiratory and metabolic systems. They help in identifying imbalances and assessing the compensatory mechanisms of these systems. Accurate knowledge of ABG analysis is essential for nurses to ensure effective patient care and safety in critical care settings.

Objective: To assess the level of knowledge regarding ABG analysis among staff nurses in a tertiary care hospital.

Methods: A descriptive cross-sectional study was conducted using a convenience sampling technique. The study included 140 staff nurses from a tertiary care hospital. Data were collected using a validated questionnaire and analyzed using descriptive statistics, including frequency distribution and normality checks.

Results: Among the participants, 58 (41.4%) demonstrated low knowledge, 36 (25.7%) had moderate knowledge, and 49 (32.9%) exhibited high knowledge of ABG analysis. In terms of ABG sampling techniques, 59 (42.1%) had low knowledge, 37 (26.4%) had moderate knowledge, and 44 (31.4%) showed high knowledge.

Conclusion: The study concluded that a significant proportion of nurses had low knowledge regarding ABG analysis, indicating a need for enhanced educational programs and continuous training to improve their competency in this area.

Keywords: ABGs, critical care, knowledge, nurses, sampling techniques.

INTRODUCTION

Nurses play a crucial role in the early identification of acid-base imbalances in critical care settings, where arterial blood gas (ABG) analysis is a common diagnostic procedure (1, 2, 3). The intensive care unit (ICU), a specialized environment designed for patients with life-threatening conditions, relies heavily on the vigilance and expertise of nurses who provide continuous bedside care (1). This setting demands a high level of competency in managing, supporting, and monitoring critically ill patients, making it one of the most challenging work environments.

The circulatory system, comprising systemic and pulmonary circulation, serves the entire body, excluding and including the lungs, respectively. ABG tests, crucial in this setting, measure oxygen and carbon dioxide levels in the blood and the blood's pH balance, providing a snapshot of a patient's respiratory and metabolic status (4). These tests are typically performed urgently, with samples drawn from an artery rather than a vein.

Normal ABG values at sea level are well-documented: a pH of 7.35-7.45, a partial pressure of oxygen (PaO2) between 75 and 100 millimeters of mercury (mmHg), a partial pressure of carbon dioxide (PaCO2) from 35 to 45 mmHg, bicarbonate (HCO3) levels of 22 to 26 milliequivalents per liter (mEq/L), and an oxygen saturation (SaO2) between 95 and 100% (3). Proper ABG analysis is vital for optimal patient management, aiding in the assessment of acid-base status, evaluating responses to treatments, and monitoring disease progression and respiratory function (5, 8).

Despite the critical role of ABG analysis in diagnosing and managing respiratory failures—indicated by deviations in PaCO2, PaO2, and pH levels—studies reveal a gap in the knowledge and skills of nurses in interpreting these results accurately (6, 7). Such gaps can lead to severe complications, including electrolyte imbalances, muscle weakness, narcosis, respiratory failure, organ failure, seizures, chronic kidney disease, arrhythmias, coma, shock, and even death (9). Thus, understanding the physiological underpinnings related to ventilation, oxygenation, and acid-base status is essential for nurses, as it supports the comprehensive interpretation of ABGs encompassing oxygenation levels, pH status, respiratory and metabolic components, and compensatory mechanisms (10).

Despite ongoing training and the presence of educational programs, clinical observations indicate a persistent lack of proficiency among nurses in ICU settings regarding ABG analysis. This deficiency underscores the critical need for improved educational strategies and practice opportunities in this area (11). Therefore, the primary objective of this study is to assess the level of knowledge among ICU nurses concerning ABG analysis, aiming to enhance understanding and reduce the incidence of serious health complications associated with misinterpretation of ABG results.

METHODS

This study aimed to evaluate the level of knowledge regarding arterial blood gas (ABG) analysis among staff nurses within a tertiary care setting. Conducted at the Jinnah Hospital in Lahore, this descriptive cross-sectional research utilized a convenience sampling method to select participants from the hospital's nursing staff. Eligible participants were nurses who had accrued at least one year of work experience. Exclusion criteria were set to omit nurses with less than one year of experience, student nurses, and head nurses, ensuring a sample representative of experienced frontline nursing staff.

The sample size was determined using the Slovin formula, which provided a statistically robust framework for quantitative analysis. Data collection was facilitated through an adapted questionnaire designed to assess knowledge levels of ABG analysis among staff nurses. This questionnaire, previously validated in similar research settings, ensured that the data collected were both reliable and relevant to the study objectives.

Upon completion of the data collection phase, responses were systematically entered into SPSS software for analysis. Descriptive statistics were employed to interpret the data, providing insights into the overall competency levels in ABG analysis among the nursing staff at the facility. This methodological approach not only highlighted the existing knowledge gaps but also set the stage for targeted educational interventions.

RESULTS

Demographical, the highest percentage of participants were in the category of age 30-35years, which is76(54.3%). Majority of participants in this study were male.80(57.1%). Majority of participants from BSN Generic68 (48.6%). Mostly have experience from 1-5 years. 109 (77.9%), Majority participants were from ICU 105(75.0%), Majority was single.130 (92.9%)

Table 1: Socio- demographics characteristics of the staff nurses (n=140)

Demographics variables	Frequency	Percent
Age		
21-25years	40	28.6
26-30years	24	17.1
31-35 years	76	54.3
Gender		
Male	80	57.1
Female	60	42.9
Education		
Diploma in General Nursing	35	25.0
Post RN	25	17.9
BSN (Generic)	68	48.6
Experience		
1-5year	109	77.9
6-10year	30	21.4
11-15year	1	.7
Department		
ICU	105	75.0

Demographics variables	Frequency	Percent
Surgical ward	15	10.7
Medical ward	16	11.4
Others	4	42.9
Marital status		
Signal	130	92.9
Married	10	7.1

Table 2: Nurses level of knowledge towards ABGs analysis

Level of knowledge towards ABGs analysis		
Level of knowledge	Frequency	Percent
Low knowledge	58	41.4
Moderate knowledge	36	25.7
High knowledge	46	32.9

Table 2 demonstrates the level of knowledge of nurses regarding ABGs analysis. The participants with low knowledge were 58(41.4%), The participants with moderate knowledge were 36(25.7%) and the participants with high knowledge were 49(32.9%).

Table 3: Nurses level of knowledge towards ABG sample technique

Level of knowledge towards ABG sample technique		
Level of knowledge	Frequency	Percent
Low knowledge	59	42.1
Moderate knowledge	37	26.4
High knowledge	44	31.4

Table 3 demonstrates the level of knowledge of nurses regarding ABGs sample technique. The participants with low knowledge were 59(42.1%), the participants with low knowledge were 37(26.4%), and the participants with low knowledge were 44(31.4%).

DISCUSSION

The results of this descriptive cross-sectional study reveal varied levels of knowledge regarding arterial blood gas (ABG) analysis among nurses at a tertiary care facility. Specifically, 41.4% of the participants demonstrated a low level of knowledge, 25.7% exhibited moderate knowledge, and 32.9% displayed high knowledge concerning ABG analysis. Similarly, in terms of ABG sample techniques, 42.1% of respondents showed low knowledge, 26.4% had moderate knowledge, and 31.4% achieved a high knowledge level.

These findings underscore a significant variation in knowledge levels, indicating a critical need for targeted educational interventions to enhance both understanding and practical skills related to ABG analysis among nurses. The variability in knowledge can be attributed to differences in educational background, access to continuous professional development, and the frequency of involvement in ABG analysis during routine clinical duties (12-14).

Strengths of the study include the use of a validated questionnaire, which ensured the reliability and validity of the data collected. Additionally, the study's design allowed for a comprehensive assessment of knowledge across different levels of expertise within the nursing staff, providing a detailed snapshot of current competencies in a high-stakes area of clinical practice (15-17).

However, the study also has limitations that must be acknowledged. The use of convenience sampling may limit the generalizability of the findings to other settings or populations. Furthermore, as the study was conducted in a single hospital, the results might not reflect the situation in other tertiary care facilities or in hospitals with different resources and training programs (18-20).

These findings highlight the necessity for ongoing professional development and training programs in ABG analysis, which are crucial for ensuring the safety and efficacy of patient care in critical settings. Institutions may consider implementing regular workshops and simulation-based training sessions to address the identified gaps in knowledge and to reinforce nurses' competencies in ABG analysis and interpretation.

CONCLUSION

This study highlighted a prevalent deficiency in the knowledge of arterial blood gas (ABG) analysis among nurses in a tertiary care setting, with the majority exhibiting low proficiency. These findings emphasize the urgent need for educational interventions, such as refresher courses and continuous training programs, to enhance nurses' understanding and application of ABG analysis. Hospital management and policymakers must implement structured follow-up programs to monitor and improve knowledge levels. Future research should employ experimental designs to evaluate the effectiveness of educational interventions in improving ABG analysis skills, thus ensuring safer patient care and supporting nurses in their critical roles in intensive care environments.

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