# Arterial blood gas analysis and the knowledge of nurses working in intensive care units

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## Abstract

Emergency department intensive care units monitor acute respiratory failure patients with arterial blood gas analysis. Nurses monitor, manage, and support critically ill patients at the bedside, making their job the hardest. Purposive sampling selected 50 Nurses for a descriptive study.  Critical Care Unit study. After examining ABG analysis literature and consulting nursing experts, the investigator created a questionnaire to measure staff nurses' understanding. Data gathering was ethically approved. Participants gave informed consent when the setting gave permission.  ABG knowledge questionnaire and socio-demographic data were obtained. Results: 16% of staff nurses had low ABG analysis knowledge, 72% had average knowledge, and 12% had strong knowledge. Conclusions: Most nurses had average ABG Analysis expertise. Nurses need ABG analysis training.

**Key words: Critical Care Unit, Staff Nurses', Arterial Blood Gas Analysis**

## Introduction:

The study of arterial blood gases (ABG) is an important component of both the diagnosis and management of a patient's oxygenation status as well as acid–base balance. The effectiveness of this diagnostic tool is contingent on the user's capacity to appropriately understand the findings. It is possible for imbalances in the body's acid–base chemistry to bring about difficulties in a wide variety of illness situations. On occasion, the anomaly may be so severe that it poses a threat to the individual's life. [1] An arterial blood gas study is a common inquiry that is performed in intensive care units and emergency departments for the purpose of monitoring patients who are experiencing severe respiratory failure. In addition to this, it has some applications in general practise, such as determining whether or not patients with chronic obstructive lung disease require oxygen therapy in the comfort of their own homes. When evaluating a patient who may have respiratory acidosis or another acid-base condition, it is required to do an arterial blood gas (ABG) analysis. [2] The work environment for nurses is the most challenging of any profession since they are the primary carers at the bedside and must monitor, manage, and provide assistance for patients who are severely ill.[3] Being able to correctly interpret an arterial blood gas (ABG) is an essential ability for medical professionals such as doctors, nurses, respiratory therapists, and others in the medical field. ABG interpretation is of utmost significance in patients who are in a severe condition.[4] In an article that was published in Nursing Times in 2005, Allen K. said that arterial blood gas analysis can be difficult. Having said that, in a lot of clinical areas, the nurse is one of the first people to see the results. This article said that a guideline for ABG interpretation is valuable

to the nurses even when all of the complexity are not fully understood. As a result, they need to know whether emergency steps are required. [5] Interpretation of arterial blood gases is simply one of the many actions in which nurses need to demonstrate proficiency in order to offer safe patient care. [6] In intensive care units, nurses play a crucial part in the early discovery of high-risk patients who have an acid-base imbalance. As a result, the goal of this study was to determine the level of knowledge that nurses had concerning the examination of arterial blood gases for very ill patients. [7]

**Material and Methods:**

A descriptive research methodology was used to investigate Nurses, and the purposeful sampling method was used to pick a total of fifty Nurses for the study.  The research was carried out at the Critical Care Unit of the Krishna Hospital and Medical Research Centre in Karad. The samples that were considered for inclusion in this study were comprised of staff nurses who were currently employed in a critical care unit and who satisfies the inclusion criterion that was in place at the time of data collection. Staff nurses of both sexes as well as staff nurses who were willing to take part in this study were recruited for the investigation. The study did not include any staff nurses who were missing during data collection or who were working in other administrative roles such as ward sister, ward supervisor, or superintendent. Also omitted from the study were staff nurses who were engaged in other administrative activities such as managing the ward. The investigator designed a questionnaire to assess the knowledge of staff nurses based on the objectives of the study, after reviewing and examining literature on ABG analysis, and based on the opinion of nursing experts. The questionnaire was based on the opinion of the nursing experts. Before the data collecting began, authorization from the ethical committee was acquired. Following the acquisition of permission from the environment, the participants were questioned regarding their willingness to take part in the study, and informed consent was collected from each participant.  In addition to gathering socio-demographic data, a questionnaire on respondents' understanding of ABG analysis was also administered.

**Results:**

**Table.1 Frequency and Percentage Distribution Of DemographicCharacteristics:**

| Sr. No. | Variable | Total | Percentage |
|---------|----------|-------|------------|
| 1. | Sex | | |
| | a.      Male | 14 | 28 |
| | b.      Female | 36 | 72 |
| 2. | Age | | |
| | a.      20 to 30 | 45 | 90 |
| | b.      31 to 40 | 1 | 2 |
| | c.      41 to 50 | 3 | 6 |

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| | | | | |
|---|---|---|---|---|
| | d. | 51 to 60 | 1 | 2 |
| 3. | Qualification | | | |
| | a. | RGNM | 25 | 50 |
| | b. | B.B.Sc. Nursing | 25 | 50 |
| | c. | M.Sc. Nursing | 0 | |
| 4. | No. of Years of Experience | | | |
| | a. | 0 to 1 Year | 18 | 36 |
| | b. | 1 to 2 Years | 10 | 20 |
| | c. | 2 to 3 Years | 6 | 12 |
| | d. | Above 3 Years | 16 | 32 |
| 5. | Area of Experience | | | |
| | a. | CCU | 50 | 100 |
| | b. | OT | 0 | 0 |
| | c. | General Wards | 0 | 0 |

Table no. 1 shows In terms of gender, 28 (72%) of the staff nurses belong to female staff nurses, while only 14 (36%) of the staff nurses belong to male staff nurses. According to age, 45 (90%) of the staff nurses belong to the age range of 20-30 years, while only 1 (2% of the staff nurses) belong to the age category of 31-40 and 51-60 years respectively. According to qualification, there was an equal distribution of GNM and B.BSC Nursing staffs, which was equivalent to 25 (50%) out of a total of 50 (100%). According to experience, the majority of the staff nurses have more than three years of experience, which accounts for 16 (32%) of the total, while just 6 (12%) of the staff nurses have between two and three years of experience. According to the nurse's area of expertise, all fifty (100%) of the staff nurses work in the CCU.

**Table no. 2 Knowledge of Group of Staff NursesRegarding ABG Analysis**

| Grades | Score | Pretest | |
|---|---|---|---|
| | | **Frequency** | **Percentage** |
| Poor | 0 to 18 | 8 | 16 |
| Average | 19 to 29 | 36 | 72 |
| Good | 30 to 40 | 6 | 12 |

Table no. 2 reveals 16% of staff nurses were found to have inadequate knowledge, 72% of staff nurses were found to have average knowledge, and 12% of staff nurses were found to have enough knowledge. Regarding ABG Analysis

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Table No.3: Association between Level of Knowledge and Their Demographic Variables

| Sr. No | Variable | | Total | Level of Knowledge | | | P - Value | Chi Square Value |
|---|---|---|---|---|---|---|---|---|
| | | | | Poor 0 to 18 | Average 19 to 29 | Good 30 to 40 | | |
| 1. | Sex | | | | | | | |
| | c. | Male | 14 | 1 | 10 | 3 | 0.3020 | 2.395 |
| | d. | Female | 36 | 7 | 26 | 3 | | |
| 2. | Age | | | | | | | |
| | e. | 20 to 30 | 45 | 8 | 32 | 5 | 0.8650 | 2.531 |
| | f. | 31 to 40 | 1 | 0 | 1 | 0 | | |
| | g. | 41 to 50 | 3 | 0 | 2 | 1 | | |
| | h. | 51 to 60 | 1 | 0 | 1 | 0 | | |
| 3. | Qualification | | | | | | | |
| | d. | RGNM | 25 | 7 | 16 | 2 | 0.0605 | 5.611 |
| | e. | B.B.Sc. Nursing | 25 | 1 | 20 | 4 | | |
| | f. | M.Sc. Nursing | 0 | 0 | 0 | 0 | | |
| 4. | No. of Years of Experience | | | | | | | |
| | e. | 0 to 1 Year | 18 | 0 | 17 | 1 | 0.0356 | 13.515 |
| | f. | 1 to 2 Years | 10 | 4 | 5 | 1 | | |
| | g. | 2 to 3 Years | 6 | 2 | 4 | 0 | | |
| | h. | Above 3 Years | 16 | 2 | 10 | 4 | | |
| 5. | Area of Experience | | | | | | | |
| | d. | CCU | 50 | 8 | 36 | 6 | NA | NA |
| | e. | OT | 0 | 0 | 0 | 0 | | |
| | f. | General Wards | 0 | 0 | 0 | 0 | | |

Table no. 3 reveals the correlation between several socio-demographic factors and the amount of information possessed by a group of staff nurses There is no statistically significant association between any of the demographic characteristics and their knowledge score. The chi-square test was used in the computations.

**Discussion:**

The findings of the current research show that 16% of staff nurses have inadequate knowledge, 72% of staff nurses have average knowledge, and 12% of staff nurses have adequate knowledge with regard to ABG analysis. An examination of the relationship

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between a group of staff nurses' socio-demographic characteristics and their levels of knowledge There is no statistically significant association between any of the demographic characteristics and their knowledge score. The chi square test was utilised in the computation of these results.

The findings of the following research by Ibrahem SE et al. might be cited as supporting evidence for the conclusions reached in the present investigation. The results of the survey conducted in 2021 indicate that the majority of the tested sample (94.6%, or 100%) possessed an unacceptable level of knowledge and practise, with mean scores of 9.452.94 and 30.5+8.7, respectively. In addition, 29.7% of the people who took part in the research had an adequate level of practise regarding the double-checking of ABG results, but they had inadequate levels of practise regarding the analysis of ABG parameters, the recording of ABG results, the reporting of ABG results, the follow-up of medical care, and the double-checking of ABG, with percentages of 100%, 100%, 94.6, 83.8, and 70.3%, respectively. In conclusion, there was not a significant difference identified between the sexes in terms of the knowledge level (t=1.142, P=0.261). Nevertheless, there was no correlation between sex and practise (t=0.528, P0.601).[8] The results of the study conducted by Kaur A et al show that the majority of the nurses, 39 (65.0%), had an average score, followed by 14 (23.3%), who had a score that was below average, and 7 (11.7%), who had a score that was above average. [9] The Upreti D et al 2020 study discloses that in the pre-test, maximum numbers of staff nurses were evaluated, and it was found that 13 staff nurses had average knowledge, 11 staff nurses had good knowledge, 2 staff nurses had exceptional knowledge, and 4 staff nurses had inadequate knowledge.[10]

**Conclusion:** The analysis and interpretation of ABG results is a highly significant duty for nurses working in critical care units, and it is one that they encounter rather frequently. Therefore, in order to correctly analyse and interpret it, they need to have the necessary skills and knowledge. According to the findings of this study, the majority of nurses have knowledge that is only average when it comes to ABG Analysis. It is recommended that training programmes be carried out in order to improve the level of knowledge held by nurses about ABG analysis. In order to generalise the results of the study, it is possible to conduct the research again using a much larger sample.

**Conflicts of interest:** There are no conflicts of interest.

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