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A study to assess the knowledge regarding ABG analysis and interpretation of ABG results among staff nurses

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Abstract
Background: An arterial blood gas (ABG) study is a blood test that measures the levels of many different gases like the oxygen rich blood, carbon dioxide and bicarbonate, some of these levels measured directly, while others are calculated from the measurement of other gases by measuring the gases in arterial blood.
Objective: To assess the level of knowledge regarding ABG analysis and interpretation of ABG results among staff nurses.
Materials and Methods: Descriptive cross-sectional design and convenient sampling technique was followed. This research is conducted among 30 samples. Data was collected using structured questionnaire. Data analysis was done using descriptive and inferential statistics.
Results: Shows that with regard to ABG analysis and interpretation results among 30 staff nurses, 5(16.7%) had 'A' grade, 6(20%) had B+ grade, 13 (43.3%) had B grade, 4(13.3%) had C grade and 2(6.7%) had D grade knowledge and mean value was 19.0 and standard deviation was 3.5 in staff nurses.
Conclusions: The study concluded that majority of staff nurses had B grade level of knowledge.

Introduction
Circulatory system is a group of organs that transport blood and the substance to and from all parts of the body. The circulatory system can be considered as composed of two parts like systemic and pulmonary circulation. Systemic circulation which serves for the body as a whole except for the lungs and pulmonary circulation, which carries the blood to and from the lungs [1]. The organ of circulatory system consists of vessels that carry the blood and a muscular pump the heart that drives the blood. Red blood cells transport oxygen and carbon dioxide blood gases throughout the body. The levels of oxygen, carbon dioxide and pH and its imbalances in our blood can indicate the presence of certain medical condition such as cardiac, lung or kidney disorders [2].

Arterial blood gas analysis provides information about oxygenation and ventilation. The examiner obtains a blood sample by direct puncture of Radial, Brachial or Temporal artery. If the radial artery is to be used the examiner performs an Allen's test first to ensure the hand has adequate collateral blood flow [3]. The sample can be obtained either through a catheter placed in an artery, or by using a needle and syringe to puncture an artery. These syringes are pre-heparinized and handled to minimize air exposure that will alter the blood gas values. Once 2 ml of blood is obtained, air bubbles are expelled and syringes is scaled with an impermeable cap to prevent contact with room air. ABG determinations are used in the management of client of mechanical ventilators. Interpreting ABGs can be a nightmare. Below is a simple stepwise system which hopefully makes the process a logical one [4].

Steps for Interpretation of Blood Gas Levels
Step 1: The paO2 values for person breathing room air at sea level is 80-100 mm Hg.

Step 2: The pH is the hydrogen ion (H+) concentration of plasma. Calculation of pH is accomplished by using the partial pressure of Carbon Dioxide (paCo2) and the plasma Bicarbonate level (HCO3). The normal pH of arterial blood is 7.35 to 7.45 and the mean is 7.40.

Step 3: The paCo2 is a measure of the partial pressure of carbon dioxide dissolved in arterial blood plasma and it is reported in million meters of mercury (mm Hg.). The normal range for pa Co2 is 35 to 45 mmHg.

Step 4: Bicarbonate (HCo3) is the acid base component that reflects kidney function. The bicarbonate level is reduced or increased in the plasma by renal mechanisms. The normal range is 22 to 26 mg/l.

Step 5: If the pH level is abnormal (less than 7.35 or greater than 7.45). The paCo2 value or the HCO3 level of both will also be abnormal. By comparing the PH, paCo2 and HCO3 level or both will lead to abnormal ABG values [5].

Table 1: The normal and abnormal values for arterial blood gas.

Value	Definition	Normal Value	Abnormal Value
pH	Indication by hydrogen ion concentration	7.35−7.45	<7.35-acidosis >7.45 alkalosis
pao2	Respiratory parameters indication of adequacy of ventilation and carbon dioxide elimination	35−45	<35 = alkalosis >45 = acidosis
paCo2	Reflects the body's ability to use and transport oxygen through the system	80−100	<80 hypoxemia
HCO3 level	Metabolic parameter; assess the kidney ability to retain or excrete HCO3	22.26	<22 acidosis >26 alkalosis

ABG is used to assess the effectiveness of gaseous exchange and ventilation spontaneous or mechanical. It would therefore see logical to request an ABG on any patient who is or has the potential to become critically ill. Acid base balance and ABG analysis are complex concepts requiring a great deal of study in order to improve the knowledge for all staff nurses regarding ABG analysis and interpretation of results. Advances in medical science and technology have prompted the establishment of many highly specialized units (ICUs) providing intensive patient care.

Statement of The Problem: A study to assess the knowledge regarding ABG analysis and interpretation of ABG results among staff nurses.

Objectives of the Study
- To assess the level of knowledge regarding ABG analysis and interpretation of ABG results among staff nurses.
- To find out the association between the level of knowledge regarding ABG analysis and interpretation of ABG results among staff nurses with their selected socio demographical variables.

Materials and Methods
Sampling and Data Collection: Descriptive cross-sectional design is used to assess the level of knowledge regarding ABG analysis and interpretation among staff nurse. A non-probability convenient sampling technique was used. Staff nurses working in general ICU, emergency wards and cardiac ICU. Prior permission was obtained from ethical clearance committee Participants signed an informed consent.

Description of Tool
Part I Deals with the socio demographic variables of staff nurses like age, gender, educational qualification, total professional experience in ICU.

Part II
Deals with the self-administered structured questionnaire to assess the level of knowledge regarding ABG analysis and interpretation of the results among staff nurses consists of 50 closed ended multiple choice questions which was developed by the investigator. The tool consists of 50 items, each correct response has been scored with one mark. The total possible score was 50 and each wrong answer has been scored with 0 marks.

Score Interpretation
The score was interpreted as follows:

Table 2: Grading System

Score	Grade
>85%	A+
>75%	A
>65%	B+
>55%	B
>50%	C
<50%	D

Data analysis: Data was analysed by using descriptive and inferential statistics.

Results
The results show that frequency and percentage distribution with regard to 28(93.3%) staff nurses are between 21-24 years and 2(6.7%) are between 25-27 years, with regard to gender 25(75%) staff nurses are females and 5(25%) staff nurse are male, regard to educational qualification, 24(80%) studied BSC (N) and 6(20%) studied PBBSC (N).With context to professional experience 15 (50%) staff nurses are below 1 year, 14(46.7%) nurses have 1−3 years and 1(3.3%) nurses has 3-5 years, regard to duration of Experience in ICU, 16 (53.3%) have <1 year experience,8(26.7%) have 1−2 years' experience, 5(16.7%) have 2-3years experience and 1(3.3%) have >3 years, regard to area of working., 4 (13.3%) staff nurses are working in emergency,8(26.7%) are in HDU,7(23.3%) are in cardiology ICU and 11(36.7%) in general ICU.

Table 3: Frequency and percentage distribution of staff nurses based on level of knowledge. (N=30)

Level of Knowledge	Nursing Staffs	
	Frequency	Percentage (%)
A+	-	-
A	5	16.7
B+	6	20
B	13	43.3
C	4	13.3
D	2	6.7

Table 4: Mean and standard deviation of knowledge scores of staff nurses. (N=30)

Group	Mean	Standard deviation
Staff nurses	18.06	3.21

For staff nurses there was significant association with the educational qualification and the remaining variables professional experience, duration of experience in ICU and area of working are non-significant.

Discussion

The discussion of the present study was based on the findings obtained from the descriptive and inferential statistical analysis of collected data. It is presented in the view of the objectives of the study. The study related to level of knowledge regarding ABG analysis and Interpretation, pertaining to level of knowledge regarding ABG analysis and interpretation among staff nurses, majority 12 (40.0%) had 'B' grade knowledge. Results show with regard to association, there was significant association between the level of knowledge of staff nurses on ABG analysis and interpretation results with socio demographic variables such as educational qualification and there was no significant association between the level of knowledge on ABG analysis and interpretation with socio demographic variable of age, gender, professional experience, duration of experience in ICU and area of working.

Conclusion

The study concluded that 12 (40%) majority of staff nurses had B grade knowledge regarding ABG analysis and interpretation of results.

Recommendations

- A similar study can be replicated as a large sample to generalize findings special education programme can be provide to staff nurses.
- A similar study can be done in different sittings.
- An experimental study can be conducted to assess the effectiveness of ABG analysis and interpretation results in various settings.
- Planned teaching can be conducted to improve ABG analysis and interpretation results.

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