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RESEARCH ARTICLE

THE EFFECT OF STRUCTURED TEACHING PROGRAM ON KNOWLEDGE ABOUT ARTERIAL BLOOD GAS ANALYSIS AMONG THE STAFF NURSES WORKING IN CRITICAL CARE UNIT

Ms. Priya Sachan and Ms. Swastika Das

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Key words:-

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Abstract

Statement: "A STUDY TO ASSESS THE EFFECT OF STRUCTURED TEACHING PROGRAM ON KNOWLEDGE ABOUT ARTERIAL BLOOD GAS ANALYSIS AMONG THE STAFF NURSES WORKING IN CRITICAL CARE UNIT OF SELECTED HOSPITAL, LUCKNOW"

Introduction: Arterial blood gas analysis is a basic and useful laboratory test for the critically ill patients. It is an essential investigation for assessing ventilation, oxygenation and acid base status among critically ill patients. These three are closely interrelated physiological parameters which maintain pH homeostasis. Measurement of arterial blood gas involves analysis of components: pH, partial pressure (PP), Base excess (BE), Bicarbonate (HCO₃), Electrolytes, Haemoglobin (Hb) and Glucose. Interpreting an arterial blood gas (ABG) is a crucial skill for physicians, nurses, respiratory therapists, and other health care personnel. Any deviation from a normal value will indicate that the client is experiencing an acid base imbalance. Disorders of acid-base balance can lead to severe complications and occasionally the abnormality may be so severe that it can lead to life threatening condition.

Objectives Of The Study:

1. Assess the level of knowledge about Arterial Blood Gas analysis among the staff nurses working in the Critical Care Unit at selected Hospital.
2. Evaluate the effect of Structure Teaching Programme on level of knowledge about Arterial Blood Gas Analysis among the staff nurses working in the Critical Care Unit at selected Hospital.
3. Association between level of knowledge about Arterial Blood Gas analysis among the staff nurses working in the Critical Care Unit with selected demographic variables.

Research Methodology: This study was conducted using Quantitative approach at Integral Hospital, Lucknow. Pre-experimental one group pre-test-post-test design was used in the study. The conceptual framework used in this study was Modified Kings Goal Attainment theory. The total sample size was 30 selected by convenience sampling technique. The data was collected by administering Structured Knowledge Questionnaire followed by

Structured Teaching Programme about Arterial Blood Gas analysis. After 7 days, post-test was done to assess the effectiveness of STP.

Results: The data obtained are tabulated and analysed using descriptive and inferential statistics. The statistical analysis of the data shows that 86.7% of the staff nurses had moderate knowledge and 13.3% of the staff nurses had inadequate knowledge. The mean pretest knowledge score regarding Arterial Blood Gas analysis was 13.96 with a standard deviation of 3.39. After giving STP the mean score was increased to 23.00 with a standard deviation of 2.36. The Structured Teaching Programme was effective in improving the knowledge as the 't' value is -12.54 which was highly significant with the degree of freedom 29 $p < 0.05$.

Conclusion: The findings revealed that there was a significant improvement in knowledge of staff nurses in post-test after structured teaching programme. It also showed that there was an association with pre-test knowledge and selected demographic variables like age and association of post-test knowledge and selected demographic variable like qualification.

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..... Introduction:-

Many lifesavings diagnostic tests are performed in clinical set up to identify disease and are very essential tools in screening any deviations from normal functions of the body. The methods used will vary from assessment of vital sign to the increasingly complex invasive diagnostic procedure such as central venous pressure (CVP), arterial pressure monitoring, transesophageal echocardiography, ABG sampling depending on the care of the patient. Though there are various diagnostic procedures, ABG analysis can be thought of as a window through which ventilation, respiration, metabolism and acid-base balance can be examined.¹

Arterial blood gases are the most commonly performed laboratory test in intensive care unit and there are no more definitive measurements than arterial-blood-gas values when assessing the need for respiratory therapy. Arterial blood gas studies aid in assessing the ability of the lungs to provide adequate oxygen and remove carbon dioxide, and the ability of the kidneys to reabsorb or excrete bicarbonate ions to maintain normal body pH. Moreover, it evaluates the serum electrolytes sodium and potassium.²

An arterial blood gas (ABG) specifically tests blood taken from an artery. Arterial blood gas analysis assesses a patient's partial pressure of oxygen (PaO_2), providing information on the oxygenation status; the partial pressure of carbon dioxide (PaCO_2), providing information on the ventilation status (chronic or acute respiratory failure), and is changed by hyperventilation (rapid or deep breathing) and hypoventilation (slow or shallow breathing); and acid-base status. Although oxygenation and ventilation can be assessed non-invasively via pulse oximetry and end-tidal carbon dioxide monitoring, respectively, blood gas analysis is the standard.³

Nurses are increasingly expected to integrate laboratory and diagnostic procedures and results in assessment, planning, implementation, and evaluation of nursing care. Nurses may interface with laboratory and diagnostic test on several levels, including; maintaining quality control to prevent or eliminate problems that may interfere with the accuracy and reliability of test results, ensuring completion of testing in a timely and accurate manner, collaborating with other health care professionals in interpreting findings and handling the plan of care. As the smallest rate of error may lead to life-threatening medical decisions.⁴

A quantitative pre-experimental research was conducted 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. 100 staff nurses were selected through convenient sampling technique. Result showed that mean of pre-test was 10.98 and mean of post-test was 18.54 which indicate that mean difference is 7.56. The calculated paired 't' value (20.82) was found to be higher than the tabulated value ($t = 1.98$)

at 0.05 level of significance. Study concluded that structured teaching programme was effective in enhancing the level of knowledge of staff nurses regarding arterial blood gas analysis and interpretation.⁵

Title Of The Study:

A study to assess the effect of structured teaching program on knowledge about arterial blood gas analysis among the staff nurses working in critical care unit of selected hospital, lucknow.

Objectives Of The Study:-

1. Assess the level of knowledge about Arterial Blood Gas analysis among the staff nurses working in the Critical Care Unit at selected Hospital.
2. Evaluate the effect of Structure Teaching Programme on level of knowledge about Arterial Blood Gas analysis among the staff nurses working in the Critical Care Unit at selected Hospital.
3. Association of level of knowledge about Arterial Blood Gas analysis among the staff nurses working in the Critical Care Unit with selected demographic variables.

Hypothesis:

The study attempted to examine the following hypothesis:

- **H1:** There will be significant effect of Structure Teaching Programme on level of knowledge about Arterial Blood Gas analysis among the staff nurses working in Critical Care Unit at $p < 0.05$ level of significance.
- **H2:** There will be significant association of level of knowledge with selected demographic variables about Arterial Blood Gas analysis among staff nurses working in Critical Care Unit at $p < 0.05$ level of significance.

Methodology:-

Research approach: Quantitative evaluative approach was selected for the study.

Research Design: One group pre-test and post-test design was selected for the study.

Research Setting: This study was conducted at Critical Care Unit of Integral hospital, Lucknow.

Research variables:

Independent variables: structured teaching programme about arterial blood gas analysis.

Dependent variables: knowledge of the staff nurses about arterial blood gas analysis.

Demographic variables:

Age, Gender, Qualification, Year of experience in Critical Care Unit, Previous knowledge.

Target population: The target population of present study is staff nurses working in the Integral hospital, Lucknow

Sample: Staff nurses who were present at that time and in the Critical Care Unit at Integral hospital, Lucknow.

Sample size: It consisted of total 30 staff nurses.

Sampling technique: In this study convenience sampling technique of non-probability sampling method was used.

Criteria for Sample Selection:

Inclusion criteria:

- Staff nurses who were working in Critical Care Unit at Integral Hospital, Lucknow.
- Staff nurses who have completed GNM, Post B.Sc. and B.Sc. Nursing.
- Staff nurses who were available at the time of study period.

Exclusion criteria:

- Staff nurses who were not willing to participate in this study.

Tools:

Development/ selection of tool:

In this study, Structured Knowledge Questionnaire on Arterial Blood Gas analysis was used. The tool was prepared by the researcher after an extensive review of research and non-research literature about Arterial Blood Gas analysis and discussion with Nursing Experts and Medical Experts.

Description of the tool: Data collection instrument consist of the following sections:

Part:1Demographic Performa: It consists of demographic variables like Age, Gender, Qualification, Year of experience in Critical Care Unit, Previous knowledge.

Part: 2Structured knowledge questionnaires about Arterial Blood Gas analysis: It was a structured knowledge questionnaire about Arterial Blood Gas analysis. This tool consists of 30 items in five sections. It covered the following aspect.

- Section A: General information
- Section B: Pre-Procedural
- Section C: Intra Procedural
- Section D: Post Procedural
- Section D: Interpretation

Result:-

PART I: Distribution of demographic characteristics of staff nurse.

Table1: Frequency and percentage distribution according to demographic variables of staff nurses. **n= 30**

S.NO	DEMOGRAPHIC DATA	CATEGORY	FREQUENCY (f)	PERCENTAGE (%)
1.	Age (in years)	20-25 year	8	26.7%
		26-30 year	10	33.3%
		31-35 year	9	30.0%
		36 and above	3	10.0%
2.	Gender	Male	9	30%
		Female	21	70%
3.	Qualification	GNM	16	53.3%
		BSc Nursing	4	13.3%
		Post Basic nursing	10	33.3%
4.	Years of experience in Critical Care Unit	<1 year	2	6.7%
		1 year - <3 years	8	26.7%
		3 years - <5 years	12	40.0%
		5 years - < 7 years	6	20%
		> 7years	2	6.7%
5.	Previous knowledge	No	22	73.3%
		Yes	8	26.7%

PART II: Assessment of level of knowledge about Arterial Blood Gas analysis among Staff Nurses.

SECTION A: Assessment of pretest level of knowledge about Arterial Blood Gas analysis among Staff Nurses.

Table 2:- Assessment of pretest level of knowledge about Arterial Blood Gas analysis among Staff Nurses. **n= 30**

LEVEL OF KNOWLEDGE	SCORE	FREQUENCY	PERCENTAGE
ADEQUATE	21-30	00	00%
MODERATE	11-20	26	86.7%
INADEQUATE	0-10	4	13.3%

The table above shows the pretest knowledge score of 30 subjects, 26 (86.7%) had moderate knowledge and 4 (13.3%) had inadequate knowledge.0020

SECTION B: Assessment of posttest level of knowledge about Arterial Blood Gas analysis among Staff Nurses.

Table 3:- Assessment of posttest level of knowledge about Arterial Blood Gas analysis among Staff Nurses. **n = 30**

CATEGORY	SCORE	FREQUENCY	PERCENTAGE
ADEQUATE	21-30	24	80%

MODERATE	11-20	06	20%
INADEQUATE	0-10	00	00%

The table above shows the posttest knowledge score of 30 subjects, 24 (80%) had adequate knowledge and 06 (20%) had moderate knowledge.

PART III: Analysis of effect of Structured Teaching Programme about Arterial Blood Gas analysis.

Table 5:- Comparison of pretest and posttest knowledge scores among staff nurses about Arterial Blood Gas analysis using Paired t- test. **n=30**

CATEGORY	Mean	SD	Mean difference	Df	Paired t value	P value	Table value at 0.05
Pretest	13.96	3.39	9.04	29	-12.547	.000**	2.05
Posttest	23.00	2.36					

** Significance at 0.05 level

PART IV: Association of pretest knowledge among staff nurses with selected demographic variables.

Table 7:- Association of pretest knowledge score of staff nurses with selected demographic variables. **n= 30**

S.No	DEMOGRAPHIC DATA	CATEGORY	Frequency	Adequate	Moderate	Inadequate	Df	Chi square	Table value	Remark
1.	Age (in years)	20-25 year	08	0	05	03	6	17.67	12.59	S
		26-30 year	10	0	09	01				
		31-35 year	09	0	09	00				
		36 and above	03	0	03	00				
2.	Gender	Male	09	0	06	03	2	4.43	5.99	NS
		Female	21	0	20	01				
3.	Qualification	GNM	16	0	01	15	4	1.53	9.49	NS
		BSc Nursing	04	0	01	03				
		Post Basic nursing	10	0	02	08				
4.	Years of experience in Critical Care Unit	<1 year	02	0	0	02	8	14.85	15.51	NS
		1 year - <3 years	08	0	07	01				
		3 years - <5 years	12	0	11	01				
		5 years - <7 years	06	0	06	00				
		>7years	02	0	02	00				
5.	Previous knowledge	No	22	0	19	03	2	0	5.99	NS
		Yes	08	0	07	01				

*NS- Not Significant

S- Significant

Table above discloses the association of pretest knowledge score of staff nurses with selected demographic variables like age, gender, qualification, year of experience in Critical Care Unit, and previous knowledge. The association was statistically tested by chi square. It indicated that the chi square values computed between the pretest knowledge score and age ($\chi^2 = 17.67$) found to be highly significant at 0.05 level of significance and with gender ($\chi^2 = 4.43$), qualification ($\chi^2 = 1.53$), year of experience ($\chi^2 = 14.85$), and previous knowledge ($\chi^2 = 0$) were found to be statistically non-significant at 0.05 level of significance.

Discussion:-

The mean pretest score about Arterial Blood Gas analysis was 13.96 and standard deviation is 3.39. After rendering structured teaching programme, the mean score increased to 23.00 with standard deviation of 2.36. The significance of structured teaching programme about Arterial Blood Gas analysis was assessed using the paired t test (dependent t test). The calculated t value for knowledge regarding Arterial Blood Gas analysis is -12.54 and P value is .000 which is highly significant at 0.05 levels. As the calculated value of "t" at 29 degree of freedom was greater than the table value at 0.05 level of significance.

The finding of the study is supported by an evaluative study to assess the effectiveness of structured teaching programme on knowledge Arterial Blood Gas analysis among the staff nurses at selected hospital, Chennai. 30 samples were selected using purposive sampling technique. The pre-test mean value is 19.5 and the standard deviation value is 3.03. The post-test mean value is 25.1 and standard deviation value is 2.14. The mean difference

is 5.6 and the standard deviation difference is 9. The Paired “t” value is 8.4, which is statistically significant at $p < 0.001$.

Conclusion:-

The above study was undertaken to assess the knowledge on ABG Analysis among staff nurses. If they are able to interpret correctly can prevent complications, keep away from errors and help in improving the condition of the patient. So, the study motivates staff nurses in improving knowledge on ABG analysis and ultimately improve the patient care and quality of nursing care. It becomes vital for the nurses working in critical care departments should have additional knowledge on ABG Analysis in order to save the patients from developing lot of complications.

Nursing Implication:

The findings of the present study have brought out certain facts that have far reaching implications for nursing in the areas of practice, education, administration and research.

Nursing Education:

Arterial Blood Gas analysis is one of the important topics which can be included in the curriculum, so that the students will be able to learn about the patient care from the basic level itself. The curriculum can be planned from the basic level.

Nursing Practice:

Nurses are the backbone of health care setup. The primary importance of giving knowledge about Arterial Blood Gas analysis for staff nurses will help to give care to the patient effectively. Nurses need to be equipped with advanced knowledge and skill to become involved in providing necessary services to patient in Critical Care Unit setting. The expanded role of professional nurse emphasizes the implication which include promotive, preventive, curative and rehabilitative aspects.

Nursing Research:

Nursing Research helps to broaden the scope of nursing. Based on the results further recommendations can be made. Further studies can be done to find out the effectiveness of various nursing practice. It is vital that student researchers update their knowledge constantly and are always willing to examine and alter their practice in the light of new published evidences.

Nursing Administration:

In the event of changing disease manifestation, knowledge explosion, technological and ever-growing challenges of critical care nursing, the administration has a responsibility to provide nurses with substantial continuing education opportunities by them for in-service education programmes, special courses workshop conferences. This will enable the nurses in updating their knowledge.

The Concept of extended role of nurse offer many opportunities for a nurse administrator to improve the knowledge regarding ABG analysis among staff nurses.

Limitation:

The limitations of the present study were:

- The study is limited to staff nurses who are working in selected Critical Care Unit hospitals of the Lucknow.
- The study was restricted with limited sample size in a selected hospital which limits the generalization of findings.

Recommendations:-

1. The study can be conducted with the large sample to validate the findings and generalizations can be made.
2. An Experimental study can be done with video assisted teaching and informational booklet method.
3. A similar study can be conducted to assess knowledge and practice regarding ABG Analysis among staff nurses.
4. Comparative study can be done between staff nurses working in private or Government Hospital.
5. Comparative Study can be done between the staff nurses working in ICU or General Ward.

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