Original Research Article

The Effectiveness of Planned Teaching Programme on Knowledge Regarding Arterial Blood Gas Analysis among Undergraduate Nursing Students in Jhalawar District

Manoj Goswami

Principal, Jhalawar Nursing College, Jhalawar, Rajasthan, India.

How to cite this article: Manoj Goswami. The Effectiveness of Planned Teaching Programme on Knowledge Regarding Arterial Blood Gas Analysis among Undergraduate Nursing Students in Jhalawar District. International Journal of Nursing Care / Vol. 13 No. 1, January-June 2025.

Abstract

An Arterial Blood Gas (ABG) test is a relatively swift and low-risk method that helps healthcare professionals obtain information on oxygen saturation, acid-base balance, partial pressure of oxygen, partial pressure of carbon dioxide, metabolic parameters, and arterial oxygen saturation[1]

Objectives

1. To assess the existing knowledge regarding Arterial Blood Gas (ABG) analysis among undergraduate nursing students at a selected nursing college.
2. To evaluate the effectiveness of a planned teaching program on Arterial Blood Gas (ABG) analysis among undergraduate nursing students at a selected nursing college.
3. To determine the association between pre-test knowledge scores and selected demographic variables.

Material and Method: A quasi-experimental one-group pre-test post-test design was used. A total of 125 samples were selected using the probability simple random sampling method. A structured questionnaire consisting of 30 items was administered as a pre-test on the first day, followed by planned teaching, and a post-test was conducted on the seventh day. The reliability coefficient (r) of the questionnaire was 0.80, which is greater than 0.7, indicating that it was reliable. The conceptual framework was based on the Adaptation Theory developed by Sr. Callista Roy (1976), incorporating input, processes, effectors, output, and feedback.

Result and Conclusion: In the results of the structured questionnaire, it was found that 29.6% of undergraduate nursing students had poor knowledge, 65.6% had average knowledge, and 4.8% had good knowledge regarding Arterial Blood Gas (ABG) analysis. The post-test knowledge score findings showed an improvement in the knowledge of undergraduate nursing students regarding ABG analysis. After the intervention, 41.6% of undergraduate nursing students had average knowledge, while 54.4% had good knowledge scores regarding ABG analysis. This suggests a marked increase in post-test knowledge scores, indicating that the planned teaching was effective. The chi-square test computed between pre-test knowledge and selected variables showed that knowledge was not dependent on age, gender, qualification, or previous knowledge.

Key words: Planned teaching programme, ABG analysis, Undergraduate nursing student.

Corresponding Author: Manoj Goswami, Principal, Jhalawar Nursing College, Jhalawar, Rajasthan, India.

E-mail: onlinemanu@yahoo.com

Submission date: Jul 23, 2024 **Revision date:** Jan 7, 2025 **Published date: Feb 3, 2025**

Introduction

Over the last few years, there has been a significant increase in the knowledge, technology, and skills required to treat critically ill patients. This has led to the development of intensive care units (ICUs), which are specialized areas where severely ill patients can be concentrated, monitored, and provided with the infrastructure and expertise necessary for managing critical illnesses. For instance, undergraduate nursing students must possess the necessary knowledge and skills to work in these settings. They must also understand arterial blood gas (ABG) analysis and continually update their knowledge, as it is one of the most commonly used tests to assess a patient's clinical status. Accurate analysis can lead to quicker and more precise adjustments in patient care plans. In many settings, nurses are becoming increasingly autonomous in patient management, including ordering and interpreting diagnostic studies.[2]

Nurses play a crucial role in the early detection of high-risk clients with acid-base imbalances in critical care units. They collaborate in the administration of drug therapy, oxygen therapy, and mechanical ventilation when necessary. In extreme circumstances where therapeutic compensation is required, nurses must be knowledgeable about the potential risks associated with these therapies and be capable of carefully monitoring administration rates and therapeutic responses..[3]

Research Methodology

Research Approach: Quantitative research approach.

Research Design: Quasi-experimental one-group pre-test post-test design.

Variables:

- Independent Variable: Planned teaching program regarding ABG analysis.
- Dependent Variable: Knowledge of undergraduate nursing students regarding ABG analysis**.**

Setting of the Study: Selected nursing colleges in the Jhalawar district.

Population: Undergraduate nursing students.

Sample Size: The sample size for the study consisted of 125 undergraduate nursing students.

Sampling Technique: Probability simple random sampling technique was used.

Reliability: Karl Pearson's correlation coefficient formula was used to estimate reliability. The reliability coefficient (r) of the structured questionnaire was 0.80, which is greater than 0.7, indicating that the questionnaire was reliable.

Pilot Study: The pilot study helped the researcher anticipate potential issues that might arise during the main investigation and provided better insights into the research methodology. No changes were required after the pilot study.

Procedure of Data Collection: Prior permission was obtained from the principal of the nursing college in the Jhalawar district. The researcher visited the college and selected the samples based on the criteria. A 30-minute pre-test was conducted using a structured questionnaire after obtaining informed consent from the participants. A 45-minute structured teaching program was delivered immediately after the pre-test. The 30-minute post-test was conducted 7 days after the structured teaching program.

Results

Table No.1: Frequency and Percentage Distribution of Selected Demographic Characteristics.

n = 125

SR.NO	DEMOGRAPHIC CHARACTERISTICS	FREQUENCY	PERCENTAGE(%)
1	Gender of individual		
A	Male	92	73.6
B	Female	33	26.4
2	Age		

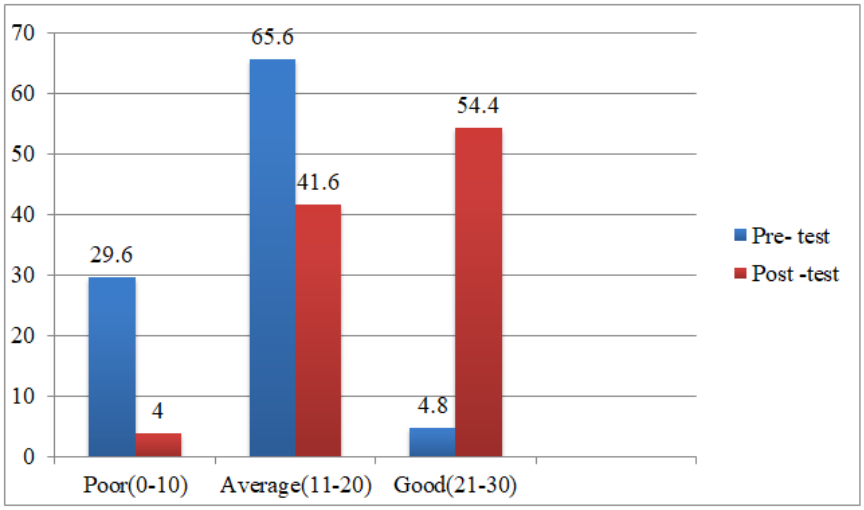
Continue.....

A	17-30 Years	125	100.0
3	Educational qualification		
A	B.Sc. Nursing 1st Year	2	1.6
B	B.Sc. Nursing 2nd Year	83	66.4
C	B.Sc. Nursing 3rd Year	19	15.2
D	B.Sc. Nursing 4th Year	21	16.8
4	Previous knowledge		
A	Yes	73	58.4
B	No	52	41.6

Table No.2: Frequency and Percentage Distribution of Pre-Test and Post Test Knowledge Score.

n = 125

KNOWLEDGE SCORE	PRE TEST		POST TEST	
	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE
Poor (0-10)	37	29.6	5	4
Average (11-20)	82	65.6	52	41.6
Good (21-30)	6	4.8	68	54.4



Figutre No 1: Frequency and Percentage Distribution of Pre – Test and Post Test Knowledge Score.

Table No.3: Comparison between Pre-Test and Post-Test Knowledge Score.

n = 125

TEST	MEAN	STD. DEVIATION	t value	df	p value
PRE-TEST SCORE	13.5040	4.50201	11.133	124	<0.0001*
POST-TEST SCORE	20.7760	5.55887			

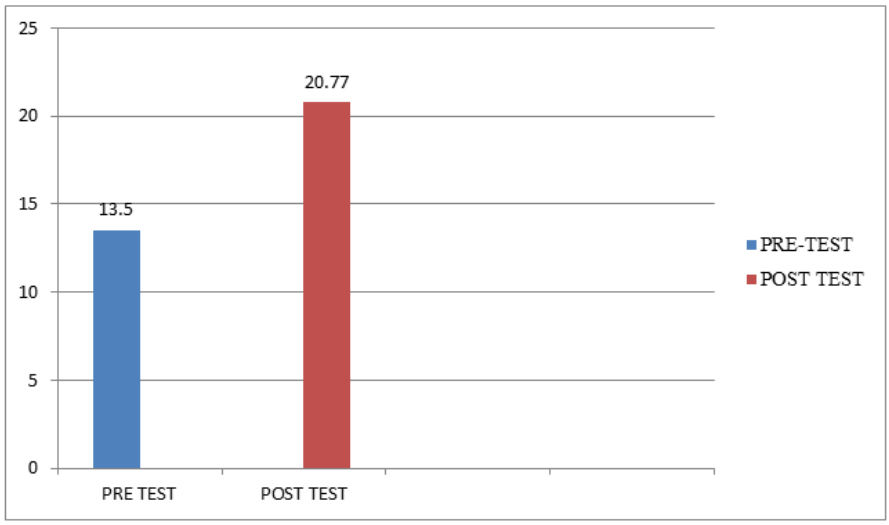


Figure No. 2: Comparison between Pre-Test and Post-Test Knowledge Score.

Table 3 and Figure 2 represent the data showing that the mean value of the pre-test knowledge score is 13.50, while the post-test knowledge score is 20.77. The calculated 't' value is 11.133, which is greater than the tabulated value, and the calculated 'p' value is <0.000, which is less than the tabulated 'p' value (0.05). This indicates a statistically significant increase in post-test knowledge scores, suggesting that the planned teaching program on Arterial Blood Gas (ABG) analysis for undergraduate nursing students was effective..

Table No. 4: Association between Pre-Test Knowledge Score with Demographic Variables.

n = 125

Sr. No	Demographic variables	Pre-test knowledge score			Test Chi square Test	p value	Remark
		Poor	Average	Good			
1	**Sex of individual**						
A	Male	29	60	3	2.162	0.339	No association
B	Female	8	22	3			
2	**Age**						
A	17-30 Years	37	82	6			
3	**Qualification**						
A	B.Sc. Nursing 1st Year	1	1	0	7.568	0.271	No association
B	B.Sc. Nursing 2nd Year	23	57	3			
C	B.Sc. Nursing 3rd Year	5	14	0			
D	B.Sc. Nursing 4th Year	8	10	3			
4	**Previous knowledge received**						
A	Yes	16	51	6	8.259	0.016	No association
B	No	21	31	0			

Discussion

- **Frequency and Percentage Distribution of Selected Demographic Characteristics:**

The majority of the undergraduate nursing students, 92 (73.6%), were male, and 33 (26.4%) were female. All 125 (100%) participants were in the age

group of 17-30 years, indicating that the majority of the sample fell within this age range.

Regarding educational qualifications, 2 (1.6%) undergraduate nursing students were in B.Sc. Nursing 1st year, 83 (66.4%) were in B.Sc. Nursing 2nd year, 19 (15.2%) were in B.Sc. Nursing 3rd year, and 21 (16.8%) were in B.Sc. Nursing 4th year. These findings indicate that most undergraduate nursing students in the study were from B.Sc. Nursing 2nd year.

In terms of prior knowledge, 73 (58.4%) undergraduate nursing students had received information about Arterial Blood Gas (ABG) analysis from workshops, seminars, or presentations, while 52 (41.6%) had not received any information regarding ABG analysis.

- **Frequency and Percentage Distribution of Pre – Test and Post Test Knowledge Score.**

Out of 125 undergraduate nursing students, 37 (29.6%) had poor knowledge in the pre-test, 82 (65.6%) had average knowledge, and 6 (4.8%) had good knowledge. This knowledge improved significantly in the post-test, where 68 (54.4%) undergraduate nursing students had good knowledge regarding Arterial Blood Gas (ABG) analysis, 52 (41.6%) had average knowledge, and only 5 (4%) had poor knowledge.

Similar findings were reported in a study by Anita Kumari (2020), where 72% of staff nurses had average knowledge in the pre-test, and 75% had good knowledge in the post-test regarding arterial blood gas analysis and interpretation. The study concluded that a structured teaching program was effective in enhancing the level of knowledge of staff nurses regarding arterial blood gas analysis and interpretation.

Additionally, a study by Thirumoorthy D (2022)[5] showed that after the administration of an information booklet, 90% of staff nurses had adequate knowledge regarding ABG analysis. These studies highlight the importance of ABG analysis in selected hospitals, signifying that the planned teaching program (PTP) was effective in improving knowledge of arterial blood gas analysis among undergraduate nursing students.

- **Comparison between Pre-Test and Post-Test Knowledge Score.**

The mean value of the pre-test knowledge score was 13.50, and the post-test knowledge score was 20.77. The calculated 't' value was 11.133, which is greater than the tabulated 't' value, and the calculated 'p' value was <0.000, which is less than the tabulated 'p' value (0.05).

Similar findings were reported in a study by Jeril Mariam Thomas (2017)[6], which revealed that the mean post-test knowledge level of the experimental group (24.10) was higher compared to the pre-test score (14.10). This study concluded that the structured teaching program was effective in improving the level of knowledge of II and III-year B.Sc. Nursing students.

Likewise, a study by Supriya Singh (2023)[7] found that the mean and standard deviation of nursing students in the pre-test was 11.783 ± 3.50, while in the post-test, it was 16.266 ± 5.09. The calculated 't' value was 5.09, which was higher than the tabulated value of 2.02 at $p < 0.05$ level of significance. These findings clarify that the self-instructional module was effective in enhancing the knowledge of nursing students regarding arterial blood sampling.

These results suggest a statistically significant increase in post-test knowledge scores, indicating that the planned teaching program on Arterial Blood Gas (ABG) analysis for undergraduate nursing students was effective.

- **Association between Pre-Test Knowledge Score with Demographic Variables.**

There is no significant association between age, gender, qualification, previous knowledge, and pre-test knowledge scores, as the calculated 'p' value is greater than the tabulated 'p' value (0.05). However, there is a significant association between pre-test scores and education level. Those with qualification 'A' demonstrated poor knowledge scores in relation to the selected demographic variables.

Conclusion

The analysis and interpretation of data collected from 125 undergraduate nursing students included the frequency and percentage distribution

of demographic variables. The effectiveness of the planned teaching program was assessed by comparing the mean pre-test and post-test knowledge scores, which demonstrated that the planned teaching was effective. The association between selected demographic variables and knowledge scores was analyzed using the calculated p-value. The results showed a significant association between pre-test scores and education levels, with those having qualification 'A' exhibiting poorer knowledge scores in relation to the selected demographic variables.

Conflict of Interest: - Nil

Source of Funding: - Self –funding

Ethical Considerations: -An ethical committee letter was submitted to Jhalawar Nursing College, Jhalawar, and permission to conduct the research was obtained. Approval was also secured from the concerned authority and the parents of each participant before data collection. The approval was granted under the reference number JNC/2023/1543, dated 06/11/2023.

References

1. Thorat R, Dani P, Gupta H. Effectiveness of structured teaching programme on knowledge regarding arterial blood gas analysis among staff nurses [Internet]. 2017 [cited 2023 Nov 6]. Available from: https://www.ijsr.net/archive/v6i11/ART20174682
2. Kaur A, Charan GS. A study to assess the effectiveness of structured teaching programme on knowledge and practice.
3. Lewis SM, Heitkemper MM, Dirksen SR. Medical-Surgical Nursing: Assessment and Management of Clinical Problems. 7th ed. St. Louis: Mosby; 2007.
4. Kumari A. Effectiveness of structured teaching programme on arterial blood gas analysis. Asian J Nurs Educ Res [Internet]. 2020 [cited 2023 Nov 6]. Available from: https://ajner.com/HTMLPaper.aspx?Journal=Asian
5. Thirumoorthy D. Effectiveness of information booklet on arterial blood gas analysis. Int J Allied Med Sci Clin Res [Internet]. 2022 [cited 2023 Nov 6];10(3):ISSN:2347-6567. Available from: http://www.ijamscr.com
6. Thomas JM. Effectiveness of structured teaching programme on knowledge of arterial blood gas analysis. Int Educ Res J [Internet]. 2017 [cited 2023 Nov 6];3(7):ISSN:2454-9916. Available from: https://ierj.in/journal/index.php/ierj/article/view/1212
7. Singh S. Effectiveness of self-instructional module on arterial blood sampling. Int J Sci Dev Res [Internet]. 2023 [cited 2023 Nov 6];8(11):ISSN:2455-2631. Available from: https://www.ijsdr.org