

Effectiveness of Simulation Based Learning on Knowledge regarding Methods of Oxygen Administration among Staff Nurses in Selected Hospital of the City: A Pre Experimental Study

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Abstract: **Aim of the Study:** The study aims to find the effectiveness of simulation Based learning on knowledge regarding methods of oxygen administration among staff nurses in selected hospital of the city. **Objectives of study:** Primary objectives 1) To assess effectiveness of simulation Based learning on knowledge regarding methods of oxygen administration among staff nurses in selected hospital of the city. Secondary objectives: 1) To assess the pre-test knowledge regarding methods of oxygen administration in children among staff nurses in selected hospitals of the city. 2) To assess the post -test knowledge regarding methods of oxygen administration in children among staff nurses in selected hospitals of the city. 3) To find out the association between levels of knowledge regarding methods of oxygen administration in children among staff nurses with their demographic variable. **Method:** Pre-experimental one group pre-test and post -test research design and quantitative approach was carried out on 50 staff nurses selected by non-Probability purposive sampling technique. **Result:** The present study evaluate and found that demographic variable In Pre-Test, Majority 58% of subjects had good level of knowledge score, 22% had average level of knowledge score, 20% had very good level of knowledge score and 0% had poor and excellent level of knowledge score. Mean knowledge score in pre-test of the subjects was 15.60 + 3.251. Minimum knowledge score in pre-test was 10 and Maximum Knowledge score in pre-test was 22. While in Post-Test, Majority 84% of subjects had excellent level of knowledge score, 12% had very good level of knowledge score, 4% had good level of knowledge score and 0% had poor and average level of knowledge score. Mean knowledge score in post-test of the subjects was 26.56 + 2.858. Minimum knowledge score in post-test was 17 and Maximum Knowledge score in post-test was 30. **Interpretation and Conclusion:** Analysis data show that highly significance difference found between the pre -test and post-test knowledge score at the level of ($P<0.05$) Simulation Based learning is provided to be Effective in improving the knowledge of staff nurses at selected hospital regarding methods of oxygen administration.

Keywords: Simulation-Based Learning, Oxygen Administration, Staff Nurses, Pediatric Nursing, Knowledge Assessment

1. Introduction

“Learning gives creativity, creativity leads to thinking, thinking provides knowledge, knowledge makes you great.”

Adequate oxygenation is essential for survival, normal growth, and the proper functioning of vital organs in newborns and children. Premature infants and pediatric patients with respiratory conditions, such as pneumonia and respiratory distress syndrome, are particularly vulnerable to hypoxemia, which increases the risk of serious complications and mortality. Oxygen therapy is a vital intervention for maintaining adequate oxygenation and preventing tissue damage. Its effectiveness depends on the appropriate selection of delivery devices, accurate administration, and continuous monitoring. Nurses play a crucial role in ensuring safe and effective oxygen therapy through their knowledge, clinical skills, and evidence-based practices. Therefore, assessing nurses' knowledge and practice regarding oxygen administration is essential for improving the quality of pediatric care and patient outcomes.

2. Need for the Study

Globally, 82% of medical oxygen demand occurs in low- and middle-income countries, where shortages of oxygen supplies

and trained healthcare professionals remain major challenges. In India, approximately 23–38% of children hospitalized with pneumonia develop hypoxemia requiring oxygen therapy. Indian guidelines recommend careful oxygen administration and continuous monitoring using pulse oximetry to maintain appropriate oxygen saturation levels.

In Maharashtra, nearly 67 lakh people suffer from chronic respiratory diseases, accounting for approximately 10% of India's respiratory disease burden. According to UNICEF, pneumonia causes over 700,000 deaths among children under five annually, equivalent to nearly 2,000 deaths per day. Furthermore, neonatal deaths account for approximately 47% of all under-five deaths globally. Hypoxemia affects an estimated 20–30% of newborns with severe respiratory distress or sepsis.

These statistics highlight the importance of adequate knowledge, safe administration, and continuous monitoring of oxygen therapy among healthcare professionals, particularly nurses, to reduce complications and improve pediatric and neonatal outcomes.

3. Review of Literature

A cross-sectional study was conducted (2022). On Knowledge, attitudes, and practices of oxygen therapy among emergency nurses. study aimed to evaluate the knowledge,

attitudes, and practices (KAP) regarding oxygen therapy among emergency nurses. data were collected from 410 qualified emergency nurses across 15 tertiary hospitals using a validated, self-developed questionnaire. Descriptive statistics were applied to summarize demographic variables and Knowledge, Attitude, and Practice (KAP) scores. result show Most participants were female (83.9%). The mean scores were 16.74 ± 8.44 for knowledge, 23.85 ± 1.73 for attitude, and 55.29 ± 5.26 for practice. While attitude and practice levels were satisfactory, knowledge gaps were identified: 21.95% were uncertain about oxygen use in myocardial infarction patients with $SpO_2 > 93\%$ without respiratory distress, and 14.88% lacked clarity regarding Venturi mask use in hypercapnic patients. SEM showed good model fit, with knowledge significantly influencing attitude ($\beta = 0.184$, $p < 0.001$) and attitude significantly influencing practice ($\beta = 0.024$, $p < 0.001$). study conclude that Although nurses demonstrated positive attitudes and satisfactory practices toward oxygen therapy, significant knowledge gaps were identified. Strengthening education and training programs is essential to improve knowledge and enhance the quality of oxygen therapy practice.

Assumption:

- Staff Nurses May have some knowledge regarding methods of oxygen administration.
- Self -structure knowledge questionnaire will enhance knowledge of staff nurses regarding methods of oxygen administration.

Limitation:

- The study is limited to 50 samples
- The study is limited to staff nurses in selected hospitals.

Research hypothesis

- **H0-** There will be no significance difference between pre-test and post-test knowledge score regarding methods of oxygen administration among staff nurses in selected hospitals of the city which is measured by structured knowledge questionnaire at $p < 0.05$ level of significance.
- **H1** - There will be significance difference between pre-test and post-test knowledge score regarding methods of oxygen administration among staff nurses in selected hospitals of the city which is measured by structured knowledge questionnaire at $p < 0.05$ level of significance.

4. Methodology

Research Approach: In present study Quantitative Research approach is used.

Research Design: In present study pre - experimental one group pre-test and post-test research design was used.

Variable:

- **Dependent:** - In present study is knowledge regarding methods of oxygen administration among staff nurses in selected hospitals of the city.
- **Independent:** In present study independent variables are Simulation Based Learning on knowledge regarding methods of oxygen administration.

Setting of the Study: The present study was conducted in a selected hospital after obtaining permission from concerned authority.

Population of the study: The population in present study are staff nurses

Target population: In present study the target population include Staff nurses working in selected hospitals.

Accessible Population: -In present study, the accessible population include staff nurses in selected hospitals and are available during data collection who were fulfilling the inclusive criteria.

Sampling: In present study, sample consisted of 50 staff nurses in selected hospitals of the city and are available during data collection.

Sampling technique: In the present study non-probability purposive sampling technique was used.

Sample size: Sample size consists of 50 staff nurses in selected hospitals and are available during data collection were the sample for this study as mentioned in the inclusion criteria.

Inclusion Criteria:

- Subject who are willing to participate in the study.
- Subject who are working in pediatric areas of the hospitals.
- Subject who can read and write English language.

Exclusion Criteria:

- Subject who are already participate in such type of study
- Subject who are working in others areas of the hospitals.
- Subject who are not available at the time of data collection.

Development of tool

In this study tool consists of self-structured questionnaire for assessing knowledge Based on the objectives of the study, demographic data, structured knowledge questionnaire were prepared to evaluate the knowledge of Staff nurses in selected hospitals. After extensive and systemic review of literature the investigator developed the tool. The source of tool construction were, review of literature from the text, journals, online sources report and other publications and discussion with the expert i.e. experts from Child Health nursing specialty, physician and statistician who enlightened and refined the investigators ideas about the tool preparation.

Description of Tool

1) Demographic Data

The investigator constructed this tool to collect the background data of the study subjects and to identify the influence of the sample characteristics with their level of knowledge.

It includes total 7 demographic variables such as age, Education status, previous information, source of Information, area of work, clinical experience, Designation.

2) Self- Structured knowledge questionnaire

A self-structured knowledge questionnaire was constructed by reviewing the related literature and consultation with experts. The questionnaire consisted of 30 multiple choice Question on knowledge regarding methods of oxygen administration as an assessment tool. Total score is 30. Each question carries 1 mark and zero for the wrong answer.

Validity of Tool

To ensure the content validity, the tool was distributed to 20 experts including Child Health nursing experts, M.S in pediatrician, statistician etc. Out of 20 tools 14 tools were received after validation from the experts.

The experts include;

- Child Health nursing subject expert: -11
- Statistician: -2
- M.S in pediatrician: -1
- Valuable suggestions were given by the experts. Necessary correction was done after discussing with guide. The tool was valid for the study.

Reliability

The main study data gathering process began from 6 January 2026 to 27 February 2026, pre -test was conducted on 06/02/2026, Post test was conducted 13/02/2026 keeping the seven Day gap between the pre-test and post-test. The investigator visited selected area and obtained the necessary permission from the concerned authority. The investigator introduced herself and informed them about the name of study to ensure better cooperation during data collection.

The investigators personally approached and explained the purpose of the study and explain how it will be beneficial for them. The investigator confirmed their willingness to participate in the study The investigator collected the group of staff nurses, made them comfortable and orients them to study and administered questionnaire, and instruct them not

In this study, Reliability of the tool was determined by administering tool to 10 samples. Cronbach's alpha formula was used for reliability. The tool was said to be reliable if the correlation coefficient was more than 0.78The obtained Cronbach's alpha value was 0.78, which indicates acceptable internal consistency of the tool. Hence, the structured knowledge questionnaire was found to be reliable and suitable for conducting the main study

Feasibility of the Study

The investigator did not find much difficulty in getting the subjects because accessible population and sample size was 50 respective to the inclusion criteria.

Pilot Study

Prior Permission was taken from concerned authority. Pilot study was conducted 02/12/2025 to 09/12/2025 for a period of 7 days. A sample of 10 Staff nurses in selected hospital. The investigator approached the sample individually, discussed the objective of the study and obtained consent for participation in study.

Procedure for Data Collection

to interact with each other and their doubts were clarified, Peper and pencil test was used for data collection once the questionnaire completed, the investigator collected them back. The staff nurses require 45 minutes of duration to complete the structured questionnaire. After the pre- test planned teaching was initiated by the investigator. Post-test was administered with same questionnaire and 7 Day. The collection of data was performed within the stimulated time. After the date gathering process, the investigator thanked all the study samples as well as the authority for their cooperation.

Plan for Data Analysis

Data analysis is the systematic organization of research data and the testing of research

Sr. no	Data Analysis	Method	Remark
1.	Descriptive statistics	Frequency and percentage	To describe the distribution of demographic variables
		Mean, Median, Standard Deviation	To determine the knowledge regarding methods of oxygen administration.
2.	Inferential statistics	t-test	To determine the effectiveness of planned teaching in terms of knowledge score
		Chi square	To determine the association between pre-test knowledge score with their selected demographic variables

Scoring technique

- Score 1 was given for correct answer
- Score 0 was given for wrong answer
- Knowledge was graded from poor knowledge to excellent knowledge on scores.

5. Result

Knowledge Score

Level of knowledge score	Percentage of marks	Marks
Poor	0-20%	1-6
Average	21-40%	7-12
Good	41-60%	13-18
Very Good	61-80%	19-24
Excellent	81-100%	25-30

Organization of data: The collected data is tabulated, analyzed, organized and presented under the following section:

A. Distribution of subjects in relation to their demographic variable (n=50)

Demographic Variables	Frequency (f)	Percentage (%)
Age in Years		
18 – 22 Years	13	26
23 – 27 Years	14	28
28 – 33 Years	10	20
Above 34 Years	13	26
Educational Status		
ANM or GNM	21	42
Basic B. Sc. Nursing	11	22
Post Basic B. Sc. Nursing	09	18
M. Sc. Nursing	09	18

Previous Information Regarding Methods of Oxygen Administration		
Yes	50	100
No	00	00
Source of Information		
Health Professionals	09	18
Clinical Experience	35	70
Colleague	06	12
Mass Media	00	00
Area do you Currently Work		
PICU	10	20
NICU	10	20
Paediatric Ward	18	36

Paediatric OPD	12	24
Years of Experience		
1 – 2 Years	18	36
3 – 5 Years	14	28
6 – 8 Years	11	22
More than 8 Years	07	14
Current designation		
Staff Nurse	40	80
Ward In charge	5	10
Nurse Educator	5	10
Clinical Nurse Specialist	0	0

B: Distribution of subjects in relation to their pre-test and post-test knowledge regarding methods of oxygen administration among staff nurses in selected hospital of the city, (n=50)

Level of knowledge score	Score Range	Percentage score	Pre-test Knowledge Score		Post-test Knowledge Score	
			Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Poor	0-6	0-20%	00	00	00	00
Average	7-12	21-40%	11	22	00	00
Good	13-18	41-60%	29	58	02	04
Very Good	19-24	61-80%	10	20	06	12
Excellent	25-30	81-100%	00	00	42	84
Mean $\pm$ SD knowledge score			15.60 $\pm$ 3.251		26.56 $\pm$ 2.858	
Mean % knowledge score			52%		88.53%	
Minimum score			10		17	
Maximum score			22		30	

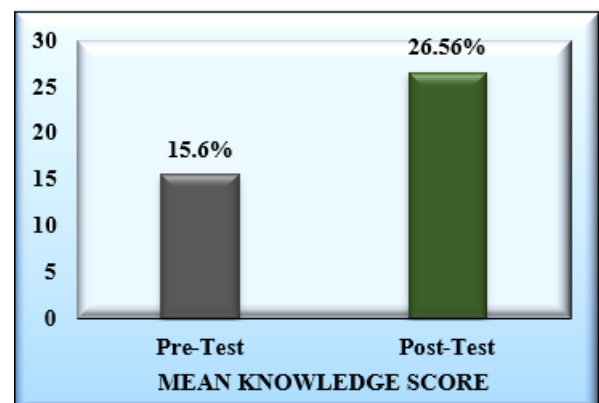
C. Significance of difference between knowledge scores in pre-test and post-test, (n=50)

Incidence of difference between knowledge scores in pre test and post test, (n=36)					
Overall	Mean	SD	Mean Difference	t-value	p-value
Pre-Test	15.60	3.251	10.96 + 3.295	23.522	0.0001 S. P<0.05
Post-Test	26.56	2.858			
P<0.05 level			*significant		

The statistical Student's paired 't' test was applied at 5% level of significance. The tabulated value for n = 50-1 i.e. 49 Degree of freedom was 49 is that 2.021. The calculated value i.e. 23.522 was much higher than the tabulated value at 5% level of significance. For overall knowledge score of subjects which was statically acceptable level of significance.

Hence it was statistically interpreted that simulation Based learning about knowledge regarding methods of oxygen administration among staff nurses in selected hospital of the city was effective.

Thus, H1 is accepted and H0 is rejected.



Significance of difference between knowledge scores in pre-test and post-test.

D. Association of post-test knowledge score regarding methods of oxygen administration among staff nurses in selected hospital of the city with selected demographic variables

Age in Years	No. of subjects	Poor	Average	Good	Very Good	Excellent	χ^2 -value p-value 8.828 df=6 0.183 NS, P>0.05
18 – 22 Years	13	0	0	1	4	8	
23 – 27 Years	14	0	0	0	0	14	
28 – 33 Years	10	0	0	0	1	9	
Above 34 Years	13	0	0	1	1	11	
S- Significant		NS- Non-Significant		df-degree of freedom			

Association of knowledge score in relation to their educational status, n=50

Educational Status	No. of subjects	Poor	Average	Good	Very Good	Excellent	χ^2 -value p-value
ANM or GNM	21	0	0	0	2	19	6.335 df=6 0.387 NS, P>0.05
Basic B. Sc. Nursing	11	0	0	0	2	9	
Post Basic B. Sc. Nursing	09	0	0	1	2	6	
M. Sc. Nursing	09	0	0	1	0	8	
S- Significant		NS- Non-Significant		df-degree of freedom			

Association of knowledge score in relation to their source of information, (n=50)

Source of Information	No. of subjects	Poor	Average	Good	Very Good	Excellent	χ ² -value p-value df=4 0.627 NS, P>0.05
Health Professionals	09	0	0	0	2	7	
Clinical Experience	35	0	0	2	4	29	
Colleague	06	0	0	0	0	6	
Mass Media	00	0	0	0	0	0	
S- Significant		NS- Non-Significant		df-degree of freedom			

Association of knowledge score in relation to their area do you currently work, n=50

Area do you Currently Work	No. of subjects	Poor	Average	Good	Very Good	Excellent	χ ² -value p-value
PICU	10	0	0	1	1	8	4.101 df=6 0.663 NS, P>0.05
NICU	10	0	0	1	2	7	
Pediatric Ward	18	0	0	0	2	16	
Pediatric OPD	12	0	0	0	1	11	
S- Significant		NS- Non-Significant		df-degree of freedom			

Association of knowledge score in relation to their years of experience, n=50

Years of Experience	No. of subjects	Poor	Average	Good	Very Good	Excellent	χ^2 -value p-value
1 – 2 Years	18	0	0	2	2	14	5.126 df=6 0.528 NS, P>0.05
3 – 5 Years	14	0	0	0	2	12	
6 – 8 Years	11	0	0	0	2	9	
More than 8 Years	07	0	0	0	0	7	
S- Significant		NS- Non-Significant		df-degree of freedom			

Association of knowledge score in relation to their Current designation. n=50

Current designation	No. of subjects	Poor	Average	Good	Very Good	Excellent	χ ² -value p-value
Staff Nurse	40	0	0	0	5	35	3.696 df=2 0.158 NS, P>0.05
Ward In charge	5	0	0	0	0	5	
Nurse Educator	5	0	0	0	2	3	
Clinical Nurse Specialist	0	0	0	0	0	0	
S- Significant		NS- Non-Significant		df-degree of freedom			

6. Conclusion

The study concluded that participants initially had inadequate knowledge regarding methods of oxygen administration. Simulation-based learning significantly improved their knowledge. Therefore, simulation-based teaching is an effective method to enhance understanding and promote safe oxygen therapy practices

7. Recommendation of the Study

- Simulation-based learning should be regularly included in nursing education programs.
- Periodic training and workshops on oxygen administration should be conducted for healthcare professionals.
- Standard guidelines and protocols should be strictly followed in clinical settings.
- Similar studies can be conducted on a larger sample size and in different settings for better generalization.

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