A Study to Evaluate the Effectiveness of Skill Competency Programme in Terms of Knowledge and Practice, Regarding Safe Oxygen Administration and Prevention of its Complications among Staff Nurses Working in Selected Hospital Meerut

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ABSTRACT

ACKGROUND: Supplemental oxygen is a life-saving treatment emergency situation, and it is frequently employed as a erapeutic agent in emergency and intensive care units. Additional oxygen administration, often at high levels, is frequently required to maintain adequate oxygen flow to essential organs. A skill-competency program is designed to assess nurses knowledge and practice in terms of their abilities and competence related to any pic of concern and thereafter educating them and filling the gaps in air knowledge and practice with the aim to improve their onwards. OBJECTIVE OF THE STUDY: 1.To develop the skill competency programme on safe oxygen administration and prevention of its complications. 2. To assess the pre-test knowledge and practice regarding safe oxygen administration nd prevention of its complication. 3. To evaluate the effectiveness of kill competency programme on safe oxygen administration and prevention of its complication in experimental group. 4. To compare e post-test score of knowledge and practice regarding safe oxygen administration and prevention of its complications, in experimental and control group. 5.To find the correlation between post-test knowledge and practice scores in experimental group regarding safe oxygen administration and prevention of its complication. METHOD: This study is quasi-experimental, using a one-equivalent pre-test post-test design. The most suited for comparing and evaluating the skill competency program's performance in terms of knowledge and practice about safe oxygen delivery and the prevention of complications among staff nurses working in a selected hospital in Meerut. The sample size was 100 people (50 samples in the control group & 50 samples in the experimental group). Non-Probability: Purposive Sampling technique was used to select samples from Chhatrapati Shivaji ubharti Hospital in Meerut for experimental group and Lala Lajpat ai Memorial hospital for control group. The knowledge and practice of the staff nurses were assessed using a structured-knowledge questionnaire and modified practice checklists. The descriptive and inferential statistics were used to tabulate and analyses the data. RESULT: The correlation between post-test knowledge and practice score of staff nurses regarding safe oxygen administration and prevention of its complications. Post-test knowledge and practice score of staff nurses calculated p value 0.0001) were compared by Karl"s Pearson correlation coefficient as applied at 0.05 level of significance and r=0.11 which shows at there was a moderate positive relationship between knowledge nd practice in experimental group and practice score of staff nurses calculated p value 0.0001 compared by Karl"s Pearson correlation efficient was applied at 0.05 level of significance and r=0.57 hich shows that there was a moderate positive relationship between knowledge and practice in control group. CONCLUSION: There as a knowledge gap among staff nurses on safe oxygen administration and prevention of its complications using by the ruptured questionnaire. There was practice deficit among staff urses regarding safe oxygen administration and prevention of its complications using by the practice checklist and OSCE stations.

INTRODUCTION

Supplemental oxygen is a life-saving treatment in emergency situation, and it is frequently employed as a therapeutic agent in emergency and intensive care units. Many patients will die if they do not receive supplemental oxygen treatment. Additional oxygen administration, often at high levels, is frequently required to maintain adequate oxygen flow to essential organs. Even if oxygen therapy saves lives, it can have negative side effects when given at high concentrations for lengthy periods of time. According to Browne & Crocker, oxygen should be provided to most critically sick patients to attain a goal saturation of 94-98 percent, or 88-92 percent for those at risk of respiratory insufficiency or hypercapnia.

Shegaw Zeleke, Demewoz Kefale, (2019) conducted research to examine nurses' supplemental oxygen therapy knowledge and practise. Structured questionnaires were used to obtain data on nurses' knowledge and practise of supplemental oxygen therapy. Only a third of nurses had competent supplementary oxygen administration practise. Nurses with a strong understanding of supplementary oxygen administration were 12-times (AOR=12.25, 95 percent CI=6.48–32.93) more likely than those with a poor understanding to have a good practise of supplemental oxygen administration.

Elly Morros-González (2018) conducted a cross-sectional survey among workers in the Pediatric Unit at Hospital Universitario San Ignacio in Bogotá, Colombia, on awareness of oxygen therapy, side effects, SpO2 objectives, and oxygen flowmeter reading. Supplemental oxygen is classified as a medicinal medicine, which means it can cause side effects. Clinical and paraclinical decisions, as well as hospital stay length, might be influenced by a lack of consensus regarding oxygen flowmeter readings and peripheral oxygen saturation (SpO2) objectives. A total of 259 people responded, yielding a response rate of 77 percent. During sleep periods in children, 22 percent believe that oxygen saturation increases or remains constant. At least one problem linked with prolonged oxygen therapy was known by 78 percent of participants, with 67 percent related to supplementary oxygen concentrations higher than recommended.

NEED FOR THE STUDY

Nurses are the most crucial group members of healthcare staff, and they are really important in improving patients' quality of life. In the healthcare setting, nurses have knowledge, expertise, and competent skills for a variety of ailments and treatments. As a result, it is critical to include them in various teaching-learning programmes in order to develop their knowledge and abilities as healthcare advances.

At a concentration of 21.00 percent, oxygen is a component of ambient air. It accounts for around 65.00 percent of human body mass and is required for energy production in all body tissues. It is one among the World Health Organization's essential medicines (WHO). The injection of oxygen at concentrations higher than those found in ambient air with the goal of treating or avoiding hypoxia is known as oxygen therapy. As an important and emergency medicine for proper resuscitation, oxygen treatment is particularly useful in managing acutely unwell patients.

Nurses play a critical role in identifying variables that may affect oxygen delivery to the lungs and other body tissues, as well as ensuring that patients who may require supplemental oxygen therapy are evaluated and treated safely and competently. As part of their duty of care to patients, nurses must ensure that oxygenation is optimised at the pulmonary and cellular levels. This necessitates an understanding of respiratory and cardiac physiology, as well as the selection of appropriate supplementary oxygen therapy equipment and delivery methods.

According to the study, **Adeniyi BO, Akinwalere OO (2021)**, In an emergency, oxygen is one of the most regularly used medications. In most situations, healthcare providers are said to be prescribing and administering oxygen in an emergency. There is a significant gap in health-care practitioners' awareness of many aspects of oxygen therapy. The study"s objective was to analyse doctors' and nurses' knowledge and practise of oxygen treatment in Ondo State, South-West Nigeria, and compare it to standard practise in order to improve the quality of care in this area.

The researchers used a descriptive cross-sectional study. Consenting doctors and nurses completed a self-administered validated and structured questionnaire, which was gathered electronically using the Monkey survey tool. Professional features, educational background, awareness and usage of oxygen therapy recommendations, knowledge of oxygen, indication for acute oxygen, and oxygen delivery techniques were all included in the questionnaire. The data was analysed using descriptive statistics, and the relationship between variables was investigated using the Chi-square test with a P value of 0.05. According to the findings, about half of the respondents had a high level of

knowledge, and roughly the same percentage had inadequate oxygen therapy practise in hospitals in Ondo State, South West Nigeria. As a result, healthcare practitioners should be encouraged to update their knowledge and practise of oxygen treatment on a regular basis.

STATEMENT OF THE PROBLEM
"A study to evaluate the effectiveness of skill competency programme in terms of knowledge and practice regarding safe oxygen administration and prevention of its complications among staff nurses working in selected hospital Meerut."

OBJECTIVES OF THE STUDY
1. To develop the skill competency programme on safe oxygen administration and prevention of its complications.

2. To assess the pre-test knowledge and practice regarding safe oxygen administration and prevention of its complication.

3. To evaluate the effectiveness of skill competency programme on safe oxygen administration and prevention of its complication in experimental group.

4. To compare the post-test score of knowledge and practice regarding safe oxygen administration and prevention of its complications, in experimental and control group.

5. To find the correlation between post-test knowledge and practice scores in experimental group regarding safe oxygen administration and prevention of its complication.

HYPOTHESIS (at 0.05 level of significance)

H1 - There is a significant difference in the pre-test & post-test knowledge and practice score before and after administration of skill competency programme regarding safe oxygen administration and prevention of its complication in experimental group.

H2- There is significant difference in the post-test knowledge & practice score regarding safe oxygen administration and prevention of its complications in experimental and control group.

H3 - There is a significant correlation between post-test knowledge and practice score in experimental group regarding safe oxygen administration and prevention of its complications in experimental group.

OPERATIONAL DEFINITIONS:
1. **Evaluate-** The purpose of this study is to compare the knowledge and practise of staff nurses regarding safe oxygen delivery and the prevention of problems before and after a skill competency programme in the experimental group, utilising a structured knowledge questionnaire and the OSCE method.

2. **Effectiveness:** It refers to the improvement in knowledge and practise skills among staff nurses as measured by a substantial difference in pre-test and post-test knowledge and practise scores related safe oxygen administration and prevention of complications.

3. **Skill competency programme-** It is a step-by-step systematic teaching programme that is used to teach and improve the knowledge and practice of staff nurses regarding safe oxygen administration and the prevention of complications in the study.

4. **Knowledge:** In this study knowledge refers to the information gained during the Skill Competency Program about safe oxygen administration and avoiding complications among staff nurses.

5. **Practice:** Practice refers to assessing and improving the competency skills of staff nurses to undertake procedures for safe oxygen administration in this study.

6. **Oxygen Administration** – In this study, safe oxygen administration is provided to prevents its complications.

7. **Staff Nurses** – Staff nurses play an essential role in oxygen administration in this study since they carefully and regularly check the patients.

MATERIAL AND METHODS:
RESEARCH DESIGN: Quasi-Experimental: non-equivalent group pre-test post-test design

VARIABLES:
INDEPENDENT VARIABLE: the skill competency programme regarding safe oxygen administration and prevention of its complications among staff nurses working in selected hospital.

DEPENDENT VARIABLE: the staff nurses' knowledge and practise.

SETTING OF THE STUDY: The study was conducted in Meerut's Chhatrapati Shivaji Subharti Hospital and Lala Lajpat rai Memorial hospital.

POPULATION: The target population include the staff nurses working in Chhatrapati Shivaji Subharti Hospital for experimental group and Lala Lajpat Rai Memorial Hospital, Meerut for control group.

SAMPLE: In this study, the samples are the staff nurses working in Chhatrapati Shivaji Subharti

Hospital for experimental group and Lala Lajpat Rai Memorial Hospital, Meerut for control group.

SAMPLE SIZE

The sample size in the study consists of 100 samples which are divided as 50 samples in the control group and 50 samples in the experimental group.

SAMPLING TECHNIQUE: Non-Probability: purposive sampling technique

CRITERIA FOR SAMPLE SELECTION INCLUSION CRITERIA-

1. Staff nurses who will be present at the time of data collection.
2. staff nurses who will be willing to participate in the study.

EXCLUSION CRITERIA-

1. Staff nurses who are not willing to participate in the study.
2. Staff nurses who are not present at the time of data collection

DATA COLLECTION TOOL AND TECHNIQUE DEVELOPMENT OF THE TOOLS

The following steps were involved in the development of tools:

➢ Review of researched and non-researched literature and opinion of experts.
➢ Preparing blue print for structured knowledge questionnaire.
➢ Development of structured knowledge questionnaire, modified practice checklists & arranging OSCE stations appropriately.
➢ Establishing scoring of tools.
➢ Assessing items for content validity.
➢ Conducting pilot study
➢ Estimation of reliability, item analysis and discrimination value.

DESCRIPTION OF TOOL AND SCORING PROCEDURE The research tools consist of:

TOOL-1: DEMOGRAPHIC VARIABLES

It consists of 7 items including variables like age, gender, qualification, experience, area of work, manage patient with complication due to oxygen therapy before & oxygen devices used before. In this study, these demographic variables have been used for the staff nurses.

TOOL-2: STRUCUTRED KNOWLEDGE QUESTIONNAIRE Structured knowledge questionnaire based on anatomy and physiology of respiratory system, oxygen administration, complication of oxygen administration and its prevention TPN monitoring & complications. Each question carries 1 mark making the total 27 scores.

TOOL-3: OSCE STATIONS
STATION 1: IDENTIFICATION OF ARTICLES REQUIRED FOR PROCEDURE

Images of 4 articles required for the oxygen administration were placed and the samples were made to identify the names of the articles. Each article carries 1 mark making the station 1 for total 4 scores within 30 seconds. The 4 articles used were:

A. Nasal cannula. b) Non-rebreather mask. c) Venturi mask with different sized ports to change the FIO2 delivered (24–50%). d) AMBU bag.

STATION 2: SITUATION BASED QUESTION

A situation-based question involving safe oxygen administration contain 1 mark within 30 seconds.

A patient has been put on nasal cannula 2 l/min 30 min ago. Their SPO2 had returned back into the normal range, resting at 98%. When the nurse comes to check in on the patients, he notices that the SPO2 has fallen to 91% and the patient is short of breath. What should the nurse do?
A. Turn off the oxygen port.
B. Adjust SPO2 monitor on the finger
C. Notify the physician
D. Apply simple face mask

STATION 3: OXYGEN ADMINISTRATION CHECKLIST

The modified practice checklist consists of 15 points involving the safe oxygen administration and 15 points involving prevention of its complications. Each points contain 1 mark and total 30 marks within 5 minutes.

RELIABILITY OF THE TOOL

The reliability co-efficient of a structured knowledge tool was calculated by using the correlation efficient formula. The value of the correlation efficient was calculated and it was found to be reliable (r=0.45).

ETHICAL CONSIDERATION:

After approval of the research committee in swami vivekanand subharti university, Meerut. Confidentiality was assured and written consent obtained from each sample. The sample was ensuring they have rights to withdraw from the study if they found any difficulties during interventions.

PLAN FOR ANALYSIS

To determine the effectiveness of the skill competency programme in terms of knowledge and practise, scores were organised, tabulated, and analysed using the frequency distribution; descriptive statistics: mean, median, standard deviation, and mean score; inferential statistics: correlation coefficient, paired and unpaired-t test.

RESULTS

Table 1: Frequency and percentage distribution of demographic characteristics of the staff nurses in experimental and control group.

N=100 Age	Experimental Group (N=50)		Control Group (N=50)	
	Frequency	Percentage	Frequency	Percentage
20-25 years	13	26%	14	28%
26-30 years	25	50%	23	46%
31-35 years	6	12%	12	24%
35-40 years	6	12%	1	2%
GENDER				
Male	26	52%	21	42%
Female	24	48%	29	58%
Other	0	0%	0	0%
QUALIFICATION				
A.N.M.	14	28%	9	18%
G.N.M.	25	50%	28	56%
BSc. Nursing	10	20%	11	22%
MSc. Nursing/NPCC	1	2%	2	4%
YEAR OF EXPERINECE				
0-3 years	15	30%	16	32%
4-6 years	16	32%	19	38%
7-8 years	11	22%	6	12%
Above 8 years	8	16%	9	18%
WORK PLACE				
CCU/OT	12	24%	12	24%
General ward	18	36%	11	22%
Speciality ward	9	18%	17	34%
WORK PLACE				
CCU/OT	12	24%	12	24%
General ward	18	36%	11	22%
Speciality ward	9	18%	17	34%
HAVE EVER MANAGED PATIENTS WITH COMPLICATIONS DUE TO O2 ADMINISTRATION				
YES	24	48%	33	
NO	26	52%	17	34%
TYPE OF O2 DEVICES USED BEFORE				
Face mask/partial -rebreather/ non-rebreather mask/ venturi-mask	24	48%	22	44%
HFNC	0	0%	0	0%
Trac. Collar	0	0%	0	0%
Oxygen tent/Oxygen hood	6	12%	4	8%
OPD/Triage	11	22%	10	20%

Assessment of the knowledge regarding 'safe oxygen administration and prevention of its complications' among staff nurses in the control group and the experimental group using Structured Knowledge Questionnaires.

N=100

S. No.	Level of assessment of knowledge	Score Range	Experimental group (n=50)		Control group (n=50)	
			Pre-test	Post-test	Pre-test	Post-test
			Frequency/ Percentage	Frequency/ Percentage	Frequency/ Percentage	Frequency/ Percentage
1.	Excellent Knowledge	19-27	9(18%)	26(52%)	0(0%)	1(2%)
2.	Good Knowledge	14-18	22(44%)	19(38%)	36(72%)	37(74%)
3.	Average Knowledge	7-13	16(32%)	5(10%)	13(26%%)	12(24%)
4.	Poor Knowledge	0-6	3(6%)	0(0%)	1(2%)	0(0%)

Assessment of the practice regarding 'safe oxygen administration and prevention of its complications' among staff nurses in the control group and the experimental group using OSCE method including Station-1, station-2 and station-3 (Modified Practice checklist).

N=100

S. No.	Level of assessment of knowledge	Score Range	Experimental group (n=50)		Control group (n=50)	
			Pre-test	Post-test	Pre-test	Post-test
			Frequency/ Percentage	Frequency/ Percentage	Frequency/ Percentage	Frequency/ Percentage
1.	Good efficient	25-35	1(2%)	10(20%)	1(2%)	1(2%)
2.	Satisfactory	11-24	36(72%)	40(80%)	46(92%)	47(94%)
3.	Need improvement	0-10	13(26%)	0(0%)	3(6%)	2(4%)

Table 5: Table showing comparison of knowledge score in control group. mean, mean difference, standard deviation (SD), SD difference (SDD), and paired t-test value of pre-test and post

N=50

Knowledge of control group	Mean score	MD	SD	SDD	Standard error	t-test value	P value(p>0.05)
Pre-test	14.22	0.94	2.76	0.74	0.511	1.840	0.071*
Post-test	15.16		2.02				

*0.05 level of significant and the 't' tabulated-d value- 2.02 at df 49.

Table showing comparison of mean, mean difference, standard deviation (SD), SD difference (SDD), and paired t-test value of pre-test and post-practice score in experimental group.

n=50

Practice of experimental group	Mean score	MD	SD	SDD	Standard error	t-test value	P value (p>0.05)
Pre-test	13.42	6.36	4.55	0.07	0.846	7.517	0.0001*
Post-test	19.78		4.62				

*0.05 level of significant and the 't' tabulated-d value- 2.02 at df 49.

Table showing comparison of mean, mean difference, standard deviation (SD), SD difference (SDD), and paired t-test value of pre-test and post-practice score in control group.

n=50

Practice of control group	Mean score	MD	SD	SDD	Standard error	t-test value	P value (p>0.05)
Pre-test	15.50	0.26	4.36	0.96	0.866	0.300	0.7652*
Post-test	15.24		3.40				

*0.05 level of significant and the 't' tabulated-d value- 2.02 at df 49.

Table showing comparison of post-test Mean, Mean difference, standard deviation (SD), SD difference (SDD) and unpaired t-test value of knowledge score in experimental and control group.

N=100

Knowledge of experimental and control group	Mean score	MD	SD	SDD	Standard error	Unpaired t-test value	P value (p>0.05)
Post-test Experimental group	18.56	3.4	3.18	1.16	0.533	6.3835	0.0001
Post-test Control group	15.16		2.02				

*0.05 level of significant and the 't' tabulated-d value- 2.02 at df 49.

Table showing comparison of post-test Mean, Mean difference, standard deviation (SD), SD difference (SDD) and unpaired t-test value of practice score in experimental and control group

N=100

Practice of experimental and control group	Mean score	MD	SD	SDD	Standard error	Unpaired t-test value	P value (p>0.05)
Post-test Experimental group	19.78	4.54	4.62	1.22	0.811	5.597	0.0001
Post-test Control group	15.24		3.40				

*0.05 level of significant and the 't' tabulated-d value- 2.02 at df 49.

Correlation between post-test knowledge and practice score regarding safe oxygen administration and prevention of its complications among staff nurses in experimental and control group.

N=100

	Correlation coefficient(r)	P-value
Experimental group	**0.11**	**0.0001**
Control group	**0.57**	**0.0001**

The comparison of post-test knowledge score of experimental and control group regarding safe oxygen administration and prevention of its complications in control group. The post-test knowledge score of experimental groups mean were (18.56) whereas in control group the post- test mean was (15.16) with mean difference (3.4). The standard deviation (SD) score in experimental group was (3.18) and (2.02) in control group with SDD (1.16). The unpaired t- test value was (6.3835) at 0.05 level of significance. Hence null hypothesis (Ho2) is rejected and alternative hypothesis (H2) is accepted.

The comparison of post-test practice score of experimental and control group regarding safe oxygen administration and prevention of its complications in control group. The post-test practice score of experimental groups mean were (19.78) whereas in control group the post- test mean was (15.24) with mean difference (4.54). The standard deviation (SD) score in experimental group was (4.62) and (3.40) in control group with SDD (1.22). The unpaired t- test value was (5.594) at 0.05 level of significance. Hence null hypothesis (Ho2) is rejected and alternative hypothesis (H2) is accepted.

The correlation between post-test knowledge and practice score of staff nurses regarding safe oxygen administration and prevention of its complications. Post-test knowledge and practice score of staff nurses calculated p value (0.0001) were compared by Karl''s Pearson correlation cefficient was applied at 0.05 level of significance and r=0.11 which shows that there was a moderate positive relationship between knowledge and practice in experimental group and practice score of staff nurses calculated p value 0.0001 compared by Karl''s Pearson correlation cefficient was applied at 0.05 level of significance and r=0.57 which shows that there was a moderate positive relationship between knowledge and practice in control group.

NURSING IMPLICATION
When it is inferred that the research will benefit others, it is valuable. The current study's findings have significance in nursing education, practise, administration, and research are all areas where nurses excel.

LIMITATIONS
➢ Due to covid scenario it was difficult to conduct study.
➢ Difficult in data collection because staffs are on duty so limited time for completing data collection.

RECOMMENDATIONS
The following recommendations for future research are made based on the study's findings.
➢ The same study could be undertaken in large samples where findings can be generalised.
➢ A comparison study can be conducted to see how the competency programme affects the outcome on safe oxygen administration.
➢ A study can be carried out to identify the necessity for staff nurses to be educated on safe oxygen administration.

CONCLUSION
There was a knowledge gap among staff nurses on safe oxygen administration and prevention of its complications using by the structured questionnaire. There was practice deficit among staff nurses regarding safe oxygen administration and prevention of its complications using by the practice checklist and OSCE stations.

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