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EFFECTIVENESS OF SIMULATION BASED TEACHING PROGRAMME ON KNOWLEDGE REGARDING ENDOTRACHEAL INTUBATION AND SUCTIONING AMONG NURSING STUDENTS IN SELECTED COLLEGE AT COIMBATORE

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ABSTRACT

Background: Endotracheal intubation and suctioning are essential Nursing procedures requiring adequate knowledge and clinical competence. Simulation-based teaching provides an effective learning approach for Nursing students. **Objectives:** To assess pre-test and post-test knowledge, evaluate the effectiveness of simulation-based teaching and determine the association between pre-test knowledge with their selected demographic variables. **Methods:** A quantitative evaluative in one group pre-test and post-test research design study was conducted among 30 second-year B.Sc. Nursing students at Texcity College of Nursing, Coimbatore, using purposive sampling. Data were collected through a structured knowledge questionnaire. **Results:** The obtained t value of 12.66 was statistically significant at ($p<0.05$).

KEYWORDS

Effectiveness, Simulation-based teaching programme, Knowledge, Endotracheal intubation and Suctioning.

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INTRODUCTION

Endotracheal Intubation is a life-saving procedure in which a flexible Endotracheal (ET) tube is inserted through the mouth or nose into the trachea to establish and maintain a patent airway. It is performed in patients who are unable to breathe adequately, have airway obstruction, respiratory failure, cardiac arrest, or require mechanical ventilation during surgery or critical illness. The procedure ensures effective oxygenation, ventilation and protection of the airway from aspiration. Tube

placement is confirmed by chest expansion, bilateral breath sounds, capnography and chest X-ray when necessary. Possible complications include trauma to the airway, esophageal intubation, aspiration, infection and tube displacement. Nurses play a vital role by preparing equipment, assisting during the procedure, monitoring vital signs and oxygen saturation, securing the tube, maintaining airway patency through Suctioning and oral care, monitoring cuff pressure and observing for complications to ensure patient safety.

Suctioning is another important airway management procedure commonly performed in hospitalized and critically ill patients. Suctioning involves the removal of secretions from the airway through a sterile catheter attached to a Suction device. The accumulation of secretions in the respiratory tract may lead to airway obstruction, decreased oxygenation, infection and respiratory distress. Therefore, proper Suctioning technique is necessary to maintain airway patency and enhance respiratory function.

Endotracheal Suctioning may be performed through artificial airways such as Endotracheal tubes or tracheostomy tubes. Although Suctioning is a routine clinical procedure, improper technique may result in complications such as hypoxia, trauma to the airway mucosa, infection, arrhythmias and increased intra cranial pressure. Hence, Nurses must possess adequate knowledge and competency regarding Endotracheal intubation and Suctioning.

Nursing education aims to prepare students with theoretical knowledge, clinical competency and critical thinking abilities necessary for delivering safe and effective patient care. Clinical procedures such as Endotracheal Intubation and Suctioning require not only theoretical understanding but also practical exposure and confidence. Traditional classroom teaching alone may not be sufficient for developing clinical competence among Nursing students.

In recent years, simulation-based teaching has gained importance in Nursing education. Simulation based teaching is an educational method that uses models, mannequins, role play or realistic clinical scenarios to provide experiential learning. It allows students to practice procedures in a controlled environment without causing harm to patients.

Simulation based teaching improves active learning, psychomotor skills, clinical reasoning and decision-making ability among students. Through repeated practice, students can gain confidence, identify mistakes and strengthen their understanding of clinical procedures. It bridges the gap between theoretical knowledge and clinical practice

Several studies have reported that simulation-based education significantly improves knowledge, skill performance, confidence and competency among Nursing students. Simulation training helps learners to understand procedure steps clearly and apply learned concepts effectively during clinical practice.

B.Sc. Nursing second year students are introduced to adult health Nursing concepts and various clinical procedures during their academic programme. Adequate knowledge regarding Endotracheal Intubation and Suctioning is necessary for future professional practice. However, students may have inadequate exposure, limited confidence and insufficient practical understanding regarding airway management procedures.

The researcher observed that many Nursing students have trouble in understanding airway management concepts and procedural steps related to Endotracheal Intubation and Suctioning. Therefore, a simulation-based teaching programme may be an effective educational strategy for improving knowledge regarding these procedures.

Hence, the researcher felt the need to assess the Effectiveness of simulation-based teaching programme on knowledge regarding Endotracheal Intubation and Suctioning among Nursing students in Selected College at Coimbatore.

NEED FOR THE STUDY

According to Pandey, Chouikar and Sahu (2025), a study was conducted to assess the effectiveness of a video-assisted teaching programme on knowledge regarding endotracheal tube suctioning among B.Sc. Nursing 2nd-year students. A quasi-experimental pre-test and post-test design was used among 60 B.Sc. Nursing students. The findings revealed that in the pre-test, 18.33% of students had poor knowledge

and 81.66% had average knowledge, while none of the students had good knowledge. After the video-assisted teaching programme, 40% had average knowledge and 60% had good knowledge, while none had poor knowledge. The mean knowledge score increased from 11.03 in the pre-test to 17.6 in the post-test. These findings demonstrated improvement in knowledge following the video-assisted teaching programme and emphasized the importance of innovative teaching methods in nursing education.

According Bhanu *et al*, (2016) assessed knowledge and practice related to endotracheal suctioning among nurses and nursing students. Among the nursing students, 26.7% had adequate knowledge, 46.7% had moderately adequate knowledge, and 26.6% had inadequate knowledge. These findings indicate variation in the level of knowledge and emphasize the need to identify knowledge gaps regarding endotracheal suctioning among nursing students.

According to Yilmaz and Ozden (2021) assessed evidence-based knowledge and emotional experiences regarding Endotracheal intubation and suctioning among 445 undergraduate Nursing students. The mean knowledge score was 36.86 ± 14.45, and 85.8% of the students obtained 50% or less of the total knowledge score, indicating a low level of knowledge. Among the students, 44.5% (n = 198) had previously experienced the Suctioning procedure. Students who had experienced Suctioning had a significantly higher mean knowledge score than those without experience (38.78 ± 12.62 vs. 35.32 ± 15.62, $p < 0.05$). The study also reported that among students who had performed suctioning, 79.3% felt nervous, 77.8% worried, 70.2% frightened, 53.0% daunted and 51.0% disgusted while performing the procedure. These findings indicate the importance of providing Nursing students with adequate theoretical and practical learning opportunities regarding Endotracheal suctioning.

According to Alshammari *et al*, (2017) studied the effect of simulated learning on knowledge and clinical performance ability regarding Endotracheal intubation and Suctioning among Nursing students. The study used a quasi-experimental design with 12 Nursing students selected by purposive sampling. The mean knowledge score increased from 6.17 in the pre-test to 8.08 in the post-test, and the difference was statistically significant at $p < 0.05$. The mean performance ability score also increased from 19.50 in the pre-test to 22.58 in the post-test, with a statistically significant difference at $p < 0.05$. A positive correlation between post-test knowledge and performance ability was reported ($r = 0.0325$). Furthermore, 100% of the students indicated that the simulation experience provided active and deep learning. These findings support the use of simulation as a teaching strategy for improving students' knowledge and performance regarding Endotracheal intubation and suctioning.

According to Kim *et al*, (2026) evaluated mixed-reality-based intubation Nursing simulation among Nursing students using a randomized controlled design. Ninety-two Nursing students were randomized, with 46 students in the experimental group and 46 in the control group; 91 completed the study. The experimental group demonstrated significantly higher intubation-Nursing performance ($U = 1707.00$, $p < 0.001$, effect size = 0.65). Knowledge increased significantly in both the experimental group ($Z = 5.842$, $p < 0.001$) and control group ($Z = 5.924$, $p < 0.001$). Readiness for clinical practice also showed a greater median change in the experimental group ($U = 1285.5$, $p = 0.046$, effect size = 0.24). These findings indicate that simulation can provide Nursing students with opportunities to develop knowledge and procedural competency related to intubation.

Simulation based teaching is an innovative educational strategy that provides Nursing students with a realistic and safe learning environment to practice complex clinical procedures without causing harm to patients. It bridges the gap between classroom learning and clinical practice by allowing repeated practice, immediate feedback, and the development of critical thinking and psychomotor skills. Simulation based education has been recognized as an effective teaching method for improving students' confidence, competence, and clinical performance.

Second-year B.Sc. Nursing students begin their adult health Nursing clinical postings during which they are exposed to airway management procedures. However, opportunities to perform Endotracheal Intubation and Suctioning on real patients are often limited due to patient safety concerns and the invasive nature of these procedures. Simulation based teaching provides students with an opportunity to acquire knowledge and develop competency in these essential life-saving skills before entering actual clinical practice.

As Endotracheal Intubation and Suctioning are essential components of Nursing care, there is a need to strengthen Nursing students' knowledge using effective teaching strategies.

Therefore, the researcher intended to conduct a study to assess the effectiveness of simulation-based teaching programme on knowledge regarding Endotracheal Intubation and Suctioning among Nursing students at Texcity College of Nursing, Coimbatore.

Objectives

To assess the Pre-test and Post-test level of knowledge regarding Endotracheal Intubation and Suctioning among Nursing students.

To evaluate the effectiveness of simulation-based teaching programme on Post-test in Improving the knowledge regarding Endotracheal Intubation and Suctioning among Nursing students.

To determine the association between the pre-test level of knowledge regarding Endotracheal Intubation and Suctioning among Nursing with their selected demographic variables

Hypothesis

H1: There will be a significant mean difference between pre-test and post-test level of knowledge regarding Endotracheal Intubation and Suctioning among Nursing student after the Simulation-based teaching programme.

H2: There will be a significant association between the pre-test level of knowledge regarding Endotracheal Intubation and Suctioning with their selected demographic variable among Nursing students.

Assumption

B.Sc. Nursing students may have inadequate knowledge regarding Endotracheal Intubation and Suctioning.

Simulation-based teaching programme may improve the knowledge regarding Endotracheal Intubation and Suctioning among nursing students.

Practical exposure through simulation enhances learning and clinical competence.

Active participation in simulation-based learning may increase student confidence in performance airway management procedures.

Improved knowledge through simulation-based teaching may help nursing student provide safe and effective care to patients requiring endotracheal intubation and suctioning

Delimitation

The study is delimited to B.Sc. Nursing students studying at Texcity College of Nursing, Coimbatore.

The study is delimited to Students who are available during the period of data collection.

The study focuses only on assessing Knowledge regarding Endotracheal Intubation and Suctioning only

The study is delimited to the Effectiveness of simulation-based teaching programme and does not assess the student's practical performance.

REVIEW OF LITERATURE

The review of literature in this study is organized under the following headings.

Section A: Study and literature related knowledge regarding Endotracheal intubation and suctioning among Nursing students

Section B: Study and literature related to Effectiveness of stimulation-based teaching programme on knowledge regarding Endotracheal intubation and Suctioning among Nursing students

Sree Vani E and Kantha K (2018) examined a pre-experimental research design to evaluated the effectiveness of a structured teaching programme on knowledge regarding endotracheal suctioning among nursing students in India. Thirty nursing students participated in the educational programme. Data were collected using a structured knowledge questionnaire and analysed using paired t-test. The post-test mean knowledge score was significantly higher than the pre-test score ($p < 0.001$). Students

demonstrated better understanding of suctioning techniques, infection control, and patient safety after the programme. The authors concluded that structured teaching effectively improves knowledge regarding endotracheal suctioning.

Liaw S Y, *et al* (2014) revealed a Quasi-experimental pre-test and post-test research design to evaluated the effectiveness of simulation-based learning in improving airway management knowledge among undergraduate nursing students in Singapore. A Nursing students participated in high-fidelity simulation sessions followed by structured debriefing. Knowledge and clinical performance were assessed using validated questionnaires and skill checklists. Statistical analysis revealed a significant improvement in post-test knowledge and clinical competency ($p < 0.001$). Students reported greater confidence and satisfaction with simulation-based learning. The authors recommended incorporating simulation into undergraduate nursing curricula to enhance patient safety and clinical performance.

METHODOLOGY

A quantitative evaluative approach with a pre-experimental one-group pre-test and post-test design was adopted to assess the effectiveness of a simulation-based teaching programme on knowledge regarding endotracheal intubation and suctioning among Nursing students. The study was conducted at Texcity College of Nursing, Coimbatore, involving 30 second-year B.Sc. Nursing students selected through purposive sampling. Data were collected using selected demographic variables such as age, gender, type of family, number of siblings, prior training in airway management, number of times you observed endotracheal intubation, number of times you performed endotracheal intubation, attend any simulation-based teaching programme, preferred learning method, and confidence in performing endotracheal intubation and suctioning. A structured knowledge questionnaire comprising 30 multiple choice questions was also used to assess the knowledge regarding endotracheal intubation and suctioning among Nursing students. A pre-test was conducted on the first day, followed by a 45-minute simulation-based teaching intervention. A post-test was administered on the seventh day. Data were analysed using descriptive and inferential statistics.

Organization of findings

The collected data from 30 B.Sc. Nursing students were analysed using descriptive and inferential statistics. The findings are organized and presented in the following section.

Section I: Data on frequency and percentage distribution of demographic variables of Endotracheal Intubation and Suctioning among Nursing students.

Section II: Data on pre-test and post-test level of knowledge regarding Endotracheal Intubation and Suctioning among Nursing students.

Section III: Data on effectiveness of simulation-based teaching programme on knowledge regarding Endotracheal Intubation and Suctioning among Nursing students.

Section IV: Data on association between pre-test level of knowledge regarding Endotracheal Intubation and Suctioning with their selected demographic variables among Nursing students.

RESULTS AND DISCUSSION

The study evaluated 30 B.Sc. Nursing students, finding that the baseline sample was predominantly female (70%), aged 18-20 years (86.6%), from nuclear families (63.4%), and critically lacking in prior practical experience, with 60% having no prior airway training, 83.3% having never performed intubation, and 76.7% expressing zero or uncertain confidence.

The implementation of the simulation-based teaching programme successfully resolved baseline deficiencies: pre-test scores showed that 86% of students had moderate knowledge and 13% had inadequate knowledge, whereas post-test scores revealed that 76% achieved adequate knowledge and 23% maintained moderate knowledge, with none remaining in the inadequate category. Statistically, the mean knowledge score rose significantly from a pre-test baseline of 14.76 (±3.62) to a post-test score of 24.4 (±4.14), yielding an absolute mean gain of 9.64 and a paired *t*-value of 12.66 ($p < 0.05$).

which confirms the high effectiveness of the teaching method and satisfies the research hypothesis. Furthermore, Chi-square analysis demonstrated a statistically significant association between the students' baseline pre-test knowledge levels and only type of family.

The above Table No.1 despite that, level of knowledge among the Nursing students. In that pre-test 26(86%) had moderate knowledge and 4(13%) had inadequate knowledge and none of students had the adequate knowledge. Where the post-test level of knowledge is 23(76%) had adequate knowledge and 7(23%) had moderate knowledge regarding Endotracheal intubation and Suctioning.

Table No.2 shows that, the pre-test mean score of knowledge regarding Endotracheal intubation and Suctioning was 14.76 with a standard deviation of 3.62, whereas the post-test mean score was 24.4 with a standard deviation of 4.14.

The mean difference between the pre-test and post-test scores was 9.64. The obtained paired 't' value was 12.66, which was higher than the table value of 2.045 at the 0.05 level of significance. Hence, it is inferred that the simulation-based teaching programme was effective in improving the knowledge regarding Endotracheal intubation and Suctioning among Nursing students.

Table No.1: Frequency and percentage distribution of study participants based on level of knowledge regarding Endotracheal Intubation and Suctioning among Nursing students (n=30)

S.No	Level of knowledge	Number of participants			
		Pre-test		Post-test	
		f	%	f	%
1	Inadequate Knowledge	4	13	0	0
2	Moderately knowledge	26	86	7	23
3	Adequate Knowledge	0	0	23	76

Table No.2: Mean, mean difference, standard deviation and t- value according to the pre-test and post-test level of knowledge regarding Endotracheal Intubation and Suctioning among Nursing students n=30

S.No	Level of knowledge	Mean	Standard deviation	Mean difference	Paired 't' test value
1	Pre-test	14.76	3.62	9.64	t =12.66* (2.045)
2	Post-test	24.4	4.14		

*-significant at p<0.05 levels

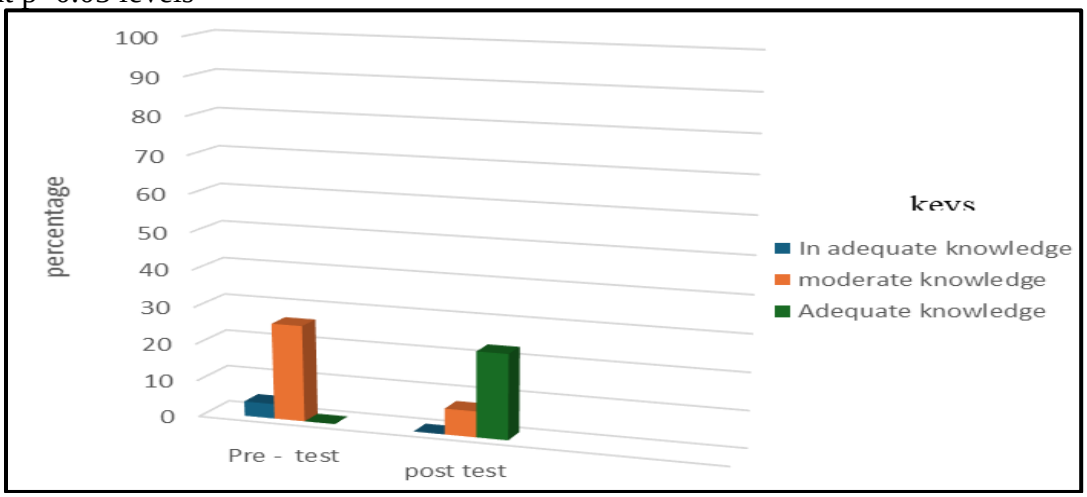


Figure No.1: A vertical bar diagram show that the percentage of sample in terms pre-test and post-test level of knowledge regarding Endotracheal intubation and Suctioning

CONCLUSION

Based on the analysis of the findings the following conclusion was drawn. The study proved that majority of the samples had inadequate knowledge for Endotracheal intubation and Suctioning. Simulation based teaching programme was helpful to the student to improve the knowledge and apply to practice also. Therefore, it is concluded that there was a significant gain in knowledge regarding Endotracheal intubation and suctioning through simulation- based teaching programme among Nursing students.

RECOMMENDATION OF THE STUDY

A similar study can be conducted with a larger sample size to improve the generalizability of the findings.

A randomized controlled trial can be conducted to compare simulation-based teaching with conventional teaching methods.

Simulation based teaching programmes can be regularly incorporated into the undergraduate Nursing curriculum to strengthen students' knowledge and clinical preparedness.

Similar studies can be conducted to assess both knowledge and practical skills related to Endotracheal intubation and Suctioning.

Long-term follow-up studies can be conducted to assess retention of knowledge and skills after the simulation-based teaching programme.

Similar research can be conducted using different simulation methods, such as high-fidelity simulation, low-fidelity simulation, video-assisted simulation, or virtual simulation.

Further studies can be conducted among staff Nurses, student Nurses in different years, and intensive care Nurses to assess knowledge and competency regarding airway management.

Future researchers can compare the effectiveness of simulation-based teaching with traditional classroom teaching, demonstration, or video-assisted teaching.

Periodic refresher training and competency assessment can be recommended to maintain knowledge and safe practice regarding Endotracheal intubation and Suctioning.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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