



A STUDY TO EVALUATE THE EFFECTIVENESS OF SIMULATION BASED TEACHING ON KNOWLEDGE REGARDING TRACHEOSTOMY CARE AMONG FINAL YEAR B.Sc. NURSING STUDENTS

Nursing

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ABSTRACT

This study evaluated the effectiveness of simulation-based teaching on knowledge regarding tracheostomy care among final-year B.Sc. Nursing students in a selected nursing college, Raichur, Karnataka. Using a pre-experimental single-group pre-test–post-test design, 40 students were selected through lottery sampling. A structured questionnaire measured knowledge before and after the intervention. The mean score increased from 15.18 to 23.93, a mean gain of 8.75 ($p < 0.001$), indicating a 29.08% improvement. No significant association was found between pre-test scores and demographic variables. Findings confirm simulation-based teaching as an effective method to improve knowledge and competence in tracheostomy care, supporting its integration into nursing curricula.

KEYWORDS

Evaluate, Effectiveness, Simulation-based teaching, Knowledge and Tracheostomy care.

INTRODUCTION

Tracheostomy is a vital surgical procedure performed to create an opening in the trachea, enabling airway access in patients with upper airway obstruction, prolonged ventilation needs, or respiratory compromise. It offers benefits such as improved patient comfort, enhanced oral hygiene, and reduced airway resistance. Effective tracheostomy care is essential to maintain a patent airway, prevent infection, and promote recovery, making it a critical nursing responsibility. Inadequate knowledge or improper technique can lead to serious complications, emphasizing the need for proper training. Simulation-based teaching has emerged as an innovative strategy in nursing education, allowing students to practice skills in a realistic yet safe environment, bridging the gap between theory and practice. This approach enhances critical thinking, procedural accuracy, and confidence without risking patient safety. The present study evaluates the effectiveness of simulation-based teaching in improving knowledge regarding tracheostomy care among final-year B.Sc. Nursing students at selected College of Nursing, Raichur, Karnataka.

Review Of Literature

Simulation-based education has emerged as a transformative approach in nursing and medical training, offering a safe, controlled, and interactive environment for learners to develop clinical competence before engaging with real patients. Its application in high-risk, skill-intensive procedures such as tracheostomy care has been increasingly studied in recent years.

Pu et al. (2022) evaluated the use of video-based education for medical students on tracheostomy care. Their study, highlighted that structured multimedia resources enhanced learners' understanding and procedural familiarity. While video resources were beneficial, the authors acknowledged that combining such resources with hands-on simulation could yield superior learning outcomes. This finding underscores the importance of multi-modal instructional strategies in fostering deeper cognitive and psychomotor skill acquisition.

Young et al. (2024) investigated the impact of a simulated tracheostomy tube change educational intervention on nursing students' confidence, knowledge, and skills. The results demonstrated a statistically significant improvement across all three domains, emphasizing that simulation not only boosts cognitive understanding but also reinforces self-efficacy. The study further revealed that repetitive practice and immediate feedback from facilitators were key drivers in skill mastery. This aligns with experiential learning theory, where active engagement leads to more durable knowledge retention.

In another quasi-experimental study, Tan et al. (2022) examined a blended training model combining hands-on simulation with e-learning for mastering tracheostomy care. Conducted in an emergency care setting, this study found that participants exposed to the combined approach outperformed those trained solely via traditional lectures. Importantly, the blended model also improved learners' adaptability

and decision-making in simulated emergency scenarios, illustrating the relevance of simulation in preparing nurses for real-world clinical unpredictability.

Lumowa et al. (2023) introduced an innovative approach by comparing wearable manikins with standard manikins for tracheostomy suctioning training among nursing and respiratory therapy students. The findings indicated that wearable manikins enhanced realism, improved ergonomic skills, and promoted better hand–eye coordination. The study highlighted the role of simulation fidelity in shaping skill acquisition, suggesting that high-fidelity simulation might be particularly effective in mastering intricate airway procedures.

In the Indian context, Thomas et al. (2021) conducted a study to assess the effectiveness of simulation-based education on nursing students' knowledge and skills in airway management, including tracheostomy care. Using a pre-test–post-test design, they observed significant improvements in both theoretical knowledge and practical competence after simulation training. This research is particularly relevant for the Indian nursing education system, where variability in clinical exposure can impact skill development. By offering a standardized training experience, simulation helps bridge the gap between classroom instruction and clinical practice, ensuring that all students achieve a baseline competence level regardless of their clinical posting variations.

Across these studies, several common themes emerge. Firstly, simulation-based training consistently results in measurable knowledge gains, skill improvement, and increased learner confidence. Secondly, the combination of cognitive (knowledge-based) and psychomotor (skill-based) learning within simulation environments fosters integrated competence that is critical in managing airway emergencies. Thirdly, the presence of facilitator feedback and opportunities for repeated practice are pivotal in maximizing learning outcomes.

The literature also points to evolving trends in simulation design. Blended learning models (Tan et al., 2022) and high-fidelity simulation tools (Lumowa et al., 2023) are becoming increasingly prominent, offering more immersive and realistic learning experiences. Moreover, while global studies predominantly focus on tracheostomy-specific training, Indian research (Thomas et al., 2021) emphasizes broader airway management, reflecting differences in curricular priorities and clinical exposure opportunities. Nonetheless, the underlying educational principles remain consistent across contexts.

The above reviewed literature substantiates that simulation-based teaching is an effective pedagogical method for enhancing knowledge and skills in tracheostomy care. The approach not only improves procedural competence but also instills confidence, preparing nursing students for safe and effective patient care. However, there is scope for

further research within the Indian context focusing specifically on tracheostomy care, using larger sample sizes and high-fidelity simulation to generate more generalizable findings.

Objectives:

1. To assess the knowledge regarding tracheostomy care among final-year B.Sc. nursing students before the administration of simulation-based teaching.
2. To evaluate and administer simulation-based teaching on tracheostomy care.
3. To assess the knowledge regarding tracheostomy care after the administration of simulation-based teaching.
4. To evaluate the effectiveness of simulation-based teaching by comparing pre-test and post-test knowledge scores.
5. To find the association between pre-test knowledge scores and selected socio-demographic variables.

Hypotheses:

- **H1:** There will be a significant difference between pre-test and post-test knowledge scores on tracheostomy care.
- **H2:** There will be a significant association between selected socio-demographic variables and pre-test knowledge scores.

Conceptual Framework: Ludwig Von Bertalanffy's modified General System Theory model.

MATERIALS AND METHODS

An evaluative research approach was adopted for the present study with a pre-experimental, single group pre-test-post-test design to assess the effectiveness of simulation-based teaching on knowledge regarding tracheostomy care. The study was conducted in the NK Bhat Centre for simulation and Research Centre-Navodaya Medical College Hospital & Research Centre, Raichur, Karnataka. The target population comprised final-year B.Sc. Nursing students of Navodaya College of Nursing who fulfilled the inclusion criteria. A total of 40 students were selected as the sample using a probability sampling technique through the lottery method. Data was collected using a structured knowledge questionnaire consisting of two sections: Section I included socio-demographic variables, and Section II contained 30 items related to tracheostomy care. The simulation-based teaching programme was developed and administered to the participants, and knowledge was assessed both before and after the intervention. Data analysis was carried out using descriptive statistics such as frequency, percentage, mean, and standard deviation, as well as inferential statistics including paired t-test to determine the effectiveness of the intervention and Chi-square test to examine the association between pre-test knowledge scores and selected socio-demographic variables.

RESULTS

The findings of the study revealed that simulation-based teaching was highly effective in improving the knowledge of final-year B.Sc. Nursing students regarding tracheostomy care. In the pre-test, the mean knowledge score of the participants was 15.18, whereas in the post-test it increased to 23.93, indicating a mean difference of 8.75. This improvement was found to be statistically significant, with a paired t-test value of 25.795 at $p < 0.001$. On average, students demonstrated a 29.08% gain in knowledge following the intervention. The analysis using the Chi-square test showed that there was no significant association between the students' pre-test knowledge scores and their selected socio-demographic variables, indicating that the improvement in knowledge was attributed to the simulation-based teaching rather than demographic factors.

DISCUSSION

The findings of this study revealed a significant improvement in students' knowledge following simulation-based teaching, aligning with previous research that supports simulation as an effective educational strategy in nursing. The notable gain in post-test scores indicates that hands-on, scenario-based learning enhances comprehension and retention compared to traditional methods. Simulation provides a risk-free environment for practicing critical procedures like tracheostomy care, fostering both technical skills and clinical judgment. The absence of association between demographic variables and pre-test knowledge suggests that the improvement was directly related to the intervention, underscoring its potential for broad application in nursing education.

CONCLUSION

The study demonstrated that simulation-based teaching is an effective

method for enhancing the knowledge of final-year B.Sc. Nursing students regarding tracheostomy care. A significant improvement in post-test scores confirmed the intervention's impact, highlighting its value in bridging theoretical learning with practical application. By providing a safe and controlled learning environment, simulation training fosters competence, confidence, and preparedness in handling critical nursing procedures. Incorporating such methods into nursing curricula can greatly contribute to improving patient safety and quality of care.

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