Self-Efficacy and Learner Satisfaction in the Management of Respiratory Emergency among Undergraduate Students: A Simulation-Based Study

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Abstract

Background Simulation is an educational method that utilizes scenarios and simulators that aide to replicate real clinical situations. This research was undertaken to evaluate the effectiveness of simulation and satisfaction following the use of high-fidelity simulation among nursing students studying at undergraduate level.

Materials and Methods This is a quasi-experimental research study which was conducted in the simulation laboratory of Mangaluru, Karnataka. This study involves simulation-based learning to improve clinical competency among 100 B.Sc. nursing students. The presimulation self-efficacy was assessed by giving a questionnaire to the students. After the pretest, the researchers gave a brief introduction to the simulation scenario and explained the facilities available in the simulation laboratory. Learning objectives were explained and the samples were divided into small groups. The simulation was given using clinical scenarios and computer-assisted Human Patient Simulator for 45 minutes in the simulation laboratory. Postassessment of self-efficacy as well as student satisfaction assessment were performed using a questionnaire.

Results The findings showed that the simulation is a productive learning strategy and builds confidence. After the simulation, 79% of students strongly agreed that their self-efficacy improved in the management of patients with respiratory emergencies. The results showed positive correlation between the variables which indicates higher level of self-efficacy improves satisfaction among learners. The present study results also revealed that 98% of students had good satisfaction and found debriefing very useful.

Conclusion The high-fidelity simulation had a great influence on improving self-efficacy and satisfaction. Hence, simulation needs to be incorporated into the curriculum to enrich skills.

Keywords
► undergraduate students
► self-efficacy
► learner satisfaction
► simulation
► respiratory emergency

Introduction

Simulation is the main key to better care and treatment of the issue when it emerges in clinical practice for real. Simulation-based learning is an effective method for bridging skill gaps in theoretical lectures while simultaneously protecting patients.[1,2] Additionally, the ability to learn, practice, and enhance skills, as well as the utilization of teacher feedback and video debriefing, are all significant aspects of simulation education.[3]

Simulation in nursing education boosts students' self-confidence and self-efficacy, especially in clinical practice.

It also improves critical thinking abilities, decision-making, and communication skills. It allows student nurses to immerse themselves in a preset clinical environment, which is excellent for developing and honing nursing skills before engaging with the patient care in the clinical area.[4] Simulation interventions in nursing are used to improve quality and strengthen the skills in the management of emergencies, which are not commonly covered in academic settings. Simulation-based learning enables real-time feedback in a controlled setting. As a result, simulation has been included in nursing education system to better prepare nursing students to face challenges in clinical practice.[5,6]

Self-efficacy, often known as self-confidence, is critical to a nurse's abilities and performance in the clinical setting. Self-efficacy among student nurses and other health care providers is an important component of successful clinical practice.[7,8] Nursing students are required to possess higher levels of self-efficacy and self-confidence in their clinical skills to perform well in their professional life. Developing self-efficacy and self-confidence in the clinical area is very much important in the early stages of nursing profession which is also a challenge for the health care industry to prepare novice nurses to meet the demand of society.[9,10] The aim of this research was intended to assess the self-efficacy and satisfaction with simulation-based education in the management of respiratory emergencies among nursing students.

Materials and Methods

Ethical clearance was obtained before the data collection process from the Institutional Ethics Committee (Protocol No. YEC2/866). Permission to utilize the settings and technical manpower was obtained from the respective authorities. Participant information sheet was provided and individual informed consent was taken from the samples before data collection. Participants were assured about the confidentiality of the information.

A preexperimental research with one-group pretest–posttest design was adopted to assess the effectiveness of simulation on self-efficacy in the management of respiratory emergencies. B.Sc. nursing students were selected using purposive sampling technique. The inclusion criteria for the selection of subject were students those who have not experienced simulation education in the management of the respiratory emergency in the past. This intervention was conducted before starting the regular clinical practical. The sample size for this was computed by G* statistical analysis. Considering 10% level of attrition with $\alpha = 0.01$ and power $= 60\%$, the sample size was estimated to be 100 nursing students.

In this study demographic proforma, simulation self-efficacy scale, and satisfaction with simulation experienced scale were used to measure the variables accurately. The tool was given to five experts in the field of simulation for validation. Eighty-three percent of agreement among experts was considered for retaining the items. A demographic proforma for obtaining information regarding age and gender was used. The simulation self-efficacy scale was used to assess self-efficacy before and after simulation—a Likert scale consisting of 13 questions regarding self-efficacy in the management of respiratory emergencies. Self-efficacy was categorized as slightly, moderately, and highly confident. The scores ranging from 13 to 26 were graded as slightly confident, 27 to 40 as moderately confident, and 41 to 52 as highly confident. Satisfaction with simulation experienced scale consists of 18 statements regarding learner satisfaction. It had subcomponents such as clinical learning, reasoning, and debriefing. The satisfaction scores between 18 and 29 were graded as low satisfaction, 30 and 60 as average satisfaction, and 61 and 90 as good satisfaction. To find out the reliability tool was administered to five subjects, and the internal consistency was computed for the simulation self-efficacy and satisfaction with the simulation experience scale by the test–retest method using Cronbach's α. The reliability of the simulation self-efficacy scale was 0.8 and the satisfaction with simulation experienced scale was 0.9.

This study involved intervention as simulation to improve clinical competency among participants. Instructional scenarios were prepared and validated to train nursing students to face the challenges of treating bronchial asthma and to practice clinical skills effectively in patient care. It was conducted for a period of 45 minutes in the simulation laboratory using Human Patient Simulator (HPS) mannequin. This started with prebriefing and concluded with briefing sessions. The presimulation self-efficacy was assessed and after the pretest, the researchers gave a brief introduction to the simulation scenario and explained the facilities available in the simulation laboratory. The learning objective was explained and the samples were divided into small groups which consisted of five participants. Simulation education was given using clinical scenarios and computer-assisted HPS. Participants were exposed to a simulated asthma emergency which allowed them to manage the case followed by the debriefing session was planned and participants were allowed to express their strengths and weaknesses, and their experience in managing the emergency.

The debriefing session was focused on understanding what and how the actions were performed during the scenario. The researchers debriefed by noticing the weakness area of participants and educated to overcome them. This allowed the participants to understand the gaps noticed during the scenario and to gain confidence in performing clinical emergencies. Postassessment of self-efficacy as well as student satisfaction assessment were performed using a questionnaire.

The collected data were intended to be analyzed in terms of the study's aim and objectives using appropriate statistical tests. Demographic data were analyzed by using frequency and percentage. The significant difference in the observations and the effectiveness was assessed by using paired 't'-test. The chi-square test was used for finding the association between self-efficacy, satisfaction, and demographics' variables.

Results

In the experimental group, most of the students (72%) were 20 years old and 28% of them were 21 years old. The majority (89%) of them were females.

Table 1 Distribution frequency and percentage of learner satisfaction on simulation among undergraduate students ($n = 100$)

Learner satisfaction	Score	f (%)
Low	18–29	–
Average	30–60	2 (2%)
Good	61–90	98 (98%)

The pretest results showed that most of the students (98.0%) were slightly confident and only 2% of them were moderately confident, and after the posttest maximum students (79.0%) were highly confident and very few samples (21.0%) were moderately confident to manage the acute bronchial asthma.

The paired t-test was used to evaluate the effectiveness of high-fidelity simulation on self-efficacy among nursing students. In the experimental group, mean pretest simulation self-efficacy score (19.07 ± 3.69) was much less than the posttest scores (45.13 ± 4.87) and calculated p-value <0.05. This indicates the effectiveness of simulation on self-efficacy among undergraduate students.

►**Table 1** shows the distribution of the percentage of learner satisfaction on simulation among undergraduate students. Results showed that the majority (98%) of samples

had good satisfaction and 2% of the samples had average satisfaction toward the simulation education.

The Karl Pearson's correlation coefficient test was used to correlate self-efficacy and learner satisfaction on simulation among undergraduate students. The results showed positive correlation between the variables, which was not statistically significant. It indicates that higher levels of self-efficacy improve satisfaction among learners.

The chi-square test was used to study the association of self-efficacy with selected demographic variables. The data presented in ►**Table 2** showed no association between age and self-efficacy but there was association found between gender and self-efficacy ($p < 0.005$).

►**Table 3** shows the association of learner satisfaction with selected demographic variables. The obtained p-value was >0.05, hence, there was no statistical association was found between learner satisfaction and demographic variables such as age and gender.

Discussion

Nursing is a skill-oriented profession and student nurses need extensive training in the care of patients. The outcome of this study was to improve the self-confidence of students in the management of patients with critical conditions.[11,12] The findings showed the effectiveness of simulation on self-efficacy. A similar study was conducted in Saudi Arabia

Table 2 Association between self-efficacy with selected demographic variables ($n = 100$)

Demographic variables	Median		χ^2 value	p-Value
	≤ 18.5	>18.5		
Age (in years)			1.78	0.13
a) 20	33	39		
b) 21	17	11		
Gender			5.00	0.02[a]
a) Male	9	2		
b) Female	41	48		

The statistical test used is chi-square test. Level of significance: $p < 0.05$.
[a]Significant $p < 0.05$.

Table 3 Association between learner satisfaction with selected demographic variables ($n = 100$)

Demographic variables	Median		χ^2 value	p-value
	≤ 84	>85		
Age (in years)			0.26	0.38
a) 20	37	35		
b) 21	16	12		
Gender			0.12	0.58
a) Male	6	5		
b) Female	47	42		

The statistical test used is chi-square test. Level of significance: $p < 0.05$.

among nursing students studying at the undergraduate level. A total of 158 third-year nursing students participated in the study. The findings revealed universal agreement that simulation is a beneficial learning approach that boosts confidence and 60% of students strongly agreed that their self-confidence had grown through learning by simulation.[13] In another study conducted in the Department of Midwifery at the University of Gondar, Ethiopia, to evaluate the self-efficacy and learner satisfaction aspects linked with simulation-based education—144 midwifery students participated. The result demonstrated the effectiveness of simulation on student self-efficacy. Satisfaction was 55% among students and confidence was 60%.[5] Another study on perception and effectiveness of obstetric high-fidelity simulation on knowledge, skills, and critical thinking among nursing students in the United States showed that simulation-related activities improved perception on simulation. There was a positive correlation between the simulation which students had experienced as an intervention and its perception.[14] The results of a research study conducted in a nursing college at Maharashtra, India, showed that 82.2% of B.Sc. nursing students identified simulation as an innovative method of teaching and learning. This type of learning significantly contributed to skill development and is an alternate way of learning to improve clinical skills.[15]

The study has certain limitations. The results of the study cannot be generalized because it was conducted for a smaller group of students. It lacks a random selection of students and is conducted in a single setting. Similar studies can be replicated on a large sample using multiple scenarios to strengthen the findings. Self-efficacy in managing critical patients can be observed in real-life situations during the postings in clinical areas. These kinds of studies help in enriching the curriculum by inculcating simulation education to improve clinical skills.

Conclusion

The results of this study showed satisfaction with simulation method of learning and significant changes in self-efficacy in the management of the respiratory emergency. Self-efficacy plays a significant role in the successful transition from a student nurse to nurse practitioner. In the research study, simulation has been identified as a teaching learning approach that may boost a learner's clinical self-efficacy and satisfaction.

Conflict of Interest
None declared.

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