The Effect of Simulation-Based Learning on Nursing Students' Clinical Performance and Reality Shock

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Abstract

Background: Simulation-based learning (SBL) is pivotal in bridging the gap between theoretical knowledge and clinical practice for nursing students. It fosters clinical competencies and helps mitigate reality shock. **Aim**: this study aimed to assess the effect of SBL on nursing students' clinical performance and reality shock. **Subjects and Methods:** This study was conducted using a quasi-experimental design at simulation lab, Faculty of Nursing, Beni-Seuf University and in the intensive care units of Beni-Seuf University Hospital. Data were gathered from a purposive sample of 115 novice critical care nursing students using three tools: a self-administered questionnaire, the Critical Simulation Scenarios Observational Checklist, and the Reality Shock Questionnaire. **Results**: Before the SBL intervention, most students demonstrated unsatisfactory clinical performance and experienced high levels of reality shock. After implementing the simulation scenarios, both clinical performance and reality shock significantly improved. Statistically significant differences were found between the pre- and post-implementation scores in total knowledge, practice, and reality shock. **Conclusion and Recommendations**: Implementing SBL positively impacts nursing students' clinical performance and effectively reduces reality shock. Integrating diverse teaching strategies, in conjunction with SBL, is highly recommended to augment students' engagement and enhance learning outcomes.

Keywords: Clinical performance, Reality shock, Simulation-based learning, Nursing education, nursing students.

Inroduction

Intensive care units (ICUs) are highly specialized environments equipped with cutting-edge technology designed to provide life-saving support and comprehensive care for patients facing severe organ failure. Critical care nursing is dedicated to managing these patients, whose vital organ functions are often severely compromised **(Aitken et al., 2023)**. In response to the complexities of critical care, simulation-based learning has gained prominence as an active learning method that empowers nursing students to refine both technical and non-technical skills in a risk-free setting (**Moran et al., 2021; Labarge, 2024).**

Simulation-based learning offers more than just technical practice; it creates a platform for nursing students to engage in reflective learning through structured debriefings. These debriefing sessions allow students to evaluate their decision-making processes and actions, which facilitates deeper knowledge retention and enhances the flexibility required for real-world application **(Kim, 2020; Lee et al., 2019)**. This method not only reinforces learning but also promotes critical thinking, decision making and adaptability, essential traits for high-pressure environments like ICUs. Moreover, the role of faculty in simulation-based learning as mentors and facilitators blends expert knowledge with student's creativity, leading to innovative approaches in the teaching and practice of critical care (**Jeffries, 2023).**

Nurses working in critical care settings face numerous obstacles: complex patient conditions, high patient acuity, rapid decision-making, and the emotional strain of managing life-threatening situations. Technology, while indispensable, further complicates these scenarios **(Jeffries, 2023; Dogham et al., 2024; Elcokany et al., 2022).** Through simulation-based learning, nursing students can safely encounter a variety of clinical situations, including rare but high-risk events like rapid patient deterioration, simulation-based learning enables students to participate in these high-stakes scenarios, thereby equipping them with the confidence and competence required to handle these situations effectively (**Moran et al., 2021).**

In addition to its technical benefits, simulation-based learning also plays a critical role in mitigating "reality shock"the disillusionment nursing students may feel when their expectations of clinical practice diverge from reality (**Nakić et al., 2023; Farag et al., 2022)**. If unaddressed, reality shock can lead to job dissatisfaction, emotional strain, and compromised patient care **(Labrague, 2024**). By allowing students to engage in realistic yet controlled scenarios, simulation-based learning helps prepare them for the complexities of real-world practice without jeopardizing patient safety **(Nakić et al., 2023).**

Transitioning into critical care practice is often overwhelming and stressful experience for novice nurses. Challenging with high-stakes situations, advanced technology, and complex patient needs, many students complain of reality shock when their expectations of clinical practice work clash with the challenging realities they face in ICUs. The pressure of dealing with critically ill patients and interacting with unfamiliar medical equipment for the first time can trigger anxiety and stress,

significantly impacting students' ability to perform. These emotional responses are core contributors to the development of reality shock in novice nursing.

Despite the significance of this issue, many nursing education programs fall short of preparing students to cope with reality shock effectively. There remains a critical gap in equipping students with the skills needed to navigate the psychological and professional phases of this phenomenon. Addressing this gap is essential to ensure a smoother transition into professional practice, reduce burnout, and maintain high-quality patient care.

In recent years, research has increasingly emphasized the role of evidence-based strategies in nursing education, with simulation emerging as a promising intervention to augment student confidence and resilience. Studies have shown that simulation-based interventions can significantly reduce the incidence of reality shock by fostering experiential learning and preparing students for the complexities of critical care **(Moran et al., 2021).** Through enhanced simulation-based curricula, nursing programs can improve student readiness and promote a more positive entry into the demanding field of critical care. In Egypt, there is a gap in the literature regarding reality shock among novice nursing students. Therefore, the current research will be conducted to investigate the effect of simulation-based learning on both nursing students' clinical competencies and reality shock.

So, this study aimed to assess the effect of simulation-based learning on nursing students' clinical performance and reality shock, focusing on its impact on their knowledge, practical competencies, and preparedness for real-world clinical scenarios.

Operational Definitions

Clinical Performance: Refers to both the theoretical knowledge and practical competencies demonstrated by novice nursing students in clinical settings.

Research Hypotheses

1-The utilization of simulation-based learning is expected to enhance the knowledge acquisition of novice nursing students.)

2-The utilization of simulation-based learning is expected to enhance clinical competencies of novice nursing students.)

3-The application of simulation-based learning is anticipated to decrease the extent of reality shock encountered by novice nursing students).

Subjects and Methods

Research Design

A quasi-experimental, one-group pretest-posttest design adhering to the STROBE guidelines was used for this study.

Setting

The study was conducted at

The Simulation Lab Faculty of Nursing, Beni-Suef University where Advanced Multipurpose patient simulator (HAL® S3201 module) was used. The Faculty adheres to the national standards for nursing education and functions under the jurisdiction of the Egyptian Ministry of Higher Education. The faculty lab supports a wide range of simulated clinical scenarios designed to mimic (actual clinical placement environment).

Reality shock assessments took place at the (ICU) of Beni-Suef University Hospital. ICU has total capacity of 19 beds, 12

ventilators, 19 monitors, and emergency crash carts**.**

Subjects

A purposive sample of 115 novice nursing students from the Faculty of Nursing, Beni-Suef University, was recruited for this study. Participation in the study required enrollment in second year critical course with no prior experience or training in the ICU. The exclusion criteria included previous ICU training or experience.

Sample Size Calculation

The sample size was calculated using Steven K. Thompson's formula) (Thompson, 2012), based on specific parameters such as a total population size of 700 novice nursing students for the academic year 2023-2024, with a 95% confidence level and a 5% margin of error. The formula used is as follows:

$$n = \frac{N \times p(1-p)}{\left[\left[N-1 \times \left(d^2 \div z^2\right)\right] + p(1-p)\right]}$$

Where

-n=115n = 115n=115 (sample size)

-N=700N = 700N=700 (population size)

-Z=1.96Z = 1.96Z=1.96 (confidence level at 95%)

-d=0.05d = 0.05d=0.05 (error proportion)

-p=0.50p = 0.50p=0.50 (probability estimate) (Steven & Thompson, 2012).

Tools for data Collection

I Tool One: Self-Administered Questionnaire

It was adopted from **(Calderón.,et al, 2020).**. It was used to assess nurses' level of knowledge regarding resuscitation, respiratory assessment, and cardiogenic shock in myocardial infarction scenarios. It consists of two parts:

Part I: Demographic data such as age and gender … etc.

Part II: Questions assessing nursing students' knowledge related to emergency situations such as resuscitation, respiratory assessment, and cardiogenic shock in myocardial infarction.

Scoring: Each correct answer in part II was scored as 1, while incorrect answers were scored as 0. A total of 25 questions were included, with a score of ≥60% indicating satisfactory knowledge, while ≤60% was classified as unsatisfactory knowledge.

T**ool Two**: **Critical Simulation-Based Scenario Observational Checklist (CSSOC)**

This checklist was developed by researchers based on reviewed literature **(Liaw, et al ,2015)** to assess the nursing students level of practice regarding resuscitation, respiratory assessment, and cardiogenic shock in myocardial infarction It includes structured checklists to assess nursing students' clinical competencies during emergency scenarios, specifically in resuscitation, respiratory assessment, and cardiogenic shock management.

Scoring: For each task performed correctly, a score of 1 was given. A total of 86 items were assessed, with ≥70% classified as satisfactory performance and ≤70% as unsatisfactory.

Tool Three: Reality Shock Questionnaire (RSQ) was adopted from **Teodoro and Molina (2016)** to evaluate the level of reality shock experienced by the nursing students. **Scoring:** Responses were scored as follows: 2 points for "agree", 1 point for "neutral", and 0 points for "disagree". A total score of ≥70% indicated a positive reality shock experience, while ≤70%

indicated a negative reality shock experience.

Ethical Consideration

Ethical approval for the study was obtained from the Beni-Suef University, College of Medicine's institutional review boards (IRB) and the ethical committee at Beni-Suef University Hospital before the study's implementation. By giving written informed consent, participants confirmed they were taking part voluntarily. Strict protocols were followed to protect participants' privacy during the whole investigation. Students were informed of their right to withdraw at any time without consequence. The obtained personal data was kept private and available only to the study team. Ensuring participants' privacy and anonymity was of utmost importance.

Tools validity

Were assessed through a five expert jury of professionals from the medical-surgical, psychiatric, and critical care nursing departments. The tools were deemed valid in terms of clarity, relevance, and comprehensiveness.

Reliability was confirmed using Cronbach's alpha, with the following results: "Knowledge scale: α=0.59\alpha = 0.59α=0.59" and "Practice scale: α=0.68\alpha = 0.68α=0.68"

Pilot study

A preliminary investigation involved 12 nursing student applicants, distinct from the final sample, to gauge the efficacy, clarity, and potential obstacles in utilizing the research instruments. The pilot findings indicated that the instruments were accurate, comprehensible, and suitable for the target demographic .

Data Collection

The study was implemented over three phases from April 2024 to May 2024:

First phase: Assessment and Scenario Design

Pretest assessments were conducted using the Reality Shock Questionnaire (RSQ) and Self-administered Questionnaire in the ICU setting to measure students' baseline knowledge and levels of reality shock. Simulation scenarios focusing on resuscitation, respiratory assessment, and cardiogenic shock were developed by researchers based on clinical guidelines and literature.

Second phase: Simulation-Based Learning Intervention

Students were divided into 10 groups (11-12 students per group). Each group participated in three simulation sessions (30 sessions total), with each session lasting 120 minutes, for a total of 60 hours. Each session involved pre-session case study discussions, hands-on practice using the HAL® S3201 simulator, and post-scenario debriefings. Throughout the sessions, students were observed using the Critical Simulation Scenario Observational Checklist (CSSOC), and performance feedback was provided.

Third phase: Post test and Evaluation

Posttest assessments using the RSQ and Self-administered Questionnaire were conducted immediately following the simulation sessions to evaluate the impact of the intervention on students' knowledge, practical skills, and reality shock.

Data Analysis

The data collected were analyzed using IBM SPSS software version 26.0. Following data entry, a thorough

examination and verification were undertaken to ensure accuracy. Descriptive statistics including means (M), standard deviations (SD), and frequencies/percentages were computed to summarize demographic data and pre- and post-test results. Paired t-tests were conducted to compare pretest and posttest results for knowledge, clinical performance, and reality shock. Statistical significance was determined at the 5% ($p<0.05$).

Results

Table (1) : exhibits the demographic characteristics of novice nursing students, with a total sample size of 115. It was found that most of the students are under 20 years old, with 87 students (75.5%) while only 28 students (24.3%) are 20 years old or older with mean age of the participants is approximately 20.12 years and a standard deviation of 0.677. Moreover, only 43 students were male while 72 students were female.

Figure (1) :shows distribution of nursing students' level of knowledge pre and post implementation of simulation-based learning scenarios. There have been significant improvements in knowledge levels in all three areas (Cardiogenic shock, Respiratory assessment, and Resuscitation) following the application of simulation-based learning scenarios. The largest improvement was seen in the Cardiogenic shock, where the post-test score leaped from 11.3 to 80.9. Additionally, the Respiratory assessment and Resuscitation areas also showed remarkable enhancements, with post-test scores of 87.8 and 92.2 respectively. Overall, the data presented highlights the effectiveness of the application of simulation-based learning scenarios in boosting knowledge levels.

Table (2): illustrates the mean knowledge score differences between pre, and post implementation of simulation-based learning scenarios. It was found that overall mean knowledge scores of nursing students significantly improved after application of simulation-based scenarios (18.33±1.88) compared with the mean knowledge scores before implementing the simulation scenario (8.47±2.48) The statistically significant p-values ≤ 0.001indicate a high degree of statistical significance in the results.

Figure (2): presents distribution of nursing students' level of clinical competencies pre and post implementation of simulation-based learning scenarios. It is obvious that there have been significant improvements in clinical competencies in all three areas (Cardiogenic shock, Respiratory assessment, and Resuscitation) following the application of simulation-based learning scenarios. It was found that only 21% of nursing students had a modest level of clinical competencies in managing cardiogenic shock, respiratory assessment, and resuscitation scenarios. In comparison with 68.7% of nursing students with remarkable clinical competencies after application of simulation-based scenario. Overall, the data presented highlights the effectiveness of the use of simulation-based learning scenarios in enhancing nursing students' clinical competencies.

Table (3): demonstrates the mean clinical competencies score differences between pre, and post implementation of simulation-based learning scenarios. It was found that overall mean clinical competencies scores

of nursing students significantly improved after application of simulation-based scenarios (60.52±5.23) compared to the mean scores before implementing the simulation scenario (36.53±4.22). The T-test results and the p-values of 0.000 suggest that the improvements observed are statistically significant, which indicates that the simulation-based scenario had a positive impact on the nursing students' clinical competencies in the specified areas.

Table (4): displays comparison reality shock score differences between pre, and post implementation of simulation-based learning scenarios. It was found that the number of nursing students who had positive experience increased significantly from 9.6% to 45.2%. whereas the number of nursing students who had negative experience decreased significantly from 90.4% to 54.8%. The p-value of 0.001 suggests that this difference is statistically significant.

Table (1): Distribution of nursing students according to their demographic data (n=115).

Items		N	%
Age	< 20 years	87	75.5
	≥ 20 years	28	24.3
	Mean ± SD 20.12±.677		
Gender	Male	43	37.4
	Female	72	62.6

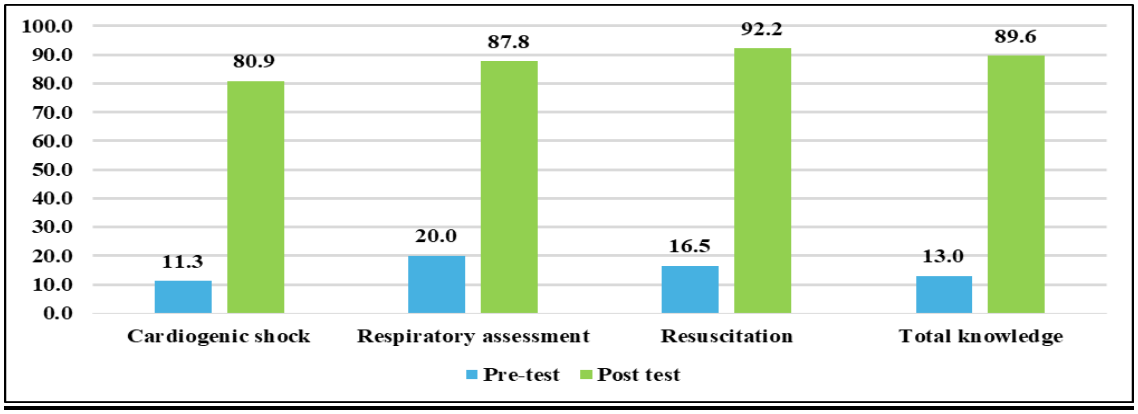

Figure (1) Distribution of nursing students' level of knowledge pre and post implementation of simulation-based learning scenarios.

Table (2): Mean knowledge score differences between pre, and post implementation of simulation-based learning scenarios.

Items	Pretest Mean +SD	Posttest Mean +SD		
			T	p value
Cardiogenic shock	2.8783±1.27	6.4870±1.18	-22.766	.000
Respiratory Assessment	2.7478±1.35	5.5565±.98	-16.635	.000
Resuscitation	2.8435±1.45	6.2870±.97	-22.097	.000
Total knowledge	8.4696±2.47	18.3304±1.88	-33.801	.000

T Paired samples t-test,

**** Statistically significant at p ≤0.001**

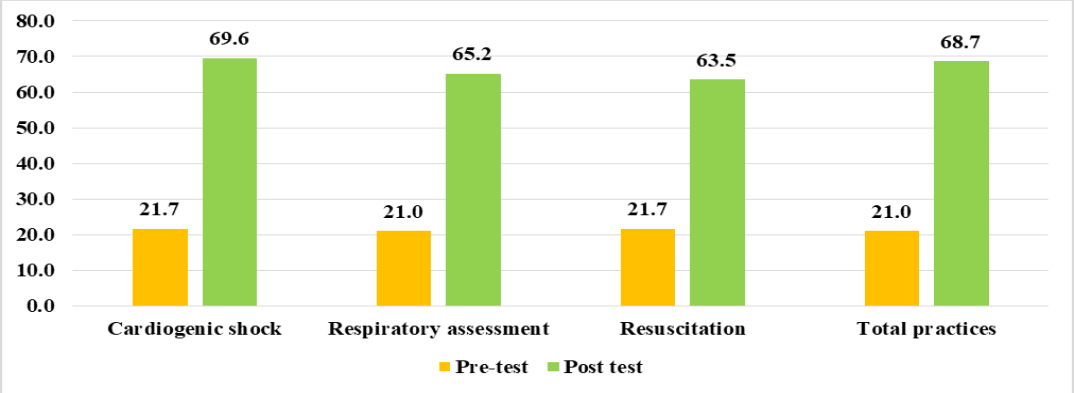

Figure (2): Distribution of nursing students' level of clinical competencies pre and post implementation of simulation-based learning scenarios.

Table (3): Mean clinical competencies score differences between pre, and post implementation of simulation-based learning scenarios.

Items	Clinical Competencies		t test	P value
	Pretest	Posttest		
	Mean +SD	Mean +SD		
Cardiogenic shock	8.3217±1.94	14.3478±2.24	-23.681	.000
Respiratory assessment	12.6174±2.63	21.1478±2.43	-17.854	.000
Resuscitation	15.5913±2.43	25.0261±.2.44	-29.663	.000
Total practice	36.5304±4.22	60.5217±5.233	-38.032	.000

T Paired samples t-test, ** statistically significant at p ≤0.001)

Table (4): Comparison between pre, and post implementation of simulation-based learning scenarios regarding reality shock experience.

Item	Reality shock				X2	P value
	Pre		Post			
	N			%		
Positive experience	11	9.6	52	45.2	10.964	0.001
Negative experience	104	90.4	63	54.8		

X2 refer to chi square test, ** Significant at p value <0.05

Discussion

The results regarding knowledge acquisition, illustrate that nursing students' clinical competencies, knowledge and reality shock positive experiences' mean scores significantly improved following the implementation of simulation-based scenarios. This might be related to exposure to the most common critical situation and how to deal with this situation.

Prior to the intervention, less than one-quarter of the students displayed satisfactory knowledge of cardiogenic shock, respiratory assessment, and resuscitation. This figure increased dramatically to over two-thirds post-intervention. The statistical significance of this improvement ($p \leq 0.001$) supports the efficacy of simulation in enhancing nursing knowledge. These findings are consistent with previous studies, such as those by **Habibli, Ghezeljeh, and Haghani (2020),** who observed significant improvements in knowledge following simulation-based education in adult cardiopulmonary resuscitation ($p < 0.001$). Similarly, **Ahmed and Hassan (2021)**, reported a significant increase in knowledge post-simulation for nursing students dealing with acute coronary syndrome. Furthermore, **Farooq et al. (2023)**, emphasized that students acknowledged the application of theoretical knowledge post-simulation.

Conversely, **Beal et al. (2017)** found that while simulation improved knowledge acquisition, it was not superior to other teaching methods. Furthermore, **Akhu-Zaheya, Gharaibeh, and Alostaz (2013)** reported no statistically significant difference in knowledge acquisition between groups exposed to high-fidelity simulation and conventional teaching. These discrepancies may stem from variations in study designs, teaching methods, and assessment protocols.

The results regarding clinical competencies, demonstrated a statistically significant improvement in students' practical skills following simulation-based learning. Pre-intervention, only 21% of the students demonstrated satisfactory practice in managing cardiogenic shock, respiratory assessment, and resuscitation. This increased significantly post-intervention, with more than 60% of students achieving satisfactory levels across all scenarios. This can be explained that demonstration and re-demonstration of clinical practice result in improvement of clinical competencies.

These findings are in line with those of **Ahmed and Hassan (2021)**, who reported significant improvements in performance post-simulation in critical care settings**. Likewise, Filomeno, Renzi, and Insa-Calderón (2020)** found that simulated clinical scenarios enhanced the problem-solving abilities of third-year nursing students. **El-Meanawi, Ali Almanzalawi, and Fathey (2019)** also reported that students' performance improved significantly across multiple phases of simulated education.

As for the reduction level of reality shock, the study observed a marked decrease in the percentage of students experiencing negative reality shock post-simulation. Before the intervention, 90.4% of the students reported negative reality shock, a figure that decreased significantly to 54.8% post-simulation. This can be explained that acquisition of knowledge and practicing emergency situation in simulation lab have positive effect in reducing their fear and reality shock.

This reduction aligns with the findings of **Zapko et al. (2018),** who highlighted that students felt more confident in their clinical practice and were satisfied with simulation-based learning. Similarly, **Ma et al. (2024)** noted that simulation-based learning led to high levels of student satisfaction and self-confidence. However, **Uslu et al. (2020)** reported no significant changes in anxiety or clinical stress levels post-simulation, suggesting that while simulation may enhance learning and confidence, its effect on emotional stress might vary depending on the context or assessment tools used.

The current research affirmed the hypothesis that the utilization of simulation-based learning is expected to enhance the knowledge acquisition and clinical competencies and decrease the extent of reality shock of novice nursing students during their clinical placement training.

Conclusion and Recommendations

The results of this study demonstrate that simulation-based learning significantly enhances nursing students' knowledge and practical skills while reducing the impact of reality shock. These findings support the hypothesis that simulation-based learning is an effective tool in improving clinical performance and easing students' transition into real-world practice. Since this study was conducted in one clinical placement training setting only from one geographical area, its results cannot be generalized, and the sample size does not represent all population.

Based on the current study, it is recommended that using simulation-based learning should be highly encouraged as a learning strategy across all clinical nursing curriculums for cultivating nursing students' knowledge, and clinical competencies and reducing reality shock. Moreover, further research should replicate this study on a larger and more diverse sample to increase the generalizability of the findings .

Finding

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Declaration of Conflicting Interests:

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Author Contribution

The author expresses gratitude to GS for their contributions to the research study, methodology design, data collection, and manuscript revision. WA. conducted the literature review, HM performed statistical analysis, MS

helped design the study, WK contributed to data acquisition, and all authors approved the final version, agreeing to be accountable for all aspects of the work.

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