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RESEARCH ARTICLE

The Role of High-Fidelity Simulation in Nursing Education in Saudi Arabia

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Abstract

Background: Nursing education needs to prepare competent nurses to provide high-quality care to clients, as a nurse's role has expanded and requires more professional abilities and self-sufficiency. However, nursing schools face significant challenges due to a shortage of educators, limited clinical areas or healthcare facilities, and an increasing number of students. To improve students' learning outcomes and enhance their self-confidence, satisfaction level, communication skills, and critical thinking abilities, nursing schools use high-fidelity simulation to allow students to practice procedures before implementing them in real life.This study examines undergraduate nursing students' perceptions of high-fidelity simulation-based learning, evaluates its impact on student confidence and satisfaction, and investigates the interrelationships between these elements and demographic characteristics after training nurse educators on high-fidelity simulation. **Methods:** The nurse educators received a pre-training program in high-fidelity simulation techniques. A self-administered questionnaire was used to evaluate students' perceptions of satisfaction and self-confidence after completing simulation-based practice. The data collected from 250 nursing students were analyzed using a descriptive analysis and Pearson correlation test. **Findings:** The mean score of students' self-confidence after experiencing a High-fidelity simulation is 3.08 out of 4. Additionally, the overall satisfaction acquired is 3.06 out of 4. Satisfaction correlates significantly with academic levels ($p < 0.05$). Undergraduate nursing students positively perceive the use of simulation in clinical education, as it enhances their satisfaction with learning and increases self-confidence. It is essential to offer ongoing professional development opportunities for nursing faculty to improve their abilities in using High-fidelity simulation effectively in teaching and assessment.

Keywords: Highfidelity; Simulation; Satisfaction; Selfconfidence; Nursing students

1 Introduction

The role of a nurse has expanded significantly, requiring more professional skills and self-sufficiency. Accordingly, nursing education should prepare competent nurses capable of providing high-quality care to clients. Nursing schools face significant challenges due to a shortage of educators, limited clinical areas, healthcare facilities, and increasing nursing students. Existing ways to improve nursing education include hybrid instructions (traditional classroom lectures and E-learning), skills labs, and clinical practice. More comprehensive methods may be needed to prepare students for the complexities and challenges of real-world clinical settings[(1)]. In recent years, nursing education has increasingly emphasized using High-Fidelity Simulation (HFS) as an innovative and effective teaching strategy. Simulation is an active learner-centered teaching strategy that involves developing clinical scenarios that emulate real-life situations. Simulation improves decision-making skills by utilizing critical thinking, resulting in increased self-motivation and focus. This interactive teaching-learning method allows learners to improve cognitive, affective, and psychomotor skills in a supportive environment[(2)]. Significant advancements in fidelity simulation in nursing education include the development of complex simulation technologies that have enhanced simulation-based learning effectiveness. This has allowed students to practice clinical skills in a safe and controlled environment[(3)]. Although HFS provides a bridge between theoretical knowledge and practical skills, some areas around the world still use traditional manikins in nursing labs. It has become common practice in Saudi Arabia to provide nursing schools with high-fidelity simulation[(4)]. Nursing students must practice before entering the actual clinical setting. Errors can result in serious patient complications, and students may become very cautious and hesitant about their clinical decisions[(5)].

Satisfaction is a crucial component of simulated learning, not only as a measure of achieving the desired outcome but as a measure of reaffirming self-confidence and gaining experience. Trusting one's judgment and performance is a form of self-confidence that significantly impacts transferring theoretical knowledge into clinical practice[(6)]. HFS improves students' learning outcomes and enhances their self-confidence, satisfaction level, communication skills, and critical thinking abilities when they practice a procedure before implementing it in real life[(7)]. There is a need for more research on simulation among Saudi nursing students, particularly on the significance of HFS training for nurse educators. Training nurse educators on high-fidelity simulation enables them to create scenarios that are realistic and aligned with the nursing curriculum's learning objectives. Instructors also provide practical debriefing sessions for students, giving constructive feedback and encouraging reflective learning. This strategy is vital as it ensures that educators are skilled in using simulation technology and techniques effectively, enhancing the learning experience for students[(8)]. Addressing this gap provides a beneficial perspective to enrich nursing education via simulation in Saudi Arabia. This study investigates undergraduate nursing students' perceptions of HFS-based learning, estimates its impact on student confidence and satisfaction, and explores the interrelationships between these factors and demographic characteristics after training nurse educators on HFS.

2 Methodology

A training program consisting of a series of workshops was developed and executed to guarantee that nurse educators are equipped to train students effectively and proficiently in HFS techniques. An evaluation was conducted to examine the effectiveness of nurse educators' training on their competency in teaching HFS effectively to nursing students.

During the 2021–2022 academic year, a descriptive cross-sectional research design was carried out on all undergraduate nursing students who had completed their practical training in HFS at levels six, seven, and eight at Nursing College. The process of sampling was done by convenience and was not probabilistic. Exclusion criteria included those who did not have HFS training and did not volunteer to participate.

About 250 students out of 276 agreed to participate in the research. The faculty administration provided written consent for the lawful gathering of student data. The study examined students' satisfaction and self-confidence after completing simulation-based practice in adult nursing care, pediatrics, maternity and childcare, psychiatric and mental health nursing, critical care, and community health nursing courses.

A three-part self-administered questionnaire was used at the end of the academic year 2022. The first part is demographic data, including age, academic level, and course type. The second part consists of 13 items that measure student self-confidence in simulation-based learning. The last part is a 23-item Educational Practices Questionnaire that evaluates students' satisfaction. The second and third parts used a four-point scale (1 = Disagree, 2= Somewhat disagree, 3 = Somewhat agree, 4 = Agree), and the items were adapted from a simulation study conducted by the National League of Nursing/Laerdal[(9)].

2.1 Statistical Analysis

The data has been categorized, encoded, and analysed using SPSS version 26.0. Descriptive statistics have been used to describe the sample variables frequencies, means, standard deviations, and percentages to summarize the data. The questionnaire was evaluated for clarity, length, and completion time by distributing it among 20 students not included in the study sample. Its content validity was also evaluated, and the internal consistency of the items of the questionnaire was determined by Cronbach's Alpha. Overall, the questionnaire had a reliability coefficient of 0.926.

A Pearson coefficient has been used to explore the relationships between demographic variables, satisfaction, and self-confidence. The results' significance was determined to be $p \leq 0.05$.

2.2 Ethical Consideration

The study was approved by the university Institutional Review Board (IRB), and consent was obtained from the participants after explaining the study's purpose, contents, and duration. Throughout the study, it was ensured that the confidentiality of the participants was maintained.

3 Results and Discussion

Addressing the satisfaction and self-confidence of nursing students is essential to improving their knowledge acquisition and clinical practice through educational programs. This study explores how undergraduate nursing students perceive HFS-based learning and evaluates its impact on their satisfaction and confidence levels after training nurse educators on HFS. Providing proficient training to nursing educators in HFS techniques was done to improve simulation-based education quality for nursing students, enhance their learning outcomes, and ensure long-term sustainability.

While the nursing literature has placed significant focus on students' satisfaction and self-confidence levels after simulation practice [10], it is essential to emphasize the value of nurse educators' training.

The response rate in this study was 90.6%. The respondents were aged 20-26. Ninety-two students were at level 8, representing 36.8 % of all respondents. Seventy-eight study respondents were at level 7 and 80 at level 6, representing 31.2% and 32%, respectively.

Participants' responses to the Self-Confidence questionnaire are presented in Table 1 in descending order of the mean. The responses to the Self-Confidence questionnaire were convergent, indicating that the simulation experience resulted in a high level of self-confidence among the participants. Most students agreed with the statements, with a mean score of 3.08 ± 0.32 out of 4. The majority of the students were confident that they could accomplish their learning objectives, had mastery of the simulation activity presented to them by their instructors, and were confident in developing a nursing care plan suitable for individuals with abnormalities.

Table 1. The responses to the Self-Confidence questionnaire items

Self-Confidence items	Mean	Standard deviation
I am certain that I can accomplish my intended learning goals	3.23	0.50
I am confident that I am mastering the content of the simulation activity that my instructors presented to me	3.21	0.51
I am confident that I can develop appropriate nursing care plan for individuals with any abnormalities	3.21	0.57
I am confident that I am obtaining the required knowledge from simulation to perform necessary tasks in a clinical practice	3.15	0.64
I am confident that I can recognize signs and symptoms of diseases	3.15	0.50
I am confident that I am developing the required skills from simulation to perform necessary tasks in clinical practice	3.11	0.61
I am confident that I can always manage to solve difficult problems if I try hard enough	3.08	0.66
I am confident that I can evaluate the effectiveness of my interventions for an individual with any abnormalities	3.06	0.62
I am confident that I can accurately assess an individual with any abnormalities	3.03	0.60
I am confident that I can appropriately intervene to meet the need of an individual with any abnormalities	3.02	0.52
I am confident that the simulation covered critical content necessary for the mastery of the curriculum	2.98	0.62

Continued on next page

Table 1 continued		
I am confident that I can deal efficiently with unexpected events	2.92	0.62
I can handle whatever comes my way in clinical practice	2.91	0.67
Total	3.08	0.32

Table 2. Responses to the Satisfaction questionnaire items

Satisfaction items	Mean	Standard deviation
The teaching materials used in this simulation were motivating me to learn	3.25	0.66
The teaching methods used in simulation were helpful	3.18	0.68
Clinical instructors/faculties demonstrate a high level of knowledge and clinical expertise	3.18	0.60
The teaching methods used in simulation were effective	3.18	0.64
The way my instructors/faculties conducted the simulation was suitable to the way I learn	3.15	0.61
Clinical instructors/faculties give me clear ideas of what is expected from me during a clinical rotation	3.13	0.66
Clinical instructors/faculties view my mistakes as part of my learning	3.13	0.65
Clinical instructors/faculties are open to discussions and different opinions	3.11	0.61
Clinical instructors/faculties provided feedback at appropriate times.	3.11	0.64
Clinical instructors/faculties assign me to cases/scenarios that are appropriate for my level of competence	3.09	0.62
The simulation provided me with a variety of learning materials and activities to promote my learning process	3.07	0.64
Clinical instructors/faculties facilitate my ability to critically assess my client's needs	3.05	0.61
Clinical instructors/faculties encourage me to link theory to practice	3.02	0.63
Instructors/faculties are consistent among different clinical practice and lab sessions	3.02	0.55
Clinical instructors/faculties give me sufficient guidance before I perform technical skills	3.01	0.63
Clinical instructors/faculties are making me feel comfortable about asking questions	2.99	0.69
Clinical instructors/faculties provide enough opportunities for independent practice in the lab and clinical sites	2.99	0.58
Faculty members behave professionally	2.97	0.67
Clinical instructors/faculties are available when needed	2.97	0.71
I enjoyed how my instructor/faculty conducted the simulation sessions	2.96	0.65
Clinical instructors/faculties are approachable	2.96	0.53
Clinical instructors/faculties give me verbal and written feedback concerning my simulation experience	2.93	0.80
Clinical instructors/faculties did not embarrass me in front of others	2.91	0.70
Total	3.06	0.41

In Table 2, respondents' responses to the Satisfaction questionnaire items are shown. The means are ranked from highest to lowest. The responses were convergent, indicating that most students agreed with the statements. The general mean was 3.06 ± 0.41 out of 4. The majority of students found the teaching materials used in this simulation to be motivating to learn, and the instructional methods used were helpful and practical. In addition, they noted that clinical instructors demonstrated a high level of clinical expertise and knowledge.

Based on Pearson's correlation, the study's results indicate that self-confidence is not correlated with either course type or academic level. In addition, there is no correlation between satisfaction and the type of course. It is, however, apparent that there is a significant correlation ($p < 0.05$) between satisfaction and academic level; the higher the academic level, the greater the satisfaction level (Table 3).

Although the simulation experience was challenging for many students initially, they gained valuable experience and became more confident and satisfied as it progressed. Simulation methods enhanced their knowledge and helped them develop appropriate care for patients.

Table 3. Correlation between satisfaction level and academic level

Test	Students' level
Pearson Correlation	0.20
Sig (2-tailed)	0.004

* Significance at p ≤0.05

The results of this study agree with those of other published studies. Several studies have shown simulation to increase nursing undergraduate students' satisfaction and confidence levels. A study comparing the impact of simulation modalities on the knowledge, skills, stress, satisfaction, and self-confidence of nursing students in three nursing schools with the same curricula found that most students were satisfied and felt confident about their experience, as evidenced by the mean scores for satisfaction and self-confidence[11].

Using simulation-based activities increased knowledge and skills and led to higher confidence in nursing students in a study conducted in Jordan[12]. In line with that, another study conducted in Jordan revealed that simulation enhanced nursing students' knowledge, self-confidence, satisfaction, and self-efficacy in care delivery[13]. In addition, a study conducted in Spain involving nursing students indicated that they were satisfied with the simulation experience and that their learning process and acquisition of nursing competencies improved as a result[14]. Moreover, a study conducted on 150 nursing students from Arab American University indicated that they felt more satisfied after experiencing the simulation, and they were more confident about the situations they encountered after the simulation experience[15]. This finding is consistent with a study involving 71 nursing students from a South Korean university who reported high levels of satisfaction with the simulation experience[16].

Nurses need high self-confidence to perform effective interventions, be dynamic team members, and recognize patient deterioration events. A systematic review presented evidence regarding the efficacy of HFS in enhancing confidence among nursing students[7]. In a study conducted in Saudi Arabia, nursing students exposed to HFS gained significantly higher self-confidence and preparedness to handle patients[17]. Also, in a study done in 2021, nursing students who used HFS to perform skills reported that activities based on stimulation were meaningful and helpful in increasing their self-confidence[18]. Similarly, nursing students participated in an HFS experience to enhance their problem-solving abilities, and they displayed an improvement in their confidence levels following the completion of simulation exercises[19]. Further, a study examining nursing students' experience of simulation-based training concluded that implementing simulation-based training in the curriculum is vital for successful learning outcomes, as well as the transfer of knowledge to clinical practice[20].

According to the results of a quantitative, quasi-experimental quality improvement project, the simulated learning environment can improve nursing students' confidence[21] . The experience of other nursing students who participated in randomized experimental pre- and post-test research with HFS contributed to their knowledge, skills, and confidence[22].

Even though simulation is currently used in various ways in nursing education as a teaching modality, the findings of simulation studies remain variable. The current study's results were inconsistent with those of Costa et al., which used the same scale among Brazilian nursing students and showed no significant difference between intervention and control groups[8].

This study demonstrated that through HFS-based education by competent educators who have received prior training in HFS, students can be adequately prepared for a successful transition to the clinical setting. By participating in this type of education, students could clearly understand what was expected of them and how to achieve it. They also learned to recognize diseases and their symptoms and perform necessary tasks in the clinical setting. As a result, they gained knowledge and confidence.

Several demographic factors contribute to satisfaction and self-confidence outcomes in nursing education simulation. According to the results of this study, no correlation was found between self-confidence and course type or academic level, and between satisfaction and course type were found. However, satisfaction is statistically correlated with academic level among study respondents, with higher academic levels resulting in higher satisfaction. This finding was supported by a study that found that there is a statistically significant correlation between the level of education and the satisfaction of students with their learning[23].

This study has the limitation that it was conducted at one university, which limits the generalizability of its findings.

4 Conclusion

This study examines the role of HFS in nursing education in Saudi Arabia, focusing on undergraduate nursing students. The study concludes that simulation is an effective teaching method and an innovative pedagogical approach that undergraduate nursing students positively perceive in Saudi Arabia. Simulation enhances student satisfaction with learning and increases their self-confidence.

The study found that the highly immersive nature of HFS simulations enables students to apply theoretical knowledge in practical scenarios, leading to a more effective learning experience that equips them with the necessary skills for practical application in a clinical setting. It is beneficial to provide continuous professional development opportunities for nursing educators to enhance their skills in using HFS effectively in teaching and assessment. Educators can maximize the benefits of simulation-based learning and ensure high-quality education for students by providing them with the necessary knowledge and resources and periodically evaluating simulation practice while making improvement plans. Further research could investigate the long-term impact of HFS-based learning on student's clinical competence and patient outcomes. This will provide valuable evidence to support integrating simulation technologies into nursing curricula and promoting sustainability.

Additionally, investigating how cultural factors affect students' perception of HFS could help identify methods to encourage inclusivity and diversity in nursing education. Educators and policymakers can consider investing in the continued development and implementation of HFS to increase the overall quality of nursing education.

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