

Perspectives of Nursing Students toward High-Fidelity Simulation Learning During the COVID-19 Pandemic

Ghada Abu Shosha^a & *Mahmoud Al-Kalaldehy^b

a: Zarqa University, Jordan; b: The University of Jordan – Aqaba Campus, Jordan

Abstract

While evidence of the impact of simulation in nursing education is growing, the COVID-19 pandemic may raise other issues regarding the effectiveness of simulation in nursing education. To explore Jordanian nursing students' perspectives toward utilizing high-fidelity simulation (HFS) learning as an alternative to clinical bedside training during the COVID-19 pandemic. A qualitative descriptive study design utilizing direct focus group discussions was employed. Purposive sampling was used to recruit Thirty-five nursing students. Transcripts were thematically analysed using Marshall and Rossman's (1999) process. Two major themes emerged from data analysis as follows: "Restore a realistic training environment", and "high Proficiency with low self-confidence". Students revealed the implications of using HFS on their knowledge, practical skills, communication, and team working. A criticism of HFS was its inability to develop confidence gained while caring with real patients suffering from contagious diseases. Despite the perceived effectiveness of HFS in nursing education, it was viewed as ineffective for building the confidence required while dealing with patients who have contagious diseases in clinical settings.

Keywords: *contagious diseases; learning perception; nursing education; qualitative research; simulation*

Introduction

Since early 2020, COVID-19 has become a significant threat to public health due to its accelerated spread globally (WHO, 2020). It created extraordinary pressure and a highly demanding situation that negatively influenced the health sector (Abu Mansour & Abu Shosha, 2022). Jordan had one of the highest incidences and mortality rates of this disease throughout 2021, compared with other countries (WHO, 2021). Therefore, Jordan confronted several challenges to implement effective measures to manage the crisis (Alqutob et al., 2020). The National Centre for Security and Crisis Management (NCSCM) had been handling the most relevant policies and interventions to control the spread of the disease including vaccine protocols, obligatory personal protective measures,

*Corresponding Author: Mahmoud Al-Kalaldehy, Faculty of Nursing, The University of Jordan – Aqaba Campus, P. O. Box 110195-11110, Amman, Jordan. Email: m.kalaldehy@ju.edu.jo

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quarantine, and social distancing ([Abu Farha et al., 2021](#)). Schools and higher education institutions were shifted to online education. It was particularly difficult to make the decision of moving towards online education for faculties offering a bachelor in nursing degree, as a large part of the nursing curriculum relies on clinical training in hospitals and health centres ([Head et al., 2022](#)). However, during 2021, clinical and applied courses were allowed to resume their clinical training in university laboratories with the application of all infection preventive measures ([WHO, 2021](#)). In view of the fact that social distancing was obligatory during the COVID-19 pandemic, simulation-based learning was an appropriate pedagogical approach to clinical training for nursing students to practice and achieve the intended learning outcomes and competencies ([Alshutwi et al., 2022](#)). In Jordan, simulation as an educational approach increased markedly and most faculties of nursing have integrated simulation in clinical training courses ([Tawalbeh, 2020](#)).

Literature Review

Simulation-based learning provides students with the clinical experience in realistic situations without the risks associated with real human exposure ([Buckley & Gordon, 2011](#); [Weldon et al., 2019](#)). High-fidelity simulation (HFS) is recognized as one of the best supportive learning strategies within nursing education to enhance cognitive and psychometric skills ([Ayed & Khalaf, 2018](#); [Tawalbeh, 2020](#)). Carrero-Planells et al. (2021) asserted that HFS has satisfactory outcomes for nursing students. Evidence supports the effectiveness of HFS in nursing education and its impact on students' performance in various specialized courses such as health assessment ([Chan & Yuan, 2014](#)), fundamental nursing ([Carrero-Planells et al., 2021](#)), advanced cardiac life support ([Tawalbeh & Tubaishat, 2013](#)), and critical care nursing ([Tawalbeh, 2020](#)). In addition, HFS learning has shown significant improvement in nursing students' confidence, attitudes, critical thinking skills, and team working, not only in school clinical skills laboratories but also in real health care settings ([Ogilvie et al., 2011](#); [Akhu-Zaheya et al., 2012](#); [Silvia, 2013](#)). Shon and Moon (2021) analysed the effectiveness of integrated simulation education among nursing college students in Korea during the COVID-19 pandemic and found that it significantly influenced nursing students' clinical judgment and critical thinking. A mixed-methods study conducted by Carrero-Planells et al. (2021) revealed that HFS was a motivating educational method that facilitated the integration of nursing students' theoretical information into practical training, and helped them in facing their fears before starting practical training within hospitals. However, a number of studies have reported some disadvantages of HFS including anxiety ([McCaughey & Traynor, 2010](#)), inducing stress ([DeCarlo et al. 2008](#); [Wotton et al., 2010](#)), and lack of inter-personal interactions ([Pike & O'Donnell, 2010](#)). Therefore, exploring nursing students' perspectives toward integrating HFS learning within clinical courses during the COVID-19 pandemic was necessary to generate in-depth insights about the planning required for future education strategies. The aim of this study was therefore to explore Jordanian nursing students' perspectives toward utilizing a HFS learning approach as an alternative to training in clinical settings during the COVID-19 pandemic.

Theoretical Framework

This study adopted the "technological competency as caring in nursing theory" which was developed by Locsin (2005). This theory considers that technological competency and caring are co-existing components of harmonious connection within nursing practice. According to Locsin (2005), technological competency is the expression of caring in which technology assists knowing the person 'in the moment' ([Locsin, 2005, 2009](#)). Individuals were seen as human beings, who are whole and complete in this perspective. Technology made the patient closer to the nurse. Thus, nurses could embrace the complexity of patient's care when technology simplifies therapeutic protocols in a simple way. Therefore, nursing living experience can be illustrated and drawn from the facts that most of the patients' responses are anticipated ([Locsin, 2010](#)). This theory emphasizes that nurses utilize technological competency as a tool to provide care and to establish a

relationship between technology, caring, and nursing. Since nursing students' perspectives of the interaction between clinical training and simulation-based technology was approached in this study, this theoretical construct can be ascribed to this association.

Methodology

Study design

A qualitative descriptive study design was employed to explore Jordanian nursing students' perspectives toward integrating HFS learning in nursing education. Specifically, the study focused on the use of HFS in clinical courses which required clinical training in health care settings but switched to laboratory training due to the COVID-19 restrictions in the period between October 2020 and September 2021.

Sample and settings

Purposive sampling was used to recruit nursing students who received their clinical training through HFS learning and had never enrolled in any hospital-based training during the above period of the COVID-19 pandemic. The selected nursing school was affiliated to Zarqa University, Jordan. The school has HFS manikins such as "Lucina Childbirth Simulator"; "the Electronic Baby Simulator"; and "Apollo Adult Patient Simulator". These manikins are regularly used in adult health nursing courses and maternal and paediatric health nursing courses. At the beginning of each semester, workshops were conducted by simulation specialists at the Faculty of Nursing, to train faculty members in using HFS. Faculty members were also trained in how to construct different scenarios based on the course content. Between 15 and 20 students were involved in each HFS laboratory. Students were debriefed after each scenario by a trained faculty member utilizing a reflective thinking process. Students were eligible to participate if they had attended the complete HFS learning for at least one of the above clinical courses. Students who had participated in previous practical courses in health clinical settings or students who were workers in any health institutions (i.e., bridging students), were excluded from participation.

Ethical Consideration

Permission to conduct the study was obtained from the Zarqa University Institutional Review Board (IRB) committee. Informed consent was obtained from all participating students. An information pack including the purpose of the study, study design, and the nature of participation was provided to all participants. Anonymous and confidential participation was assured with participants having the right to decline to participate and to withdraw from the study at any stage. All participants were informed that participation was voluntary and that refusal to participate would not affect their evaluation. Participants were also asked to provide permission for interviews to be recorded electronically and for quotations from the interviews to be used in the study report. Finally, participants were informed that the primary researcher would request a second interview to check the accuracy of the interpretation of the findings.

Data collection

Data collection was conducted through semi-structured, focus group discussions (FGDs). FGDs are used to enhance the richness of the information associated with a specific phenomenon through inspiring thinking between participants (Mishra, 2016; Polit & Beck, 2017). Prior to FGDs, the researchers developed the interview agenda based on their knowledge and experience in HFS learning as well as peer-reviewed articles which investigated the phenomenon. Interview questions were reviewed by a panel of two experts in qualitative research who were selected based on their extensive experience in publishing qualitative research in international journals. The two experts provided feedback on the questions and included some recommendations. During FGDs, the first researcher (GAS) established a rapport with the participants to elicit deeper thoughts and attitudes

related to the application of HFS during the COVID-19 pandemic. Seven FGDs were conducted in a convenient place on the university campus in the students' native Arabic language. Each FGD lasted between 75 and 90 minutes. Participants were informed about potential contact from a second researcher, meaning that they may be contacted individually again to validate the study findings. Data collection was carried out between May and September 2021.

Data analysis

All tape-recorded transcripts were transcribed verbatim in Arabic and checked for accuracy by other researchers. These independent external researchers were experienced in qualitative nursing research and were selected according to their expertise in the academic field. Thereafter, transcripts were translated into English by the author GA and validated by a bilingual translator, who was a faculty member in nursing field. The process of thematic analysis developed by Marshall and Rossman (1999) was adopted to analyse the data. The process started with reading the transcript in a comprehensible pattern and searching for highlighted ideas related to students' perceptions towards HFS. The subsequent step included coding the highlighted ideas. During the coding process, the researchers each documented their thoughts and beliefs about the relationships between the codes by means of 'bracketing', as a way of minimizing the influence of these on the data interpretation (Marshall & Rossman, 1999). Codes were thereafter categorized into mutually exclusive categories and themes, which each held their own unique structure and meaning. Finally, the researchers discussed themes using excerpts obtained directly from participants during the FGDs (Marshall & Rossman, 1999).

Trustworthiness of the study findings

Multiple interventions were undertaken to enhance trustworthiness during the data collection and analysis processes. These included: 1) cross-checking of codes and themes for accuracy by an external auditor; 2) ensuring participants provided 'rich' descriptions during FGDs, through careful facilitation and offering sufficient time; and, 3) member checking with all participants through individual face-to-face meetings to confirm the accuracy of the emerging findings.

Findings

Thirty-five students participated in the study and attended seven focus groups of between 4 and 6 participants. Of them, 21 were females and 14 were male students. Students' ages ranged from 18.5 and 21.5 years old at average of 19.5 years old.

Thematic analysis findings

Two major themes emerged from the data analysis: 1) Restore a realistic training environment; and, 2) High proficiency with low self-confidence.

Theme 1: Restore a realistic training environment

This theme demonstrated the students' perspective toward the efficiency of HFS, which provided them with an outstanding opportunity to simulate the reality of clinical training during the exceptional COVID-19 teaching conditions. Students valued the HFS properties that offered the exposure of various aspects of patient care. In particular, they described the interaction between learner and simulation as a liveable experience that could substitute the real bedside clinical training.

Students asserted that HFS allowed them to deal with different conditions including acute, emergency, and life-threatening conditions. They claimed that HFS learning strategy helped them to organize thinking and enhance readability for real nursing working environment. The following two excerpts demonstrate students' opinions: "HFS is really helpful, we learn much from different

scenarios that represent patient's status...When I learn in the simulation lab, I feel like being in the hospital. It's greatly similar to hospital" (Participant 5), plus, "It's amazing to do everything that you want and learn the assessment and diagnostic procedures ...we have plenty of time to think before initiating any intervention or taking decisions regarding patient's care, so organizing thinking is inevitable" (Participant 9).

Students regarded the importance of HFS in terms of retaining knowledge which were taught in the theoretical classes. Thus, HFS contributed to shrinking the gap between theory and practice as the following students shared,

When we are being taught the theoretical part in the class we can understand the lecture, but when we try reflecting that in the scenarios using the HFS, these concepts become much clearer and retainable in our mind leading to proper connection between theory and practice. (Participant 11)

Indeed, when we are working with HFS, the simulator provides a real patient's experience ...every time when the teacher discusses with us the case scenarios, the simulator gives us the opportunity to apply the relevant practices virtually using different simulated features. (Participant 20)

In relation to team working, students stated that HFS improved their ability to communicate and work effectively in teams. Due to its multifaceted features, HFS facilitated managing roles, in which each contributor was assigned a specific role in the team. One student stated,

When using HFS, every student can be enrolled in a certain role, which allows him/her to express thoughts and ideas; we also can communicate together and learn from each other when HFS enables us to share the caring experience within the scenario. It's a really useful experience. (Participant 31)

Evidently, students showed satisfaction with the transition from using the traditional teaching method to HFS learning during the COVID-19 pandemic. They expressed their motivation for learning using HFS which mimicked a real human response, as one student shared, "Indeed, it is a wonderful educational experience that mimics most human behaviour... This transition from traditional education to more innovative methods encourages us to learn and think critically and avoid missing out on teaching due to the COVID-19 pandemic" (Participant 19).

In conclusion, this theme emphasized nursing students' positive feedback from receiving education through HFS learning during the COVID-19 pandemic. Students appreciated using HFS to replace real training environment provided in health care settings. They discovered the importance of being able to empower their knowledge, skills, communication, and team working through utilizing HFS.

Theme 2: "High Proficiency with low self-confidence"

Students declared that despite the numerous benefits of received knowledge during training through HFS, an essential aspect of proficiency was missed. This was noticeably represented by low self-confidence. Specifically, during the COVID-19 pandemic, students suggested that experience gained from direct contact with contagious patients could not be replaced by HFS. It was indicated that HFS does not extensively depict the real caring environment, especially with these associated with infected patients and thus, some practices such as infection prevention measures, and the use of personal protective equipment are inaccessible. Some students showed disappointment for these missing practices as the following two students said, "We have never been confronted with infectious patients; we are in a real pandemic; it is a global crisis...we are enthused to see how to deal proficiently with these cases including all risk minimizing measures" (Participant 28), and "I'm so excited to see how nurses work with COVID-19 patients, and how to

manage the risk of infection spread...it's a special consideration which is unfortunately lacking with HSF" (Participant 16).

Some students expressed the need for additional training alongside HFS to enhance their ability to deal with infectious patients, as indicated by one student, "Since we do not have training in the hospitals to deal with real patients with COVID-19, we would need special training focusing on COVID-19 management to be confident when dealing with such patients in the future" (Participant 15).

However, students recognized that receiving training using HFS provided a safer learning environment, with less exposure to the risk of contamination. It was emphasised that while mistakes may be made by students on simulators, these are not permissible when working with humans. The following quotes highlight students' attitudes towards these risks: "Of course, we prefer clinical training in hospitals, but during the COVID-19 pandemic and its outbreak, it was better for us to get training in the university labs using HFS to reduce the risk of getting infection" (Participant 12), and, "We must always remember that training in the university labs may be associated with some errors, but these are not allowed on humans" (Participant 27).

This theme discussed students' awareness of the necessity for developing self-confidence while receiving their training using HFS. Despite the absence of risks compared to when working with patients, students felt that HFS did not build the required level of confidence to deal with infectious patients similar to those with COVID-19. As students claimed, this aspect of care is less likely to be supported by HFS learning.

Discussion

Employing HFS learning is one of the evolving strategies for nursing education, especially for the COVID-19 pandemic. This study aimed to explore Jordanian nursing students' perspectives toward using the HFS learning approach as an alternative learning strategy for clinical training during the COVID-19 pandemic.

The study uncovered two main themes: 1) Restore a realistic training environment; and, 2) High proficiency with low self-confidence. Students in this study commended HFS for its effectiveness in providing an analogous experience of real bedside care for various health conditions including acute and life-threatening conditions. Their description of HFS as a learning experience was based on its multifaceted features which aligned closely to the real nursing interventions. A study by Au et al. (2016) revealed that more than 70% of nursing students appreciated the use of HFS in nursing education and had positive feelings toward using its activities. This study supported the impact of HFS on promoting critical thinking and prioritizing care. Congruently, Ayed and Khalaf (2018) affirmed the value of integrating HFS in nursing education to offer a variety of learning experiences, encourage decision-making, and increase satisfaction and confidence. Kaddoura et al. (2015) and Fawaz and Hamdan-Mansour (2016) found that nursing students display substantial improvement in their clinical judgment, critical thinking, and motivation to care when being trained with HFS.

Students in the current study declared the ability of HFS to bridge the gap between theoretical knowledge and clinical practice. A Chinese study conducted by Yuan et al. (2014) found that HFS offered a convenient learning environment that facilitates the transformation of theory into skills thus developing clinical reasoning and critical thinking skills. Another study by Konieczny (2017) found that HFS is not only effective for advanced nursing practices but also for basic nursing skills such as medication administration and other nursing procedures. Pol-Castañeda et al. (2020) affirmed that simulation is an effective educational resource in the nursing curriculum to improve patient safety as the findings of their study showed significant improvement in medication administration skills among nursing students.

Establishing effective communication and team working are other key advantages of HFS revealed by nursing students in the current study. This advantage was reported by Garbee et al. (2013) who found that HFS improves teamwork and communication skills between nursing students and other healthcare professionals. Additionally, the effective interaction between students which is facilitated by HFS can provide motivation for learning among nursing students. This productive feature adds additional strength to the learning process and helps to replace deficiencies in practice which is associated with the lack of conventional training (Nimbalkar et al., 2015; Tawalbeh, 2020).

Students exhibited due recognition for the role of HFS in avoiding unacceptable mistakes towards humans in clinical settings. Man (2017) emphasized the benefit of students' engagement with HFS before actual clinical placements, enhanced competence and safety, and decreased hesitation. Likewise, Au et al., (2016) found that 85% of nursing students perceived HFS as an accessible way for acquiring knowledge and skills.

Despite the advantages attributed to HFS, a missing feature was its inability to build true confidence for dealing with real patients. Students clarified that committing mistakes using HFS was associated with less stress and tension and removed the risk of cross-contamination. However, HSF impacted on their ability to deal with contagious patients with confidence in the future. Evidence has shown that emulating the exact clinical environment found in real clinical practice is not greatly achievable through HFS (Hurst, 2015; Man, 2017). Accordingly, an extended training supplement on infection prevention measures is recommended along with HFS learning (Brandão et al., 2021).

With respect to the "technological competency as caring in nursing theory", the study embodied the efficiency of using technologies in nursing education that provide the optimal virtual learning experiences required for competent and safe practice. This concept integrates the human experience while interacting with technology. Students appreciated the efficiency of using modern educational technologies as alternative sources of learning. They also found that the benefits of HFS were multiple especially during the COVID-19 pandemic.

In conclusion, HFS is a recommended teaching method to substitute nursing students' clinical training in exceptional situations where field visits are prohibited. To achieve optimal learning outcomes, nursing educators should integrate additional elements that assess and promote students' self-confidence in working with infection-related risks in highly contagious patients. Future studies are encouraged to investigate differences in students' perspectives between HFS learners and actual clinical trainees with respect to the attainment of self-confidence and clinical competencies.

Implications for an International Audience

Although simulation-based learning is a widely accepted educational strategy in the nursing field, its impact on nursing students during the extraordinary conditions associated with the COVID-19 restrictions was unveiled in this study. Students who were enrolled in the specialized practical nursing courses during the time of this study provided positive feedback from their experiences of HFS learning. However, despite this concrete impact, students postulated that HFS limited the development of self-confidence especially for dealing with contagious patients. Therefore, HFS learning should not be promoted as an alternative teaching approach when considering how to build self-confidence.

Conclusion

Based on the perspectives of nursing students, this study supports the significance of integrating HFS in nursing education. Students displayed various attitudes towards using HFS learning when the need for replacing clinical training was imminent due to the restrictions associated with the

COVID-19 pandemic. Students perceived HFS as a facilitator for improving clinical skills, retaining knowledge, improving team working and interpersonal communication. However, on the contrary, HFS was found to be insufficient in reinforcing students' self-confidence to deal with infectious patients. Students believed that applying precautionary measures was not required when using HFS, but the opposite applied to direct patient contact. For that reason, nursing educators should consider multidimensional caring aspects when simulating case scenarios using HFS including infection control components.

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ORCID

Ghada Abu Shosha <https://orcid.org/0000-0003-3280-2334>

Mahmoud Al-Kalaldeh <https://orcid.org/0000-0002-2789-8733>

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