NURSING EDUCATION: AN ANALYSIS OF THE EFFICACY OF SIMULATION-BASED TRAINING

Mubarak Nasser Mansour Aldosari[1]*, Abdullah Abdulrahman Alzaid[1], Saad Mohammed Alhargan[1], Fisal Fahad Almalhan[1], Hind Ali Alsuwais[1], Sahar Meraya Alameer[1], Abdulrahman Raja Greeb Alharbi[1], Faleh Nasser Alsubaie[1], Abdulrahman Abdullah Saif Alsahli[1], Ahood Mtalag Al Otaibi[1], Fatimah Othman Alfoti[1], Mubarak Nasser Mansour Aldosari[1],

Abstract

The primary aim of this study was to assess the effectiveness of simulation-based training specifically within the domain of nursing education. By conducting an exhaustive search of electronic databases, pertinent research was identified in the form of a systematic literature review. The researchers employed inclusion criteria to ascertain studies that investigated the effects of simulation-based training on a variety of outcomes in nursing education. Both quantitative and qualitative investigations were incorporated in the review. On the basis of the retrieved data, a thematic analysis was performed to identify recurring themes and patterns concerning the effectiveness of simulation-based training. The quality of the studies included in the list was evaluated utilizing appropriate methodologies. The findings of the review emphasized the benefits that can be obtained by integrating simulation-based training into nursing programs: improved acquisition of knowledge, enhanced competence, and increased self-confidence. However, challenges including financial ramifications, the need for adequate personnel training, and concerns from students were also acknowledged. Further investigation and consensus among nursing specialists are imperative to establish a comprehensive corpus of data regarding the effectiveness of simulation-based training, as demonstrated by the research. The findings of this study contribute to the existing body of knowledge regarding the impact of simulation-based training on nursing education and offer recommendations for its improvement and integration.

Keywords: nursing education, simulation-based training, effectiveness, skill development, Literature review.

*Kingdom Of Saudi Arabia, Ministry Of Health

***Corresponding Author:** Mubarak Nasser Mansour Aldosari
*Kingdom Of Saudi Arabia, Ministry Of Health

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1. Introduction

Simulation is an interactive pedagogical method that employs a wide range of resources in order to simulate real-world situations [1]. Moreover, it affords students the chance to refine their skills, participate in medical reasoning, and formulate well-informed assessments regarding patient care within a safe environment [2]. Moreover, it is highly suitable for imparting self-reflection skills and supervising individuals during a critical situation.

Bland et al. [3] presented an exhaustive synopsis of the attributes that define simulation as an instructional methodology. The researchers identified several fundamental components that comprise simulation. These include the development of a fictitious scenario, the implementation of authentic representation, active participation, integration, repetition, evaluation, and introspection. As a result, it promotes active learning, stimulates innovative thinking, and develops advanced problem-solving abilities, potentially nurturing students' self-reliance. However, there are also disadvantages associated with simulation, including its high cost, the need for staff development to impact performance, the constrained time available for faculty training, and the potential for inaccurate transfer due to improper simulator adjustments [4].

It is imperative to reaffirm the need to improve students' psychological preparedness, as the majority of simulation activities have the potential to elicit feelings of apprehension and frustration. The current emphasis on simulation-based training is motivated by several factors, such as the growing demand for advanced skills, the patient bill of writing, and the transition from passive to active learning in instructional methodologies. Furthermore, the current instructional paradigms have been influenced by a professional obligation to guarantee patient safety, difficulties in securing clinical sites, and the heightened demand for clinical practice of the highest caliber. Within the domain of nursing, there is an impressive scarcity of rigorous research that employs a meticulously structured methodology to provide dependable data on the effects of simulation [5,6]. This underscores the necessity for further investigation and alignment of opinion among nursing experts regarding the subject.

The individual studies recorded both positive and negative results pertaining to instruction based on simulation. The practical implementation of high frequency (HF) modeling in the medical field has been hindered by criticism stemming from its potential to foster excessive confidence among students [7]. On the contrary, nursing research has also demonstrated that simulation has no discernible effect on knowledge, skill, or self-assurance [8].

As a result, the primary aim of this study was to rectify this discrepancy through the compilation of comprehensive data regarding the effects of simulation-based instruction on nursing students' skill proficiency [9]. Moreover, this study investigates the proficiency of professional nurse practitioners and students as a reference group to identify possible discrepancies. Simulation provides a multitude of advantages and consequences for both students and the healthcare industry as a whole. According to research, simulation enhanced the student's understanding, competence, and confidence in providing authentic patient-centered care [10,11].

2. Research Methodology

The study utilized a literature review methodology to analyze the use of simulation-based training in nursing education. It analyzed existing literature using electronic databases like PubMed, CINAHL, and Scopus, focusing on keywords like "simulation-based training," "nursing education," and "effectiveness." The investigation was conducted from the databases' establishment to the current time, and a manual review of relevant scholarly publications and reference lists was conducted to ensure all relevant material was included.

3. Teaching and Learning Approaches

The evaluation of various pedagogical approaches and their effects encompassed the assessment of competencies and expertise. The examination outcomes unveiled recurring trends that emerged as a result of the effectiveness of simulation-based learning. The concepts of expertise and abilities are intrinsically linked in the context of resolving matters pertaining to achievement. Nurse educators frequently place emphasis on the concurrent growth of knowledge and abilities, all the while preserving a perspective consistent with traditional academic establishments. This assessment evaluates competencies and knowledge through the utilization of various technologies.

A previous study demonstrated that students who were exposed to LBL demonstrated improvement in simulation-based learning when compared to the control group [12]. The assessment of simulation-based learning offers empirical evidence that simulations are effective in creating an educational environment that promotes the gain of knowledge, development of abilities, assurance, and safety. An instructional tool that facilitates the

distribution of knowledge regarding fall monitoring was developed by Kim [13] and received approval from Shin et al. [14]. The results of implementing simulation-based instruction demonstrated notable effects, which varied in magnitude from moderate to substantial. These findings could offer valuable insights to nurse educators regarding situations in which patient simulation is more effective than traditional learning methods.

Attitude comprises an individual's feelings or perspectives regarding a particular subject, including nonverbal signals of pride. Nursing students participated actively in a number of simulation-based learning activities and expressed their own opinions and perspectives regarding the simulation-based learning curriculum. A Situation-Background-Assessment-Recommendation (SBAR) fall modeling system was developed in a previous study for third-year nursing students in the SBAR group (n = 26) [15]. The study employed a randomized random pretest post-test design. The control group comprised twenty-eight individuals who were subjected to the fall simulation software through a premeditated three-stage scenario development procedure. The results of the study indicated that the SBAR group exhibited improvements across all variables when compared to the placebo group.

4. The efficacy of Self-Realization

Self-related assessments, such as confidence, self-directed education, and self-evaluation, were incorporated in seven studies both before and after simulation-based learning experiences [16-18]. In comparison to the pre-scenario self-evaluation, the post-scenario self-evaluation revealed a higher level of proficiency ($p < 0.001$). Further factors that were assessed included self-confidence and satisfaction with oneself [19,20].

Self-directed learning comprises the entirety of the learner's involvement, including conception, planning, execution, and evaluation of a learning endeavor. Ko and Kim [12] divided senior nursing students into two groups for their study. One group (n = 86) was assigned to receive collaborative learning through simulation-based instruction, while the other group (n = 98) received simulation-based learning. The evaluation of the efficacy of the simulation scenario was carried out utilizing the Personal Readiness Assessments Test (IRAT) and the Group Preparedness Assessment Test (GRAT). The improvement was greater in the group that received SBE + LBL than in the group that received SBE alone.

Self-efficacy refers to an individual's degree of assurance in their ability to regulate their own motivation, behavior, and social environment. In their study, Mohamed and Fashafsheh [16] assessed the self-efficacy and interpersonal skills of one hundred fourth- and third-grade nursing students through the use of simulated instruction incorporating low-fidelity and high-fidelity models. The evaluation was predicated on the proficiency of the pupils. A statistically significant development in the self-efficacy and communication abilities of every participant was observed in the study ($p < 0.001$). The results of the study conducted by Karabacak et al. [17] revealed a statistically significant enhancement in self-efficacy ($p < 0.05$) subsequent to the implementation of simulation-based skills instruction.

Self-confidence pertains to an individual's conviction in their own abilities, qualities, and capacity to make sound judgments. The focus of a study conducted by Ha utilizing the Q-methodology was the encounters of nursing students who participated in simulation-based learning at nursing facilities and were exposed to routine patient care. Included in the investigation were 47 fourth-grade nursing students. The research discovered that the integration of SPs resulted in favorable outcomes for the nursing students' self-assurance and proficiency. As an illustration of the efficacy of simulation-based learning, this proved to be extremely advantageous for patient care. Self-confidence was also found to be positively influenced by nursing students' perceptions of the use of simulation-based branching path simulators (BPS), according to Masha'al [19]. In addition, Demirtas et al. [20] provided evidence that a subset of 89 fourth-grade nursing students who participated in a cardiac resuscitation (CPR) program that utilized simulation-based learning experienced a significant boost in their confidence regarding the ability to handle emergency situations effectively following the completion of the curriculum.

Self-evaluation refers to an individual assessment performed with the intention of identifying areas that could be improved or utilized to achieve specific predetermined goals [21]. Simulation-based learning approaches have been investigated as a potential tool for outcome parameter self-assessment in educational interventions [22]. Haukedal et al. [23] divided second-grade nursing students into two cohorts for the purpose of a pilot study. The control group comprised 69 students, while the intervention group comprised 68 students. The focal point of the scenario was the

application of simulation-based learning to the First2Act Model, incorporating a patient whose condition was deteriorating. The results of the research suggested that the study participants demonstrated a considerable degree of competence in conceptual comprehension and a strong degree of confidence in implementing the intervention. A significant difference in competence was observed between the self-evaluation performed after the scenario and the pre-situation assessment ($p < 0.001$). Moreover, studies employing simulation-based evaluation have demonstrated more substantial impact sizes in comparison to research employing self-assessment, grades, or assessments for evaluation. Simulation-based learning has been shown to improve performance on assessments of expertise and aptitude [24,25].

5. Proficiency, Effective Communication, and Self-Assurance

Effective communication is essential for promoting high-quality nursing care as it significantly improves an individual's performance in interactions. To assess communication capabilities, it is critical to employ a wide variety of methodologies. Ko and Kim [12] conducted a study to assess the communication proficiencies of nursing students through the implementation of a six-week intervention that utilized simulation-based learning and comprised three sessions. The participants in this research were senior nurses who fulfilled the necessary qualifications to deliver direct treatment to clients in a clinical environment. The trial evaluation of interpersonal skills in this study incorporated both the GRAT and IRAT instruments. In contrast to the control group, the participants of the SBE program who received team-based education demonstrated superior communication abilities, according to the findings.

An investigation was conducted by Choi et al. [18] into the application of computer simulation education to a sample of 135 nursing students through the use of classroom-centered interactive communication. The education program was delivered to the educating group via the compEd software, whereas the control group was provided with a desktop or tablet PC. The educational group exhibited a more pronounced increase in interpersonal interaction in comparison to the control group.

Both competence and assurance are dependent on the attainment of an adequate amount of knowledge or skills in a specific field of expertise. The proficiency of nursing students in simulation-based learning was assessed in multiple papers through an examination of the theory and practice of nursing specializations. Karabacak et al. [17] discovered that the correlation between competence and confidence among first-year nursing students was more pronounced in simulation-based skills instruction as opposed to pre-simulation training. An additional investigation focused on the Q-approach to standard patient care and produced comparable results, indicating that nursing students exhibited improved proficiency [26]. Hung et al. [27] discovered that the test group exhibited a greater perception of competence in simulation-based hospital instruction for adults when compared to the control group. Simulation has demonstrated itself to be an exceptional method for evaluating proficiency, leading to improvements in self-efficacy, collaborative aptitude, and overall competence within healthcare environments.

6. Discussion

Organizations employ the simulation methodology to predict, assess, and improve the results of their decisions and operations procedures, while circumventing the costs and uncertainties associated with modifying and implementing new processes. Therefore, the principal aim of this study was to investigate the benefits associated with the implementation of simulation-based training in emergency departments of hospitals. The results suggest that emergency department overcrowding is a global issue that has become more challenging to address due to the continuous increase in patient demands, the increasing complexity of situations, and the limited resources available in healthcare facilities. It is impossible to overstate the significance of addressing this matter, as it could cause delays in the provision of critical medical services to patients, which would lead to a variety of adverse consequences [28].

Extensive use is made of research methodologies in the field of operations to investigate and improve the efficacy of emergency department operations in order to address this issue [29]. Personnel in the emergency department are the initial responders to patients in their ordinary and natural conditions. However, their responsibilities are significantly magnified during hospital emergencies. Hence, it is imperative that individuals possess the requisite proficiencies, efficacy, and authentic aptitudes to successfully preserve human lives and augment their holistic welfare [29]. In October 2016, Noh et al. [30] conducted research with the objective of developing and evaluating a simulation-based educational course utilizing multiple modalities. The course's purpose was to improve the response capabilities of medical department personnel in

hospitals. There were a total of forty participants in the investigation. The results of the study indicate that it is critical to develop a training program for hospital emergency department personnel that incorporates multimode simulation techniques. The primary objective of this program should be to significantly improve the disaster response capabilities of every participant [31].

At present, simulation-based research is receiving considerable attention due to its applicability in determining critical decisions regarding patient transportation within the emergency department. Due to the lack of practical assessment instruments, the scope of training and instruction was constrained, according to the findings of the study. The educational platform provided by the virtual domain augments the expertise, aptitudes, and knowledge of healthcare personnel [32]. Improving nursing competencies, such as time management, contributes to the delivery of care of superior quality [33].

Undertaking a descriptive cross-sectional investigation, Jeong et al. [34] intended to develop a computerized simulation-based training program for hospital-based nurses. The principal objective of this program was to enhance the competencies of nurses in order to enable them to respond to catastrophes more efficiently. The Pearson correlation coefficient was utilized in the present study to analyze the data collected from emergency department nurses. The following competencies in the field of institutional nursing were identified through the evaluation of requirements using an altered Delphi method: triage, emergency management, medical center capacity administration during incidents, and preservation strategies in specific circumstances. Each ability was adjusted to correspond with appropriate simulation methods.

The assessment of the program revealed that nurses exhibited improved understanding, crisis management, problem-solving, and technical skills, in addition to an elevated level of proficiency in responding to catastrophes. The software developed in the course of this research possesses the capacity to function as a pivotal tool in subsequent inquiries concerning the development of curricula [31]. The research findings suggest that historically, rescue services have been entrusted with the duty of supervising the initial response and improving their operational capacities. To guarantee that healthcare personnel can deliver an effective and expedient response, training is essential. Assessing the effectiveness of this instruction is exceedingly complex due to the fact that genuine proficiency can solely be demonstrated when an imperative patient is present.

The implementation of computer simulation-based training provides nurses with the opportunity to augment their managerial competencies and cultivate an overall sense of assurance [35]. Various strategies are implemented within the emergency department to optimize the standard and efficiency of patient care, as well as the overall continuity of medical services. The utilization of computer simulations to optimize operations and improve healthcare decision-making is increasing [36]. Furthermore, research has established that the implementation of simulation-based training could potentially improve the quality of medical services by providing a framework for simulating supplementary hospital procedures; thus, this could have an effect on the manner in which services are provided to patients [37].

A study conducted by Jeong et al. [34] in 2020 examined the competencies and expertise of 234 nurse practitioners who were part of a cohort working in a publicly funded hospital situated in Korea. The evaluation of nurses' comprehension of emergency protocols was carried out through the assessment of their ability to recognize and place confidence in eight disaster laws. Furthermore, the assessment of nursing proficiency was conducted utilizing the Disaster Nursing Emergency Response Competency Scale. The results revealed a significant positive correlation between clinical nurses' self-assurance and nursing proficiency in the face of catastrophes and their capacity to recognize crises. Following this, further investigation ought to concentrate on devising strategies to augment the awareness and confidence of nurses in times of chaos. Furthermore, it is imperative to prioritize the provision of supplementary training opportunities pertaining to both natural and human-induced catastrophes within the domain of nursing management. This would augment the self-confidence and proficiency of nurses [38].

Additionally, this study demonstrated that the effectiveness of training and practical approaches to enhancing the skills of emergency department personnel in a simulated environment is dependent on their level of self-assurance and practical expertise. Rivera et al. [37] undertook an assessment and comparison of the effectiveness of two emergency preparedness training initiatives. The aforementioned interventions were executed through the integration of traditional training methods alongside training based on simulations. The researchers reached the conclusion that by integrating simulation-based instruction into

disaster preparedness curricula, hospital emergency personnel's knowledge and responsibilities could be significantly improved.

A qualitative cross-sectional study was undertaken by Nejadshafiee et al. [38], wherein a sample of 142 emergency division personnel at hospitals was surveyed. The results of the research suggested that by incorporating strategies such as continuous virtual activities and educational programs, it is possible to significantly improve the fundamental skills and knowledge of the personnel.

7. Conclusion

In brief, simulation-based training has demonstrated its effectiveness as an instructional approach in the field of nursing education. It offers numerous benefits to students and the healthcare sector as a collective entity. Simulation provides a safe and controlled environment for learners to engage in the improvement and hone of their skills, cultivate their capacity for critical analysis, and arrive at informed decisions regarding the care of patients. It fosters the development of critical thinking skills, innovative problem-solving capabilities, and dynamic learning, all of which are essential for independent nursing practice.

By adhering to these recommendations, nursing education programs could potentially improve their utilization of simulation-based training. Consequently, this would furnish nurses with the essential competencies and confidence required to effectively navigate the intricacies of modern healthcare practice.

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