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## **The effectiveness of simulation-based training in general health practitioner education**

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**Abstract**--The objective of this research was to examine the efficacy of simulation-based training in the field of nursing education. A thorough search of electronic databases was done to identify relevant research using a systematic literature review. The researchers used inclusion criteria to identify studies that specifically examined the effects of simulation-based training in nursing education on a range of outcomes. The review included both quantitative and qualitative investigations. Thematic analysis was conducted on the retrieved data in order to uncover prevalent patterns and topics pertaining to the efficacy of simulation-based training. The assessment of the listed studies' quality was conducted using suitable methodologies. The review's results underscored the advantages of incorporating simulation-based training into nursing school, including enhanced information acquisition, competence enhancement, and increase in self-assurance. Nevertheless, obstacles such as financial implications, personnel training, and student apprehension were also recognized. The research underscores the need for more investigation and agreement among nursing experts in order to develop a robust body of data about the efficacy of simulation-based training. The results of this research enhance comprehension of the influence of simulation-based training in the field of nursing education and provide suggestions for its integration and enhancement.

**Keywords**---nursing education, simulation-based training, effectiveness, skill development, literature review.

## 1. Introduction

Simulation is a dynamic learning approach that utilizes diverse resources to replicate real-life scenarios.(1) Furthermore, it provides trainees with the opportunity to hone their abilities, engage in medical reasoning, and come to informed judgments on patient care inside a secure setting.(2) Additionally, it is

well-suited for instructing introspective abilities and overseeing patients throughout a critical circumstance. Bland et al (3) provided a comprehensive overview of the characteristics of simulation as a pedagogical approach. They identified many key elements that constitute simulation, including the creation of a hypothetical scenario, the use of genuine representation, active engagement, integration, repetition, assessment, and reflection. Consequently, it fosters active learning, innovative thinking, and advanced problem-solving skills, which may cultivate students' capacity to work independently.

However, simulation also has drawbacks like its expensive nature, the requirement for staff development to influence performance, limited time for faculty training, and the possibility of erroneous transfer owing to incorrect simulator adjustments.(4) Once again, it is necessary to enhance the psychological readiness of students, since the majority of simulation activities tend to induce anxiety and frustration in them.(5)

The present focus on simulation-based training is driven by many factors, including the patient bill of writing, the increasing need for high proficiency, and the shift from passive to active learning in teaching approaches. In addition, the present patterns of teaching have been affected by a professional responsibility to ensure patient safety, challenges in locating clinical venues, and the increased need for high-quality clinical practice. In the field of nursing, there exists a dearth of rigorous research that can offer robust data on the impact of simulation using a meticulously structured methodology.(6) This highlights the need of conducting more inquiries and reaching an agreement on the matter among nursing specialists.

The individual studies documented both adverse and beneficial outcomes associated with simulation-based instruction. In the field of medical care, the utilization of high frequency (HF) modeling has been subject to criticism due to its potential to induce excessive confidence among students, so impeding their practical application.(7) Conversely, nursing research also indicated that simulation did not have any impact on knowledge, ability, and confidence.(8) Consequently, the objective of this research was to address this disparity by generating consolidated information about the impact of simulation-based instruction on skill proficiency within the nursing field. Furthermore, this research examines the students and professional nurse practitioners as a benchmark group in order to determine any potential disparities in skill performance. Simulation offers several benefits and impacts for both learners and the healthcare sector at large. Research indicated that simulation facilitated the student's acquisition of knowledge, proficiency, and self-assurance in real patient-centered care.(9-11)

## **2. Research Methodology**

The study used a literature review methodology to collect and examine pertinent research on the utilization of simulation-based training in the field of nursing education. This design facilitates a full analysis of the existing literature, so assuring a comprehensive comprehension of the subject matter.

### **2.1. Data Collection**

The procedure of data collecting included a methodical exploration of electronic databases, including PubMed, CINAHL, and Scopus, using pertinent keywords such as "simulation-based training," "nursing education," and "effectiveness." The investigation was carried out from the establishment of the databases to the current time. Furthermore, a comprehensive review of relevant scholarly publications and reference lists of selected research was conducted manually to guarantee the incorporation of all pertinent material.

### **2.2. Inclusion Criteria**

In order to guarantee the pertinence and excellence of the research included, precise criteria for inclusion were implemented. The following criteria were employed:

- To guarantee the quality and validity of the results, only papers published in credible peer-reviewed publications were taken into consideration.
- Studies published in English were based on the researchers' language competency.
- In order to get a thorough knowledge of the efficacy of simulation-based training in nursing education, a combination of quantitative and qualitative investigations was included into the study design. The methodologies used in this study included randomized controlled trials, quasi-experimental studies, cohort studies, case-control studies, qualitative interviews, and focus group discussions.
- The study included individuals who were nursing students, registered nurses, or nurse practitioners who were engaged in simulation-based training. Exclusions were made for studies involving healthcare practitioners or non-healthcare persons.
- The study includes research that used simulation-based training as a main educational intervention in the field of nursing education. The research included investigations that used high-fidelity simulators, virtual reality simulations, standardized patients, or computer-based simulations.

### **2.3. Exclusion Criteria**

In order to maintain the study's focus and relevance, certain exclusion criteria were implemented. The following criteria were employed:

- Studies those were not directly relevant to nursing education or simulation-based training.
- In order to assure the inclusion of peer-reviewed, evidence-based research, some sources such as grey literature, conference abstracts, editorials, and opinion pieces were removed.
- In order to uphold the rigor and trustworthiness of the results, studies that had inadequate sample sizes or insufficient data were eliminated.
- The process of extracting and analyzing data included using a standardized data extraction form for the chosen research.

### **2.4. Data Extraction and Analysis**

A standardized data extraction form was used to obtain data from the chosen studies. The data that was retrieved included many research parameters, such as the author, year, and country. Additionally, it contained participant profiles, intervention details, measured outcomes, and significant results. Thematic

analysis was used to examine the retrieved data and find prevalent themes and patterns pertaining to the efficacy of simulation-based training in the field of nursing education.

### **3. Teaching and Learning Techniques**

The assessment of different teaching and learning techniques and their impacts included the measurement of knowledge and skills. The review findings revealed recurring patterns generated from the efficiency of simulation-based learning. The notions of expertise and abilities are inherently interconnected when it comes to addressing accomplishment issues. Nurse educators often prioritize the simultaneous development of both knowledge and skills, while still maintaining a mindset that aligns with conventional educational institutions. This evaluation evaluates knowledge and abilities via the use of diverse technologies. In a prior investigation (12), it was shown that students exhibited enhancement in simulation-based learning when exposed to LBL in comparison to the control cohort. The evaluation of simulation-based learning provides empirical support for the efficacy of simulations in establishing an educational setting that fosters the acquisition of information, skills, safety, and self-assurance. A pedagogical instrument for disseminating information on fall monitoring was devised by Kim (13) and endorsed by Shin et al. (14). The use of simulation-based teaching revealed significant impacts, ranging from moderate to substantial, and may provide valuable guidance to nurse educators on the circumstances in which patient simulation proves more efficacious than conventional learning approaches.

### **4. Perception**

Attitude pertains to an individual's perspectives or emotions towards something, such as their display of pride or nonverbal cues. Nursing students actively engaged in several simulation-based learning events and articulated their own sentiments and viewpoints on the simulation-based learning curriculum. A prior investigation created a Situation-Background-Assessment-Recommendation (SBAR) fall modeling system for third-year nursing learners in the SBAR group (n = 26) utilizing a randomized random pretest post-test methodology (15). The control group consisted of 28 participants who were specifically exposed to the fall simulation software via a three-stage scenario preparation process. According to the research findings, the SBAR category shown enhancements in all variables in comparison to the placebo category.

### **5. The efficacy of Self-Realization**

Prior to and after simulation-based learning experiences, seven research included self-related assessments, including self-directed education, confidence, and self-evaluation (16-18). The post-scenario self-evaluation demonstrated greater proficiency compared to the pre-scenario self-evaluation ( $p < 0.001$ ). Additional variables evaluated were self-assurance and self-contentment (18-20).

Self-directed learning encompasses the process of conceiving, designing, executing, and assessing a learning endeavor that is guided by the learner. In a

research done by Ko and Kim (12), senior nursing students were placed into two groups: one group got simulation-based instruction (category collaborative learning) (n = 86), while the other group received simulation-based learning (n = 98). The assessment of the simulation scenario's effectiveness was conducted via the use of the Group Preparedness Assessment Test (GRAT) and Personal Readiness Assessments Test (IRAT). The group that received SBE plus LBL shown more improvement in comparison to the SBE group.

Self-efficacy pertains to an individual's level of confidence in their capacity to effectively regulate their own drive, conduct, and social surroundings. In their research, Mohamed and Fashafsheh (16) used simulated instruction employing low- and high-fidelity models to evaluate the interpersonal abilities and self-efficacy of 100 third- and fourth-grade nursing learners. The assessment was based on the students' competency. All participants in the research demonstrated a statistically significant improvement in their self-efficacy and communication abilities ( $p < 0.001$ ). According to the research conducted by Karabacak et al. (17), the findings indicated a significant increase in self-efficacy ( $p < 0.05$ ) after the simulation-based skills instruction.

Self-confidence is characterized by an individual's sense of assurance in their own capabilities, attributes, and decision-making. In a research conducted by Ha using the Q-methodology, the emphasis was on the experience of nursing learners with regular patient treatment in simulation-based learning at nursing facilities. The study included 47 4th grade nursing students. The study found that the implementation of SPs had a positive impact on the confidence and nursing competence of the nursing students. This proved to be very beneficial for treatment of patients and showcased the effectiveness of simulation-based learning. According to Masha'al (19), it was also shown that nursing students' perspectives on the employment of simulation-based Branching path simulator (BPS) had a positive impact on their self-confidence. Furthermore, Demirtas et al. (20) documented that the implementation of cardiac resuscitation (CPR) program with a specific emphasis on simulation-based learning among a sample of 89 fourth-grade nursing learners led to a notable increase in their self-assurance in effectively managing emergency scenarios after the completion of the education.

Self-evaluation is a personal evaluation conducted to find areas that may be enhanced or used to accomplish certain predetermined objectives. The potential use of simulation-based learning approaches in the context of self-assessment within educational interventions for outcome parameters have been explored (22). In a pilot study conducted by Haukedal et al. (23), second-grade nursing pupils were placed into two groups: a control group consisting of 69 learners and an intervention group consisting of 68 students. The scenario centered on the simulation-based learning of the First2Act Model, which included a patient who had a worsening condition. The findings indicated that the participants in the study had a significant level of proficiency in theoretical understanding and exhibited a high level of trust in executing the intervention. The self-evaluation conducted after the scenario demonstrated greater competence compared to the pre-situation assessment ( $p < 0.001$ ). Furthermore, research using simulation-based evaluation shown greater impact sizes compared to those utilizing self-

assessment, tests, or grades for evaluation. The results on expertise and ability assessments were shown to be raised by simulation-based learning (24,25).

## **6. Effective Communication, Proficiency, and Self-assurance**

The proficiency in communication plays a crucial role in facilitating good nursing care by enhancing one's performance during interactions. In order to evaluate communication abilities, it is important to use a diverse range of methodologies. In their research, Ko and Kim (12) evaluated the communication abilities of nursing learners using a six-week intervention using simulation-based learning, consisting of three sessions. The individuals included in this study were senior nurses who met the criteria for providing direct client care in a clinical setting. The trial examination of interpersonal skills in this research included the GRAT as well as IRAT assessment tools. The findings indicated that the group receiving team-based education in the SBE program had superior communication skills compared to the control group. In a research done by Choi et al. (18), computer simulation education was examined in the context of nursing students (n = 131) via the implementation of classroom-focused interactive communication. The educating group received the education program using the compEd software, while the control category had access to a desktop or tablet PC. The group receiving education had an even greater boost in interpersonal interaction compared to the control group.

Competency and assurance are contingent upon the acquisition of enough knowledge or skills within a particular domain of expertise. Several papers examined the proficiency of nursing students in simulation-based learning by analyzing the theory and application of nursing specializations. In their study, Karabacak et al. (17) found that simulation-based skills instruction had a stronger correlation with the competence and confidence of first-year nursing students compared to pre-simulation training. A further study centered on the Q-approach of standard patient care yielded similar findings and demonstrated enhanced proficiency amongst nursing learners (26). In their study, Hung et al. (27) found that the test group felt a higher level of competency in simulation-based instruction of hospitals for adults compared to the control group. Simulation proved to be an excellent approach for assessing competence, resulting in enhanced self-competency, team ability, and overall competency in healthcare settings.

## **7. Evaluation and Evaluating**

Performance refers to the systematic execution or achievement of an activity, task, or function. Our research examined the performance of nursing students before and after receiving intervention with simulation-based learning, as described in four papers. In a research conducted by Jang et al., an experimental design was used to evaluate the efficacy of 226 nursing learners in relation to a cancer nursing simulation software. The study consisted of an experiment group and a control set. Haukedal et al. (23) examined the use of simulation-based learning as a treatment for a patient who had a worsening condition. This finding is further corroborated by another research that investigated the efficacy of simulation-based skills education and training (12).

Awareness refers to the cognitive process of perceiving, comprehending, or understanding something, resulting in a mental impression. There were two papers that specifically examined the perceptions and perceived talents related to simulation-based learning. One research investigated the perspectives of nursing learners (n = 52) at a nursing college about the efficacy of branching path modeling as a participatory educational instrument for handling pain in individuals with dementia (19). The findings indicated that nursing students had a very favorable view of branching path modeling and advocated for the use of simulation-based learning in situations pertaining to elderly care. According to the findings of Hung et al. (27), the experimental cohort of nursing learners participating in a course focused on medical care for adults indicated that problem-based learning was very beneficial. Furthermore, the experimental cohort of nursing learners exhibited higher levels of competence compared to the control group.

## **8. Discussion**

The simulation methodology is a method used by businesses to forecast, evaluate, and enhance the outcomes of their accomplishments and choices procedures, while avoiding the expenses and uncertainties associated with altering existing processes and implementing new ones. Hence, the primary objective of this research was to examine the advantages of using simulation-based training inside hospital emergency departments. The findings indicate that the prevalence of overcrowding in emergency departments in hospitals is a worldwide concern that has gotten more difficult as a consequence of the consistent rise in patients' needs, the escalating intricacy of situations, and the constrained resources within healthcare facilities. The importance of addressing this issue cannot be overstated, as it has the potential to create delays in the delivery of essential medical services to patients, resulting in a range of negative outcomes.(28)

In order to address this issue, research methodologies in the field of operations are extensively used to examine and enhance the efficiency of emergency department operations.(28) Emergency department personnel are the first personnel who attend to patients in their natural and typical circumstances. Nevertheless, their duties are amplified in hospital crises. Therefore, it is essential for individuals to possess suitable skills, efficiency, and genuine talents in order to effectively save human lives and enhance their overall well-being.(29)

In October 2016, a research was undertaken by Noh et al. (30) to create and assess a multiple modes simulation-based educational course aimed at enhancing the competences of hospital medical department personnel in responding to occurrences. The study had a total of 40 participants. Based on the findings, it is essential to design a training program using multimode simulation techniques for hospital emergency department personnel. This program should aim to enhance the disaster response skills of all participants in a substantial manner (31).

Currently, there is a significant emphasis on simulation-based research because to its suitability for making crucial choices about the flow of patients inside the emergency department. The findings of the research revealed that the scope of



training and instruction was constrained as a consequence of the absence of practical assessment instruments. The virtual realm offers an educational platform that enhances the knowledge, talents, and skills of healthcare personnel.(32) Enhancing nursing competences, including managing time, improves the execution of high-quality care.(33)

In their research, Jeong et al. (34) undertook a descriptive cross-sectional investigation with the objective of creating a computerized simulation-based training course for nurses in hospitals. The primary purpose of this program was to augment the capabilities of nurses in effectively responding to catastrophes. The present study used the Pearson correlation coefficient to examine the data collected from emergency department nurses. The evaluation of requirements, using the altered Delphi approach, resulted in the identification of the following proficiencies in the field of institutional nursing: triage, handling emergencies, medical center capacity administration during incidents, and strategies for preservation in certain situations. Every skill was modified to suit suitable simulation techniques. The program's evaluation demonstrated enhanced comprehension, handling emergencies, problem-solving, as well as technical proficiencies among nurses, as well as heightened competence in responding to catastrophes. The software created during this study has the potential to serve as a fundamental instrument in future investigations pertaining to curriculum creation.(31)

The findings of the research indicate that rescue services have traditionally assumed the responsibility of overseeing the first response and enhancing their operational capabilities. Training is necessary to ensure that healthcare personnel can provide an efficient and impactful response. Evaluating the impact of this instruction is very intricate since the true proficiency can only be shown in the presence of an urgent patient. Utilizing computer simulation-based training offers nurses the chance to enhance their management abilities and boost their general self-confidence.(35)

In the emergency department, many approaches are used to enhance the caliber and effectiveness of patients' care and the overall flow of care. The use of computer simulations to enhance decision-making in healthcare and optimize operations is on the rise.(36) Moreover, it has been determined that the use of simulation-based training has the potential to enhance the level of medical services by offering a structure for simulating additional hospital procedures, therefore impacting the delivery of services to patients.(37)

In a research conducted in 2020, Jeong et al. (34) investigated the knowledge and abilities of a sample of 234 nurse practitioners employed in a publicly funded hospital located in Korea. The measurement of nurses' understanding of emergency codes was conducted by the assessment of their identification and trust in eight disaster laws. Additionally, the evaluation of nursing competence was performed employing the Disaster Nursing Emergency Response Competency Scale. The findings indicated a positive correlation between the ability of clinical nurses to identify crises and their elevated levels of self-assurance and nursing proficiency in the context of catastrophes. Subsequent research should focus on formulating tactics to enhance nurses' consciousness and self-assurance during

emergency situations. Moreover, in the field of nursing management, it is crucial to prioritize the provision of additional training opportunities in both natural and human-induced catastrophes. This would enhance nurses' self-assurance and skills.(38)

This research further shown that the efficacy of enhancing the abilities of emergency department personnel using practical and training approaches in a simulated setting is contingent upon their degree of self-confidence and practical skills. Rivera et al. (37) conducted an evaluation and comparison of the efficacy of two training initiatives pertaining to emergency preparation. These interventions were implemented via the use of conventional training techniques as well as simulation-based training. The researchers determined that the incorporation of simulation-based instruction into disaster preparedness curriculum has the potential to enhance the knowledge and duties of hospital emergency personnel.

In a qualitative cross-sectional investigation conducted by Nejadshafiee et al. (38), surveys were administered to a sample of 142 hospital emergency division staff. The findings of the study indicated that the implementation of techniques including ongoing virtual actions and educational initiatives can effectively enhance the primary competencies and augment the expertise and abilities of the staff.

## **9. Conclusion and Recommendation**

In summary, simulation-based training has shown its efficacy as a pedagogical strategy within the realm of nursing education. It provides a multitude of advantages to both students and the healthcare industry in its whole. Simulation offers a secure setting for trainees to participate in skill development and refinement, foster critical thinking abilities, and make well-informed judgments pertaining to patient care. It promotes dynamic learning, creative critical thinking, and sophisticated problem-solving abilities, all of which are crucial for autonomous nursing practice.

Nevertheless, simulation-based training is not without its disadvantages, such as its exorbitant expenses, the need for staff training, restricted faculty training time, and the possibility of inaccurate skill transfer. Furthermore, it is often seen that students encounter feelings of worry and dissatisfaction while engaging in simulation exercises, underscoring the need of attending to their psychological preparedness.

Notwithstanding these obstacles, the emphasis on simulation-based training in nursing education has been propelled by a multitude of elements, including the need for elevated proficiency, apprehensions about patient safety, restricted availability of clinical settings, and the transition towards active learning methodologies. Nevertheless, there is a dearth of rigorous research in the nursing domain that offers substantial evidence on the effects of simulation via a meticulously designed approach. Hence, it is essential to conduct more research and reach an agreement among nursing experts in order to develop a robust body of data pertaining to the efficacy of simulation-based training.

Various researches have shown both favorable and unfavorable consequences linked to simulation-based training. While several investigations have shown enhancements in knowledge, abilities, and self-assurance among nursing students, alternative research has revealed a lack of substantial influence. The aforementioned gap underscores the need for a comprehensive compilation of data about the influence of simulation-based training on the development of nursing skills. Moreover, it is important to conduct a comparative analysis of the performance shown by students and professional nurse practitioners in order to ascertain any possible disparities in the development of skills.

The evaluation of various pedagogical approaches has provided evidence for the efficacy of simulation-based learning in facilitating the development of information, skills, safety, and self-confidence. Promising outcomes have been seen in the enhancement of the educational environment for nursing students via the combination of various technology and instructional methodologies.

The function of perception in simulation-based learning is of utmost importance, since the attitudes and emotions of nursing students towards the curriculum may have a substantial influence on their overall learning experience. Research has shown that nursing students who actively participated in simulation-based learning had favorable attitudes and reported enhancements in several characteristics when compared to control groups. This statement underscores the significance of taking into account the viewpoints of students and integrating their comments into the development and execution of simulation-based training initiatives.

In addition, it has been observed that self-related measures, such as self-directed learning, self-efficacy, self-confidence, and self-evaluation, have shown favorable results subsequent to engaging in simulation-based learning encounters. There have been notable advancements seen among nursing students in their capacity to proficiently manage their own learning, engage in efficient communication with patients and healthcare professionals, and assess their own performance. The aforementioned results underscore the capacity of simulation-based training to augment students' abilities in self-awareness and self-assessment. Several suggestions may be made to further improve the efficacy of simulation-based training in nursing education in light of the data reported in this article including:

1. It is important to conduct more rigorous research investigations that use meticulously designed techniques in order to evaluate the effects of simulation-based training on the development of nursing skills. Subsequent inquiries should strive to provide substantial evidence and build agreement among nursing experts.
2. It is important to establish comprehensive staff development programs to guarantee that nursing educators have thorough training in simulation-based learning. Engaging in this practice will augment their capacity to proficiently organize educational encounters and provide invaluable mentorship to nursing students.
3. The enhancement of students' psychological preparation for simulation activities should be addressed via the development of strategies. Efforts need to be undertaken to mitigate anxiety and frustration via the establishment of conducive learning environments and the provision of essential emotional support to students.

4. It is important to promote the incorporation of various technologies and instructional methods in order to provide a dynamic and captivating educational setting. Learning outcomes may be enhanced by the use of many new tools such as high-fidelity simulators, virtual reality, computer-based simulations, and other similar technologies.
5. The active solicitation and integration of nursing students' viewpoints and opinions is crucial in the development and execution of simulation-based training programs. Their comments might provide useful perspectives on enhancing the program and catering to their individual learning requirements.
6. Simulation-based training should encourage collaboration across diverse healthcare fields, such as nursing, medicine, and allied health professionals. This will improve collaboration, effective communication, and cross-functional abilities, which are crucial in delivering patient-focused healthcare.
7. Extended duration In order to evaluate the effects of simulation-based training on the performance of nursing graduates in real-world clinical settings, it is recommended that long-term follow-up studies be undertaken. This study aims to assess the enduring efficacy and viability of simulation-based methodologies.

Through the implementation of these guidelines, nursing education programs may enhance their use of simulation-based training, therefore equipping nurses with the necessary skills and self-assurance to successfully navigate the complexities of contemporary healthcare practice.

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