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ORIGINAL ARTICLE

The Use of Simulation in Nursing Education: An Assessment of its Effectiveness in Preparing Nurses for Clinical Practice

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ABSTRACT

Objective: The objective of this research is to assess the effectiveness of simulation-based training in nursing education and its impact on the preparedness of nurses for clinical practice.

Material and Methods: This quasi-experimental study was conducted on 70 study participants at the Benazir College for Nursing (BCON) at Shaheed Mohtarma Benazir Bhutto Medical University (SMBBMU) Larkana Sindh Pakistan. Individuals taking part in the medical-surgical nursing and critical care nursing classes. Suitable candidates were undergraduate nursing students currently include in the fundamental and advanced adult healthcare and critical care classes, aged 18 or older, and willing to participate in the research. However, students who had not undergone instruction in all simulators pertinent to the program prerequisites were not considered for the study.

Results: A total of 70 participants were enrolled in the study. Out of them 11 (15.7%) participants were in the age group of <22, while 35 (50%) participants fell within the age range of 23-28, and 24 (34.2%) participants were >28 years old. In terms of educational level, 38 (54.2%) were at level 6, while 32 (45.7%) were at level 7. Before the intervention, participants rated their confidence in implementing repeated procedure tasks in the CSC at 2.85 ± 1.20. However, after the intervention, this rating significantly increased to 4.10 ± 0.54 ($p<0.001$). Participants reported using the skills learned in the CSC during their hospital rotations, with ratings increasing from 1.98 ± 0.75 to 4.12 ± 0.82. The CSC also had a positive impact on performance during clinical rotations, with a rating increase from 3.10 ± 0.65 to 4.10 ± 0.86. Participants expressed the opinion that certain skills could be better learned and practiced in a clinical area (CA), as indicated by the increase in ratings from 1.93 ± 0.98 to 3.98 ± 0.89. In terms of gender, males had a slightly higher mean score in self-efficacy (3.10 ± 0.15) compared to females (3.01 ± 0.14), although the difference was not statistically significant ($p = 0.41$). However, females had higher mean scores in both competency (4.10 ± 0.60) and communication (4.10 ± 0.34) compared to males (competency: 3.94 ± 0.15, communication.

Practical implication: This research suggests simulation-based training is a valuable learning method for nursing students, enabling them to develop critical thinking, clinical reasoning, and effective communication skills in a controlled, safe environment. By rigorously evaluating the effectiveness of simulation-based learning, this research provides critical insights into educational strategies that enhance the clinical competencies of nursing students. As a result, nursing programs can refine their curricula to better prepare students for real-world clinical environments, ultimately leading to higher quality patient care and improved patient outcomes. Furthermore, the findings can inform policy-makers and educational institutions about the value of investing in simulation technology, fostering a more robust and adaptive healthcare workforce. By ensuring that new nurses are well-prepared through proven educational methods, the study supports a reduction in medical errors, increases the efficiency of healthcare delivery, and enhances overall patient safety. The community benefits from having access to better-trained nurses who can meet the increasing demands of modern healthcare settings, contributing to a healthier and more resilient population.

Conclusion: The conclusions of this study indicate that simulation-based training provides a valuable learning experience for nursing students, allowing them to develop and refine crucial skills in a controlled and safe environment.

Keywords: Simulation, clinical practice, preparing nurse, nursing education

INTRODUCTION

Simulation-based training has emerged as a promising educational approach in nursing education, offering an immersive and realistic learning experience for aspiring nurses.[1] With the increasing complexity of healthcare environments and the need for competent and well-prepared nursing professionals, the effectiveness of simulation-based training has become a topic of significant interest.[2]

Simulation-driven training entails utilizing interactive scenarios and realistic simulations to recreate clinical circumstances that nurses may confront in authentic environments.[3] It provides students chances to utilize conceptual understanding, cultivate analytical thought capabilities, and improve clinical judgment skills within a secure and regulated setting.[4] By engaging in realistic patient care scenarios, nursing students can gain hands-on experience, refine their technical skills, and improve their confidence in delivering quality care.[5]

Numerous research studies have explored the efficacy of simulation-driven instruction in the field of nursing learning and have documented favorable results.[6–8] Investigated the influence of simulation-focused instruction on the aptitude of nursing learners in real-life settings and discovered a notable enhancement in their overall practical proficiency.[9] The use of simulation allowed students to practice and refine their skills, leading to increased competence and readiness for real-world clinical practice.[10]

Moreover, simulation-based training provides a platform for nursing students to experience and manage critical incidents that they may encounter in clinical settings.[11] Through repeated exposure to such situations, students can develop effective problem-solving strategies, enhance teamwork and communication skills, and cultivate the ability to handle high-stress scenarios. This can ultimately contribute to improved patient safety and better outcomes in clinical practice.

However, despite the growing popularity of simulation-based training in nursing education, it is essential to critically examine its effectiveness and evaluate its impact on the preparedness of nurses for real-world practice.[12] Through an extensive evaluation of the available literature and examination of practical data, this study seeks to enhance our comprehension of the advantages and constraints of using simulation-based instruction in the field of nursing education. The aim of this study is to evaluate the efficiency of training using simulations in nursing instruction and its

influence on the readiness of nurses for real-world healthcare settings.

MATERIAL AND METHODS

This quasi-experimental investigation carried out at the Benazir College For Nursing (BCON) at Shaheed Mohtarma Benazir Bhutto Medical University (SMBBMU) Larkana Sindh Pakistan, with a total of 70 individuals participating in the study. The healthcare laboratories house simulators of moderate precision for medical and crucial purposes.

Inclusion and Exclusion Criteria: The study focused on inclusion criteria for participants in the medical-surgical nursing and critical care nursing courses. Eligible participants were undergraduate nursing students enrolled in the basic and advanced adult healthcare and critical care courses, aged 18 or above, and willing to participate. However, students who had not received training in all simulators relevant to the program requirements were excluded from the study.

Data were gathered using four different instruments: Demographic information

Communication skill assessment (CS)
General self-efficacy Scale measurement (GSES)
Clinical Competence Scale evaluation (CCS)

Demographic information: Demographic data is a tool commonly used in research to collect information about the participants' characteristics, such as age, gender, educational background, and other relevant factors. This tool helps researchers understand the sample's composition and identify any potential relationships between demographic variables and the study's outcomes. By collecting demographic data, researchers can ensure the representativeness and generalizability of their findings.

Communication Skill (CS) Assessment: Communication skill assessment is a tool designed to measure individuals' abilities and effectiveness in various aspects of communication. This tool typically includes a range of questions or scenarios that evaluate verbal and nonverbal communication skills, active listening, empathy, clarity of expression, and other relevant communication competencies. The CS assessment provides valuable insights into participants' communication strengths and weaknesses, enabling researchers to explore the relationship between communication skills and other variables of interest in the study.

General Self-Efficacy Scale (GSES): The General Self-Efficacy Scale (GSES) is a psychometric tool used to measure individuals' beliefs in their own ability to cope with challenging situations and accomplish tasks successfully. It typically consists of a set of statements or questions to which participants rate their level of agreement. The GSES assesses participants' overall sense of self-efficacy, which can influence their motivation, decision-making, and performance in various domains. By incorporating the GSES into the study, researchers can examine the impact of self-efficacy on the variables under investigation.

Clinical Competence Scale (CCS): The Clinical Competence Scale (CCS) is a tool specifically tailored to assess the clinical competence of individuals in healthcare or medical settings. This scale comprises a set of criteria or indicators related to knowledge, skills, attitudes, and behaviors necessary for effective clinical practice. By employing the CCS, researchers can evaluate the participants' level of clinical competence and explore potential associations between clinical competence and the study's outcomes. This tool provides valuable insights into the participants' aptitude for delivering quality healthcare and informs discussions around training and professional development.

The instructional techniques employed in the program for medical education that relies on simulations included brief talks, videos, collective conversations, showcasing and repeating low and moderate fidelity simulations. - The participants were not chosen randomly and all took part in the training program centered around simulations. The scenarios encompassed various situations that nursing students may encounter, such as ECG interpretation, blood transfusions, administering intravenous injections, delivering oxygen therapy, caring for wounds and stomas, as well as inserting and removing Ryles tubes.

The study procedure received authorization from the Benazir College For Nursing (BCON) at Shaheed Mohtarma Benazir Bhutto Medical University (SMBBMU) Larkana Sindh Pakistan institutional review board (IRB).

Statistical analysis: The information was inputted into a database, and statistical analysis of the data was performed utilizing the Statistical Package for Social Science (SPSS) program. A significance level of ≤0.05 was deemed as statistically meaningful. To portray the data, descriptive statistics such as frequencies, percentages, means±SD were employed. The disparities in communication skills, self-efficacy, and competency before and after HFS were assessed using a paired t-test. A comparison among baseline characteristics and communication, self-efficacy, and competency was conducted through an independent t-test and ANOVA.

RESULTS

A total of 70 participants were enrolled in the study. Out of them 11 (15.7%) participants were in the age group of <22, while 35 (50%) participants fell within the age range of 23-28, and 24 (34.2%) participants were >28 years old. In terms of educational level, 38 (54.2%) were at level 6, while 32 (45.7%) were at level 7. Regarding the previous experience with simulation, 26 (37.1%) had prior experience, whereas 44 (62.8%) did not. These statistics offer valuable insights into the demographics and characteristics of the participants, aiding in the understanding of the sample group's composition. Table 1

Table 2 showed pre-intervention and post-intervention analysis of the mean scores ± standard deviation for various aspects of student-patient interaction. Each aspect is measured on a scale of 1 to 3, with a higher score indicating better performance. Before the intervention, the mean scores for all aspects were relatively low, ranging from 1.34 to 1.84. However, after the intervention, significant improvements were observed across all aspects, as evidenced by the higher post-intervention mean scores, ranging from 2.46 to 2.82. The standard deviations indicate the degree of variability within each group. The p-value for each aspect, except for the second aspect, is reported as being <0.0001, indicating a highly significant improvement. Table 2

Before the intervention, participants rated their confidence in implementing repeated procedure tasks in the CSC at 2.85 ± 1.20. However, after the intervention, this rating significantly increased to 4.10 ± 0.54 ($p<0.001$). Similarly, learning long and complex procedures in small parts showed improvement, with a pre-intervention rating of 2.92 ± 1.15 increasing to 4.21 ± 0.64 post-intervention. The availability of adequate help in the CSC when struggling with something was rated at 2.95 ± 0.87 before the intervention, which improved to 3.86 ± 0.95 post-intervention. Additionally, practicing in the CSC was considered beneficial for understanding theoretical concepts, as indicated by an increase from 2.96 ± 1.07 to 4.10 ± 0.71 in the ratings. The time spent in the CSC was found to lead to continuous improvement in clinical skills, as evidenced by an increase in ratings from 2.96 ± 0.85 to 4.76 ± 0.67 post-intervention. Moreover, practicing in the CSC positively influenced students' self-confidence when performing procedures on actual patients, with ratings improving from 1.88 ± 0.73 to 3.96 ± 0.64. Participants reported using the skills learned in the CSC during their hospital rotations, with ratings increasing from 1.98 ± 0.75 to 4.12 ± 0.82. The CSC also had a positive impact on performance during clinical rotations, with a rating increase from 3.10 ± 0.65 to 4.10 ± 0.86. Practicing in the CSC was found to enhance the safety of patients during clinical training, as reflected by the increase in ratings from 1.99 ± 0.64 to 3.86 ± 0.65. Peer suggestions for improvement in the CSC were considered valuable, as shown by the increase in ratings from 3.21 ± 0.85 to 3.99 ± 0.85. Observations revealed that participants learned best when educators demonstrated the skills before their own practice, with ratings increasing from 2.20 ± 0.78 to 4.02 ± 0.82. Learning in

groups and helping each other also proved effective, as indicated by the rise in ratings from 1.97 ± 0.59 to 3.98 ± 0.74. Assessing skills in the CSC was considered a logical measure of practical skills, although the ratings increased only slightly from 1.88 ± 0.66 to 2.96 ± 0.82. Participants expressed the opinion that certain skills could be better learned and practiced in a clinical area (CA), as indicated by the increase in ratings from 1.93 ± 0.98 to 3.98 ± 0.89. While practicing in the CSC was deemed essential, participants acknowledged the need for training with actual patients once they had gained proficiency in the center. Ratings increased from 1.98 ± 0.86 to 4.10 ± 0.56. The use of nursing manikins in the CSC was considered realistic and beneficial for skill development, as shown by an increase in ratings from 1.89 ± 0.62 to 4.20 ± 0.85. Comparing performance in the CSC and with real patients, participants reported performing better in the CSC, with ratings increasing from 2.12 ± 0.80 to 4.13 ± 0.87. However, they also recognized the importance of practicing with real patients, as indicated by the increase in ratings from 1.86 ± 0.89 to 4.20 ± 0.96. Overall, participants expressed enjoyment in using the CSC, as shown by the increase in ratings from 1.82 ± 0.81 to 4.10 ± 0.97. The perception of learning more in the CSC varied, with ratings increasing from 1.87 ± 0.86 to 3.88 ± 0.68. Participants also expressed mixed opinions regarding the adequacy of preparation sessions before starting procedures, with ratings increasing from 1.97 ± 0.73 to 4.21 ± 0.95. Table 3

Table 1: Distribution of Participants According to Baseline Characteristics (n=70).

Characteristics	Number	Percentage (%)
Age in Groups		
<22	11	15.7%
23 - 28	35	50%
>28	24	34.2%
Level		
level 6	38	54.2%
level 7	32	45.7%
Previous experience with simulation		
Yes	26	37.1%
No	44	62.8%

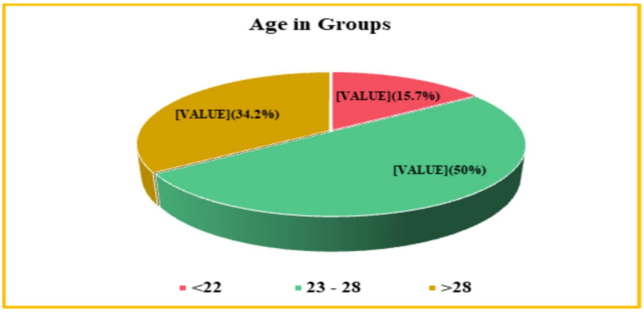

Figure 1: Distribution of Participants According to age Group

Table 2: Compare the Communication Skills of the Group Pre and Post-Intervention Group of the Study, Following the Simulation Training (n=70).

	Pre-intervention Mean±SD	Post-intervention Mean±SD	P-value
The student has eye contact to the patient	1.34 ± 0.35	2.51 ± 0.42	<0.0001
The student talks face to face with the patient	1.41 ± 0.61	2.54 ± 0.47	
The student explains what he is doing to the patient and why	1.43 ± 0.47	2.46 ± 0.71	
The student talks by easy way to be understood	1.52 ± 0.72	2.52 ± 0.41	
The student explains technical terms to the patient	1.81 ± 0.42	2.82 ± 0.41	
The student give the patients chance to ask questions	1.81 ± 0.62	2.58 ± 0.41	
Student explains to the patient that the action could be painful	1.84± 0.62	2.61 ± 0.71	
Student politely answer the patients question	1.42 ± 0.51	2.47 ± 0.73	
Student uses word that are easy to understand for the patient	1.34± 0.59	2.57 ± 0.36	
Student executes the action correctly	1.74 ± 0.58	2.53 ± 0.72	

Table 3: Compare the Clinical Competence of the Group Pre and Post-Intervention Group of the Study, Following Training with Simulation Methods (n=70).

	Pre-intervention Mean±SD	Post-intervention Mean±SD	P-value
In the clinical skills center (CSC), can repeated procedure tasks until can confident which I am implementing them correctly	2.85 ± 1.20	4.10 ± 0.54	<0.001
In the clinical skills center, learning a long and complex procedure in small parts.	2.92 ± 1.15	4.21 ± 0.64	
In the clinical skills center, we can get adequate help when we are struggling with something	2.95 ± 0.87	3.86 ± 0.95	
Practicing in the clinical skills center must artificial to be beneficial	2.97 ± 1.25	3.87 ± 0.70	
It's good to be able to produce mistakes and know that nobody will get damage.	2.89 ± 1.02	4.13 ± 0.75	
Things we do in CSC, assist me to understand some of the theory I having taught.	2.96 ± 1.07	4.10 ± 0.71	
Time spent in CSC lead to continuous improvement of clinical skills	2.96 ± 0.85	4.76 ± 0.67	
Practicing in CSC makes students more self-confident when they perform the same procedure to the patients.	1.88 ± 0.73	3.96 ± 0.64	
In hospital often using the skills learnt in the CSC	1.98 ± 0.75	4.12 ± 0.82	
Practicing in CSC improves the performance on clinical rotation	3.10 ± 0.65	4.10 ± 0.86	
Practicing in the clinical skills center makes your behavior on clinical training safer for patients	1.99 ± 0.64	3.86 ± 0.65	
In the clinical skills center (CSC) we find suggestions from my peers about how to improve what you do	3.21 ± 0.85	3.99 ± 0.85	
We best learn when educators demonstrate the skill before I am doing it myself	2.20 ± 0.78	4.02 ± 0.82	
We best learn with group of peers through we help one other	1.97 ± 0.59	3.98 ± 0.74	
Assessing the skills in the CSCis a logical measure of your skills in practice.	1.88 ± 0.66	2.96 ± 0.82	
Skill educated and practiced in the CSC could be better done in a clinical area (CA)	1.93 ± 0.98	3.98 ± 0.89	
When we can do a skill in CSC we need training with actual patients	1.98 ± 0.86	4.10 ± 0.56	
Nursing manikins are realistic for helping to develop my skills.	1.89 ± 0.62	4.20 ± 0.85	
We are performing better in CSC than with actual patients	2.12 ± 0.80	4.13 ± 0.87	
We are performing better with real patients than in CSC.	1.86 ± 0.89	4.20 ± 0.96	
We have enjoyed when using CSC.	1.82 ± 0.81	4.10 ± 0.97	
We have learned more in CSC or not.	1.87 ± 0.86	3.88 ± 0.68	
Preparation sessions before start the procedure helped you enough or not.	1.97 ± 0.73	4.21 ± 0.95	

Table 4: Comparison Regarding Demographic Attributes and the Aspects of Communication, Self-Assurance, and Proficiency (n=70).

Characteristics	Communication Mean±SD	Self-Efficacy Mean±SD	Competency Mean±SD
Gender			
Male	3.10±0.15	3.94±0.15	3.98±0.14
Female	3.01±0.14	4.10±0.60	4.10±0.34
P-value	0.41	0.24	0.001
Level			
Level 6	3.20±0.10	4.01±0.42	4.1±0.32
Level 7	3.1±0.14	4.11±0.56	4.0±0.51
P-value	0.431	0.367	0.264
Experience with simulation			
Yes	3.06±0.14	4.20±0.54	4.10±0.30
No	2.44±0.08	4.13±0.43	4.01±0.35
P-value	0.235	0.421	0.317

In terms of gender, males had a slightly higher mean score in self-efficacy (3.10 ± 0.15) compared to females (3.01 ± 0.14), though the difference was not statistically significant (p = 0.41). However, females had higher mean scores in both competency (4.10 ± 0.60) and communication (4.10 ± 0.34) compared to males (competency: 3.94 ± 0.15, communication: 3.98 ± 0.14), with the difference in competency being statistically significant (p = 0.001).

When considering the level of participants, there were no substantial differences in self-efficacy and communication scores between Level 6 (self-efficacy: 3.20 ± 0.10, communication: 4.01 ± 0.42) and Level 7 (self-efficacy: 3.1 ± 0.14, communication: 4.11 ± 0.56), with p-values of 0.431 and 0.367, respectively. However, Level 7 participants had a slightly lower mean score in competency (4.0 ± 0.51) compared to Level 6 (4.1 ± 0.32), although the difference was not statistically significant (p = 0.264).

Regarding experience with simulation, participants who had previous experience scored higher in self-efficacy (3.06 ± 0.14) compared to those without experience (2.44 ± 0.08), while the difference was not statistically significant (p = 0.235). However, there were no substantial alterations in mean scores for both competency and communication between participants with experience (competency: 4.20 ± 0.54, communication: 4.10 ± 0.30) and those without experience (competency: 4.13 ± 0.43, communication: 4.01 ± 0.35), with p-values of 0.421 and 0.317, respectively. Table 4

DISCUSSION

Simulation provides a safe and controlled environment that allows students to practice and refine their clinical skills, critical thinking abilities, and decision-making processes. By engaging in realistic scenarios, students can experience the challenges and complexities they may encounter in real-life patient care settings.[13] Simulation also offers the opportunity for students to develop communication and teamwork skills through multidisciplinary collaboration. Moreover, the incorporation of post-simulation debriefing sessions allows students to contemplate their performance, recognize aspects for enhancement, and obtain valuable input from educators.[14] Research studies have consistently demonstrated positive outcomes associated with simulation-based education, including increased self-confidence, improved clinical competence, and enhanced patient safety.[15] However, it is crucial to ensure that simulation is complemented with clinical experiences to bridge the gap between theory and practice effectively. Efficient interaction between student nurses and patients is crucial for developing the abilities needed to integrate into practical healthcare settings and enhance student learning.[16] The latest research demonstrates that the communication proficiency of the experimental group advanced following their involvement in training sessions based on simulation. This outcome aligns with the discovery made by McGaghie et al.,[17] indicating noteworthy statistical enhancements in communication competence for clinical procedures such as chest tube insertion.

Young et al.,[18] demonstrate that enhancement of the interpersonal abilities over a period in medical settings following participation in a training program. Similarly, Thidemann and Söderhamn,[19] indicate that the utilization of high fidelity simulation (HFS) has the potential to advance and refine communication proficiencies (CP) among health education students.

Foronda et al.,[20] also demonstrate that students with proficient communication abilities aid them in effectively evaluating the patient before contacting the physician. Nevertheless, a recent investigation revealed a notable enhancement in communication ratings as reported by observers in the medical student cohort.[21] The Jahan et al.,[22] analysis determined that communication skills are fundamental proficiencies essential for enhanced patient care and hold significance for nursing instructors in a clinical environment.

Overall, simulation in nursing education is an invaluable tool that effectively prepares nurses for the challenges and complexities of clinical practice, contributing to the delivery of safe and competent patient care.

CONCLUSION

The findings of this research indicate that simulation-based training provides a valuable learning experience for nursing students, allowing them to develop and refine crucial skills in a controlled and safe environment. By replicating realistic patient scenarios, simulations enable students to apply theoretical knowledge, make critical decisions, and engage in hands-on practice without jeopardizing patient safety. This active learning approach promotes critical thinking, clinical reasoning, and effective communication among aspiring nurses.

REFERENCES

1. Mehdipour –Rabori R, Bagherian B, Nematollahi M. Simulation-based mastery improves nursing skills in BSc nursing students: a quasi-experimental study. BMC Nurs [Internet]. 2021 Dec 6;20(1):10. Available from: https://bmcnurs.biomedcentral.com/articles/10.1186/s12912-020-00532-9
2. Abildgren L, Lebahn-Hadidi M, Mogensen CB, Toft P, Nielsen AB, Frandsen TF, et al. The effectiveness of improving healthcare teams' human factor skills using simulation-based training: a systematic review. Adv Simul [Internet]. 2022 Dec 7;7(1):12. Available from: https://advancesinsimulation.biomedcentral.com/articles/10.1186/s41077-022-00207-2
3. Biyik Bayram S, Caliskan N. The Use of Virtual Reality Simulations in Nursing Education, and Patient Safety. In: Contemporary Topics in Patient Safety - Volume 1 [Internet]. IntechOpen; 2022. Available from: https://www.intechopen.com/chapters/73839
4. Tawalbeh LI. Effect of simulation modules on Jordanian nursing student knowledge and confidence in performing critical care skills: A randomized controlled trial. Int J Africa Nurs Sci [Internet]. 2020;13:100242. Available from: https://linkinghub.elsevier.com/retrieve/pii/S2214139120301190
5. Papathanasiou I, Kleisiaris C, Fradelos E, Kakou K, Kourkouta L. Critical Thinking: The Development of an Essential Skill for Nursing Students. Acta Inform Medica [Internet]. 2014;22(4):283. Available from: http://www.scopemed.org/fulltextpdf.php?mno=167258
6. Hustad J, Johannesen B, Fossum M, Hovland OJ. Nursing students' transfer of learning outcomes from simulation-based training to clinical practice: a focus-group study. BMC Nurs [Internet]. 2019 Dec 8;18(1):53. Available from: https://bmcnurs.biomedcentral.com/articles/10.1186/s12912-019-0376-5
7. Asegid A, Assefa N. Effect of simulation-based teaching on nursing skill performance: a systematic review and meta-analysis. Front Nurs [Internet]. 2021 Sep 1;8(3):193–208. Available from: https://www.sciendo.com/article/10.2478/fon-2021-0021
8. Aebersold M. Simulation-Based Learning: No Longer a Novelty in Undergraduate Education. OJIN Online J Issues Nurs [Internet]. 2018 Apr 3;23(2). Available from: https://ojin.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Vol-23-2018/No2-May-2018/Articles-Previous-Topics/Simulation-Based-Learning-Undergraduate-Education.html

9. Lee BO, Liang HF, Chu TP, Hung CC. Effects of simulation-based learning on nursing student competences and clinical performance. Nurse Educ Pract [Internet]. 2019 Nov;41:102646. Available from: https://linkinghub.elsevier.com/retrieve/pii/S1471595319300927
10. Datta R, Upadhyay K, Jaideep C. Simulation and its role in medical education. Med J Armed Forces India [Internet]. 2012 Apr;68(2):167–72. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0377123712600409
11. Salifu DA, Heymans Y, Christmals C Dela. A Simulation-Based Clinical Nursing Education Framework for a Low-Resource Setting: A Multimethod Study. Healthcare [Internet]. 2022 Aug 28;10(9):1639. Available from: https://www.mdpi.com/2227-9032/10/9/1639
12. Oh S, Park J. A Literature Review of Simulation-Based Nursing Education in Korea. Nurs Reports [Internet]. 2023 Mar 19;13(1):506–17. Available from: https://www.mdpi.com/2039-4403/13/1/46
13. Alinier G, Oriot D. Simulation-based education: deceiving learners with good intent. Adv Simul [Internet]. 2022 Dec 18;7(1):8. Available from: https://advancesinsimulation.biomedcentral.com/articles/10.1186/s41077-022-00206-3
14. Fey MK, Scrandis D, Daniels A, Haut C. Learning Through Debriefing: Students' Perspectives. Clin Simul Nurs [Internet]. 2014 May;10(5):e249–56. Available from: https://linkinghub.elsevier.com/retrieve/pii/S1876139914000103
15. Crowe S, Ewart L, Derman S. The impact of simulation based education on nursing confidence, knowledge and patient outcomes on general medicine units. Nurse Educ Pract [Internet]. 2018 Mar;29:70–5. Available from: https://linkinghub.elsevier.com/retrieve/pii/S1471595317300203
16. Schiavenato M. Reevaluating Simulation in Nursing Education: Beyond the Human Patient Simulator. J Nurs Educ [Internet]. 2009 Jul;48(7):388–94. Available from: https://journals.healio.com/doi/10.3928/01484834-20090615-06
17. McGaghie WC, Issenberg SB, Petrusa ER, Scalese RJ. A critical review of simulation-based medical education research: 2003â€“2009. Med Educ [Internet]. 2010 Jan;44(1):50–63. Available from: https://onlinelibrary.wiley.com/doi/10.1111/j.1365-2923.2009.03547.x
18. Kim HY, Ko E, Lee ES. Effects of Simulation-based Education on Communication Skill and Clinical Competence in Maternity Nursing Practicum. Korean J Women Heal Nurs [Internet]. 2012;18(4):312. Available from: https://kjwhn.org/journal/view.php?doi=10.4069/kjwhn.2012.18.4.312
19. Thidemann IJ, Söderhamn O. High-fidelity simulation among bachelor students in simulation groups and use of different roles. Nurse Educ Today [Internet]. 2013 Dec;33(12):1599–604. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0260691712004017
20. Foronda C, Gattamorta K, Snowden K, Bauman EB. Use of virtual clinical simulation to improve communication skills of baccalaureate nursing students: A pilot study. Nurse Educ Today [Internet]. 2014 Jun;34(6):e53–7. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0260691713003833
21. Ammentorp J, Thomsen JL, Jarbøl DE, Holst R, Øvrehus ALH, Kofoed PE. Comparison of the medical students' perceived self-efficacy and the evaluation of the observers and patients. BMC Med Educ [Internet]. 2013 Dec 8;13(1):49. Available from: https://bmcmededuc.biomedcentral.com/articles/10.1186/1472-6920-13-49
22. Shinnick MA, Woo MA. Does Nursing Student Self-efficacy Correlate with Knowledge When Using Human Patient Simulation? Clin Simul Nurs [Internet]. 2014 Feb;10(2):e71–9. Available from: https://linkinghub.elsevier.com/retrieve/pii/S1876139913001746

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