



ORIGINAL

Nurse-midwifery students' experiences in high-fidelity simulation: a focus group study

Experiencias de los estudiantes de enfermería obstétrica en la simulación de alta fidelidad: un estudio de grupo focal

Júlia Carvalho¹  , Cláudia Brás¹  , Helena Duarte²  , José Fonseca³ , Maria João Tomás³ , Maria Inês Polónio² , Ana-Bela Caetano¹  

¹Higher School of Nursing of Coimbra, Health Sciences Research Unit: Nursing. Coimbra, Portugal.

²Hospital and University Center of Coimbra, Maternity Bissaya Barreto. Coimbra, Portugal

³Hospital and University Center of Coimbra, Maternity Daniel de Matos. Coimbra, Portugal

Cite as: Carvalho J, Brás C, Duarte H, Fonseca J, João Tomás M, Polónio MI, et al. Nurse-midwifery students' experiences in high-fidelity simulation: a focus group study. Salud, Ciencia y Tecnología. 2024; 4:.588. <https://doi.org/10.56294/saludcyt2024.588>

Submitted: 04-02-2024

Revised: 16-05-2024

Accepted: 20-09-2024

Published: 21-09-2024

Editor: Dr. William Castillo-González 

Corresponding autor: Júlia Carvalho 

ABSTRACT

Introduction: active teaching methodologies, particularly those using high-fidelity simulation, stand out in nursing education for their ability to facilitate the development of students' technical-scientific and non-technical skills, as well as prepare them for clinical practice. High-fidelity simulation using realistic models is an effective tool for improving students' communication skills, leadership and critical thinking. This study aims to explore nurse-midwifery students' learning experiences in high-fidelity simulation.

Methods: explorative qualitative study using two focus groups interviews with nurse-midwifery students at the Higher School of Nursing. Qualitative data were analyzed using content analysis.

Results: two main themes emerged from content analysis: (i) Simulation-based learning and (ii) Simulation-based teaching. The first theme includes three categories: development of technical-scientific skills, development of non-technical skills, and preparation for internship. The second theme also includes three categories: enhancing theoretical knowledge, facilitating teaching, and post-scenario discussion (debriefing).

Conclusions: the use of high-fidelity simulation as a teaching strategy in the training of nurse-midwifery students contributed to the development of technical and non-technical skills essential to nursing practice.

Keywords: Nursing Education; Nurse-Midwifery Students; Simulation; Focus Groups; Qualitative Research.

RESUMEN

Introducción: las metodologías activas de enseñanza, en particular las que utilizan la simulación de alta fidelidad, destacan en la enseñanza de la enfermería por su capacidad para facilitar el desarrollo de las habilidades técnico-científicas y no técnicas de los estudiantes, así como para prepararlos para la práctica clínica. La simulación de alta fidelidad con modelos realistas es una herramienta eficaz para mejorar las habilidades de comunicación, liderazgo y pensamiento crítico de los estudiantes. Este estudio pretende explorar las experiencias de aprendizaje de los estudiantes de enfermería obstétrica en la simulación de alta fidelidad.

Métodos: estudio cualitativo exploratorio mediante dos entrevistas a grupos focales con estudiantes de enfermería obstétrica de la Escuela Superior de Enfermería. Los datos cualitativos se analizaron mediante análisis de contenido.

Resultados: del análisis de contenido surgieron dos temas principales: (i) Aprendizaje basado en la simulación y (ii) Enseñanza basada en la simulación. El primer tema incluye tres categorías: desarrollo de habilidades

técnico-científicas, desarrollo de habilidades no técnicas y preparación para las prácticas. El segundo tema también incluye tres categorías: mejora de los conocimientos teóricos, facilitación de la enseñanza y debate posterior al escenario (debriefing).

Conclusiones: el uso de la simulación de alta fidelidad como estrategia de enseñanza en la formación de estudiantes de enfermería obstétrica contribuyó al desarrollo de habilidades técnicas y no técnicas esenciales para la práctica de la enfermería.

Palabras clave: Enseñanza de Enfermería; Estudiantes de Enfermería Obstétrica; Simulación; Grupos de Discusión; Investigación Cualitativa.

INTRODUCTION

Recent changes in nursing education have led to the need to explore different teaching approaches and understand their impact on student outcomes. Implementing active teaching-learning methods is essential in nursing education, given the practical nature of nursing curricula. High-fidelity simulation is an active teaching-learning methodology that provides nurse-midwifery students with skills they can transfer to clinical practice. This tool helps students develop technical and non-technical skills for training in maternal health and obstetric nursing. It provides a realistic training environment without compromising patient safety, while increasing confidence in hospital internships.⁽¹⁾

Nurse-midwifery students can develop technical, communication, teamwork, critical thinking, and decision-making skills through high-fidelity simulation training.^(2,3)

Simulation in nursing education helps fill the gap in nurse-midwifery student training caused by the lack of student experience during internships. This approach offers students the opportunity to learn in different intervention scenarios.⁽⁴⁾

This study aims to explore nurse-midwifery students' learning experiences in high-fidelity simulation scenarios.

Clinical simulation training as part of nursing education

The teaching methodologies used in postgraduate health programs have undergone a paradigm shift in recent years. Higher education institutions have moved away from traditional teacher-centered approaches to more active methods, where students play a central role in their learning.⁽⁵⁾ Thus, methods that encourage student participation, known as active methodologies, have come to the fore, namely high-fidelity simulation.

High-fidelity simulation can be an effective tool for training nurse-midwifery students as it allows them to have practical experience in scenarios that resemble real-life situations and develop technical and non-technical skills.^(6,7)

Simulation-based nursing education can assist students in overcoming these difficulties by reducing stress during the transition to clinical settings and promoting confidence and manual dexterity.^(7,8)

Through the use of computerized interactive manikins and the participation of nurse-midwifery students as actors in simulation scenarios, high-fidelity simulation provides a realistic experience where students can practice their skills and make decisions in a controlled and safe environment. The acquisition of these skills improves the learning outcomes and systematizes knowledge, preparing students for real-world challenges.⁽⁸⁾

Nurse-midwifery students can make errors and learn from them without jeopardizing patient safety. The possibility to experience different clinical situations in a simulated environment allows students to make decisions without harming the patients and applying their theoretical knowledge in a more effective way.⁽⁹⁾ Students can repeat simulation scenarios multiple times to improve their skills and gain confidence for clinical practice.^(10,11)

Simulation scenarios that focus on communication are essential in nursing education because they allow students to develop their communication skills, such as empathy, active listening, and the ability to provide clear communication to colleagues involved in the scenario. Effective communication and leadership are key components to enhance the quality of care, especially in emergency situations where the healthcare team must respond promptly and efficiently.⁽⁶⁾

Simulation training provides students with realistic scenarios where they can interact with other actors and learn to communicate effectively in emotionally challenging situations. Students also train team communication, which is crucial for efficient and coordinated teamwork. In addition, by developing various scenarios, rotating all actors through them, and repeating learning experiences, students can enhance non-technical skills that are crucial to their training.⁽²⁾

In a study with midwifery students⁽⁶⁾ found that simulation-based learning experiences allowed students to reflect on clinical case scenarios and critically evaluate their actions and decision-making processes.

Using interactive manikins in high-fidelity simulated clinical practice scenarios promotes reflective observation. During debriefing sessions that follow the simulation activity, students develop theories and draw conclusions about their experiences. Debriefing is a core component of simulation that can improve learning and performance outcomes, critical thinking, clinical reasoning, and problem-solving.

Many higher education institutions worldwide have been using high-fidelity simulation in nursing education, namely mannequins and virtual reality holograms, as an effective strategy to prepare students for clinical practice.

Simulation should be complemented with real-life clinical experiences, where students can have the opportunity to acquire and apply specific nurse-midwifery skills to provide safe, high-quality maternal and neonatal care.

METHODS

This study aims to explore nurse-midwifery students' learning experiences in high-fidelity simulation. This exploratory qualitative study used focus groups. It followed the COREQ (Consolidated Criteria for Reporting Qualitative Research) guidelines for research design found on the EQUATOR network website⁽¹²⁾ which includes essential indicators for planning and conducting qualitative studies.

The focus groups were held at the Nursing School of Coimbra (ESEnfC). The sample consisted of nurse-midwifery students enrolled in the first year of a master's degree who had attended at least 90% of laboratory classes of the course unit of Maternal and Obstetric Health Nursing using high-fidelity simulation and who agreed to participate in this study.

Participants were selected by purposive sampling to reflect the diversity within the group.⁽¹³⁾ The 20 students enrolled in the class taught by the researchers were invited by them to participate in the study. However, three students declined the invitation. During this direct contact, the researchers explained the study's objectives and purpose. Students were divided into two focus groups based on heterogeneity criteria related to different contexts, years of professional practice, and schedule availability.⁽¹³⁾

Data collection

The focus group sessions occurred in October 2023. The first session had ten nurse-midwifery students, and the second had seven.

The researchers created a data collection guide for the focus groups to ensure that all relevant topics were addressed, based on the literature review by Kinalski *et al.*⁽¹⁴⁾

This guide was divided into four areas: opening the session, legitimizing the focus group, implementing the focus group, and summarizing and closing the session. The order of the questions is merely indicative and can be adapted whenever necessary based on the fluidity of the participants' narratives.^(13,15)

A questionnaire was used for the participants' sociodemographic characterization.

During data collection, the moderator of the focus groups was the principal investigator, a PhD professor with over 15 years of professional experience in the topic under analysis.⁽¹⁶⁾ The moderator took into account the assumptions underlying the focus group methodology and followed the principle of non-directiveness, allowing for a discussion without interference or personal opinions. The moderator facilitated the participation of all members and guided the discussion toward the objectives, promoting a productive conversation.^(15,17)

A teacher experienced in qualitative research took on the role of observer and was asked to pay attention to logistical conditions and take notes during the session.^(13,16) Data saturation was reached when the sessions generated repeated information in relation to the data collected in the first session, and no further sessions were necessary.⁽¹³⁾ Each focus group session lasted approximately two hours.

Data analysis

The data were transcribed in full (use of thick description) to represent the diversity of opinions and corroborate the researcher's analysis, which are criteria that correspond to transferability in qualitative research.^(18,19)

Data were analyzed based on the content analysis technique, which involves synthesizing and reducing the amount of information available into content categories and integrating them into a given context.⁽²⁰⁾

The first stage involved creating a body of analysis using the focus group transcript, notes, and a series of documents with relevant and current evidence on the topic.

During the second stage, the researchers read the transcripts individually to become familiar with the data. They read and re-read the material from an exploratory perspective and coded the information.⁽²⁰⁾ The participants did not receive the transcripts for comments or suggestions.

Open coding techniques were used to transform content into units of meaning for subsequent categorization.⁽²¹⁾ After coding, categorization strategies were applied. This manual and open coding process was conducted using NVivo® software to better organize, systematize, visualize, and locate the body of analysis. However,

the analysis software did not replace the researcher’s responsibility for the substantive interpretation of the findings.⁽¹⁷⁾ The most frequent words or expressions in transcripts were also identified, resulting in a word cloud shown in Figure 1.⁽²⁰⁾



Figure 1. Word cloud of the 11 most common words in the focus groups transcripts

In the third stage, internal validation procedures were applied. The categories were compared to check if they were not repeated or overlapped. Finally, a conceptual structure was obtained consisting of two main themes with six categories of analysis, which were divided into subcategories.

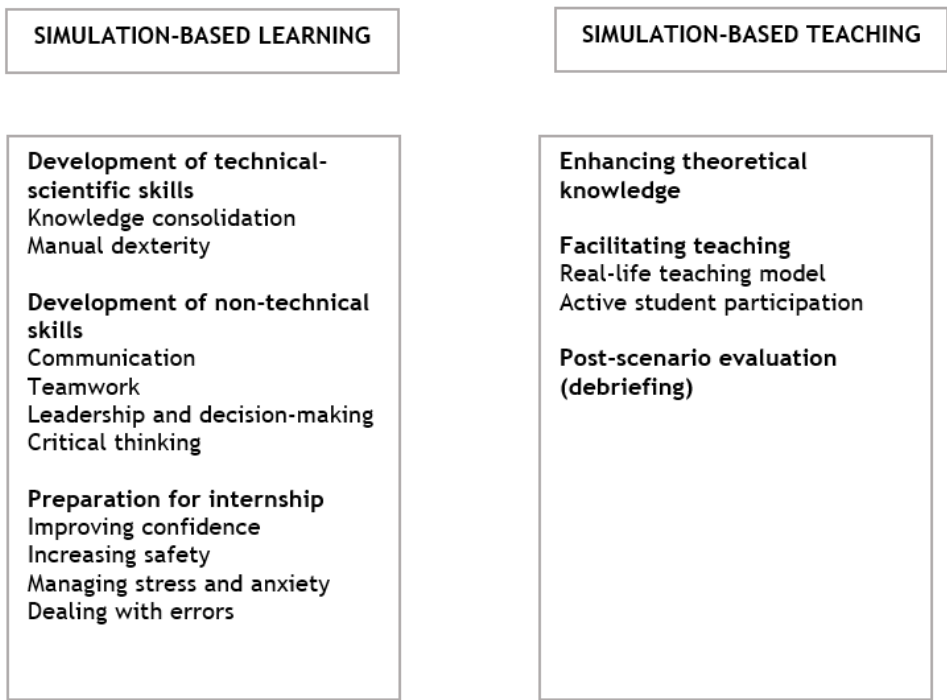


Figure 2. Overview of the themes, categories, and subcategories

Ethical considerations

The study was submitted to and approved by the Ethics Committee of the Health Sciences Research Unit (UICISA: E) of the ESEnFC, and formal approval to proceed with the study was obtained under opinion n°. P961_07_2023.

All participants were ensured data confidentiality and anonymity, the exclusive use of data for the purposes of this research, and the destruction of data at the end of the study. The informed consent form included the criteria for participation, the objectives of the study, the request for audio recording of the session, and the researcher’s obligations during the study to safeguard the ethical principles.⁽²²⁾ The focus groups were planned and conducted solely by the researchers.

RESULTS

The sample consisted of 16 women and one man aged 23 to 41 years, with a mean age of 29 years. Participants had an average of nine years of work experience. The majority (52,9 %) of them were married or in a de facto relationship. All participants reported having chosen the education institution because its laboratories had high-fidelity simulators.

Two themes emerged from data analysis: simulation-based learning and simulation-based teaching, as shown in Figure 2. The 'simulation-based learning' theme includes three categories: development of technical-scientific skills, development of non-technical skills, and preparation for internship. The "simulation-based teaching" theme includes three categories: enhancing theoretical knowledge, facilitating teaching, and post-scenario evaluation (debriefing). Each subcategory is further explained by illustrative quotes.

Simulation-based learning

Three categories emerged from data analysis: Development of technical-scientific skills, Development of non-technical skills, and Preparation for internship.

The 'Development of technical-scientific skills' category includes the 'Knowledge consolidation' and 'Manual dexterity' subcategories. The participants mentioned that high-fidelity simulation contributed significantly to the consolidation of theoretical knowledge, transferring it to clinical practice. The students reported that this methodology was essential to improve manual dexterity in obstetrics:

"I think high-fidelity simulation helped to consolidate knowledge, not only to understand the theoretical component, but also to understand exactly what happens" P1

"One of our biggest concerns is manual dexterity to perform procedures... being in a simulation context allows us to train manual dexterity" P3

The 'Development of non-technical skills' category includes the Communication, 'Teamwork', 'Leadership and Decision-making', and 'Critical thinking' subcategories.

Data analysis revealed that simulation is a learning methodology that promotes communication and teamwork. Participants described how they became more aware of the importance of communication and teamwork as they interacted with the various actors in the scenarios and with the simulator:

"We promote cohesion, we facilitate communication with each other, it makes us feel more comfortable and I think it helps our communication a lot" P8

"It is all very real, I think the communication with the simulator also makes it easier, it is as if we were in clinical practice" P3

"Doing the simulation as a team and in the different scenarios... it allows us to have someone by our side to call our attention to the different situations" P9

The participants reported that simulation was an opportunity to practice critical thinking, decision-making, and leadership skills in different scenarios:

"Simulation allows everyone, without exception, to take on a leadership role and develop it with the help of their colleagues" P4

"Having trained in different scenarios such as cardiotocography... helps us develop critical thinking and think about the best way to act" P10

The 'Preparation for internship' category includes four subcategories: 'Improving confidence,' 'Increasing safety,' 'Managing stress and anxiety,' and 'Dealing with errors.'

Students reported that this learning methodology helped them increase their confidence and assurance significantly, manage stress, and reduce the risk of errors in clinical contexts:

"... but I think we feel more confident having done the simulation... we felt reassured because we experienced with various scenarios, such as dystocia, nuchal cords, pelvic deliveries, normal deliveries, skin-to-skin contact." P7

"...we already know what to do because we practiced, which also makes us feel reassured and confident in clinical settings" P10

"It reduces stress and we find it easier to intervene, so I think it was a valuable experience" P1

"We feel more confident because we've already made mistakes in simulation and learned from them, so we're going to get it right and learn together." P1

Simulation-based teaching

The 'Simulation-based teaching' category includes three subcategories: 'Enhancing theoretical knowledge,' 'Facilitating teaching,' and 'Post-scenario discussion (debriefing)'.

In the subcategory "Enhancing theoretical knowledge" the students reported that knowledge should be enhanced for learning in a simulated context. This allows them to use their knowledge and improve their

performance:

"It helps us to link theory and practice to consolidate our learning, I think it's good." P5

"We learn how to apply this knowledge in practice while giving it the importance it deserves." P16

The 'Facilitating teaching' category includes the 'Real-life teaching model' and 'Active student participation' subcategories. Participants reported that high-fidelity simulation, which is an educational approach similar to real-world situations, helps students learn more effectively:

"High-fidelity simulation is very similar and close to reality." P4

"...it's similar to the real situation and more controlled, with pauses for us to understand the process and everything that can happen." P1

"... simulation lets us take an active role in our knowledge acquisition process, making us also responsible for our training." P5

In the subcategory "Post-scenario discussion (debriefing)" the participants reported that debriefing is a strategy for consolidating knowledge, allowing them to reflect on scenarios and identify and correct errors:

"...debriefing is very important because it lets us reflect on what we did..." P8

"Debriefing also allows us to monitor errors or other things that can be improved." P3

DISCUSSION

High-fidelity simulation is an important teaching and learning strategy in health as it helps nursing students develop clinical and non-clinical skills.^(23,24)

Participants reported that high-fidelity simulation helps them develop technical-scientific skills. Some studies show that simulation has a positive impact on the acquisition of knowledge and the development of skills for clinical practice. They also reported that simulation allows them to develop their skills, namely manual dexterity. Training and improving manual dexterity helped them to develop technical skills.^(8,25)

High-fidelity simulation also helped them develop non-technical skills needed for nursing practice, such as communication, teamwork, leadership, decision-making, and critical thinking.

As a learning tool, simulation helps to improve core clinical skills, such as effective communication, teamwork, decision-making, and critical thinking, which are sometimes difficult to train in internships or other environments with limited learning experiences.^(26, 27)

The different high-fidelity simulation scenarios also allow students to experience situations where they need to work as a team and learn about their roles, effective communication, and collaborative problem-solving. The dynamics between students during simulation scenarios allow students to develop their teamwork and communication skills.⁽²⁾ Simulation also helps them to learn with their peers, which encourages them to participate and engage in discussions, thus increasing collaborative learning.⁽⁴⁾

The participants reinforced that simulation scenarios helped them learn and become leaders. In these scenarios, students have to make important decisions and need to be effective leaders. Leadership and decision-making skills are essential in clinical practice, with high-fidelity simulation providing contexts in which students need to analyze information and make informed decisions.⁽²⁸⁾

In this decision-making process, students need to develop critical thinking, which is fundamental to nursing practice. Simulation-based learning improves students' clinical reasoning and self-confidence in clinical settings, promoting patient safety, and contributes to reflective and cumulative learning.^(4,29)

Participants highlighted that simulation can help them feel more confident and safe and better manage stress and anxiety to provide an adequate response to patients' needs.

The simulation experience allows students to face complex situations for the first time in a safe place and become better prepared for clinical placements, while reducing fear and anxiety in their first real experience in a clinical setting.⁽⁴⁾

Simulated practice increases self-confidence and self-efficacy, providing a safe training environment. At the same time, students improved structured thinking and consolidated the sequence of actions to better intervene in emergencies.⁽⁴⁾ Self-confidence is an important variable to intervene in emergencies and helps people to act quickly, do things well, and avoid errors.⁽³⁰⁾

The results of a study show that students in a simulation group were more confident and satisfied than those in the expository group, improving understanding and improving skills in clinical practice, in the management of obstetric emergencies and postpartum hemorrhages.⁽³¹⁾

Simulation provides a unique opportunity to identify, analyze, and correct errors in a safe and controlled environment. Repeated simulation training helps students understand their errors, analyze their causes, and learn from them to implement solutions.⁽³²⁾ Optimizing error-based learning requires a deliberate and careful approach, and teachers should plan and support students to recognize, admit, and respond effectively to their errors.⁽³³⁾

Students felt that trial-and-error learning was more effective with high-fidelity simulation because their errors had no irreversible consequences on real patients and were accepted as part of learning.^(4,34) In a study with nurse-midwifery students, Vermeulen *et al.*⁽³⁵⁾ found that simulation allowed them to make and learn from errors and improve their skills in a safe environment without harming patients. The students reported that simulation allows them to enhance theoretical knowledge by helping them apply their knowledge in different scenarios.

Simulation should be used after acquiring theoretical knowledge so that students can apply what they have learned. Many studies highlight the importance of linking theory and practice and the benefits for the teaching and learning process in nursing.⁽³⁶⁾ Students reported that simulation helped them apply theory to practice and consolidate their knowledge.⁽⁴⁾

Students identified simulation as an essential learning and teaching strategy because they face real-life situations and can actively participate in them. High-fidelity simulation is an innovative and effective teaching method that provides students with a simulated and immersive learning environment where they can apply their knowledge and skills in a realistic scenario.⁽¹⁾ In cases where real-life clinical situations only occur rarely, for example in obstetric emergencies, simulation is an essential part of midwifery curricula.⁽³⁵⁾

Students see simulation as a tool through which they can simulate real situations, playing an important role in the transition to clinical practice.^(6,37,38) Also, realistic scenarios facilitate learning by promoting a proactive attitude in students and allowing them to apply theory in clinical practice.^(3,25) A study uncovered associations among undergraduate nursing students' perceived realism, engagement level, and observed competency in a high-fidelity simulation.⁽³⁹⁾

Simulation experiences are an effective teaching and learning approach because they allow students to become more active and participative in a safe and controlled environment.⁽³⁵⁾

The participants highlighted the importance of post-scenario evaluation, which allowed them to reflect on, identify, and correct errors, improve their performance, and consolidate knowledge. High-fidelity simulation with debriefing is a powerful and essential tool in nursing education that helps students improve their performance and identify strengths and aspects in need of improvement.⁽⁴⁰⁾ Students can review their performance, discuss their actions, emotions, and decision-making processes, identify gaps in knowledge or skills, and learn from the simulation experience, thus maximizing their learning potential.⁽⁴¹⁾

Teachers play a key role in this process and should focus on student learning and not on evaluating or judging student performance.⁽⁴²⁾ Students can learn more by reflecting on their own work and with their peers.⁽⁴³⁾ Debriefing is crucial to making experiential learning effective because it provides more appropriate clinical reasoning patterns and helps students make the best decisions in real clinical settings.⁽⁴¹⁾

CONCLUSIONS

Simulation is crucial for the nursing discipline, specifically for the training of nurse-midwifery students, because it is a safe and effective strategy for acquiring skills, improving confidence, increasing safety, reducing stress and anxiety, and minimizing errors.

This study highlights the importance of high-fidelity simulation in the development of technical-scientific and non-technical skills essential for nurse-midwifery students, helping them to overcome the complex challenges experienced in midwifery units.

Nurse-midwifery students reported that high-fidelity simulation has helped them to become more familiar with complex clinical equipment and scenarios and more prepared to work in a complex hospital environment.

High-fidelity simulation, combined with effective debriefing, realistic teaching, and active student participation, is a powerful and effective approach in nursing education, preparing nurse-midwifery students to overcome clinical challenges with confidence, competence, and safety.

REFERENCES

1. Powell E, Scrooby B, Van Graan A. Nurse educators' views on implementation and use of high-fidelity simulation in nursing programmes. *Afr J Health Prof Educ.* 2020 Dec 1;12(4): 215. <https://doi.org/10.7196/AJHPE.2020.v12i4.1411>
2. Greene D, Doss J. Developing teamwork skills in baccalaureate nursing students: impact of TeamSTEPPS® training and simulation. *Int. J. Nurs. Educ. Scholarsh.* 2021;18(1): 20200077. <https://doi.org/10.1515/ijnes-2020-0077>
3. Fonseca L, Monteiro J, Aredes N, Bueno J, Domingues A, Coutinho V, Baptista R. Interdisciplinary simulation scenario in nursing education: Humanized childbirth and birth. *Rev Lat Am Enfermagem.* 2020 Jun 19; 28: 3286. <https://doi.org/10.1590/1518-8345.3681.3286>

4. Watson C, Gómez-Ibáñez R, Granel N, Bernabeu-Tamayo M. Nursing students first experience on high fidelity simulation: A phenomenological research study. *Nurse Educ Pract.* 2021 Aug; 55:103162. <https://doi.org/10.1016/j.nepr.2021.103162>
5. Costa R, Medeiros S, Martins J, Menezes R, Araújo M. O uso da simulação no contexto da educação e formação em saúde e enfermagem: uma reflexão acadêmica. *Espac. Saude.* 2015 março; 16(1): 59-65. <https://doi.org/10.22421/15177130-2015v16n1p59>
6. Moloney M, Murphy L, Kingston L, Markey K, Hennessy T, Meskell P, Atkinson S, Doody O. Final year undergraduate nursing and midwifery students' perspectives on simulation-based education: a cross-sectional study. *BMC Nurs.* 2022 Nov 6; 21(1): 299. <https://doi.org/10.1186/s12912-022-01084-w>
7. Sterner A, Nilsson M, Eklund A. The value of simulation-based education in developing preparedness for acute care situations: An interview study of new graduate nurses' perspectives. *Nurse Educ Pract.* 2023 Feb; 67: 103549. <https://doi.org/10.1016/j.nepr.2023.103549>
8. Azizi M, Ramezani G, Karimi E, Hayat A, Faghihi S, Keshavarzi M. A comparison of the effects of teaching through simulation and the traditional method on nursing students' self-efficacy skills and clinical performance: a quasi-experimental study. *BMC Nurs.* 2022 Oct 20; 21(1): 283. <https://doi.org/10.1186/s12912-022-01065-z>
9. Colon W, Zambrano P, Puruncajas J, Zhinin G. Exploration of virtual reality as a tool for simulating leadership and teamwork situations among university students. *Salud, Ciencia y Tecnología.* 2024 Jan 1;4:1017. <https://doi.org/10.56294/saludcyt20241017>
10. Moabi P, Mtshali N. Nurse Educators' Views on the Implementation of Simulation-based Education in Lesotho. *AJNM.* 2022; 24(2): 16. <https://doi.org/10.25159/2520-5293/12370>
11. Bailey L, Emory J. High-fidelity simulation improves confidence in nursing students. *Teach Learn Nurs.* 2022 Apr; 17(2): 191-194. <https://doi.org/10.1016/j.teln.2021.12.004>
12. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups. *Int J Qual Health C.* 2007 Dec; 19(6): 349-57. <https://doi.org/10.1093/intqhc/mzm042>
13. Barbour RS. *Doing Focus Groups.* 2th ed. Los Angeles: SAGE Publications Ltd; 2018. 1-225 p.
14. Kinalski DF, Paula CC, Padoin SM, Neves ET, Kleinubing RE, Cortes LF. Focus group on qualitative research: experience report. *Rev Bras Enferm.* 2017 Apr 1; 70(2): 424-9. <https://doi.org/10.1590/0034-7167-2016-0091>
15. Azeredo, Z. *Teoria e prática em investigação qualitativa.* Edições Piaget; 2019.
16. Krueger RA, Casey AM. *Focus Groups: a practical guide for applied research.* 5th ed. Washington DC: SAGE Publications, Inc.; 2015.
17. Flick U. *An Introduction to Qualitative research.* 6th ed. London: SAGE Publications Ltd; 2018.
18. Coutinho CP. *Metodologia de investigação em Ciências Sociais e Humanas: teoria e prática.* 2a ed., reimpressão. Coimbra: Almedina; 2022.
19. Egry EY, Fonseca RMG. Acerca da qualidade nas pesquisas qualitativas em Enfermagem. In: Costa AP, Souza FN, Souza DN, editors. *Investigação Qualitativa: inovação, dilemas e desafios.* 2a ed. Oliveira de Azemeis:Ludomedia; 2017. p. 75-102.
20. Krippendorff K. *Content Analysis: an introduction to its methodology.* 4th ed. California: Sage Publications, Inc.; 2019.
21. Bardin L. *Análise de Conteúdo.* 4a edição revista. Lisboa: Edições 70; 2014.
22. Morgan DL. *Basic and Advanced Focus Groups.* USA: SAGE Publications, Inc; 2018.

23. Cant R, Cooper S. Use of simulation-based learning in undergraduate nurse education: An umbrella systematic review. *Nurse Educ Today*. 2017; 49: 63-71. <https://doi.org/10.1016/j.nedt.2016.11.015>
24. Liaw S, Wong L, Chan S, Ho J, Mordiffi S, Ang S, et al. Designing and Evaluating an Interactive Multimedia Web-Based Simulation for Developing Nurses' Competencies in Acute Nursing Care: Randomized Controlled Trial. *J Med Internet Res* 2015;17(1): 5. <https://doi.org/10.2196/jmir.3853>.
25. Presado M, Colaço S, Rafael H, Baixinho C, Félix I, Saraiva C, Rebelo I. Learning with High Fidelity Simulation. *Cien Saude Colet*. 2018 Jan; 23(1): 51-59. Portuguese, English. <https://doi.org/10.1590/1413-81232018231.23072017>.
26. Amod HB, Brysiewicz P. Promoting experiential learning through the use of high-fidelity human patient simulators in midwifery: A qualitative study. *Curationis*. 2019; 42(1). <https://hdl.handle.net/10520/EJC-13b87d93be>.
27. Labrague L. Use of Simulation in Teaching Nursing Leadership and Management Course: An integrative review. *Sultan Qaboos Univ Med J*. 2021 Aug; 21(3): 344-353. <https://doi.org/10.18295/squmj.4.2021.007>.
28. Brown K, Rode J. Leadership development through peer-facilitated simulation in nursing education. *J. Nurs. Educ*. 2018; 57(1): 53-57. <https://doi.org/10.3928/01484834-20180102-11>.
29. Guerrero JG, Tungpalan-Castro GM, Pingue-Raguini M. Impact of simulation debriefing structure on knowledge and skill acquisition for postgraduate critical care nursing students: three-phase vs. multiphase. *BMC Nurs*. 2022 Dec 1; 21(1). <https://doi.org/10.1186/s12912-022-01100-z>.
30. Martins J, Coutinho V, Baptista R, Oliveira L, Gonçalves R, Paiva L, Mendes I. Impact of a simulated practice program in the construction of self-confidence for intervention in emergencies and its association with knowledge and performance. *J Nurs Educ Prac*. 2017; 7(1): 45-50. <http://dx.doi.org/10.5430/jnep.v7n1p45>.
31. Alsaraireh A, Madhavanprabhakaran G, Raghavan D, Arulappan J, Khalaf A. (). Effect of a high-fidelity simulation-based teaching-learning experience (SBTLE) on maternal health nursing students' knowledge of postpartum hemorrhage, confidence, and satisfaction. *Teach Learn Nurs*. 2024; 19(1): 176-181. <https://doi.org/10.1016/j.teln.2023.10.009>.
32. Kocyigit H, Karagozoglu S. Effects of Scenario-Based High Fidelity and Repeated Simulation Methods on the Medical Error Tendency, Self-efficacy and State Anxiety Levels of Nursing Students. *Int J Caring Sci*. 2022;15. Available from: www.internationaljournalofcaringsciences.org.
33. Palominos E, Levett-Jones T, Power T, Martinez-Maldonado R. Healthcare students' perceptions and experiences of making errors in simulation: An integrative review. *Nurs Educ Today*. 2019; 77: 32-9. <https://doi.org/10.1016/j.nedt.2019.02.013>.
34. Najjar R, Lyman B, Miehl N. Nursing Students' Experiences with High-Fidelity Simulation. *Int. J. Nurs. Educ. Scholarsh*. 2015; 12(1): 27-35. <https://doi.org/10.1515/ijnes-2015-0010>.
35. Vermeulen J, Buyl R, D'haenens F, Swinnen E, Stas L, Gucciardo L, et al. Midwifery students' satisfaction with perinatal simulation-based training. *Women and Birth*. 2021 Nov 1; 34(6): 554-62. <https://doi.org/10.1016/j.wombi.2020.12.006>.
36. Lucas G, Kemeny A, Paillot D, Colombet F. A simulation sickness study on a driving simulator equipped with a vibration platform. *Transp. Res. Part F: Traffic Psychol. Behav*. 2020; 68: 15-22. <https://doi.org/10.1016/j.trf.2019.11.011>.
37. Lockertsen Ø, Løvhaug L, Davik N, Bølgén B, Færden A, Skarstein S. Second-year undergraduate nursing students' experiences with clinical simulation training in mental health clinical practice: A focus group study. *Nurse Educ Pract*. 2023 Jan; 66:103534. <https://doi.org/10.1016/j.nepr.2022.103534>.
38. Nadler C, Pina J, Schmidt S, Okido A, Fonseca L, Rocha P, et al. Impact of high-fidelity simulation in

pediatric nursing teaching: an experimental study. *Texto Contexto Enferm.* 2022; 31: 20210410. <https://doi.org/10.1590/1980-265X-TCE-2021-0410en>.

39. Berro E, Dane F, Knoesel J. Exploring the relationships among realism, engagement, and competency in simulation. *Teach. Learn. Nurs.* 2023 18(4): 241-245. <https://doi.org/10.1016/j.teln.2023.07.010>.

40. Ali A, Miller E, Ballman K, Bakas T, Geis G, Ying J. The impact of debriefing modalities on nurse practitioner students' knowledge and leadership skills in managing fatal dysrhythmias: A pilot study. *Nurse Educ Pract.* 2020 Jan 1;42. <https://doi.org/10.1016/j.nepr.2019.102687>.

41. Tanoubi I, Labben I, Guédira S, Drolet P, Perron R, Robitaille A, et al. The impact of a high fidelity simulation-based debriefing course on the Debriefing Assessment for Simulation in Healthcare (DASH)© score of novice instructors. *J Adv Med Educ Prof.* 2019 Oct 1;7(4):159-64. <https://doi10.30476/jamp.2019.74583.0>.

42. Kolbe M, Eppich W, Rudolph J, Meguerdichian M, Catena H, Cripps A, et al. Managing psychological safety in debriefings: A dynamic balancing act. Vol. 6, *BMJ Simulation and Technology Enhanced Learning*. BMJ Publishing Group; 2020; 6(3): 164-171. <https://doi:10.1136/bmjstel-2019-000470>.

43. Wong FM, Chan AM, Lee NP, Luk KK. Can High-Fidelity Patient Simulation Be Used for Skill Development in Junior Undergraduate Students: A Quasi-Experimental Study. *Healthcare (Switzerland).* 2023 Aug 1;11(15): <https://doi.org/10.3390/healthcare11152221>

FINANCING

The authors did not receive financing for the development of this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

Conceptualization: Júlia Carvalho, Cláudia Brás, Ana-Bela Caetano.

Data curation: Júlia Carvalho, Cláudia Brás, Ana-Bela Caetano.

Formal analysis: Júlia Carvalho, Cláudia Brás, Ana-Bela Caetano.

Research: Júlia Carvalho, Cláudia Brás, Ana-Bela Caetano.

Methodology: Júlia Carvalho, Cláudia Brás, Ana-Bela Caetano.

Project management: Júlia Carvalho, Cláudia Brás, Ana-Bela Caetano.

Resources: Júlia Carvalho, Cláudia Brás, Ana-Bela Caetano.

Software: Júlia Carvalho, Cláudia Brás, Ana-Bela Caetano.

Supervision: Júlia Carvalho, Cláudia Brás, Ana-Bela Caetano.

Validation: Júlia Carvalho, Cláudia Brás, Ana-Bela Caetano, Helena Duarte, José Fonseca, Maria João Tomás, Inês Polónio.

Display: Júlia Carvalho, Cláudia Brás, Ana-Bela Caetano, Helena Duarte, José Fonseca, Maria João Tomás, Inês Polónio.

Drafting - original draft: Júlia Carvalho, Cláudia Brás, Ana-Bela Caetano, Helena Duarte, José Fonseca, Maria João Tomás, Inês Polónio.

Writing - proofreading and editing: Júlia Carvalho, Cláudia Brás, Ana-Bela Caetano, Helena Duarte, José Fonseca, Maria João Tomás, Inês Polónio.