High-Fidelity Simulation in Continuing Nursing Education: Strategy for Reducing Care Errors

Simulação de Alta Fidelidade na Educação Continuada de Enfermagem: Estratégia para Redução de Erros Assistenciais

Simulación de Alta Fidelidad en la Educación Continua de Enfermería: Estrategia para Reducir los Errores Asistenciales

RESUMO

Objetivo: Analisar o impacto da simulação de alta fidelidade na educação continuada de profissionais de enfermagem, com foco na redução de erros assistenciais. **Método:** Revisão integrativa da literatura nas bases MEDLINE, LILACS e BDENF, incluíram-se artigos publicados entre 2015 e 2024, disponíveis na íntegra em português, inglês e espanhol. **Resultados:** A literatura evidencia benefícios expressivos da simulação de alta fidelidade na capacitação de enfermeiros, como aprimoramento do raciocínio clínico, redução de falhas técnicas, fortalecimento da comunicação, aumento da confiança profissional e maior retenção de conhecimento. Estudos demonstram diminuição de eventos adversos após treinamentos simulados, sobretudo em contextos críticos como UTI e emergência. O debriefing pós-simulação mostrou-se relevante para o desenvolvimento do pensamento crítico. **Conclusão:** A simulação de alta fidelidade é estratégia eficaz para educação continuada em enfermagem, reduz erros assistenciais e promove a segurança hospitalar.

DESCRITORES: Treinamento com simulação de alta fidelidade; Enfermagem; Educação continuada; Segurança do paciente.

ABSTRACT

Objective: To analyze the impact of high-fidelity simulation on continuing education for nursing professionals, with a focus on reducing care errors. **Method:** Integrative literature review of the MEDLINE, LILACS, and BDENF databases, including articles published between 2015 and 2024, available in full in Portuguese, English, and Spanish. **Results:** The literature shows significant benefits of high-fidelity simulation in nurse training, such as improved clinical reasoning, reduced technical errors, strengthened communication, increased professional confidence, and greater knowledge retention. Studies show a decrease in adverse events after simulated training, especially in critical contexts such as ICUs and emergency rooms. Post-simulation debriefing has proven to be relevant for the development of critical thinking. **Conclusion:** High-fidelity simulation is an effective strategy for continuing education in nursing, reducing care errors and promoting hospital safety.

DESCRIPTORS: High-fidelity simulation training; Nursing; Continuing education; Patient safety.

RESUMEN

Objetivo: Analizar el impacto de la simulación de alta fidelidad en la formación continua de los profesionales de enfermería, con especial atención a la reducción de los errores asistenciales. **Método:** Revisión integradora de la literatura en las bases MEDLINE, LILACS y BDENF, incluyendo artículos publicados entre 2015 y 2024, disponibles en su totalidad en portugués, inglés y español. **Resultados:** La literatura evidencia beneficios significativos de la simulación de alta fidelidad en la formación de enfermeros, como la mejora del razonamiento clínico, la reducción de fallos técnicos, el fortalecimiento de la comunicación, el aumento de la confianza profesional y una mayor retención de conocimientos. Los estudios demuestran una disminución de los eventos adversos tras los entrenamientos simulados, sobre todo en contextos críticos como la UCI y las urgencias. El debriefing posterior a la simulación demostró ser relevante para el desarrollo del pensamiento crítico. **Conclusión:** La simulación de alta fidelidad es una estrategia eficaz para la educación continua en enfermería, reduce los errores asistenciales y promueve la seguridad hospitalaria.

DESCRIPTORES: Formación con simulación de alta fidelidad; Enfermería; Educación continua; Seguridad del paciente.

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INTRODUCTION

Patient safety is recognized as a central component of healthcare quality and is fundamental to the effectiveness, efficiency, and reliability of the services provided. According to the World Health Organization (WHO), patient safety involves the prevention of errors and unnecessary harm to patients resulting from healthcare, directly reflecting on the patient experience and the sustainability of the healthcare system (WHO; 2023).

In recent decades, there has been an increase in the number of adverse events observed in hospitals, which impact not only patients—increasing morbidity, mortality, and costs—but also professionals. International

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studies indicate that adverse hospital events occur in up to 10% of hospitalizations, approximately half of which could be prevented (SKELLY; 2025).

In the Brazilian context, data from the National Accreditation Organization (ONA) show that between August 2023 and July 2024, 295,355 healthcare failures were recorded. These events can cause harm to patients, prolong hospitalizations, generate additional costs, cause emotional distress among nursing professionals, compromise institutional trust, and imply legal risks (ONA; 2025).

In healthcare, professionals work in critical stages of care, often associated with significant failures, notably: medication administration, maintenance of invasive devices, monitoring of vital signs, emergency response, and interprofessional communication. The high number of reported failures reinforces the need for training strategies that transcend purely theoretical teaching, allowing professionals to develop technical and non-technical skills in environments that reproduce the complexity of real care, but without exposing patients to risks (OLIVEIRA, 2025).

In this context, continuing education emerges as an essential tool for the constant updating and improvement of healthcare professionals' skills. Through structured programs, training, and capacity-building activities, the aim is to strengthen knowledge, technical skills, and attitudes, ensuring that professionals are prepared to respond to the complex demands of healthcare practice and the challenges of patient safety (OLIVEIRA, 2025).

Given this scenario, high-fidelity clinical simulation has established itself as an innovative methodology in health education. Through realistic scenarios, simulation allows nursing students and professionals to practice technical skills, clinical reasoning, and behavioral competencies, such as communication, decision-making, and teamwork. Furthermore, studies suggest that simulated training can contribute to a reduction in adverse events in healthcare practice (NASCIMENTO; 2024, BOOSTEL; 2017).

In this context, the present study proposes to analyze the impact of high-fidelity simulation on the continuing education of nursing professionals, with a specific focus on reducing care errors. The research is justified by the need to assess whether this methodology, when applied to continuous professional practice, effectively contributes to improving patient safety, promoting quality care, and strengthening the training of professionals in highly complex services.

METHOD

This is an integrative literature review study, with the aim of aggregating and summarizing the results of other studies on the topic of high-fidelity simulation in continuing nursing education as a strategy for reducing healthcare errors, deepening knowledge about the investigated content. The integrative review consists of constructing a comprehensive analysis of the literature on a given topic, with the initial purpose of fully understanding the phenomenon analyzed based on previous studies.

The study was structured according to the stages of the integrative review, which include: definition of the problem and formulation of the research question, organization of the search strategy, establishment of inclusion and exclusion criteria, survey of relevant literature, analysis of selected studies, synthesis of data, and presentation of results.

In the initial stage, definition of the problem and elaboration of the guiding question, the PICO strategy was employed, in which the acronyms correspond to: P (Population); I (Intervention) – intervention or situation of interest; C (Comparison); and O (Outcome) – expected outcome or result.

Thus, in this study, PICO was defined as follows: P (Population): nursing professionals participating in continuing education; I (Intervention): use of high-fidelity simulation; C (Comparison): traditional methods of continuing education; and O (Outcome): reduction of care errors. Thus, the review had the following guiding question: "How can high-fidelity simulation, applied to continuing education in nursing, contribute to the reduction of care errors?".

The selection of scientific articles was carried out from January to April 2025, using the Medical Literature Analysis and Retrieval System Online (MEDLINE), Latin American and Caribbean Health Sciences Literature (LILACS), and Nursing Database (BDENF) as search sources, accessed through the Virtual Health Library (VHL). The following descriptors were used for the search strategy: High-fidelity simulation training; Nursing; Continuing education; Patient safety, controlled terms from the Health Sciences Descriptors (DeCS), whose combination was conducted using the Boolean operators *AND* and *OR* in order to increase the sensitivity and specificity in the retrieval of studies.

Strict inclusion criteria were defined to ensure the relevance and quality of the material analyzed. Articles published and available in full, written in Portuguese, English, or Spanish, and directly related to the topic under investigation, published between 2015 and 2024, were eligible. Exclusion criteria included abstracts, incomplete texts, and works classified as gray literature, such as theses, dissertations, and works that did not address the guiding question.

Data synthesis and presentation of results followed the Preferred Report-

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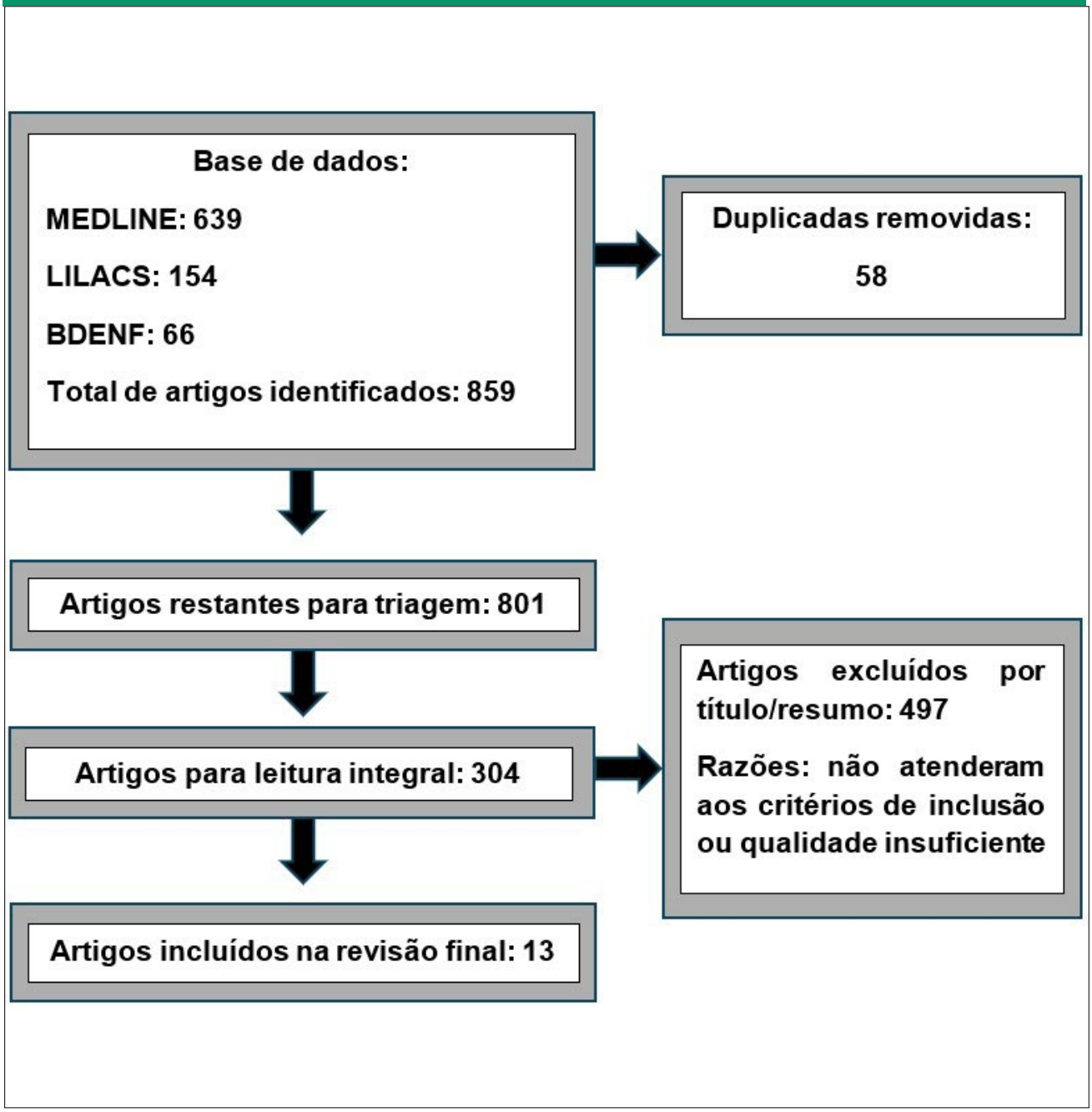
ing Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Initially, 859 articles were identified in the selected databases, 639 from MEDLINE, 154 from LILACS, and 66 from BDENF. After removing 58 duplicates, 801 articles remained for title and abstract analysis. At this stage, 497 articles were excluded because they did not meet the inclusion criteria, resulting in 304 articles for full reading. After complete evaluation, 51 studies were selected for critical analysis, of which 13 articles were effectively included in the review due to their relevance and methodological quality, as illustrated in Figure 1.

FIGURE 1: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)



Source: Own authorship (2025).

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Thirteen articles were selected for this study, identified in the following databases: MEDLINE (n = 5), LILACS (n = 3), and BDENF (n = 5), with a predominance of studies conducted in the field of nursing. The publications analyzed originated in different countries, namely: United States (n = 1), Spain (n = 1), United Kingdom (n = 1), Morocco (n = 1), Korea (n = 1), Brazil (n = 4), and Portugal (n = 4).

These articles were published between 2015 and 2024, distributed in the following journals: PLOS One (n=1), Revista Brasileira de Educação Médica (n=2), Nurse Education Today (n=1), Healthcare (n=1), BMC Medical Education (n=1), Revista Latino-Americana de Enfermagem (online) (n=1), Medicina (Ribeirão Preto, online) (n=1), Acta Paulista de Enfermagem (online) (n=1), Revista Eletrônica Acervo Saúde (n=1), Repositório Científico da Escola Superior de Enfermagem de Coimbra (n=1), Ciência & Saúde Coletiva (n=1), and Repositório Científico do Instituto Politécnico de Viana do Castelo (n=1).

Regarding the methodological design, the use of qualitative approaches (n=4) and experience reports (n=3) stood out, highlighting the search to understand perceptions, pedagogical practices, and training processes. Although less frequent, quasi-experimental (n=2), experimental (n=1), observational (n=1), quantitative (n=1), and diagnostic (n=1) studies were also identified. These data are presented in Table 1.

QUADRO 1: Descrição dos artigos conforme autores, ano de publicação, base de indexação, periódico de veiculação e metodologia empregada.

No.	Reference/Year	Journal	Location	Method
1	Lee *et al*. 2024[1]	MEDLINE	United States	Observational
2	González *et al*. 2019[2]	MEDLINE	Spain	Experience Report
3	Lestander *et al.* 2016[3]	MEDLINE	United Kingdom	Qualitative
4	Blaak *et al*. 2025[4]	MEDLINE	Morocco	Quasi-experimental
5	Kim *et al*. 2016[5]	MEDLINE	Korea	Qualitative
6	Duarte *et al*. 2024[6]	Lilacs	Portugal	Experimental
7	Barroso *et al*. 20237	Lilacs	Brazil	Experience Report
8	Kaneko *et al.* 2015[8]	Lilacs	Brazil	Experience Report
9	Araújo *et al*. 2021[9]	BDENF	Brazil	Diagnosis
10	Pereira *et al*. 2024[10]	BDENF	Brazil	Quasi-experimental
11	Simões 2022[11]	BDENF	Portugal	Quantitative
12	Presado *et al*. 2018[12]	BDENF	Portugal	Qualitative
13	Sousa 2021[13]	BDENF	Portugal	Qualitative

Source: Own work (2025).

The selected articles shared a common emphasis on the training and performance of health professionals, especially doctors and nurses, with a focus on educational practices, innovation in teaching, and qualification strategies. In summary, the articles reflect a convergent interest in improving health education and professional practice, pointing to the value of active methodologies and practical experiences as learning tools.

DISCUSSION

The findings of the reviewed studies reinforce the role of high-fidelity simulation (HFS) as a robust pedagogical tool for continuing education in nursing, especially in the context of patient safety and the reduction of care errors. In general, the articles converge on the evidence that HFS promotes the simultaneous improvement of technical and non-technical skills, favoring the development of critical attitudes, self-confidence, and decision-making skills in complex clinical situations [1,2,3,4,13].

A central point identified is the impact of HFS on affective and psychomotor learning, crucial aspects for early risk recognition, safe management of interventions, and effective communication. The revised meta-analysis demonstrated that high-fidelity experiences have more significant effects on psychomotor and affective domains, while medium-fidelity simulators favor specific technical skills [5]. Similarly, quasi-experimental studies

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show that SAF improves knowledge acquisition and retention, allowing professionals to transfer learning to real-life care situations, contributing to a reduction in care failures [4,6,9] .

In this context, evidence on medium-term retention is especially relevant. In a study that evaluated performance in pre-test, immediate post-test, and delayed post-test (30 days), it was observed that students who underwent simulation maintained high levels of knowledge, while the control group showed a significant decline[9]. This finding reinforces that SAF not only promotes immediate skill acquisition but also consolidates lasting learning, a critical element in ensuring the safe application of clinical protocols and procedures in real emergency or highly complex situations.

> “The literature emphasizes that healthcare errors are often associated with communication failures, inadequate leadership, and deficiencies in coordination and decision-making.”

High-fidelity simulation, by reproducing highly complex scenarios under emotional pressure and task overload, enables nurses to recognize these vulnerabilities safely, allowing learning from mistakes without risk to the patient [2,3,7,8,13] . Structured debriefing stands out as a critical element, promoting reflection on technical processes, decisions made, and team interaction, consolidating lasting behavioral changes [2,3,12].

In addition, SAF has proven effective in both academic settings and continuing education programs for experienced professionals, including intensive care units and hospital emergency rooms [7,8,10,13]. Studies conducted with nurses have demonstrated significant improvement in technical skills, such as airway management, defibrillation, and chest compressions, and in non-technical skills, such as situational awareness, communication, and cooperation, showing that even experienced professionals benefit from systematic training [13] . In situ simulation, in particular, allows training to be integrated into the real work environment, identifying organizational weaknesses and processes that can contribute to care errors, while taking advantage of the resources already available in the unit, facilitating implementation and team adherence [7,8] .

Another relevant aspect is the need for continuous and systematic training. One-off training increases risk perception and self-confidence, but does not necessarily consolidate sustainable behavioral changes [1,6]. The repetition of scenarios, combined with structured reflection and immediate feedback, strengthens cognitive, technical, and interpersonal skills, promoting knowledge retention and preparation for critical situations [4,9,12]. Furthermore, SAF promotes the integration of theory and practice, contributing to the development of critical thinking, clinical reasoning, prioritization of behaviors, and resource management skills, which are central elements for patient safety [1,3,12].

Although the benefits are evident, studies also point to challenges for implementation: high costs, the need for trained instructors, adequate infrastructure, and consistent pedagogical design are fundamental requirements for SAF to be effective and sustainable [2,4,5]. The use of in situ simulation emerges as a mitigating strategy, allowing training to take place with the hospital's own resources, in a real work environment, integrating training and care practice and facilitating team adherence [7,8].

CONCLUSION

High-fidelity simulation is an effective and versatile training strategy for continuing nursing education, promoting the integrated development of technical, cognitive, and non-technical skills. The findings of this review indicate that HFS not only improves the acquisition of clinical skills but also promotes knowledge retention, strengthens self-confidence, improves communication and teamwork, and encourages critical reflection on professional practice.

The systematic application of simulation, including in situ modalities, allows professionals to be trained in complex scenarios safely, identify potential flaws in care processes, and integrate training with the resources already available at the unit, directly contributing to the reduction of care errors and the strengthening of a culture of patient safety.

Therefore, it is recommended that continuing education programs incorporate high-fidelity simulation in a structured, continuous, and replicable manner, with guided debriefing and a focus on reflection on clinical practices, ensuring that professionals are prepared to deal with critical situations and maintaining high standards of quality and safety in care.

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