

Clinical simulation as a teaching-learning methodology in the management of pressure injuries¹

Simulación clínica como metodología de enseñanza-aprendizaje en el manejo de lesiones por presión

Simulação clínica como metodologia de ensino-aprendizagem no manejo de lesão por pressão

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ABSTRACT

Objective: To assess the influence of clinical simulation as an educational strategy on the knowledge of undergraduate nursing students about the assessment, prevention, and management of pressure injuries. **Methodology:** A quasi-experimental study was conducted in May 2023 with undergraduate nursing students. A simple random sample of 20 students was selected. The study was conducted in three stages: 1) pre-test; 2) implementation of the intervention (clinical simulation); and (3) post-test. For the pre- and post-tests, a validated instrument was used: the Caliri-Pieper Pressure Injury Knowledge Test. Descriptive analysis and Student's T-test for repeated measures were performed. A significance level of 5% ($p < 0.05$) was adopted. **Results:** Most participants were female (90%) and aged between 20 and 26 years. After the educational intervention, the levels of knowledge about pressure injuries increased significantly

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($p < 0.001$), with emphasis on the improvement in the identification of preventive strategies, such as the use of protective creams (from 45% to 85%) and adequate repositioning on the bed (from 10% to 55%). **Conclusion:** The study assessed the influence of clinical simulation on the enhancement of the knowledge of nursing students about the assessment, classification, prevention, and treatment of pressure injuries. The results indicated that the employed strategy effectively promoted the development of essential competencies for nursing practice, contributing to the training of future professionals.

Keywords: nursing education; nursing; pressure ulcer; clinical simulation; nursing care.

RESUMEN

Objetivo: Evaluar la influencia de la simulación clínica como estrategia educativa en el conocimiento de estudiantes de pregrado en enfermería sobre la evaluación, prevención y manejo de las lesiones por presión. **Metodología:** Estudio cuasi-experimental realizado en mayo de 2023 con estudiantes de pregrado en enfermería. Muestra aleatoria simple constituida por 20 estudiantes. El estudio se llevó a cabo en tres etapas. 1) pretest; 2) aplicación de la intervención (simulación clínica); y 3) posttest. Tanto para la prueba previa como para la posterior, se utilizó un instrumento validado, el Test de Conocimiento de Lesiones por Presión de Caliri y Pieper. Se realizó un análisis descriptivo y se aplicó la prueba *T de Student* para medidas repetidas. Se adoptó un nivel de significación del 5% ($p < 0,05$). **Resultados:** La mayoría de los participantes eran mujeres (90%), con edades entre 20 y 26 años. Tras la intervención educativa, los niveles de conocimiento sobre lesiones por presión aumentaron significativamente ($p < 0,001$), destacándose la mejora en la identificación de estrategias preventivas, como el uso de cremas protectoras (del 45% al 85%) y el reposicionamiento adecuado en la cama (del 10% al 55%). **Conclusión:** Este estudio evaluó la influencia de la simulación clínica en el enriquecimiento del conocimiento de estudiantes de enfermería acerca de la evaluación, clasificación, prevención y tratamiento de las lesiones por presión. Los hallazgos demostraron que dicha estrategia promovió eficazmente el desarrollo de competencias esenciales para la práctica de enfermería, contribuyendo a la formación de futuros profesionales.

Palabras clave: educación en enfermería; enfermería; úlcera por presión; simulación clínica; atención de enfermería.

RESUMO

Objetivo: Avaliar a influência da simulação clínica como estratégia educacional no conhecimento de estudantes de graduação em enfermagem sobre avaliação, prevenção

e manejo de lesões por pressão. **Metodologia:** Estudo quase-experimental, não randomizado, realizado em maio de 2023 com estudantes de graduação em enfermagem. Amostra aleatória simples constituída por 20 estudantes. O estudo foi conduzido em três etapas. 1) pré-teste; 2) aplicação da intervenção (simulação clínica); e 3) pós-teste. Para o pré e o pós-teste, utilizou-se um instrumento validado, o Teste de Conhecimento de Lesão por Pressão de Caliri e Pieper. Realizou-se análise descritiva e o teste *T de Student* de medidas repetidas. Adotou-se um nível de significância de 5% ($p < 0,05$). **Resultados:** A maioria dos participantes era do sexo feminino (90%), com idades entre 20 e 26 anos. Após a intervenção educativa, os níveis de conhecimento sobre lesões por pressão aumentaram significativamente ($p < 0,001$), com destaque para a melhoria na identificação de estratégias preventivas, como o uso de cremes protetores (de 45% para 85%) e reposicionamento adequado no leito (de 10% para 55%). **Conclusão:** O estudo avaliou a influência da simulação clínica no aprimoramento do conhecimento de estudantes de enfermagem sobre avaliação, classificação, prevenção e tratamento de lesões por pressão. Os resultados evidenciaram que a estratégia utilizada foi capaz de promover o desenvolvimento de competências essenciais para a prática de enfermagem, contribuindo para a capacitação de futuros profissionais.

Palavras-chave: educação em enfermagem; enfermagem; lesão por pressão; simulação clínica; cuidados de enfermagem.

INTRODUCTION

Over recent years, the enhancement of teaching-learning strategies, especially in health-related courses, has been driven by the implementation of active methodologies, among which clinical simulation (CS) should be highlighted. CS is a pedagogical approach that integrates theory and practice, providing training in skills and competencies, as well as fostering the development of self-confidence, critical-reflective thinking, and professional maturity (Araújo, 2022). This methodology allows students to experience clinical situations, from simple to complex, in controlled environments that simulate reality, allowing for a range of possibilities for training (Bortolato-Major *et al.*, 2019).

In order to achieve the planned results and improve the performance of the participants, all simulation-based experiences require systematic, flexible, and cyclical planning (Tyerman *et al.*, 2019). Accordingly, CS is divided into stages. The first stage is the pre-briefing, which aims to prepare students through theoretical foundation based on consistent available evidence and to guide them for the simulated experience, establishing the rules and ensuring a psychologically safe learning environment, essential for student engagement (INACSL Standards Committee *et al.*, 2021). Next, in the second stage, the development of the simulated scenario occurs. This stage requires

the elaboration of a scenario validated by specialists, including measurable goals and objectives, and a detailed description of the used environment and resources (Bortolato-Major *et al.*, 2019; Lioce *et al.*, 2015; Oliveira *et al.*, 2018). Finally, the third stage is carried out, the debriefing. At this moment, the students are led to critical reflection on the experienced scenario, identifying points for improvement, discussing good practices, and also recognizing mistakes and successes. The debriefing should be conducted by qualified professionals and grounded in theories and scientific evidence (Bortolato-Major *et al.*, 2019; INACSL Standards Committee *et al.*, 2021).

Clinical simulation as an active methodology has great potential for training nursing students, especially regarding the management of pressure injuries (PIs). They are considered a global public health problem, with a significant impact on the quality of life of patients and their families (EPUAP/NPIAP/PPPIA, 2019).

Pressure injuries are characterized as damage to the skin and/or soft tissues, often located over bony surfaces or caused by medical devices. They result from prolonged pressure and can be worsened by factors such as comorbidities, inadequate nutrition, and local microclimate (Moraes *et al.*, 2016). They are often observed in patients with reduced mobility, hospitalized for long periods or in intensive care units, and represent an important indicator of the quality of the provided care. Inadequate management is associated with increased morbidity and mortality, prolonged hospitalization, high readmission rates, high health care costs, and significant physical and emotional suffering for patients and families (EPUAP/NPIAP/PPPIA, 2019; Rabeh *et al.*, 2018).

In professional practice, it is the nurse's role to lead the risk identification process, apply predictive scales such as the Braden Scale, implement preventive interventions, conduct continuous assessment, and coordinate interdisciplinary care, being a key player for the safety and recovery of the patient with pressure ulcers (Alshahrani *et al.*, 2021). However, studies have shown significant gaps in the theoretical-practical knowledge of nursing students regarding PIs, particularly concerning prevention, classification, and clinical application of the acquired knowledge. Even though they exhibit positive attitudes, many students demonstrate insufficient knowledge to ensure safe and effective practice (Cukljek *et al.*, 2022; Kara; Arikan; Kahyaoglu, 2021; Bobbink *et al.*, 2023).

Thus, it is noted that traditional teaching of this content, often focused on theoretical exposition, is not always sufficient to promote the development of clinical skills and critical judgment necessary for decision-making in real situations. In light of this, higher education institutions have invested in innovative strategies, such as clinical simulation, which favors experiential learning, clinical reasoning, and the safety of future professionals in caring for patients at risk of PIs. Accordingly, it becomes essential to

investigate whether this teaching methodology aids in meaningful learning about this theme even during training. Therefore, this study aimed to assess the influence of clinical simulation as an educational strategy on the knowledge of undergraduate nursing students regarding assessment, prevention, and management of pressure injuries.

METHODOLOGY

This is a quasi-experimental (pre-post) study, non-randomized, conducted in May 2023 with undergraduate nursing students from a public university in the Zona da Mata region of Minas Gerais. The study took place at the Clinical Simulation Center of the institution, an environment designed for practical teaching with infrastructure similar to that of a hospital unit. The laboratories of the Clinical Simulation Center are equipped with beds, mannequins, and hospital supplies (gloves, sheets, solutions, dressing kits, among others). The environment was carefully designed to simulate a clinical ward, providing students with a realistic and safe professional learning experience.

The study population consisted of students regularly enrolled in the Nursing Skills I subject of the nursing undergraduate program, totaling 71 students. The research was disseminated among the students through a random selection draw. A sample of 20 students was included, selected through simple random sampling. The draw was conducted by a researcher external to the study. This number was established to ensure the effectiveness of the clinical simulation that requires small groups for better utilization. This choice also considered the need for a comfortable accommodation and to provide a clear view of the scenario development for all participants in the study site's laboratory. Previous participation in clinical simulation at some point during the nursing undergraduate program was adopted as an inclusion criterion. This decision was based on the need to ensure prior familiarity with the simulation methodology, its structural elements, and overall dynamics, in order to avoid difficulties related to the unfamiliarity of the strategy interfering with the understanding of the scenario objectives or the study results.

The study was conducted in three stages. In the first stage, lasting 30 minutes, participants signed the Free and Informed Consent Form and received information about the research. Subsequently, they filled out a semi-structured sociodemographic questionnaire and answered a pre-test using the instrument validated in Portuguese named Caliri-Pieper Pressure Injury Knowledge Test (TCLP Caliri-Pieper) (Miyazaki; Caliri; Santos, 2010). This test is an instrument widely used to assess the knowledge of nursing professionals on the prevention and treatment of pressure injuries, consisting of 41 true or false statements, with eight items on the assessment and classification of PI and 33

items on prevention. For each of the statements, the participant should select an answer considering the options: True (T), False (F), and Do not Know (DK). For each correct answer, one point was assigned. The correct answers corresponded to true statements answered as T or false statements answered as F. For incorrect answers or those answered as DK, the assigned score was zero. The total score of the knowledge test corresponded to the sum of all correct answers, with knowledge about the theme considered adequate if achieving 90% or more of correct answers according to what was established by the authors of the scale (Miyazaki; Caliri; Santos, 2010).

The second stage of the research consisted of a structured intervention in three moments: pre-briefing, simulated scenario, and debriefing. The intervention was carried out in a single day, in the morning shift. The following learning objectives were addressed: (1) conduct anamnesis and physical examination focusing on the main complaint; (2) identify and classify correctly PIs; (3) perform dressings technically and safely; and (4) guide the patient and accompanying person according to the guidelines of good clinical practices. The pre-briefing, lasting two hours, was conducted through a theoretical expository class on the study theme and then followed by a practical activity carried out in small groups at the institution's Clinical Simulation Center. This practice had the objective of consolidating the skills developed in the theoretical stage, promoting the integration between conceptual knowledge and technical application.

In the sequence, a simulated scenario was executed, based on a script previously validated by Gouveia (2020), which portrayed the admission of a patient to a hospital unit for the treatment of PI. The script was adapted with authorization to meet the research objectives. Simulated patients participated in the simulation, represented by individuals trained to faithfully perform the roles of hospitalized patients and accompanying people, providing greater realism and involvement to the experience. The activity was conducted by a professor and nurse who is a member of the research team, with extensive experience in clinical simulation, author of studies and publications in the field. Two of the students who composed the study sample were invited, voluntarily, to act as nurses responsible for the health care, while the other participants (18) acted as observers. The execution time of the scenario was approximately 30 minutes. After the simulation, all the students participated in a 15-minute debriefing session, mediated by the teacher, in a private environment, focused on a critical analysis of their performance, reflection on the learned lessons, and identification of topics for improvement. Finally, the third stage of the research was conducted. This session lasted for 30 minutes, and the students were asked to complete the post-test by answering the TCLP Caliri-Pieper instrument again.

The data were double-entered in Microsoft Excel® and analyzed using the Statistical Package for the Social Sciences (SPSS, version 23). For the overall assessment of the obtained answers, all questions were scored according to the answer key present in the instrument used for data collection. Continuous variables were described based on their means and standard deviations, and categorical variables were described using frequencies and proportions. A Student's T-test for repeated measures was used to investigate whether the intervention was able to improve the knowledge about pressure injury in the sample. The normality of the data was assessed using the Shapiro-Wilk test (0.933; $p=0.173$). A significance level of 5% ($p<0.05$) was adopted.

The study followed the ethical principles of Resolution nº 466/2012 of the Brazilian National Health Council, being approved by the Ethics Committee in Research with Human Beings of the proposing institution, under Opinion nº 5,644,838. The students who agreed to participate in the research signed the Free and Informed Consent Form, guaranteeing the confidentiality and anonymity of the data.

RESULTS

Among the 20 students who made up the sample, most were female, totaling 18 participants (90%), who were aged between 20 and 26 years. Only three participants (15%) reported having prior training, of whom one (5%) had completed a degree and two (10%) had technical training.

Regarding the knowledge of students about the assessment and classification of pressure injuries, among the eight questions that measured this item, after the intervention, the students achieved over 90% accuracy in four (50%) of the questions. Only question 6, "A pressure injury in stage/category 3 is a partial loss of skin involving the epidermis," showed a decrease in the percentage of correct answers after the intervention. An improvement in general knowledge was identified after the implemented intervention, particularly regarding question 38, "Stage/category 2 pressure injuries can be extremely painful due to the exposure of nerve endings," with a significant increase from 10% to 60% in correct answers (Table 1).

Table 1 – Knowledge of nursing students about the ASSESSMENT and CLASSIFICATION of Pressure Ulcers regarding the pre- and post-test. Viçosa, MG, Brazil, 2023.

Questions	Pre-test		Post-test	
	n	%	n	%
1 – Stage/category 1 pressure injury is defined as intact skin with a localized area of erythema that does not blanch and may appear differently on darkly pigmented skin. (T)	16	80.0	18	90.0
6 – A stage/category 3 pressure injury is a partial loss of skin, involving the epidermis. (F)	15	75.0	14	70.0
9 – Stage/category 4 pressure injuries manifest full-thickness skin loss and tissue loss with exposure or direct palpation of the fascia, muscle, tendon, ligament, cartilage, or bone. (T)	20	100.0	20	100.0
20 – Stage 2 pressure injuries manifest full-thickness skin loss. (F)	12	60.0	13	65.0
31 – Pressure injuries are sterile wounds. (F)	13	65.0	19	95.0
32 – An area of skin with a pressure injury scar may be damaged more quickly than intact skin. (T)	11	55.0	16	80.0
33 – A blister in the calcaneus area should not be a cause for concern. (F)	19	95.0	20	100.0
38 – Stage/category 2 pressure injuries can be extremely painful due to the exposure of nerve endings. (T)	2	10.0	12	60.0

Source: data collected from research, 2023.

When analyzing the knowledge of nursing students about the prevention of pressure ulcers before and after the intervention, no improvement in knowledge was identified only in question 19, “The patient with limited mobility who can remain in the chair should have a cushion on the seat to protect the bony prominences (V),” where the percentage of correct answers dropped from 85% in the pre-test to 70% in the post-test. It is noteworthy that, in questions 22, “The measures to prevent new injuries do not need to be adopted continuously when the patient already has a pressure injury (F),” 26, “Every patient who is not ambulating should be subjected to a risk assessment for the development of pressure injury (V),” 35, “All care to prevent or treat pressure injuries do not need to be recorded (F),” and 37, “Friction can occur when moving the patient on the bed (V),” the students already showed a high percentage of knowledge in the pre-test (95%), with an increase to 100% in the post-test. In addition, in questions 12, “A schedule with times for changing the patient’s position should be used for every patient with the presence of or at risk for pressure injury (T),” 24, “The mobilization and transfer of patients who cannot move independently should always be carried out by

two or more people (T)", 27, "Patients and their relatives should be informed about the causes and risk factors for the development of pressure injury (T)", and 40, "The development of educational programs in the institution can reduce the incidence of pressure injury (T)", the students achieved 100% accuracy in both tests (Table 2).

Table 2 – Knowledge of nursing students about the PREVENTION of Pressure Injury regarding the pre- and post-test after the intervention (clinical simulation). Viçosa, MG, Brazil, 2023.

Questions	Pre-test		Post-test	
	n	%	n	%
2 – The risk factors for the development of pressure ulcers are: immobility, incontinence, inadequate nutrition, and altered level of consciousness. (T)	17	85.0	20	100.0
3 – All patients at risk for pressure ulcers should have systematic skin inspections at least once a week. (F)	11	55.0	11	55.0
4 – The use of hot water and soap can dry out the skin and increase the risk for pressure injury. (T)	11	55.0	20	100.0
5 – It is important to massage the areas of the bony prominences, if they are hyperemic. (F)	7	35.0	18	90.0
7 – All patients should be assessed upon their admission to the hospital for the risk for the development of pressure injuries. (T)	16	80.0	19	95.0
8 – The transparent healing creams and extra-fine hydrocolloid dressings help to protect the skin against the friction effects. (T)	9	45.0	17	85.0
10 – An adequate dietary intake of proteins and calories should be maintained during illness/hospitalization. (T)	16	80.0	20	100.0
11 – Patients who are restricted to bed should be repositioned every 3 hours. (F)	18	90.0	18	90.0
13 – Water or air gloves help to prevent pressure injuries. (F)	9	45.0	19	95.0
14 – Waterwheel or air cushion types help to prevent pressure injuries. (F)	3	15.0	16	80.0
15 – In the lateral decubitus position, the patient with presence of pressure injury or at risk for one should maintain an angle of 30 degrees in relation to the mattress of the bed. (T)	2	10.0	11	55.0
16 – In a patient with the presence of a pressure injury or at risk for one, the head of the bed should not be elevated at an angle greater than 30 degrees, unless there is a medical contraindication. (T)	7	35.0	17	85.0

17 – The patient who cannot move by himself/herself should be repositioned every 2 hours when sitting in the chair. (F)	7	35.0	10	50.0
18 – The patient with limited mobility who can change body position without assistance should be advised to relieve pressure every 15 minutes while sitting in the chair. (T)	10	50.0	19	95.0
19 – The patient with limited mobility who can remain in the chair should have a cushion on the seat to protect the area of bony prominences. (T)	17	85.0	14	70.0
21 – The skin of the patient at risk for pressure injury should remain clean and free of moisture. (T)	16	80.0	19	95.0
23 – The movable sheets or covers should be used to transfer or move patients who cannot move by themselves. (T)	15	75.0	17	85.0
25 - In the patient with a chronic condition who cannot move by himself/herself, rehabilitation should be initiated and include guidance on the prevention and treatment of pressure injuries. (T)	18	90.0	20	100.0
28 - The areas of bony prominences can come into direct contact with each other. (F)	17	85.0	20	100.0
29 - Every patient at risk for the development of pressure injuries should have a mattress that redistributes pressure. (F)	12	60.0	19	95.0
30 - When macerated by moisture, the skin is damaged more easily. (T)	17	85.0	20	100.0
34 – A good way to reduce pressure in the calcaneus area is to keep it elevated from the bed. (T)	17	85.0	19	95.0
36 – Shearing is the force that occurs when the skin adheres to a surface and the body slides. (T)	17	85.0	19	95.0
39 – In patients with incontinence, the skin should be cleaned at the time of elimination and during routine intervals. (T)	18	90.0	20	100.0
41 – Hospitalized patients need to be assessed for the risk of pressure injury only once during their hospitalization. (F)	20	100.0	19	95.0

Source: data collected from research, 2023.

The knowledge of students was measured before the intervention (pre-test) and after the intervention (post-test). The results showed that the levels of knowledge were higher in the post-test compared to the pre-test ($p < 0.001$) (Table 3).

Table 3 – Test results of the difference in the levels of knowledge about Pressure Injury before (pre-test) and after the intervention (post-test). Viçosa, MG, Brazil, 2023.

Variables	n*	Mean	SD**	p-value***
Pre-test	20	29.35	2.66	
Post-test	20	36.70	2.08	<0.001

Source: research data, 2023.

*n: sample size;

**SD: standard deviation;

***Paired Student's T-test.

DISCUSSION

PIs are considered important indicators of the quality of health care. Their emergence is often associated with pain, suffering, and increased costs for health systems, in addition to negatively impacting patient safety and the quality of life of family members (Rabeh *et al.*, 2018). In light of this, periodic assessment, accurate classification, and the implementation of preventive strategies are fundamental responsibilities of the nurse. In order to perform these effectively, constant updating of knowledge is essential, along with the use of pedagogical methodologies capable of promoting the practical application of technical-scientific knowledge (Moraes *et al.*, 2016).

In this study, an intervention was carried out consisting of a theoretical expository class on the theme, practical laboratory activities focusing on technical skills, execution of a simulated scenario, and debriefing. This proposal was designed to enhance learning potential, promoting the retention of theoretical content, the development of technical skills, and clinical reasoning, in a controlled environment that favored critical reflection and decision-making. The literature has demonstrated that associated didactic strategies, especially when they include active methodologies such as CS, promote significant gains in the cognitive, technical, and attitudinal performance of health students (Campoi *et al.*, 2019). In particular, CS stands out for providing a safe environment for learning, where mistakes can be corrected without causing harm to the patient, favoring the development of clinical competencies based on reflective experiences. In the field of nursing, its use has been widely validated as an effective tool for teaching complex themes, such as the prevention and management of pressure ulcers, precisely because it allows for the integration of theory, practice, and patient-centered care (Silva *et al.*, 2023).

Among the questions related to the assessment and classification of pressure injuries, those with the highest accuracy rates in the post-test stood out, such as questions 1, 31, and 33, which addressed the definition of stage 1 PI, the sterile nature of the injuries, and the presence of blisters in the calcaneus area, respectively. These results indicate that, although the students had limited prior knowledge, the methodological intervention helped in consolidating the content, suggesting that the integrated approach favored meaningful learning. Previous studies have also reported deficits in knowledge about the assessment and classification of pressure ulcers among nursing professionals and students, reinforcing the relevance of more effective educational strategies (Fulbrook; Lawrence; Miles, 2019; Correia; Santos, 2019).

Of all the questions related to the assessment and classification of PIs, question 38 showed the lowest accuracy rates in the pre- and post-test, with an increase from 10% (2 correct answers) to 60% (12 correct answers). Although this growth indicates an improvement in performance after the educational intervention, the final percentage still remained below expectations, particularly when compared to the other questions addressed in the instrument. The question dealt with a specific aspect of the stage/category 2 PIs: the fact that they can be extremely painful due to the exposure of nerve endings. One possible hypothesis for this inferior performance is that, during academic training, the contents on pain physiology and its relationship with skin anatomy are not always explored in depth in the context of PIs. Teaching tends to prioritize morphological characteristics, such as depth, color, and the presence of devitalized tissue, while the sensory and subjective components of the injury experience, such as pain, may be undervalued in theoretical and practical contents. Accordingly, there is consensus in the literature about the need for more innovative and integrated teaching methods that include the patient's perspective, especially regarding pain and discomfort (Ariburnu; Korkmaz, 2024; Chao *et al.*, 2024).

Therefore, these findings highlight the importance of enhancing the education on pressure injuries, incorporating approaches that encompass the subjective dimension of the suffering experienced by the patient, such as, for example, pain, in line with the principles of person-centered care. In addition, they point to the need for future research that explores more deeply how knowledge about the sensory aspects of PIs is constructed throughout nursing training, contributing to the development of more comprehensive and humanized clinical competencies (Ariburnu; Korkmaz, 2024; Chao *et al.*, 2024).

In the questions related to the prevention of PIs, those with the highest correct answer rate in the post-test (100%) include question 2, which addresses the risk factors for the development of PIs, such as immobility, incontinence, inadequate nutrition, and altered

level of consciousness. Among these factors, immobility should be highlighted as one of the main determinants for the onset of this problem, showing the importance of actions aimed at patient mobility as an essential preventive strategy.

Questions 24 and 25 complement this approach by describing preventive actions related to mobility, including guidelines on the adequate movement of the patient on the bed. This result reinforces the relevance of a practical and evidence-based approach in daily care. Additionally, other risk factors, such as skin maceration and dryness, are addressed in questions 4, 21, 30, and 37, which emphasize preventive measures to minimize these factors, such as the use of protective barriers and the maintenance of skin hydration. Furthermore, among the questions with the highest success rates in the post-test, question 26 stands out, which addresses the assessment of non-ambulatory patients, and question 35, which concerns the documentation of care related to the prevention of PIs. These findings reinforce the importance of detailed record-keeping and continuous assessment as critical components for quality care and prevention of PIs. The results show that, although nursing professionals have knowledge about risk factors and preventive measures, it is essential that this knowledge is integrated into the planning and implementation of preventive care in a systematic manner. Previous studies, such as that of Souza *et al.* (2021), support the need for continuous training and the adoption of evidence-based protocols to promote a comprehensive and efficient approach to the prevention of pressure injuries.

Finally, the findings of this study indicate that clinical simulation had a positive impact on increasing knowledge about PIs, demonstrating its assistance in enhancing the understanding of students in terms of prevention, assessment, classification, and treatment. However, some limitations should be considered. The sample being restricted to a single educational context may limit the generalization of the findings. The lack of a control group also made it difficult to compare the effectiveness between different pedagogical approaches. In addition, there was no assessment of long-term retention of the acquired knowledge.

CONCLUSION

The current study assessed the use of clinical simulation in enhancing the knowledge of nursing students about the assessment, classification, prevention, and treatment of pressure injuries, with a sample of 20 nursing students. The results demonstrated that clinical simulation is an active methodology that influences the development of essential competencies for nursing practice, significantly contributing to the training of future professionals in the prevention and management of pressure injuries. It is concluded that this educational approach positively impacts academic training by integrating

theory, practice, and critical reflection, favoring the consolidation of knowledge and the improvement of care quality, in accordance with the principles of patient-centered care and evidence-based practice.

As perspectives for future investigations, it is suggested to conduct studies with larger and more representative samples, including different educational institutions, as well as the use of control groups for comparison between methodologies. Furthermore, it is recommended to analyze knowledge retention in the medium and long term and to investigate the impacts of this strategy on clinical performance in real care contexts. Such studies may contribute to the strengthening of the evidence on the effectiveness of clinical simulation and to improving nursing education curricula.

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