Literature review

Undergraduate nursing students' knowledge of pressure injury prevention: an integrative review

Conhecimento de graduandos de enfermagem sobre prevenção das lesões por pressão: uma revisão integrativa

Lorena Fortuna Santos Rastely[1]
Rosana Freitas Azevedo[2]
Maria de Lourdes de Freitas Gomes[3]

[1]Corresponding author. Universidade do Estado da Bahia (Salvador). Bahia, Brazil. lorenafortuna10@gmail.com
[2]Universidade do Estado da Bahia (Salvador). Bahia, Brazil.
[3]Escola Bahiana de Medicina e Saúde Pública (Salvador). Bahia, Brazil.

ABSTRACT | OBJECTIVE: To identify what scientific publications describe about undergraduate students' knowledge of pressure injury prevention measures. **METHODS:** Integrative review with articles published between 2019 and June 2024 in the SciELO, MEDLINE, SCOPUS, EMBASE, Web of Science and LILACS databases, through the VHL. The descriptors used were: pressure injury, nursing students, knowledge, disease prevention. The data from the selected studies was gathered using a data collection tool. After this stage, the studies were synthesized in descriptive form for discussion. **RESULTS:** 17 articles were found that met the objective of the study, 13 of which were published internationally and 4 nationally. The analysis revealed that 76.5% identified insufficient levels of knowledge about the prevention of pressure injuries in academic nursing training. The students had difficulties with aspects such as the concept of shear, the angle of elevation of the headboard, daily inspection of the skin and adequate time for repositioning patients. Only 23.5% of the studies indicated adequate levels of knowledge on the subject. **CONCLUSION:** The articles analyzed reflect that the level of knowledge about PI prevention by undergraduate nursing students is inadequate. Insufficient rates of correct answers were found in relation to PI preventive measures, highlighting gaps in academic training and the need to reformulate educational approaches in undergraduate training.

KEYWORDS: Nursing. Knowledge. Pressure Injury. Nursing Students. Prevention.

RESUMO | OBJETIVO: Identificar o que as publicações científicas descrevem sobre o conhecimento dos graduandos acerca das medidas de prevenção de lesão por pressão. **MÉTODOS:** Revisão integrativa com artigos publicados entre os anos de 2019 a junho de 2024 nas bases de dados SciELO, MEDLINE, SCOPUS, EMBASE, Web of Science e LILACS, por meio da BVS. Os descritores utilizados foram: lesão por pressão, estudantes de enfermagem, conhecimentos, prevenção de doenças. Os dados dos estudos selecionados foram reunidos utilizando um instrumento de coleta de dados. Após essa etapa, os estudos foram sintetizados de forma descritiva para discussão. **RESULTADOS**: Foram encontrados 17 artigos que se adequaram ao objetivo do estudo, sendo 13 estudos publicados em nível internacional e 04 em nível nacional. A análise revelou que 76,5% identificaram níveis insuficientes de conhecimento sobre a prevenção de lesões por pressão na formação acadêmica em enfermagem. Os acadêmicos apresentaram dificuldades em aspectos como conceito de cisalhamento, ângulo de elevação da cabeceira, inspeção diária da pele e tempo adequado de reposicionamento de pacientes. Apenas 23,5% dos estudos apontaram níveis adequados de conhecimento sobre o tema. **CONCLUSÃO:** Os artigos analisados refletem a que o nível de conhecimento sobre a prevenção de LP por graduandos de enfermagem é inadequado. Constatou-se taxas insuficientes de acertos em relação às medidas preventivas de LP, evidenciando lacunas na formação acadêmica e a necessidade de reformulação das abordagens educacionais na formação acadêmica dos graduandos.

PALAVRAS-CHAVE: Enfermagem. Conhecimento. Lesão por Pressão. Estudantes de Enfermagem. Prevenção.

Submitted Oct. 17th, 2024, Accepted Apr. 10th, 2025,
Published June 2nd, 2025
J. Contemp. Nurs., Salvador, 2025;14:e5973
http://dx.doi.org/10.17267/2317-3378rec.2025.e5973 | ISSN: 2317-3378
Assigned editors: Cátia Palmeira, Tássia Macêdo

How to cite this article: Rastely LFS, Azevedo RF, Gomes MLF. Undergraduate nursing students' knowledge of pressure injury prevention: an integrative review. Scientific evidence about nursing undergraduate students' knowledge about pressure injury prevention. J Contemp Nurs., 2025;14:e5973. http://dx.doi.org/10.17267/2317-3378rec.2025.e5973

1. Introduction

Within the scope of professional practice, it is evident that the nurse is the protagonist when it comes to the prevention, classification and treatment of pressure injuries. According to the National Pressure Ulcer Advisory Panel (NPUAP), pressure injury (PI) is characterized by localized damage to skin and/or underlying tissues, usually over a bone prominence or associated with the use of a medical device, due to intense and/or prolonged pressure or combined shear pressure.[1]

It is worth noting that pressure injury is classified as an avoidable adverse event. According to the National Patient Safety Program (NPSP), the insertion of measures to reduce the occurrence of these injuries are essential to achieve the highest quality of care provided in all health institutions throughout the country. In addition, pressure injuries prolong the period of hospitalization of patients and increase the costs associated with treatment, as well as negatively impact the quality of life of patients.[2,3]

The theoretical training about care for people with PI is usually complemented by clinical practice, in which students can observe, stage and treat wounds in a real practical context. However, the demands of work environments are often not met and understood by professionals in training. This aspect may contribute to an increase in the occurrence of PI, especially in patients with higher risk, and its control represents a challenge in care practices.[4]

In this context, the nursing graduate needs to have knowledge about the injuries, so that they can develop a qualified assistance in the future of their professional practice. This reality can be modified through more effective teaching strategies in order to achieve the necessary skills of the future professional for the prevention and treatment of PI.[5]

Based on the information presented, the general objective of this study was to describe the scientific evidence about the knowledge of nursing students about the measures to prevent pressure injuries.

2. Methodology

The integrative literature review is a methodology characterized by the combination of studies developed with different methods, the synthesis of results and analysis of primary data in a rigorous and systematic way.[6]

To carry out the integrative review, the study was made by means of six stages: 1) elaboration of the guiding question; 2) search of available literature; 3) realization of data collection; 4) critical analysis of included articles; 5) discussion of the results and 6) synthesis of the review. To identify the guiding question, the mnemonic PICo strategy was used (P= patient, population or problem; I= phenomenon of interest; Co= context for integrative review). In this sense, the population (P) refers to nursing students, I = knowledge about prevention measures; Co = pressure injury. Based on the PICo strategy, the question was formulated: "What is the available scientific evidence about the knowledge of nursing students on the prevention of pressure injuries?".

Table 1. Combination of descriptors according to the PICo strategy, Salvador, Bahia, Brazil, 2024

P	I	Co
"Estudantes de Enfermagem" OR "Estudiantes de Enfermería" OR "Students, Nursing" OR "Nursing Student" OR "Nursing Students" OR "Pupil Nurses"	Conhecimento OR Knowledge OR Conocimiento OR Conhecimentos OR Epistemologia OR Epistemology "Prevenção de Doenças" OR "Disease Prevention" OR "Prevención de Enfermedades" OR "Ações Preventivas contra Doenças" OR "Ações Preventivas contra Incapacidades" OR Prevenção OR prophylaxis OR "preventive therapy" OR "prevention and control" OR "preventive measures" OR prevention	"Úlcera por Pressão" OR "Pressure Ulcer" OR "Úlcera por Presión" OR "Escara de Decúbito" OR "Escara de Pressão" OR "Pressure Ulcers" OR "Ulcer, Pressure" Bedsore OR Bedsores OR "Pressure Injury" OR "Injury, Pressure" OR "Pressure Injuries" OR "Pressure Sore" OR "Pressure Sores"

Source: the authors (2024).

The data collection was carried out through the search of scientific articles in the following selected databases: Scientific Electronic Library Online (SciELO), Medical Literature Analysis and Retrieval System Online (MEDLINE), SCOPUS, EMBASE, Web of Science and Latin American and Caribbean Health Sciences Literature (LILACS), through the Virtual Library in Health (VHL). The cited databases were accessed via CAPES Journal Portal, through the Internet/VPN/UNEB network.

The search strategies were formulated using the Health Sciences Descriptors (DeCS) of the BVS and the Medical Subject Headings (MeSH) of the National Library: pressure injury/pressure ulcer/Pressure Injury, Nursing Students/ Nursing Students Knowledge/Epistemology, Prevention of Diseases/preventive therapy/prevention and control. These descriptors were combined with Boolean AND and OR operators in different ways to allow a broad search.

Table 2. Search strategies designed for each selected database and their respective results, Salvador, Bahia, Brazil, 2024 (to be continued)

Database	Search strategy prepared
SCOPUS	"Estudantes de Enfermagem" OR "Estudiantes de Enfermería" OR "Students, Nursing" OR "Nursing Student" OR "Nursing Students" OR "Pupil Nurses" AND Conhecimento OR Knowledge OR Conocimiento OR Conhecimentos OR Epistemologia OR Epistemology AND "Prevenção de Doenças" OR "Disease Prevention" OR "Prevención de Enfermedades" OR "Ações Preventivas contra Doenças" OR "Ações Preventivas contra Incapacidades" OR Prevenção OR prophylaxis OR "preventive therapy" OR "prevention and control" OR "preventive measures" OR prevention AND "Úlcera por Pressão" OR "Pressure Ulcer" OR "Úlcera por Presión" OR "Escara de Decúbito" OR "Escara de Pressão" OR "Pressure Ulcers" OR "Ulcer, Pressure"OR Bedsore OR Bedsores OR "Pressure Injury" OR "Injury, Pressure" OR "Pressure Injuries" OR "Pressure Sore" OR "Pressure Sores"
SciELO	("Estudantes de Enfermagem" OR "Estudiantes de Enfermería" OR "Students, Nursing" OR "Nursing Student" OR "Nursing Students" OR "Pupil Nurses") AND (conhecimento OR knowledge OR conocimiento OR conhecimentos OR epistemologia OR epistemology) AND ("Prevenção de Doenças" OR "Disease Prevention" OR "Prevención de Enfermedades" OR "Ações Preventivas contra Doenças" OR "Ações Preventivas contra Incapacidades" OR prevenção OR prophylaxis OR "preventive therapy" OR "prevention and control" OR "preventive measures" OR prevention) AND ("Úlcera por Pressão" OR "Pressure Ulcer" OR "Úlcera por Presión" OR "Escara de Decúbito" OR "Escara de Pressão" OR "Pressure Ulcers" OR "Ulcer, Pressure" bedsore OR bedsores OR "Pressure Injury" OR "Injury, Pressure" OR "Pressure Injuries" OR "Pressure Sore" OR "Pressure Sores")

Table 2. Search strategies designed for each selected database and their respective results, Salvador, Bahia, Brazil, 2024 (conclusion)

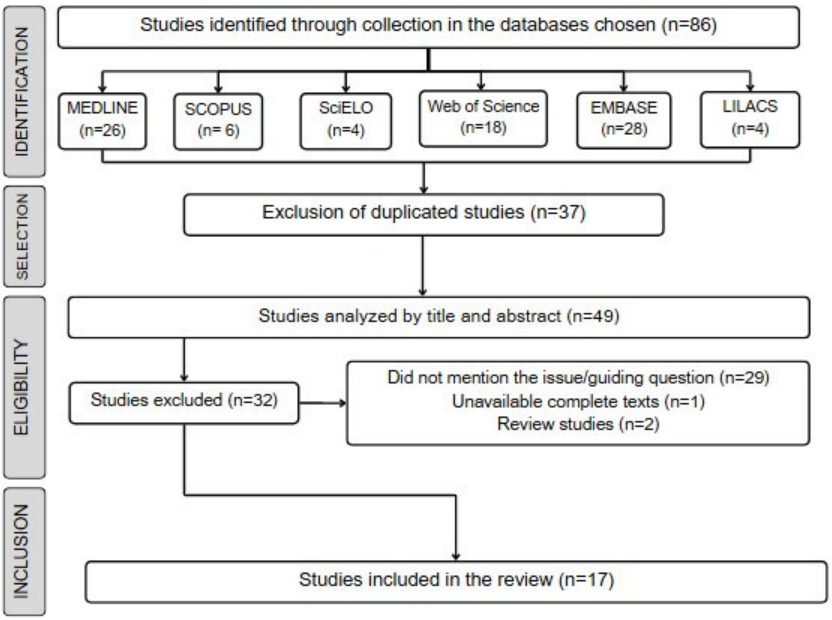
Database	Search strategy prepared
Web of Science	(((ALL=("Estudantes de Enfermagem" OR "Estudiantes de Enfermería" OR "Students, Nursing" OR "Nursing Student" OR "Nursing Students" OR "Pupil Nurses")) AND ALL=(Conhecimento OR Knowledge OR Conocimiento OR Conhecimentos OR Epistemologia OR Epistemology)) AND ALL=("Prevenção de Doenças" OR "Disease Prevention" OR "Prevención de Enfermedades" OR "Ações Preventivas contra Doenças" OR "Ações Preventivas contra Incapacidades" OR Prevenção OR prophylaxis OR "preventive therapy" OR "prevention and control" OR "preventive measures" OR prevention)) AND ALL=("Úlcera por Pressão" OR "Pressure Ulcer" OR "Úlcera por Presión" OR "Escara de Decúbito" OR "Escara de Pressão" OR "Pressure Ulcers" OR "Ulcer, Pressure" Bedsore OR Bedsores OR "Pressure Injury" OR "Injury, Pressure" OR "Pressure Injuries" OR "Pressure Sore" OR "Pressure Sores")
EMBASE	('estudantes de enfermagem' OR 'estudiantes de enfermería' OR 'students, nursing'/exp OR 'students, nursing' OR 'nursing student'/exp OR 'nursing student' OR 'nursing students'/exp OR 'nursing students' OR 'pupil nurses') AND (conhecimento OR 'knowledge'/exp OR knowledge OR conocimiento OR conhecimentos OR epistemologia OR 'epistemology'/exp OR epistemology) AND ('prevenção de doenças' OR 'disease prevention'/exp OR 'disease prevention' OR 'prevención de enfermedades' OR 'ações preventivas contra doenças' OR 'ações preventivas contra incapacidades' OR prevenção OR 'prophylaxis'/exp OR prophylaxis OR 'preventive therapy'/exp OR 'preventive therapy' OR 'prevention and control'/exp OR 'prevention and control' OR 'preventive measures' OR 'prevention'/exp OR prevention) AND ('úlcera por pressão' OR 'pressure ulcer'/exp OR 'pressure ulcer' OR 'úlcera por presión' OR 'escara de decúbito' OR 'escara de pressão' OR 'pressure ulcers' OR 'ulcer, pressure'/exp OR 'ulcer, pressure') AND ('bedsore'/exp OR bedsore OR bedsores OR 'pressure injury'/exp OR 'pressure injury' OR 'injury, pressure' OR 'pressure injuries' OR 'pressure sore'/exp OR 'pressure sore' OR 'pressure sores')
MEDLINE	(("Estudiantes de Enfermería" OR "Students, Nursing" OR "Nursing Student" OR "Nursing Students" OR "Pupil Nurses") AND (Conhecimento OR Knowledge OR Conocimiento OR Conhecimentos OR Epistemologia OR Epistemology)) AND ("Prevenção de Doenças" OR "Disease Prevention" OR "Prevención de Enfermedades" OR Prevenção OR prophylaxis OR "preventive therapy" OR "prevention and control" OR "preventive measures" OR prevention) AND ("Úlcera por Pressão" OR "Pressure Ulcer" OR "Úlcera por Presión" OR "Pressure Ulcers" OR "Ulcer, Pressure" Bedsore OR Bedsores OR "Pressure Injury" OR "Injury, Pressure" OR "Pressure Injuries" OR "Pressure Sore" OR "Pressure Sores")
LILACS	("Estudantes de Enfermagem" OR "Estudiantes de Enfermería" OR "Students, Nursing" OR "Nursing Student" OR "Nursing Students" OR "Pupil Nurses") AND (conhecimento OR knowledge OR conocimiento OR conhecimentos OR epistemologia OR epistemology) AND ("Prevenção de Doenças" OR "Disease Prevention" OR "Prevención de Enfermedades" OR "Ações Preventivas contra Doenças" OR "Ações Preventivas contra Incapacidades" OR prevenção OR prophylaxis OR "preventive therapy" OR "prevention and control" OR "preventive measures" OR prevention) AND ("Úlcera por Pressão" OR "Pressure Ulcer" OR "Úlcera por Presión" OR "Escara de Decúbito" OR "Escara de Pressão" OR "Pressure Ulcers" OR "Ulcer, Pressure" bedsore OR bedsores OR "Pressure Injury" OR "Injury, Pressure" OR "Pressure Injuries" OR "Pressure Sore" OR "Pressure Sores")

Source: the authors (2024).

The searches were limited to the period between 2019 and June of 2024, in order to include the most recent publications on the subject. Eligibility criteria: articles in the English, Portuguese and Spanish languages, with full texts and available in full. Duplicate articles that did not meet the criteria for inclusion in the research were excluded. We also excluded dissertations, theses, literature reviews, editorials, conference abstracts and publications that did not answer the guiding question of this review and duplicate productions.

After the data collection stage with the prepared strategies, the acquired studies were extracted and imported to the online reference manager Mendeley, where the exclusion of duplicates and pre-selection of the studies according to the established criteria was carried out. The analysis and discussion included 17 articles. The selection process of the articles is described in the flowchart (Figure 1), according to the recommendations of the checklist of the Statement for Reporting Systematic Review and Meta-Analyses of Studies – PRISMA.

Figure 1. PRISMA Flowchart



Source: the authors (2024).

For the stage of critical analysis of selected studies, study data were extracted in a descriptive way by means of an instrument built by the author that gathered the main information of the publications selected as: author, year and country of publication, type of study, number of students, objectives, results, type of instrument used to evaluate knowledge and conclusion. To obtain better identification, each study obtained a code composed of the letter A = Article, followed by a number ranging from one to seventeen (A1, A2, A3...).

3. Results

In total, 86 studies were obtained, with the largest number of studies found in the EMBASE (n=28) and MEDLINE (n=26) databases. Considering the inclusion and exclusion criteria, 17 studies were selected to compose the final selection of the review. Regarding the country of origin of the publications, four were national studies (23.5%) and thirteen international studies (76.5%), where of these thirteen studies, four were studies conducted in Turkey (23.5%).

In the language aspect, thirteen publications were concentrated in the English language (77.8%), three publications in the Portuguese language (16.7%) and one study in the Spanish language (5.6%). In terms of the period between 2019 and June of 2024, 2023 was the year with the highest number of publications (n=4). Concerning the type of studies, cross-sectional observational studies predominated in their totality (100%).

Regarding the professional area, twelve studies were published exclusively by nursing professionals (70.6%), while five studies (29.4%) were published by nurses and other health professionals, evidencing the protagonism of nursing in the scope of research related to the measurement of knowledge of nursing students about PI prevention.

Table 3. Characterization of selected studies, Salvador, Bahia, Brazil, 2024 (to be continued)

Cod	Title	Author/Country/ Year	Objective/ N. of students	Main results
A1	Insights into pressure injury prevention: Assessing the knowledge, attitudes, and practices of Palestinian nursing students	Hammad *et al.* Palestine / 2024[7]	455 / To assess the knowledge, attitudes and practices of Palestinian nursing students regarding pressure injury prevention.	It was found that students had an average knowledge score of 54% and a positive attitude score of 75.8 and demonstrated a reasonable level of practice of 75.3%. Significant differences were observed in the total Knowledge, Attitude and Practice scores associated with academic year, clinical experience and the number of departments attended during clinical training.
A2	Pressure Injury Knowledge and Attitudes of Senior Nursing Students	Yoltay; Özşaker. Turkey / 2024[8]	166 / To describe pressure injury (PI) knowledge and attitudes of senior nursing students (SNSs).	Approximately 50% had experience in preventing IP. 14.1% had provided care to patients with IP and 21.2% had staged IPs. The mean knowledge score of the SNSs on IP prevention was 50.3% correct, and only 20.5% (n = 35) of the SNSs answered the questions at an acceptable level of proficiency (60%). The percentage of correct answers on the Attitude towards Prevention of Pressure Ulcers of the SNSs was 75.7%.
A3	Knowledge and Attitude of Nursing Interns Toward Pressure Injury Prevention in Saudi Arabia: A Multiregional Cross-Sectional Study	Al Gharash, *et al.* Saudi Arabia / 2024[9]	161 / To explore and understand the knowledge and attitudes of nursing interns towards pressure injury prevention in Saudi Arabia.	Participants reported inadequate knowledge regarding pressure injury prevention, with a mean knowledge score of 48.15%. Furthermore, participants demonstrated unsatisfactory attitudes towards pressure injury prevention, with a mean score of 61.36%. Students who completed longer internships had better knowledge levels than those who completed shorter internships.
A4	Nursing Students' Knowledge on Pressure Injuries Following a Blended-Learning Unit: A Quasi-experimental Study	Bobbink, *et al.* Western Switzerland / 2023[10]	21 / To assess the knowledge of first-year nursing students on the etiology, classification, prevention and treatment of pressure injuries (PI) after blended learning and clinical practice.	A total of 21 students participated in all three time points. At baseline, the mean percentage of correct responses on the PUKAT was 45.8%. This score increased to 59.2% after the blended learning unit and 65% after completion of the clinical placement. Across all three-time points, students scored highest on knowledge about risk assessment and lowest on knowledge about prevention.
A5	Nursing students' knowledge towards pressure injury prevention: A cross-sectional study in the north of Morocco	Chami, *et al.* Morocco / 2023[11]	265 / To assess nursing students' knowledge about pressure injury prevention.	The overall mean score of participants was low (5.88/25). "Pressure ulcer prevention" and "Specific patient groups" were the most critical topics. Most participants did not use the risk assessment tool in the laboratory or clinical settings (66.5%) or pressure redistribution mattresses or cushions (43.3%).
A6	Students' knowledge, attitude and practices towards pressure ulcer prevention and management	Abrahams, *et al.* Namibia /2023[12]	50 / To determine the knowledge, attitude and practices (KAP) of undergraduate nursing students regarding the prevention and treatment of pressure ulcers.	Nursing students reported good levels of knowledge (n = 35; 70%), attitude (n = 39; 78%) and practices (n = 47; 94%). There was no statistically significant association between demographic variables and the level of knowledge, attitudes and practices.

Table 3. Characterization of selected studies, Salvador, Bahia, Brazil, 2024 (continuation)

Cod	Title	Author/Country/ Year	Objective/ N. of students	Main results
A7	Analysis of nursing professionals' knowledge about pressure ulcer prevention: a cross-sectional study	Nóbrega, *et al.* Brazil/2023[13]	34 / To analyze and compare the level of knowledge about pressure injury prevention among nurses and nursing technicians who work in Intensive Care Units and nursing undergraduate students in the final year of the course.	It was seen that only 22.7% of nurses, 7.1% of technicians and 0.0% of nursing undergraduates achieved the percentage of correct answers ≥ 90% recommended by the knowledge test.
A8	Croatian nurses' and nursing students' knowledge about pressure injury prevention	Cukljek, *et al.* Croatia /2022[14]	198 / To determine the knowledge of nurses and nursing students about pressure injury (PI) prevention.	The average number of correct answers was 41.8%, which is not considered a satisfactory result. Nurses from the clinical hospital obtained 45.48% of correct answers, while part-time students obtained 39.7%. The respondents obtained the best results in the topic risk assessment and the lowest in the topic prevention of pressure ulcers.
A9	Knowledge and attitudes of Turkish nursing students towards pressure injury prevention	Dag Sucu; Firat Kilic. Turkey/ 2022[15]	259 / To assess nursing students' knowledge levels and attitudes regarding PIP prevention and to analyze the relationship between their knowledge and attitudes.	Participants scored lowest on the etiology and causes (32.3%) and classification and observation (33.5%) subscales of the PUPKAI-T.
A10	Australian First-Year Nursing Student Knowledge and Attitudes on Pressure Injury Prevention: A Three-Year Educational Intervention Survey Study	Mather; Jacques; Prior. Australia/ 2022[16]	1102 / To investigate first-year nursing students' knowledge and attitudes regarding pressure injury prevention and explore whether additional educational interventions enhanced learning.	Students' knowledge of pressure injuries was low, with pressure injury prevention measures scoring lowest (<50%). Students over the age of 25 and males scored higher on attitudes. There were significant differences in mean knowledge scores between the 2016 and 2018 cohorts. The 2016 cohort scored consistently lower on the attitude survey than the other two cohorts.
A11	Pressure injury knowledge of Turkish internship nursing students	Sönmez; Taşdemir; Ören. Turkey/ 2021[17]	278 / To describe the knowledge about pressure injury (PI) of Turkish nursing students in internship.	The average knowledge score of nursing students was 59.2%. The prevention/risk score was higher; only 28.4% of students scored satisfactorily on the test.
A12	Attitude towards pressure injury prevention in nursing students: the APuP questionnaire	Pérez-López, *et al.* Spain / 2021[18]	188 / To explore the attitude of nursing students towards pressure injury prevention.	The mean score obtained in the APuP questionnaire was 44.23% of the maximum). The questionnaire has good overall internal consistency and the item fit indices were good. A less positive attitude was found in students who had completed clinical internships and in students in more advanced years. There is an inverse correlation between the attitude score and the knowledge score.

Table 3. Characterization of selected studies, Salvador, Bahia, Brazil, 2024 (conclusion)

Cod	Title	Author/Country/ Year	Objective/ N. of students	Main results
A13	Pressure injury prevention: attitudes and knowledge of nursing students	Fernandes; Lima; Santos. Brazil / 2021[19]	100 / To assess attitudes and knowledge on pressure injury prevention in a sample of Portuguese nursing students	Participants revealed adequate knowledge of the different mean values of the respective factors, Etiology and Development (78%), Classification and Observation (80.5%), Risk Assessment (83.5%), Nutrition (81.5%), Preventive Measures: Reduction of the amount of pressure and shear (83.1%) and
				Preventive Measures: Reduction of the duration of pressure and shear (88.2%).
A14	Knowledge of nursing students on the subject of pressure ulcers prevention and treatment.What we know about pressure ulcers?	Szymański; Porębska; Sipak-Szmigiel. Poland / 2020[20]	203 / To analyze the status of students' knowledge about pressure ulcers.	Over half of the respondents (57.64%) had a sufficient level of knowledge about prevention and treatment of pressure ulcers. The level increased with the duration of the study, with the highest level being recorded in the last years, both in the I and II study cycles. The better (higher) individuals assessed their knowledge about prevention and treatment of pressure ulcers, the higher their level of knowledge was.
A15	The impact of standardized patient interactions on nursing students'	Yilmazer, *et al.* Turkey / 2020[21]	38 / To explore the effects of education on the performance and knowledge of undergraduate nursing students using standard practice patient simulation in the prevention of pressure ulcers.	In this study, a significant increase in the level of knowledge and performance in assessments was observed after theoretical education. It was found that theoretical education, demonstrative education with a standardized patient and the practice of simulating standardized patients, especially after debriefing sessions, have a permanent impact on students.
A16	The knowledge of nursing undergraduate students about pressure lesions for patient safety	Furtado, *et al.* Brazil / 2019[22]	114 / To describe the knowledge of nursing students regarding the assessment, classification and prevention of pressure injuries.	Knowledge about pressure injuries was considered unsatisfactory in 56.1% of the questions. The average number of correct answers among 4th-year students was significantly higher than the average for 2nd-year students for items related to preventive measures. In the other comparisons, there were no significant differences.
A17	The knowledge of nursing undergraduate students about pressure lesions	Ribeiro, *et al.* Brazil/ 2019[23]	56 / To analyze the knowledge of nursing students about pressure injuries.	Only 1 nursing student presented knowledge considered adequate about pressure injuries. Of the items related to assessment and classification, 33.3% were considered known; and of those related to prevention, 36.3%.

Source: the authors (2024).

4. Discussion

In 2019, the European Pressure Ulcer Advisory Panel (EPUAP), Pan Pacific Pressure Injury Alliance (PPPIA) and National Pressure Ulcer Advisory Panel (NPUAP) released an updated version of the Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline (CPG). This guideline emphasizes the importance of comprehensive patient assessment, identification of risk factors and implementation of appropriate interventions for pressure injuries. In relation to the main preventive interventions highlighted in the guideline, we have: evaluation and maintenance of skin integrity; promotion of adequate nutritional status; repositioning and early mobilization; redistribution of pressure by using supporting surfaces and the use of prophylactic dressings in the most vulnerable areas for development of PI.[24]

According to the CPG, there are appropriate and validated evaluation tools for measuring knowledge or attitudes related to pressure injury prevention.[24] Among the most cited instruments in the selected studies is the Pressure Injury Knowledge Assessment Tool (PUKAT) and Pieper Ulcer Knowledge Test (PUKT).

Table 4. Knowledge assessment instruments used and their respective studies, Salvador, Bahia, Brazil, 2024

Knowledge assessment instruments used	Code of the articles
Pressure Injury Knowledge Assessment Tool (PUKAT)	A1 A2 A3 A4 A5 A8 A9 A10 A13
Pieper Ulcer Knowledge Test (PUKT)	A7 A11 A16 A17
Knowledge on Pressure Injury Prevention (PIPK)	A12
Self-reported questionnaire adopted and modified of Hommel & Santy-Tomlinson 2018; Mitchell 2018; NICE 2014; Tahvonen et al., 2017	A6
Application of own questionnaire	A14 A15

Source: the authors (2024).

The Pressure Injury Knowledge Assessment Tool (PUKAT), developed in 2010, consists of 29 questions in its multiple-choice totality, with the objective of evaluating knowledge about the prevention of pressure injuries. This instrument covers the most important aspects, being divided into six areas: 1) etiology and development of pressures; 2) classification and observation; 3) nutrition; 4) risk assessment; 5) reduction in pressure quantity; 6) reduction in pressure duration. In addition, in 2017, this tool was updated to the PUKAT 2.0 version, where there was a reduction to 25 questions with six areas: 1) etiology; 2) classification and observation; 3) risk assessment; 4) nutrition; 5) prevention of pressure injuries; 6) Specific patient groups.[25]

Regarding the Pieper Pressure Ulcer Knowledge Test (PPUKT) created in 1995, it consists of 41 questions, with three answer options: true (V), false (F) and do not know (NS). This questionnaire is organized according to the following categories: category 1 on the evaluation and classification of PI with 8 items, and category 2 with 33 questions about preventive measures of PI. Each correctly answered question corresponds to a point, and the total score corresponds to the sum of all correct questions.[25]

Based on the analyzed articles, among the seventeen studies collected, 13 (76.5%) found insufficient levels of knowledge about the prevention of pressure injuries in the academic training in nursing. An Australian cross-sectional study (A10) described that the degree of knowledge of students in the first year of nursing was 51.7%, considered a low percentage. In addition, the understanding of the students about the role of nursing professionals in the implementation of preventive measures related to pressure injuries, was evidenced.[16]

In relation to the Brazilian studies, three (A7, A16, A17) obtained unsatisfactory results regarding the level of students' knowledge about PI prevention. The study carried out in 2019 (A16) obtained an unsatisfactory result of knowledge level in several aspects related to prevention, as for example in the items that addressed the practice of daily skin inspection and use of technologies to relieve and redistribute the pressure exerted.[22] Similarly to another study from 2023 (A7), conducted with 34 students, Most of the errors were concentrated in aspects related to PL prevention, such as the frequency of repositioning patients restricted to the bed, practice of skin inspection, use of pressure redistribution surfaces and angulation of the patient's bedside head.[13]

Another Brazilian study (A17), carried out in two higher education institutions in 2019, showed that academics achieved lower scores in relation to some aspects associated with prevention, such as the concept of shearing, headrest elevation angle, daily skin inspection and correct time of repositioning of patients restricted to the chair. It was noted that clinical practice has a positive influence on the degree of knowledge of nursing academics.[23]

Regarding the importance of clinical practice, a Palestinian study (A1) obtained the same conclusion compared to the relatively low scores associated with the prevention of PI; it is evident that the long duration of clinical practice together with the extended period of nursing education can positively influence the acquisition of professional knowledge and competences.[7]

The nursing graduate, as a future health professional, must have an effective understanding about PI prevention so that it can offer quality care. This aspect can be achieved through more effective pedagogical approaches, which aim to prepare the professional with the necessary skills for the prevention and treatment of PI.

It is essential that undergraduates engage in extracurricular activities such as research and extension, as well as participating in lectures, courses, practical classes and other initiatives aimed at deepening knowledge on the subject. These experiences are essential for the development of attitudes, skills and competencies that will strengthen care practice in the future.

In relation to the Turkish studies (A2, A9, A11), three low scores were found with the application of validated instruments. A Turkish study published in the year 2021 (A11) compared the scores of students who had experience with patient care, with the scores of students who did not have such experiences, showing that the score of experienced academics was higher compared to the score of students without experience. As well as another Turkish study carried out in 2024 (A2) that brought current data on the low knowledge score on the prevention of PD by students.[8,15,17]

Following the same line of results, it is worth mentioning a study carried out in Western Switzerland (A4) with 21 nursing students, where the knowledge of these graduates was measured in three moments. In all three moments, the students obtained low scores related to knowledge about pressure injury prevention, highlighting the importance of reformulating the nursing curriculum in order to include more topics on the prevention of pressure injuries.[10]

In addition, a Moroccan study (A5) carried out with 285 students in the year of 2023, brought data about the low performance of nursing students. In this study, none of the participants obtained a score equal to or greater than 60%. In addition, there was a higher incidence of incorrect responses in relation to the practice of massage on hyperemized skin as a preventive measure against lesions.[11] Other studies developed in Croatia (A8), Spain (A12) and Saudi

Arabia (A3) also presented similar results regarding the unsatisfactory scores of nursing students on knowledge about PI prevention.[9,14,18]

The findings of these studies indicate that the understanding of these undergraduates about the subject needs to be reviewed in order to ensure good performance in care. The inclusion of the theme in curricular components, offering courses that discuss the current guidelines on PI, during the semesters need to be rethought by the undergraduate colleges of the course for training nurses with skills and competencies necessary to assist the patient preventing and treating PI.

Regarding the adequate levels of knowledge about pressure injury prevention, only four studies (23.5%) stand out. A study conducted in Namibia (A6) indicated that nursing students had good levels of knowledge, attitudes and practices associated with the prevention of pressure injuries. In this same study, it is evidenced that good practices are derived from a good knowledge about the prevention of these adverse events.[12]

A study conducted in the northern region of Brazil (A13) with 100 nursing students also presented adequate results. Regarding the preventive measures to reduce the amount of pressure and shear, the score was 83.1%, and on the other preventive measures such as reducing the duration of pressure and shear, the percentage of hits was 88.2%. That is, the students present, on average, positive attitudes towards the prevention of pressure injuries. This result highlighted that there is an association between knowledge and attitudes, this association can show that the student who has a greater knowledge and greater likelihood to use strategies aimed at preventing pressure injuries.[19]

Another Polish study (A14) conducted with 203 full-time students, in the year of 2020, found that more than half of the target audience (57.64%) had a satisfactory level of knowledge about the prevention of pressure injuries, and this level of knowledge increased throughout the duration of the study. Among the aspects mentioned, it was pointed out that the level of knowledge of students increases as the subsequent years of study, in addition, the students had the awareness and critical thinking about the need to have theoretical and practical knowledge in the prevention of pressure injuries.[20]

Following the same reasoning of positive results, we highlight a Turkish study (A15) developed with 38 students, carried out through the application of its own instrument, containing four steps and performance tests inserted throughout the period of data collection. This study showed that there was a significant increase in the level of knowledge and performance in the evaluations after the application of practical simulations with standardized patients and moments of theoretical education, highlighting the positive impacts of the insertion of practical simulations along the academic trajectory of the students involved.[21]

Regarding the preventive measures of pressure injuries applied by nursing students, only one study (A6) covered this topic. The study provided data that indicated that most students (94%) applied adequate measures, but it is evident that only 22% of the interviewed students practiced decubitus change in patients at 15-minute intervals. It is evident that management and correct measures are positive outcomes of a good level of knowledge and attitudes, but it is essential that the practice of basic behaviors associated with the prevention of pressure injuries are implemented in an exemplary way during clinical practice.[12]

The understanding by nursing students about the preventive measures associated with pressure injuries allow a more proactive and critical approach of this public to the management of patients at risk of developing PI, reducing possible complications and optimizing hospital resources. In this sense, the prior knowledge of preventive measures ensures a safer and higher quality assistance, making students more prepared for professional practice.

The prevention of pressure injuries should be a joint task of the entire health team. It is essential to ensure that all professionals in the area are adequately trained and informed to prevent and treat these injuries.[26]

In this sense, to ensure patient safety in care scenarios it is essential to encourage and provide specialized learning during the academic training period.

In short, future professionals must be equipped with the necessary skills to identify risk factors early and implement effective interventions. It is worth highlighting the importance of the insertion and evaluation of knowledge about the prevention of pressure injuries since the training process of these professionals, ensuring that they are able to deal with this critical issue in clinical practice. The integration of theories and practices related to pressure injuries should be a priority in curricula, promoting not only theoretical understanding but also practical application in real scenarios.

5. Conclusion

Based on the results obtained, one must conclude that the knowledge of nursing students about prevention measures for pressure injury was at an inadequate level – low rates of hits in relation to the basic measures of prevention of PI recommended by the instruments applied. Therefore, there are gaps in academic training that can compromise the quality of assistance provided.

The insufficient level of knowledge about PI prevention in academic training may lead to a greater likelihood that the assistance provided by future nursing professionals is lacking skills and competencies, contributing to the development of pressure injuries. The present study shows that there is a need to reformulate educational approaches for nursing academics regarding the prevention of pressure injuries, placing emphasis on the prevention of these events. In this sense, it is essential to adopt strategies of teaching and learning in the curricular matrices, so that correlates theory with practice.

Furthermore, a limitation of the study is the limited number of publications on the subject. It also highlights the encouragement to develop curricular and extracurricular activities associated with the importance of PI prevention.

Acknowledgments

We thank the *Universidade do Estado da Bahia*, through the *Programa Institucional de Iniciação Científica* (PICIN) for providing scientific and financial support for the development of this research, strengthening the university's commitment to the teaching, research and extension triad.

Authors' contributions

The authors declared to have made substantial contributions to the work in terms of research design or design; data acquisition, analysis or interpretation for the work; and writing or critical review of relevant intellectual content. All authors approved the final version to be published and agreed to take public responsibility for all aspects of the study.

Conflicts of interest

No financial, legal or political conflict involving third parties (government, companies and private foundations, etc.) has been declared for any aspect of the submitted work (including but not limited to grants and funding, participation in advisory board, study design, manuscript preparation, statistical analysis, etc.).

Indexers

The Journal of Contemporary Nursing is indexed in DOAJ and EBSCO.

References

1. National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel, Pan Pacific Pressure Injury Alliance. Prevenção e tratamento de úlceras por pressão: guia de consulta rápido [Internet]; 2019 [cited 2024 Aug 26]. Available from: https://epuap.org/download/8570/pdf

2. Portaria 529, de 1º de abril de 2013. Institui o Programa Nacional de Segurança do Paciente (PNSP) [Internet]. Brasília, DF: 2013 [cited 2024 Aug 26]. Available from: http://bvsms.saude.gov.br/bvs/saudelegis/gm/2013/prt0529_01_04_2013.html

3. Pachá HH, Faria JI, Oliveira KA, Beccaria LM. Lesão por Pressão em Unidade de Terapia Intensiva: estudo de caso-controle. Rev Bras Enferm. 2018;71(6):3027-34. https://doi.org/10.1590/0034-7167-2017-0950

4. Mazzo A, Miranda FBG, Meska MHG, Bianchini A, Bernardes RM, Pereira GA Jr. Ensino de prevenção e tratamento de lesão por pressão utilizando simulação. Esc Anna Nery. 2018;22(1):e20170182. https://doi.org/10.1590/2177-9465-EAN-2017-0182

5. Bertochi G, Zorzo LM, Costa S de P, Baron C, Morschbacher J. Nursing students' knowledge on pressure injury. RSD. 2022;11(8):e6511830297. https://doi.org/10.33448/rsd-v11i8.30297

6. Soares CB, Hoga LA, Peduzzi M, Sangaleti C, Yonekura T, Silva DR. Revisão integrativa: conceitos e métodos utilizados na enfermagem. Rev Esc Enferm USP. 2014;48(2):335-45. https://doi.org/10.1590/s0080-62342014000002000020

7. Hammad BM, Eqtait FA, Ayed AJ, Salameh BS, Fashafsheh IH, Saleh MY. Insights into pressure injury prevention: Assessing the knowledge, attitudes, and practices of Palestinian nursing students. J Tissue Viability. 2024;33(2):254-61. https://doi.org/10.1016/j.jtv.2024.03.011

8. Yoltay HE, Özşaker E. Pressure Injury Knowledge and Attitudes of Senior Nursing Students. Adv Ski Amp Wound Care. 2024;37(1):1-5. https://doi.org/10.1097/asw.0000000000000088

9. Al Gharash H, Alharbi A, Alshahrani Y, Mousa O. Knowledge and Attitude of Nursing Interns Toward Pressure Injury Prevention in Saudi Arabia: A Multiregional Cross-Sectional Study. SAGE Open Nurs. 2024;10. https://doi.org/10.1177/23779608241251631

10. Bobbink P, Gschwind G, Charbonneau L, Guex C, Chabal L, Probst S. Nursing Students' Knowledge on Pressure Injuries Following a Blended-Learning Unit: A Quasi-experimental Study. Adv Ski Amp Wound Care. 2023;36(12):636-41. https://doi.org/10.1097/asw.0000000000000066

11. Chami L, Boussaid O, Boussaid H, Serhani Y, Zerhane R, Janati-Idrissi R. Nursing students' knowledge towards pressure injury prevention: A cross-sectional study in the north of Morocco. J Tissue Viability. 2023;32(2):248-258. https://doi.org/10.1016/j.jtv.2023.02.002

12. Abrahams FR, Daniels ER, Niikondo HN, Amakali K. Students' knowledge, attitude and practices towards pressure ulcer prevention and management. Health SA Gesondheid. 2023;28:a2180. https://doi.org/10.4102/hsag.v28i0.2180

13. Nóbrega ID, Medeiros TP, Bezerra KA, Marcolino ED, Santos-Rodrigues RC, Soares MC. Análise do conhecimento de profissionais de enfermagem sobre prevenção de lesão por pressão: estudo transversal. Esc Anna Nery. 2023;27. https://doi.org/10.1590/2177-9465-ean-2022-0219pt

14. Cukljek S, Rezic S, Ficko SL, Hosnjak AM, Smrekar M, Ljubas A. Croatian nurses' and nursing students' knowledge about pressure injury prevention. J Tissue Viability. 2022;31(3):453-58. https://doi.org/10.1016/j.jtv.2022.04.008

15. Dag Sucu G, Firat Kilic H. Knowledge and attitudes of Turkish nursing students towards pressure injury prevention. J Tissue Viability. 2021;31(1):16-23. https://doi.org/10.1016/j.jtv.2021.08.003

16. Mather C, Jacques A, Prior SJ. Australian First-Year Nursing Student Knowledge and Attitudes on Pressure Injury Prevention: A Three-Year Educational Intervention Survey Study. Nurs Rep. 2022;12(3):431-45. https://doi.org/10.3390/nursrep12030042

17. Sönmez M, Taşdemir N, Ören N. Pressure Injury Knowledge of Turkish Internship Nursing Students. J Tissue Viability. 2021;30(4):571-75. https://doi.org/10.1016/j.jtv.2021.07.004

18. Pérez-López C, López-Franco MD, Comino-Sanz IM, Pancorbo-Hidalgo PL. Actitud hacia la prevención de lesiones por presión en estudiantes de enfermería: cuestionario APuP. Gerokomos. 2021;32(1):43-50. https://doi.org/10.4321/s1134-928x2021000100010

19. Fernandes CS, Lima A, Santos M. Prevenção de lesões por pressão: atitudes e conhecimento de estudantes de enfermagem. J Nurs Health. 2021;11(3). https://doi.org/10.15210/jonah.v11i3.20924

20. Szymański S, Porębska E, Sipak- Szmigiel O. Knowledge of nursing students on the subject of pressure ulcers prevention and treatment: What we know about pressure ulcers?. Pol J Surg. 2020;92(3). https://doi.org/10.5604/01.3001.0014.0508

21. Yilmazer T, Tuzer H, Inkaya B, Elcin M. The impact of standardized patient interactions on nursing students' preventive interventions for pressure ulcers. J Tissue Viability. 2020;29(1):19-23. https://doi.org/10.1016/j.jtv.2019.11.004

22. Furtado AF, Marcondes L, Lenhani BE, Batista J. Conhecimento de acadêmicos de enfermagem sobre lesões por pressão: desafio para a segurança do paciente. Rev Baiana Enferm. 2020;33. https://doi.org/10.18471/rbe.v33.34425

23. Ribeiro AM, Ribeiro EK, Ferreira MT, Sousa JE, Silva AA, Boldoino LS. Conhecimento de acadêmicos de enfermagem sobre lesão por pressão [Internet]. Rev Rene. 2019;20:e41016. Available from: http://repositorio.ufc.br/handle/riufc/45394

24. European Pressure Ulcer Advisory Panel, National Pressure Ulcer Advisory Panel, Pan Pacific Pressure Injury Alliance. Prevention and treatment of pressure ulcers/injuries: clinical practice guideline [Internet]. The international guideline. 2019. Available from: https://internationalguideline.com/2019

25. Manderlier B, Van Damme N, Vanderwee K, Verhaeghe S, Van Hecke A, Beeckman D. Development and psychometric validation of PUKAT 2·0, a knowledge assessment tool for pressure ulcer prevention. Int Wound J. 2017;14(6):1041-51. https://doi.org/10.1111/iwj.12758

26. Borges EL, Spira JAO. Lesão por pressão: prevenção e manejo. In: Feridas: como tratar. 3ª ed. Borges, EL, Lima VLAN. Rio de Janeiro: Rubio, 2024 400p.