SCOPING REVIEW ARTICLE

REVISTA ENFERMAGEM ATUAL IN DERME

EVALUATION AND TREATMENT OF PRESSURE INJURY IN HOSPITALIZED OLDER PEOPLE: SCOPING REVIEW

EVALUACIÓN Y TRATAMIENTO DE LESIONES POR PRESIÓN EN PERSONAS MAYORES HOSPITALIZADAS: REVISIÓN DEL ALCANCE

AVALIAÇÃO E TRATAMENTO DE LESÃO POR PRESSÃO EM PESSOAS IDOSAS HOSPITALIZADAS: REVISÃO DE ESCOPO

[1]Fernanda Kelly Oliveira de Albuquerque
[2]Fabiana Maria Rodrigues Lopes de Oliveira
[3]João Victor Batista Cabral
[4]José Uilson Ferreira Galindo Júnior
[5]Andressa Monteiro Gomes
[6]Sílvia Cláudia Ferreira de Andrade
[7]Maria das Graças de Arruda Silva Rodrigues
[8]Keylla Talitha Fernandes Barbosa

[1]Universidade Federal da Paraíba, Programa de Mestrado Profissional em Gerontologia (PMPG). João Pessoa, Paraíba, Brazil. Orcid: https://orcid.org/0000-0003-2480-2473
[2]Universidade Federal de Campina Grande. João Pessoa, Paraíba, Brasil. Orcid: https://orcid.org/0000-0002-5966-232X
[3]Universidade Federal da Paraíba. João Pessoa, Paraíba, Brasil. Orcid: https://orcid.org/0000-0001-8836-7875
[4]Universidade Federal da Paraíba, Programa de Mestrado Profissional em Gerontologia (PMPG). João Pessoa, Paraíba, Brazil. Orcid: https://orcid.org/0000-0003-0810-0324
[5]Universidade Federal da Paraíba, Programa de Mestrado Profissional em Gerontologia (PMPG). João Pessoa, Paraíba, Brazil. Orcid: https://orcid.org/0009-0006-6898-8328
[6]Universidade Federal da Paraíba, Programa de Mestrado Profissional em Gerontologia (PMPG). João Pessoa, Paraíba, Brazil. Orcid: https://orcid.org/0000-0002-8462-0746
[7]Universidade Estadual da Paraíba. Campina Grande, Paraíba, Brazil. Orcid: https://orcid.org/0000-0003-2143-4257
[8]Universidade Estadual da Paraíba. Campina Grande, Paraíba, Brazil. Orcid: https://orcid.org/0000-0001-6399-002X

Corresponding author
Fernanda Kelly Oliveira de Albuquerque
Rua Estudante Oliveiros Fernandes Filho, 131. Residencial Antônio Jorge Sobrinho, Apt. 101. Bairro Bancários. João Pessoa – PB - Brazil. CEP: 58051-040. fone: +55 (83)98879-3382. E-mail: fe_kellyjp@yahoo.com.br

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ABSTRACT

Objective: To map nursing interventions performed to assess and treat pressure injuries in hospitalized elderly people. **Method**: Scoping review, with searches between March and April 2024, carried out in the city of João Pessoa/Paraíba/Brazil, according to the method defined by The Joanna Briggs Institute, in the databases: Medline/PubMed, Embase, LILACS, CINAHL, Scopus, Cochrane, Web of Science, BDENF, ProQuest Dissertations & Theses Global and Google Scholar, with no language restrictions and no time limit. The search took place from March to April 2024. **Results:** Eighteen studies published between 1995 and 2023 were selected. The primary evidence involved interventions, assessment, nursing management systems and products/technologies in the treatment of pressure injuries. **Conclusion:** The mapped interventions demonstrated good results and good cost-benefit ratio; however, there was a lack of standardization of evaluation criteria. The evidence reinforces the need for nursing care based on Evidence-Based Practice.
Keywords: Pressure Injury; Elderly; Nursing.

RESUMEN

Objetivo: Mapear las intervenciones de enfermería realizadas para evaluar y tratar las lesiones por presión en ancianos hospitalizados. **Método**: Scoping review, con búsquedas entre marzo y abril de 2024, realizadas en la ciudad de João Pessoa/ Paraíba/ Brasil, según el método definido por The Joanna Briggs Institute, en las bases de datos: Medline/ PubMed, Embase, LILACS, CINAHL, Scopus, Cochrane, Web of Science, BDENF, ProQuest Dissertations & Theses Global y Google Scholar, sin restricciones de idioma y sin límites de tiempo. La búsqueda se realizó de marzo a abril de 2024. **Resultados**: Se seleccionaron 18 estudios publicados entre 1995 y 2023. La evidencia primaria involucró intervenciones, evaluación, sistemas de gestión de enfermería y productos/tecnologías en el tratamiento de las lesiones por presión. **Conclusión**: Las intervenciones mapeadas demostraron buenos resultados y una buena relación costo-beneficio, sin embargo, hubo falta de uniformidad en los criterios de evaluación. La evidencia refuerza la necesidad de una atención de enfermería basada en la Práctica Basada en la Evidencia.
Palabras clave: Lesión por Presión; Anciano; Enfermería.

RESUMO

Objetivo: Mapear as intervenções de enfermagem realizadas para avaliação e tratamento de lesão por pressão em pessoas idosas hospitalizadas**. Método:** *Scoping review*, com buscas entre março e abril de 2024, realizadas na cidade de João Pessoa/ Paraíba/ Brasil, conforme o método definido pelo *The Joanna Briggs Institute*, nas bases de dados: Medline/ PubMed, Embase, LILACS, CINAHL, Scopus, Cochrane, *Web of Science*, BDENF, *ProQuest Dissertations & Theses Global* e *Google Scholar*, sem restrição de idioma e sem limite de tempo. Abusca ocorreu de de março a abril de 2024. **Resultados:** Foram selecionados 18 estudos publicados entre 1995 e 2023. As evidências primordiais envolveram intervenções, avaliação, sistemas de gerenciamento de enfermagem e produtos/tecnologias no tratamento de lesões por pressão. **Conclusão:** As intervenções mapeadas demonstraram bons resultados e boa relação custo-benefício, porém, constatou-se a falta de uniformização dos critérios avaliativos. As evidências reforçam a necessidade de um cuidado de enfermagem pautado na Prática Baseada em Evidências.
Palavras-chave: Lesão por Pressão; Idoso; Enfermagem.

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INTRODUCTION

The decline in fertility rates, combined with the increase in population longevity due to advances in health care and socio-economic conditions, has led to an accelerated growth process in Brazil's elderly population. This is not unique to Brazil and is evidence of a global trend, bringing enormous changes in the needs of populations. With health, specifically, these changes directly impact the change in the epidemiological profile, with a significant increase in chronic non-communicable diseases, significantly affecting the older population[1].

Despite this, individuals belonging to this population niche have high incidence rates of institutionalization, disability, functional dependence, and mortality. In addition, there is a high number of hospitalizations, with prolonged hospital stays, restricted mobility, use of medication and medical devices, nutritional deficits, and other conditions common to hospitalization in the elderly, which favor the occurrence of skin lesions[2].

Recognized as a global public health issue, Pressure Injury (PI) has become an increasing and frequent concern, especially in the hospital environment. According to a report by the National Health Surveillance Agency (ANVISA), PI notifications accounted for 20.30% of adverse events recorded between 2014 and 2022, totaling 223,378 notifications. In this timeframe, PI was the second most frequently reported adverse event category by the Patient Safety Centers in Brazilian health services[3].

In the last decades, there has been a significant worldwide increase in the number of cases of PI, which is characterized by damage to the skin, tissue, and/or underlying structure because of isolated pressure, friction, and/or shear, which eventually occurs in people with reduced mobility. In elderly people, this can be supported by the physiological changes typical of human aging, such as a decrease in skin elasticity, a reduction in the subcutaneous fat layer, a decline in defense cells and atrophy of apocrine and sebaceous glands, changes in blood circulation, as well as a decrease in mobility and sensory perception[4].

Its pathological mechanism involves reperfusion ischemia, lymphatic drainage variations, cell deformation, and apoptosis. Prolonged excess pressure on the site (especially in areas with bony projections) reduces blood flow and oxygen supply to the affected tissues. It is classified according to the degree of tissue involvement suffered by the patient as follows: stage 1, 2, 3, 4, deep tissue PI, unclassifiable PI, PI related to a medical device, and PI on membranes and mucous membranes[5,6].

In addition, the incidence of injury increases following the combination of risk factors, which can be classified as primary factors, such as reduced mobility/activity, pressure on the skin, reduced perfusion (which can be caused by diabetes, vascular disease, dysfunction of blood pressure levels, smoking and edema) and reactive hyperemia, or

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secondary factors, such as advanced age, metabolic alterations, nutrition (malnutrition or obesity) and general state of health[7].

In this scenario, PI has become a growing challenge for nursing professionals in different hospitalization sectors. There is a search to improve and raise the quality of care in various areas of intervention, especially with a focus on prevention and treatment during hospitalization[8]. This topic is of great importance for care practice, especially regarding nursing care, since the occurrence of these injuries is not only related to the health condition of the elderly but also directly reflects the standard of care offered by health professionals and patient safety.

The treatment of PI should be carried out with preventive interventions. Professionals treating patients with wounds need to be able to identify the lesions and indicate the most appropriate covering since there are currently several brands and varieties of coverings available in the commercial sector, each acting at different stages of healing. Applying institutional protocols provides safety for the professional and ensures excellence in the care provided[9]. In this context, it is essential to reinforce and support nursing practice, allowing professionals to assess and treat PI in the elderly population based on scientifically proven practices that can be replicated in the care environment[10].

Considering these considerations and the nursing care of elderly people hospitalized with PI, focusing on an individualized care plan is essential. This will facilitate the standardization of conduct/decision-making and avoid inadequate treatment, difficulties in incorporating new technologies, waste of materials and special dressings, and lack of monitoring of process and results indicators.

This review aims to map the nursing interventions used to assess and treat pressure injuries in hospitalized elderly people.

METHOD

It consists of a Scoping Review, according to the approach defined by the *Joanna Briggs Institute* (JBI)[11] and following the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses—extension for scoping reviews* (PRISMA-ScR)[12].

Methodological procedure

To conduct the study, a research question was formulated using the acronym PCC, in which P refers to the Population (elderly), C to the Concept (nursing interventions for the assessment and treatment of pressure injuries), and C to the Context (hospitalized). Thus, the research question was formulated using this strategy: What nursing interventions are used to evaluate and treat hospitalized elderly people with pressure injuries?

The inclusion criteria used included studies with no limitations on language or period of publication, developed with nursing professionals caring for hospitalized elderly people with PI, in stages 1, 2, 3, 4, unclassifiable, by devices and of membranes and mucous membranes, with or without the presence of infection, by using specific nursing

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care or developing approaches to assessing and treating this condition. Letters, editorials, books, and abstracts from event proceedings were discarded.

The research protocol has been registered with the Open Science Framework (https://osf.io/) and has the DOI 10.17605/OSF.IO/P9DG4.

Data collection

The searches were carried out from March to April 2024 in the city of João Pessoa/ Paraíba/ Brazil, in the following databases: *Excerpta Medica DataBASE* (EMBASE), *Cumulative Index to Nursing and Allied Health* Literature (CINAHL), SCOPUS, *Web of Science*, Nursing Database (BDENF), *Cochrane Library* and the following portals: *Medical Literature Analysis and Retrieval System* (PUBMED), Latin American and Caribbean Literature on Health Sciences Information (LILACS). In addition, gray literature sources were also consulted on *ProQuest Dissertations & Theses Global* and *Google Scholar*.

The search strategy used the Health Sciences Descriptors (DeCS) and the *Medical Subject Head Medical Subject Headings* (MeSH): (*"Aged"* OR *"Elderly" OR "older adults")* AND *("Nursing"* OR *"Nursing Assessment"* OR *"Nursing Care"* OR *"Nursing Intervention")* AND *("pressure injury"* OR *"pressure ulcer"* OR *"pressure sore"* OR *"decubitus ulcer"* OR *"bed ulcer"* OR *"bed sore"* OR *"bedsore")* AND *("Hospitalization"* OR *"Hospitalizations*").

The search results were moved to the *EndNote Web* bibliographic manager, where duplicate studies were eliminated. The studies were then moved to the *Rayyan software*, where they were initially screened by two independent reviewers, who read the title and abstract to avoid the risk of bias, choosing them according to the inclusion and exclusion criteria. In cases of disagreement, a debate occurred between the researchers to reach an agreement and verdict by a third reviewer. After the initial stage, the studies were read in full to identify those supporting this review. The final selection consisted of eighteen studies.

The selection results are presented in a PRISMA-ScR(12) flowchart, illustrated in Figure 1.

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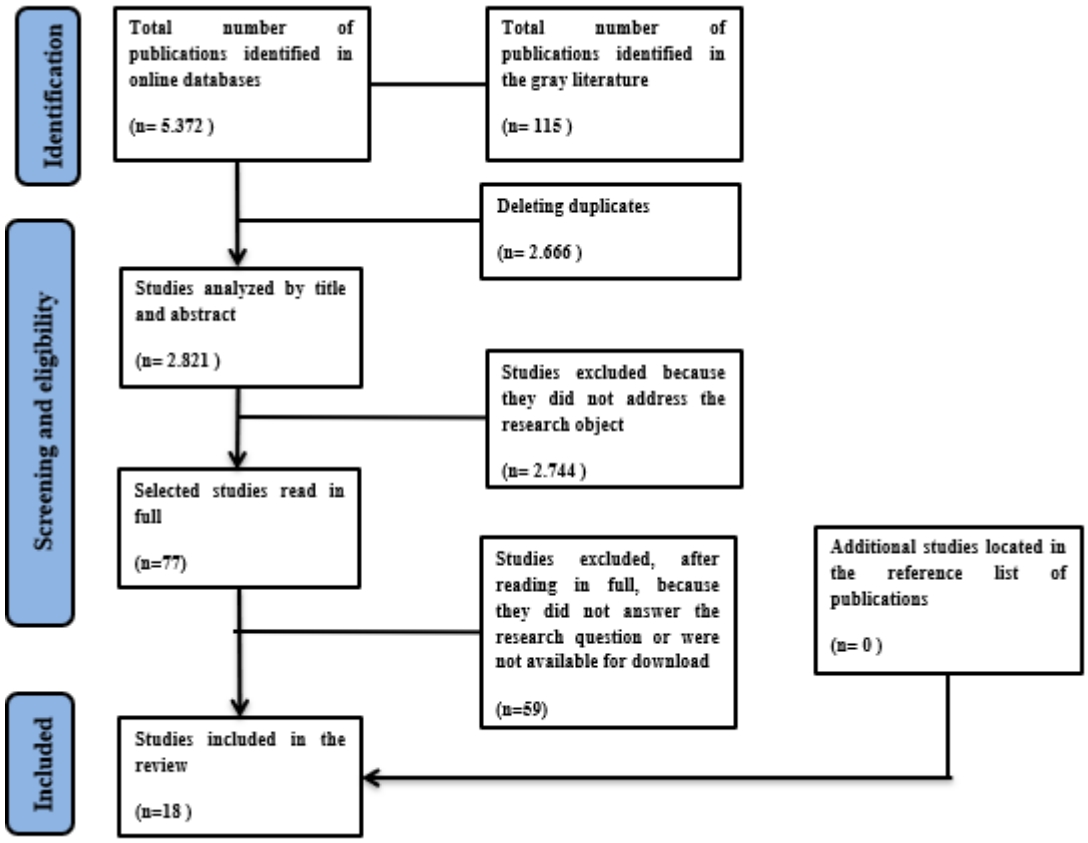
Figure 1 – Flowchart of the distribution of the number of articles identified, excluded and included. João Pessoa, Paraíba, Brazil, 2024.



Source: Adapted from PRISMA-ScR, 2024.

Data analysis and processing

Using a data extraction tool adapted from JBI[11], the studies were compiled, and the information was analyzed and understood according to the guiding question. The data included the following variables: author, country of origin, journal, year of publication, objectives, population and sample size, methodology, type of intervention (nursing interventions for the assessment and treatment of pressure injuries), assessment tool, results, and main findings related to the research question, documenting them in an *Excel* table *(Microsoft Office)*. The results were analyzed through a thorough reading of the studies, with the evidence organized into categories.

Ethical aspects

It should be noted that the research respected ethical precepts, considering the technical-scientific knowledge involved in literature review studies so that all authors were duly referenced and cited. Furthermore, as this is a scoping review, it does not require analysis by an ethics committee.

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RESULTS

Chart 1 shows key information on the 18 selected studies. The articles were published from 1995 to 2023, with 2021 standing out (3; 16.7%). Regarding the location of the studies, 04 (22.2%) came from the United States of America, and 04 (22.2%) from Japan. The predominant language was English (17; 94.4%).

Regarding the type of study, 06 (33.3%) were retrospective, 04 (22.2%) were randomized clinical trials, 03 (16.7%) were prospective cohort studies, 02 (11.1%) were described as case studies, 02 (11.1%) were narrative literature reviews and 01 (5.6%) was a non-randomized study controlled.

Chart 1 - Studies included in the scoping review, according to title, journal, and country of origin. João Pessoa, Paraíba, Brazil, 2024.

Article title	Journal	Country of origin
Wound Management of Multi-Site Pressure Ulcer at Different Stages in Elderly Patients[13]	Clinical, Cosmetic, and Investigational Dermatology	China
Use of photographs for the identification of pressure ulcers in elderly hospitalized patients: validity and reliability[14]	Wound Repair and Regeneration	USA
Use of Medical-Grade Honey to Treat Clinically Infected Heel Pressure Ulcers in High-Risk Patients: A Prospective Case Series[15]	Antibiotics	Greece
Treatment of pressure ulcers in a rehabilitation ward[16]	British Journal of Nursing	England
Treatment of human ulcers by application of macrophages prepared from a blood unit[17]	Experimental Gerontology	USA
The biological debridement of bedsore with the larvae of Lucilia sericata: a case report[18]	Iran J Dermatol	Iran
Pressure Ulcers: Prevention and Management[19]	Mayo Foundation for Medical Education and Research	USA
Hydrogen water intake via tube-feeding for patients with pressure ulcers and its reconstructive effects on normal human skin cells in vitro[20]	Medical Gas Research	Japan
Evaluating the effect of the new incentive system for high-risk pressure ulcer patients on wound healing and cost-effectiveness: A cohort study[21]	International Journal of Nursing Studies	Japan
Effectiveness of a Honey Dressing for Healing Pressure Ulcers[22]	Wound Ostomy Continence Nurs.	Turkey
Economic Evaluation of Collagenase-Containing Ointment and Hydrocolloid Dressing in the Treatment of Pressure Ulcers[23]	Pharmacoeconomics	The Netherlands
Comparison of platelet-rich plasma gel in the care of pressure ulcers with the dressing with serum	International Wound Journal	Turkey

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physiology in terms of healing process and dressing costs[24]		
Estudio comparativo de efectividad de dos ácidos grasos hiperoxigenados en el tratamiento de úlceras de grado I en pacientes geriátricos hospitalizados [25]	Enfermería Clínica	Spain
Clinical validity of the estimated energy requirement and the average protein requirement for nutritional status change and wound healing in older patients with pressure ulcers: A multicenter prospective cohort study[26]	Geriatrics & Gerontology International	Japan
Skin assessment and pressure ulcer care in hospital-based skilled nursing facilities[27]	Wound Management & Prevention	USA
Assessment and Management of Pressure Ulcers in the Elderly: Current Strategies[28]	DRUGS & AGING	Israel
Application efficacy of bundled nursing management in care of elderly patients with pressure ulcers[29]	American Journal of Translational Research	China
An evaluation of polyvinylidene film dressing for treatment of pressure ulcers in older people[30]	Journal of Wound Care	Japan

Source: Authors, 2024.

After reading and capturing the data, two categories related to PI in hospitalized elderly people emerged. They were then grouped according to their similarities and distinctions: Interventions, Assessment, and Nursing Management Systems in PI and Products/technologies in treating PI. For a better understanding, the categories are described in Chart 2.

Chart 2 - Categories related to PI in hospitalized elderly people. João Pessoa, Paraíba, Brazil, 2024.

Interventions, Evaluation and Nursing Management Systems in PI	- Prevention and treatment of PI[13,16,19,26,27]. - Assessment, classification, and recording of PI characteristics[14,27]. - PI risk evaluation[27]. - Incentive system for the management of PI[21].
Products/technologies in the treatment of PI	- Application of wet creams and barrier creams[13,27]. - Negative pressure suction, silver dressing, red light application, flap/micro skin implant, and epithelial tracking [13] - Dressing with Medical Grade Honey[15]. - Dressing with blood unit macrophages[17]. - Application of *Lucilia Seriata* fly larvae[18]. - Administration of water dissolved in hydrogen via a feeding tube[20]. - Dressing with honey sauce[22]. - Application of collagenase ointment associated with hydrocolloid dressing[23]. - Application of platelet-rich plasma gel[24]. - Dressing with Hyper hydrogenated Fatty Acids[25]. - Dressing with polyvinylidene food wrap[30].

Source: authors, 2024.

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DISCUSSION

This study made it possible to map publications on nursing interventions in evaluating and treating PI in hospitalized elderly people. Some characteristics should be emphasized, such as the predominance of articles written in English. It should also be noted that no studies were produced in Brazil, demonstrating this scoping review's relevance to instrumentalizing Brazilian nursing in wound management.

After an exhaustive reading of the articles, the information was assessed, organized, and grouped according to its similarities and differences, as shown below.

Interventions, Evaluation and Nursing Management Systems in PI

This category lists the most comprehensive nursing practices and interventions[13,19,21,27] without being targeted at a particular type of product or technology. The following practices were listed: prevention and treatment of PI[13,19,27]; assessment, classification, and recording of the characteristics of PI[14,27]; evaluation of the risk of PI[27]; and incentive system for the management of PI[21].

Various practices have been cited for prevention and treatment, such as pressure relief through frequent repositioning[13,19,27], dressings[13,27], debridement[13,19], nutritional support[16,26], use of an air mattress[13], management of complications[19], use of standardized protocols[27] and individualized care plans[27].

Current evidence indicates that repositioning reduces the pressure time on the soft tissue and reduces the damage to the blood capillaries. Other elements, such as support surfaces or cushions, are helpful when applying this intervention[31]. Repositioning all patients at risk of PIs at a personalized time is suggested. Treatment objectives, skin and tissue tolerance, clinical condition, pain, and comfort should determine the frequency of repositioning[3].

Studies [13,19,27] have demonstrated that choosing a particular type of dressing and debridement should be based on the clinical scenario and the available scientific evidence. They highlight the need to remove devitalized tissue and optimize the wound environment to promote granulation and re-epithelialization. International reference bodies recommend removing devitalized tissue and continuing with debridement until the wound has a clean bed filled with granulation tissue[6].

Studies treat nutritional support, especially the minimum need for energy and protein, as highly relevant to preventing decline and preserving the nutritional condition of hospitalized elderly people, speeding up the healing of PIs[14,27].

Nutritional status is decisive in preventing and treating PI, as all tissues require macro and micronutrients to promote growth, maintenance, and healing. In addition, meeting the calorie target is vital for energy supply, and healing is essential for phagocytic activity, cell proliferation, and fibroblast function. International standards indicate an increase in

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protein supply, which is crucial to forming new blood vessels, fibroblast proliferation, collagen production, and the production and migration of leukocytes[32].

A study of 52 elderly people [13] mentioned using pneumatic mattresses to reduce and release local pressure. The study aimed to explore individualized treatment options for PI at various stages in elderly patients with multiple comorbidities.

Patient Safety Practices in Healthcare include the use of special mattresses, such as viscoelastic mattresses, or the inclusion of an alternating pressure air mattress for people at risk of developing PI. Individual pressure redistribution needs should be considered when choosing the support surface, such as the degree of immobility and inactivity, the size and weight of the patient, the number, severity, and location of PIs already present, and the risk of developing new injury[3].

An American article[19] highlights the importance of including the management of complications (infections, osteomyelitis, fistulas, and systemic infections) in treatment. Commonly associated with PIs, these complications worsen the clinical situation of the affected person, causing local or systemic infection, increased length of hospital stay, and dependence on the patient and caregivers, triggering an overload of care or even death[32].

Nurses in another American study[27] highlighted the importance of standardized protocols and individualized care plans to guide the treatment of PIs. The *National Pressure Ulcer Advisory Panel advises* that the choice of material and treatment for PIs should take into consideration the objectives, the adherence of the patient or informal caregivers, as well as clinical evaluation involving the extent, shape and depth of the lesion; the demand for treatment of the bacterial load; the ability to maintain a moist environment in the bed of the lesion; the nature and volume of exudate; the condition of the surrounding tissues and skin; the presence of tunneling/cavitation, as well as pain. In addition, it is always necessary to evaluate the cost-benefit of the treatment, considering the direct and indirect costs to the health network and the individual[6].

As for recording the characteristics of the lesions, the following information was reported: length and width, odor, drainage, depth, tissue color, and necrotic tissue. The majority used a standardized evaluation form for documentation daily or weekly, and photography was also mentioned[27]. I want to point out that recording information is essential to ensure that care is maintained, and the desired results are analyzed. The characteristics of the lesion, the type of tissue, and the progress of healing should be described methodically and support the recommended coverage. The notes should include aspects of the assessment, improvement, dressing used, and possible coverage changes during care. With this, it is possible to use the records as a source of consultation, favoring continuity and quality of care[9].

In this context, the importance of using digital photography to analyze and record lesions

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stands out. A study has shown that trained nurses can accurately classify PIs from photographs[14] depicting PIs at various stages, even in non-white patients. The study incorporated numerous pictures and a rigorous design, allowing validity and reliability to be evaluated.

Although designed to assess reliability and validity in PI diagnosis, this study also brought insight into the application of photographic images in the assessment and telemedicine management of wounds and other dermatologic conditions. The authors suggest that electronic images of wounds may soon become commonplace for documentation in an electronic medical record or to facilitate a clinical consultation.

When assessing the risk of PI, studies have shown the need to use instruments for assessment and reassessment, with the Braden Scale (BS) being the most widely used, with a daily periodicity[27]. This evidence converges with the ANVISA guidelines, reinforcing the importance of adopting validated scales, such as the BS, which should be applied to all admitted patients daily throughout their hospitalization. If the client develops a PI, an even more rigorous daily skin assessment is recommended to reduce the risk of new lesions; a physical examination with a thorough evaluation of the skin in the areas of a bony protuberance (sacral region, heels, trochanters, occipital, knees and elbows)[3].

It consists of six criteria: BS evaluates sensory perception, degree of humidity, activity, mobility, nutrition, friction, and shear. The score ranges from 6 to 23 points, and as the score decreases, the risk involved increases[33].

Experience with a management incentive system was cited in a study in Japan[21], which focused on hiring qualified nurses. The data showed that this type of system can improve the cure rate of PIs with reduced medical costs. This way of managing the work process in a health service brings us back to Scientific Theory. This is characterized by an economic vision, maximizing work efficiency through financial incentives, strengthening the concept of productivity, and investing in professional qualifications to improve worker efficiency[3

The various practices cited highlight the importance of care protocols in assessing and treating PIs in hospitalized elderly people. This technology qualifies care based on Evidence-Based Practice by instrumentalizing nurses' choices after clinical judgment, focusing on the care that should be provided to meet the patient's health needs, and facilitating its implementation[35].

Products/technologies in the treatment of PI

This category includes specific analyses of products/technologies the nursing team applied to and evaluated their effectiveness in treating PIs in hospitalized elderly people. The studies[13-15,17,18,20,22-25,27,30] covered the following topics: application of moist creams and barrier creams[13,27]; closed negative pressure suction, silver dressing, application of red light, surgical flap/micro skin implant and epithelial

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tracking[13]; dressing with Medical Grade Honey[15]; dressing with blood unit macrophages[17]; application of *Lucilia Seriata* fly larvae[18]; administration of water dissolved in hydrogen via a feeding tube[20]; dressing with Honey Sauce[22] application of collagenase ointment associated with hydrocolloid dressing[23]; application of platelet-rich plasma gel[24]; dressing with hyper hydrogenated Fatty Acids and dressing with polyvinylidene (PVL) food packaging[30].

The studies identified different instruments for assessing results depending on the intervention used, the most common being clinical evaluation of PI healing (6; 33.3%), Pressure Ulcer Scale for Healing (PUSH) (2;11.1%), and *Depth, Exudate, Size, Infection/Inflammation, Granulation tissue, Necrotic tissue* (DESIGN) (2;11.1%).

The PUSH scale consists of three items: size, volume of exudate, and predominant tissue in the lesion. It is recognized for its simple and quick application, with scores ranging from 0 (indicating less severity) to 17 (representing greater severity). DESIGN refers to the acronym of six instrument elements: depth, exudate, size, inflammation/infection, granulation, and necrotic tissue. The "P" can be included in content-filled vesicles[36].

Scales are essential for analyzing PIs' healing process and attesting to the efficacy of specific therapy. Still, the lack of a universal monitoring instrument or approach generates inconsistencies in the records, reinforcing the need to adopt a standard assessment approach.

In a study of 68 American hospital units[27], the prevention and treatment intervention most often cited by nurses was the "application of barrier ointment" (91.2%). Barrier cream moisturizes, protects, and restores the skin's pH, creating a protective barrier against external agents. It is indicated for moisture control in people wearing geriatric diapers and with exudating lesions[3].

Concerning individualized treatment in elderly people with PI in the sacrococcygeal region, a Chinese retrospective study[23] explored various technologies, such as negative pressure suction, silver dressing, red light application, surgical flap/micro skin implantation, and epithelial tracking.

Negative pressure therapy is recommended as an initial complementary therapy to reduce the size and depth of lesions classified as S3 and S4[6]. Silver ions act on the DNA of bacteria and spores, reducing their replication through the oxidation that occurs when the silver connects with the fluid. Silver is present in various dressing forms, with different ion-release methods, and is indicated for infected, colonized, and chronic lesions[37].

Still, concerning the technologies explored, the laser (red light spectrum) is proving to be effective in wound healing, regulating the inflammatory process, boosting tissue repair, and reducing collagen-destroying metalloproteinases in the matrix, which results in better tissue organization and revascularization of ischemic tissue[38]. Lesions at more advanced stages, which do not respond to conservative

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treatment, may be indicated for treatment by plastic surgery, such as a surgical flap/micro skin implant and epithelial tracking. Treatment should continue with careful assessment and dressing.

Evaluating the efficacy of products and technologies, a study of clinically infected heel PIs assessed the effectiveness and safety of topical treatment with a gel based on medical-grade honey (MGH)[15]. The average period for healing the lesion was 128 days; the therapeutic approach proved safe, effective, easy to apply, and cost-effective.

An American study investigated the efficacy of treating PI in 199 elderly patients using local injections of macrophages prepared from a unit of blood[17]. The treatment, in the form of a closed, sterile system, proved significantly more effective than conventional methods, pointing to the clinical potential of this approach in wound healing.

Among the publications analyzed, we also found a case study reporting the successful treatment of an elderly man with PI using *Lucilia sericata* fly larvae[18]. After 12 sessions (36 days) of larvae treatment, healing was complete. The results indicated that the therapy can reduce healing time and costs, although there is a potential limitation due to evaluating a single patient.

A study of 22 elderly people in Japan evaluated the clinical efficacy of hydrogen-dissolved water via tube feeding in healing patients with PI [20]. The elderly showed a reduction in lesion size and early recovery, with a reduction in hospitalization time. In addition, the study analyzed the mechanisms related to hydrogen's performance in wound healing at the cellular level in vitro, concluding that this effect would result from the construction of type I collagen in dermal fibroblasts, the mitochondrial reduction capacity promoted and repression in epidermal keratinocytes.

A randomized clinical trial of 36 elderly people with PI E2 or E3 compared the effect of a honey dip versus an ethoxy-diaminoacridine plus nitrofurazone curative[22]. At week 5, the PUSH tool scores showed that healing among the subjects who used honey dressing was about four times higher than in the comparison group. However, further studies are needed to understand better the benefit of honey dressing in patients with PI and its efficacy compared to advanced dressings.

Concerning PI E4 in the calcaneus after orthopedic surgery, a randomized clinical trial with 24 elderly women evaluated the efficacy and cost-effectiveness of two treatments: an ointment containing collagenase and a hydrocolloid dressing[23]. In terms of overall costs and costs per successfully treated patient, this study indicated that treatment with collagenase was more cost-effective than with hydrocolloid, with a shorter time for the lesion to heal.

In a palliative care unit, a study of 60 elderly people admitted after surgery compared the effects of platelet-rich plasma gel (PRP) therapy and a gas dressing with saline solution applied to PI E2 on the coccyx[24]. The PRP therapy positively affected healing, with

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statistically better results in reducing the lesions' area, exudate, and tissue types than the saline dressing.

A randomized clinical trial in Spain evaluated the equivalence between hyperoxygenated fatty acids (HFOA) and mementos in curing 148 S1 PI in elderly hospitalized patients [25]. AGHO had a 14% higher incidence of cure than treatment with mepentols, thus demonstrating non-equivalence. The study suggests that treatment with AGHO can be used with quality, safety, and efficacy in S1 PI in hospitalized geriatric patients.

In geriatric hospitals in Japan, a study of 49 elderly people compared the effectiveness of polyvinylidene (PVL) food wrap as a dressing material versus conventional ointments and gauze dressings for PI[30]. The PVL film dressing was superior to traditional treatment in managing S3 and 4 PI in the acute inflammatory phase and may be helpful in the long-term treatment of elderly people.

The main results of the products, coverings and dressings analyzed in the studies were: good cost-benefit ratio[15,17,18,23-24,30], safety and effectiveness[15,17,18,22,25], healing of the lesion[17,22,24-25], easy application[15,22,30], improvement in clinical results[15,23] closed and sterile system[17], reduction in the size of the lesion and early recovery[20].

To achieve good results in the therapeutic plan for elderly people hospitalized with PI, it is essential to provide effective adaptation of care in the health-disease process. The nurse acts as a key agent in this process, which includes offering the person being cared for confidence, security, tranquility, and relief through actions that promote well-being and comfort[39].

Despite the above, the potential limitation of this scoping review is the lack of national studies, which may demonstrate a reality of care for the elderly that differs from that of Brazil.

CONCLUSION

Based on the findings of this review, it was concluded that the nursing interventions used in the assessment and treatment of PI in hospitalized elderly people could be categorized into interventions, assessment and nursing management systems in PI, and products/technologies in the treatment of PI. Although the preventive approach was not the focus of the review, the evidence reinforced the importance of this practice using validated scales, especially in elderly people already affected by the injury, helping to prevent it from worsening and preventing the development of new injuries. In this way, standardized protocols and individualized care plans are used to guide treatment.

Various products and technologies applied by the nursing team have been evaluated for their effectiveness, showing promising results and a good cost-benefit ratio in healing the lesions. However, the lack of standardization in the evaluation criteria reinforces the need to adopt a standard evaluation approach.

The implications of this review for the practice of teaching, research, and management in the assessment and treatment of PI in the

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hospitalized elderly population include the need to train professionals with a reflective and critical attitude, enabling them to adapt interventions to the specific needs of the elderly, as well as highlighting the importance of drawing up and validating protocols for this population. In nursing care, the value of care based on evidence-based practice stands out, as the application of institutional protocols can reinforce and underpin the nurse's care practice, respecting the demands and potential of the context in which the elderly person is inserted.

Contributions can be implemented at a national level, requiring the commitment of the scientific community to encourage new research into the challenges involved in caring for the elderly, leading to the improvement of practices that can be replicated in the hospital context.

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Scientific Editor: Francisco Mayron Morais Soares. Orcid: https://orcid.org/0000-0001-7316-2519