Prevention of pressure injury in neonates in the neonatal Intensive Care Unit: a scoping review protocol

Prevenção de lesões por pressão em neonatos em UTI neonatal: protocolo de revisão de escopo

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ABSTRACT

Objective: To map strategies to prevent pressure injuries in neonates admitted to the neonatal intensive care unit (NICU). **Methods:** This study uses a scoping review protocol developed using the Joanna Briggs Institute (JBI) methodology. The aim is to answer the following question What are the strategies to prevent pressure injuries in neonates admitted to the NICU? The following databases will be searched Medical Literature Analysis and Retrieval System Online (MEDLINE/PubMed), Scientific Electronic Library Online (SciELO), SCOPUS (Elsevier), Excerpta Medica Database (EMBASE/Elsevier), LILACS, BDENF, and others (through the regional BVS portal), Cochrane Library (Wiley), Web of Science Core Collection (Clarivate Analytics), Academic Search Premier (EBSCO), CINAHL with Full Text (EBSCO), Pubmed Central (NLM), and gray literature. Independent reviewers performed selection and data extraction. Results will be presented graphically with a narrative summary. Endnote software will be used for reference management, while Rayyan Systems Inc. software will be used for selection. Tools will be developed to assist in the selection and data extraction phases. The results will be presented using the PRISMA-ScR flowchart.
Descriptores: Pressure Ulcer; Infant, Newborn; Intensive Care Units, Neonatal.

RESUMO

Objetivo: Mapear as estratégias para a prevenção de lesões por pressão em neonatos internados em unidades de terapia intensiva neonatal. **Método:** O presente estudo utiliza um protocolo de revisão de escopo desenvolvido pelo método do Joanna Briggs Institute (JBI). O objetivo é responder à seguinte pergunta: Quais são as estratégias para prevenção de lesões por pressão em neonatos internados na Unidade de Terapia Intensiva Neonatal? Serão consultadas as seguintes bases de dados: *Medical Literature Analysis and Retrieval System Online* (MEDLINE/PubMed), *Scientific Electronic Library Online* (SciELO), SCOPUS (Elsevier), *Excerpta Medica Database* (EMBASE/Elsevier), LILACS, BDENF e outras (via Portal Regional da BVS), *Cochrane Library* (Wiley), *Web of Science Core Collection* (Clarivate Analytics), *Academic Search Premier* (Ebsco), *Cumulative Index to Nursing and Allied Health Literature* (CINAHL) with Full Text (Ebsco), Pubmed Central (NLM) e literatura cinzenta. A seleção e extração dos dados serão realizadas por revisores independentes. Os resultados serão apresentados graficamente com um resumo narrativo. O software Endnote será utilizado para gerenciar as referências, enquanto o software Rayyan Systems Inc. será empregado para a seleção. Instrumentos foram elaborados para auxiliar nas etapas de seleção e extração de dados. Os resultados serão apresentados por meio do fluxograma PRISMA-ScR.
Descritores: Lesão por Pressão; Recém-Nascido; Unidades de Terapia Intensiva Neonatal.

INTRODUCTION

According to the concept of the World Health Organization (WHO) and the National Pressure Injury Advisory Panel (NPIAP) Pressure Injury Staging System, which updated the terminology from Pressure Ulcer to Pressure Injury (PI), these injuries occur as a result of prolonged pressure, pressure in combination with shear, or pressure related to medical devices, resulting in localized tissue damage and ischemic necrosis of the skin and underlying tissues. Tissue tolerance to pressure and shear is also influenced by micro-

climate, nutrition, perfusion, comorbidities, and tissue condition[1, 2].

Neonates and children are vulnerable patients with specific risk factors for developing PIs. These factors include skin immaturity and fragility, critical illnesses requiring hospitalization in intensive care units, prolonged hospital stays, and the use of medical devices. A comprehensive assessment that includes evaluating the risk of PIs, skin assessment, nutritional status, and pain is essential to understand their needs and implement an individualized prevention plan[3].

The Neonatal Intensive Care Unit (NICU) poses numerous challenges to maintaining skin integrity due to the care provided to critically ill patients, often involving invasive procedures that can compromise skin functionality and lead to developing PIs in premature and full-term neonates[4].

A national study conducted in Argentina in 2018 revealed a prevalence of 4.15% of PIs in neonates, with 66% of newborns at risk of developing PIs. The most frequently affected anatomical areas were the head and sacral region, and all the injuries were related to hospitalization[5].

A systematic review identified studies investigating the frequency and risk factors for pressure, friction, and shear-related skin injuries in neonates. The findings indicated a prevalence ranging from 9.25% to 43.1%, with risk factors associated with the use of medical devices, gestational age, and birth weight[6].

Given this epidemiological landscape, international organizations such as the National Institute for Health and Care Excellence (NICE) in the United Kingdom provide recommendations for prevention, including methods for risk identification and assessment[7]. The National Pressure Ulcer Advisory Panel (NPUAP), European Pressure Ulcer Advisory Panel (EPUAP), and Pan Pacific Pressure Injury Alliance (PPPIA) collaborate in developing evidence-based clinical guidelines for different age groups, including neonates, to support decision-making in the prevention of this condition[8].

Thus, evidence-based practice plays a crucial role in enhancing nursing care. Through a scoping review, it is possible to evaluate a specific topic in the literature, and map and synthesize evidence, providing an overview of the subject. Therefore, it is important to have conceptual clarity and conduct thorough planning to ensure that the scoping review is of high quality, reliability, and potentially publishable. Although conducted for different purposes than systematic reviews, this type of review also requires rigorous and transparent methods to ensure reliable results[9,10].

Additionally, scoping reviews are often considered a precursor to systematic reviews and have the main objectives of identifying available evidence types, analyzing knowledge gaps, clarifying concepts/definitions, examining research conduct, and identifying key characteristics or factors related to a specific concept[10].

By addressing the strategies for preventing PIs in the neonatal population, the aim is to organize care based on the findings mapped in the global literature on the topic. Furthermore, the intention is to identify potential primary studies to conduct a systematic review of effectiveness in the future.

During the preliminary search on online platforms such as the International Prospective Register of Systematic Reviews (PROSPERO), Open Science Framework (OSF), MEDLINE (Medical Literature Analysis and Retrieval System Online), Cochrane Library, and JBI Evidence Synthesis, systematic reviews related to the incidence and prevalence of PIs, as well as medical devices in adult and elderly patients and specific prevention strategies in settings such as intensive care units (ICUs), were found.

A review in the Cochrane Library analyzed the effectiveness, in terms of reducing the incidence of PIs, of preventive measures and strategies in hospitalized newborns[11].

The main differences of this review compared to existing reviews will be its comprehensive scope, without temporal or language restrictions, and the inclusion of various study designs, not limited solely to the analysis of incidence as an outcome. Therefore, this study aims to map the strategies for preventing PIs in neonates admitted to the NICU. Specifically, the aims are to:

Describe the risk factors related to PIs in the study population.

Identify the strategies for preventing PIs in newborns based on gestational age classification (premature, late preterm, full-term, post-term) and birth weight classification (extremely low birth weight, very low birth weight, low birth weight, etc.).

The review question is: What are the strategies for preventing pressure injuries in neonates admitted to the NICU?

The secondary questions are:

• What are the risk factors related to pressure injuries in neonates admitted to the NICU?

METHODS

This is a scoping review following the Joanna Briggs Instituto (JBI) methodology. The review protocol follows the steps defined by the JBI methodology, including the definition of the title, objective, and review question, development of inclusion criteria, planning of the search strategy, selection of evidence sources, data extraction, evidence analysis, and presentation of results [12]. Before submission to the Open Science Framework (OSF) platform [13], the protocol for this review was evaluated by the core staff of the Brazilian Center for Evidence-Based Health Care: JBI Center of Excellence (JBI Brazil) during a scientific meeting in September 2022. The protocol was registered at OSF and assigned the following DOI: https://doi.org/10.17605/OSF.IO/D4U5A.

Inclusion criteria

Participants

The review will include all studies involving neonates. The concepts presented in the Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH) terms [14] will be included.
The following concepts will be included:

- Newborn: An infant during the first 28 days after birth.
- Premature infant: An infant born before the 37th week of gestation.
- Extremely premature infant: Infant born before 28 weeks of gestation.
- Low birth weight newborn: Newborn with a birth weight of less than 2500 grams.
- Very low birth weight newborn: Newborn weighing less than 1500 grams, regardless of gestational age.
- Post-term infant: Infant born after 42 weeks of gestation.

According to the WHO, a newborn or neonate is a child under 28 days of age [15]. In addition, newborns may be classified according to gestational age and birth weight [16].
There are no restrictions based on participants' gender, ethnicity, country of origin, socioeconomic status, or health status. Studies that extend beyond the specified age range and include children will be considered if the results can be extracted for the relevant age group of interest in this study.
Studies involving newborns with pre-existing pressure injuries or studies focusing on other skin lesions will be excluded.

Concept

Studies that address pressure injury (PI) prevention strategies based on international consensus and guidelines [7,8] will be considered. These include risk assessment tools, skin and tissue assessment, preventive skin care, nutritional support, repositioning and early mobilization, support surfaces, and medical device-related pressure injuries.
Technologies such as prophylactic dressings will also be considered, even if they are not included in the guidelines, as long as they have been evaluated in primary studies and justified by the authors.
Studies that address general skin care strategies, prevention, and treatment of skin lesions will be included, provided that specific results for PI prevention strategies are reported separately to allow extraction of relevant data.
Studies focusing solely on treating and healing PI, recommendations for neonatal skin cleansing and antiseptics, umbilical cord care, use of emollients, and prevention of diaper dermatitis will be excluded. Studies on the incidence and prevalence of PIs and other skin lesions were also excluded.

Context

In the review context, neonatal intensive care units (NICUs) are defined in the DeCS as hospital units that provide intensive and continuous care to critically ill newborns [14].
In Brazil, *Portaria* no. 930, dated May 10, 2012, defines a NICU as a hospital environment designed to comprehensively care for critically ill newborns with a potential risk of death. It uses appropriate technologies to provide specialized and specific services, including the necessary physical structure, equipment, and human resources.

Types of sources

The following types of studies will be considered: experimental and quasi-experimental studies, including randomized controlled trials and non-randomized controlled trials (controlled clinical trials); observational studies, such as case-control studies, analytical cross-sectional studies, prospective and retrospective cohort studies, case series, individual case reports, and descriptive cross-sectional studies; systematic reviews that meet the inclusion criteria according to the research question; qualitative studies that address the concept of interest; and

relevant opinion articles and texts. Therefore, various research approaches will be considered to provide a comprehensive understanding of pressure injury prevention strategies in neonates admitted to the NICU.

Search strategy

An initial limited search of MEDLINE/PubMed was conducted to identify relevant studies on the topic. Based on this, a comprehensive search strategy was developed using keywords identified in the titles and abstracts of the articles and indexing terms (Figure 1).

In the search strategy, all identified keywords and indexing terms will be used and adapted to each specific database or source of information. The references of the articles selected for analysis will be checked and included if they meet the inclusion criteria. Studies published in any language and without time limitation will be included.

The following reference databases, information portals, and gray literature sources, such as Science.gov and Open Grey, will be searched. Searches will also be conducted in the Regional Portal of the Virtual Health Library (VHL) and its main databases, including the Latin American and Caribbean Health Sciences Literature (LI-LACS), the Nursing Database (BDENF), and the Spanish Bibliographic Index in Health Sciences (IBECS). In addition, searches will be conducted in PubMed, MEDLINE, Scientific Electronic Library Online (SciELO), and Cochrane Library (John Wiley).

Searches will also be conducted in the CAPES (Coordination of Superior Level Staff Improvement) Periodicals Portal using institutional access to databases such as Excerpta Medica Database (EMBASE) and Scopus (Elsevier), Core Collection (Clarivate Analytics), Academic Search Premier, Cumulative Index to Nursing and Allied Health

Database	Search strategy	Recovered articles
PUBMED	(("Infant, Newborn"[mh] OR Newborn Infant*[tiab] OR Newborn*[tiab] OR Neonate*[tiab] OR "Infant"[mh] OR Infant*[tiab] OR "Child, Preschool"[mh] OR Preschool*[tiab] OR "Child"[mh] OR Child*[tiab] OR Children[tiab] OR "full term infant"[tiab] OR neonatus[tiab] OR "newly born baby"[tiab] OR "newly born child"[tiab] OR "newly born infant"[tiab] OR Pediatric*[tiab] OR "Infant, Premature"[mh] OR Preterm*[tiab] OR Premature*[tiab] OR "Neonatal Prematurity"[tiab] OR prematurita*[tiab]) AND ("Pressure Ulcer"[mh] OR "Bed Sore"[tiab] OR "Bed Sores"[tiab] OR Bedsore*[tiab] OR Decubitus Ulcer*[tiab] OR Pressure Sore*[tiab] OR Pressure Ulcer*[tiab] OR "decubital ulcer"[tiab] OR decubital[tiab] OR decubitus*[tiab] OR "pressure injury"[tiab] OR "pressure sore"[tiab] OR Hospital acquired pressure ulcer[tiab] OR Hospital acquired pressure injury[tiab] OR Medical device-related pressure injuries[tiab])) AND ("Secondary Prevention"[mh] OR Prevention*[tiab] OR "Early Therapies"[tiab] OR "Early Therapy"[tiab] OR Secondary Prevention*[tiab] OR "Skin Care"[mh] OR "skin evaluation"[tiab] OR Risk Assessment*[tiab] OR Benefit Risk Assessment*[tiab] OR Benefit-Risk Assessment*[tiab] OR "Benefits and Risks"[tiab] OR Health Risk Assessment*[tiab] OR Risk Analys*[tiab] OR Risk Benefit Assessment* OR Risk-Benefit Assessment*[tiab] OR "Risks and Benefits"[tiab] OR "Enteral Nutrition"[mh] OR "Enteral Feeding"[tiab] OR Force Feeding*[tiab] OR Gastric Feeding Tube*[tiab] OR "Tube Feeding"[tiab] OR "Parenteral Nutrition"[mh] OR Intravenous Feeding*[tiab] OR Parenteral Feeding*[tiab] OR "Patient Positioning"[mh] OR Patient Positioning*[tiab] OR reposition*[tiab] OR "re position"[tiab] OR position[tiab] OR "turn patients"[tiab] OR "turn intervals"[tiab] OR turning[tiab] OR mobilis*[tiab] OR mobiliz*[tiab] OR "moving and lifting patients"[tiab] OR "pressure relief"[tiab] OR "pressure relieve"[tiab] OR "pressure reduction"[tiab] OR "Perception"[mh] OR Perception*[tiab] OR "Sensory Processing"[tiab] OR Humidity[tiab] OR Mobility[tiab] OR "Friction"[mh] OR Friction[tiab] OR "Moving and Lifting Patients"[mh] OR Patient Handling*[tiab] OR Patient Lifting*[tiab] OR Patient Moving*[tiab] OR "Patient Moving and Lifting" [tiab] OR Patient Repositioning*[tiab])	679

Source: Prepared by the authors, 2023.

Figure 1 - Search strategy performed in the PUBMED database on 10/25/2022. Rio de Janeiro, RJ, Brazil, 2023

Literature (CINAHL) with Full Text (EBSCO), and PubMed Central (NLM).

Selection of evidence

Once the databases have been searched, all identified citations are grouped and imported into Endnote. Duplicates will be removed, and the references will be loaded into the Rayyan Systems Inc. software for selection.

A pilot test will be conducted to ensure consistency in the selection process. Two independent and blinded reviewers will then evaluate the titles and abstracts of the studies. Potentially relevant references will be retrieved in total. The full-text articles of the selected studies will be thoroughly analyzed according to the established inclusion criteria. The reasons for excluding studies are documented in the scoping review report.

Any disagreements between the reviewers during the selection process will be resolved through online meetings and discussions between the reviewers or with a third reviewer if consensus cannot be reached.

The results will be comprehensively reported using a flow chart based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR)[17].

Data extraction

Two independent reviewers will extract data from the articles included in the scoping review. Specific information on the population, approach, context, research methods, and key findings relevant to the research question will be collected. A screening of the studies will be conducted in which the two initial reviewers will read the titles and abstracts of the articles and assess their relevance based on the selection criteria. Subsequently, the selected articles from the screening phase will be read in full.

Before and after the selection process, consensus meetings will be held among the reviewers to compare the selected studies. In disagreement, a third reviewer will be consulted to reach a consensus. In addition, the reference lists of all selected studies will be critically appraised to identify additional studies not found in the databases.

The data extraction forms shown in Figures 2 and 3 will be modified and revised to obtain information from the selected studies. The modifications will be described in the final report of the scoping review. In the case of missing or incomplete data, study researchers will be contacted via email or other contact information provided by the authors.

CHARACTERIZATION OF THE STUDIES						
CODE	AUTHORS	TITLE	COUNTRY	JOURNAL	YEAR	STUDY TYPES

Source: Prepared by the authors, 2023.
Figure 2 - Data extraction instrument (Part 1). Rio de Janeiro, RJ, Brazil, 2023

CODE	PARTICIPANTS (characteristics, age range, sample)	CONDITION (related to the risk of developing PI)	CONCEPT - Strategies for prevention		CONTEXT	RESULTS
			Type of intervention	Category of intervention		

Source: Prepared by the authors, 2023.
Figure 3 - Data extraction instrument (Part 2). Rio de Janeiro, RJ, Brazil, 2023

Analysis and presentation of the data

Evidence will be presented according to the objectives of the study. Tables, graphs, data maps, and descriptive summaries will be used. In addition, the

evidence will be discussed in depth concerning relevant literature. The goal is to address the research question and meet the objectives of the study.

REFERENCES

1. World Health Organization. International Classification of Diseases for Mortality and Morbidity Statistics (ICD 11). Genava: WHO; 2018 [cited 2022 Sept 12]. Available from: https://icd.who.int/browse11/l-m/en

2. National Pressure Injury Advisory Panel. NPIAP Pressure Injury Stages [Internet]. Westford: NPIAP; 2016 [cited 2022 Sept 09]. Available from: https://cdn.ymaws.com/npiap.com/resource/resmgr/online_store/npiap_pressure_injury_stages.pdf

3. Boylan C. Paediatric pressure injuries: considerations for this patient cohort. Wound Practice and Research. 2020;28(2):84-89. https://doi.org/10.33235/wpr.28.2.84-89

4. Eichenwald EC, Hansen AR, Martin CR, Stark AR. Cloherty and Stark's Manual of neonatal care - South Asia Edition. 8. ed. Issue 3. New Delhi: Wolters Kluwer; 2021.

5. Etchenique S, Saiz M. Primer estudio nacional de prevalencia de úlceras por presión en Argentina, 2018. El primer paso para la maratón nacional de UPP. Gerokomos [Internet]. 2020 [cited 2022 Sept 21];31(1):41-50. Available from: http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1134-928X2020000100009&lng=es

6. August DL, New K, Ray R, Kandasamy Y. Frequency, location and risk factors of neonatal skin injuries from mechanical forces of pressure, friction, shear and stripping: a systematic literature review. J Neonat Nurs 2018;24(4):173–80. https://doi.org/10.1016/j.jnn.2017.08.003

7. National Institute for Health and Care Excellence. Pressure ulcers: prevention and management - Clinical Guideline [Internet]. [place unknown]: NICE; 2014 [cited 2022 Sept 07]. Available from: https://www.nice.org.uk/guidance/cg179/resources/pressure-ulcers-prevention-and-management-35109760631749

8. European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention and treatment of Pressure Ulcers/Injury: clinical Practice Guideline. The International Guideline [Internet]. Haesler E, editor. [place unknown]: EPUAP/NPIAP/PPPIA; 2019 [cited 2022 Aug 22]. Available from: https://www.biosanas.com.br/uploads/outros/artigos_cientificos/127/956e02196892d7140b9bb3cdf116d13b.pdf

9. Lockwood C, Dos Santos KB, Pap R. Practical Guidance for Knowledge Synthesis: Scoping Review Methods. Asian Nurs Res (Korean Soc Nurs Sci). 2019 Dec;13(5):287-294. http://dx.doi.org/10.1016/j.anr.2019.11.002.

10. Munn Z, Peters MDJ, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. BMC Med Res Methodol. 2018;18(1). https://doi.org/10.1186/s12874-018-0611-x

11. Alfaro LA, Balaguer LE, Pérez PA, Gómez SJ, Rodríguez DMC, García MP. Efectividad de las medidas y estrategias de prevención de úlceras por presión en neonatos. Gerokomos. 2020;31(3):193-197. http://dx.doi.org/10.1016/j.anr.2019.11.002

12. Peters MDJ, Godfrey C, McInerney P, Munn Z, Tricco AC, Khalil, H. Chapter 11: Scoping Reviews (2020 version). In: Aromataris E, Munn Z, editors. JBI Manual for Evidence Synthesis [Internet]. Adelaide: JBI; 2020 [cited 22 Aug 23]. Available from: https://

CONFLICT OF INTERESTS

The authors have declared that there is no conflict of interests.

synthesismanual.jbi.global/. https://doi.org/10.46658/JBIMES-20-12

13. Open Science Framework. OSF [Internet]. [place unknown]: OSF; c2011-2023 [cited 2022 Aug 23]. Available from: https://osf.io/

14. Centro Latino Americano e do Caribe de Informação em Ciências da Saúde. DeCS – Descritores em Ciências da Saúde [Internet]. [place unknown]: BIREME; [cited 2022 Aug 23]. Available from: https://decs.bvsalud.org/

15. World Health Organization. Newborn health [Internet]. Geneva: WHO; c2022 [cited 2022 Aug 23]. Available from: https://www.who.int/westernpacific/health-topics/newborn--health

16. Gomella T, Eyal FG, Bany-Mohammed F.eds. Gomella's Neonatology: Management, Procedures, On-Call Problems, Diseases, and Drugs [Internet]. 8 ed. China: McGraw-Hill; 2020 [cited 2022 Aug 23]. Available from: https://accesspediatrics.mhmedical.com/book.aspx?bookID=2762#234450615

17. Preferred Reporting Items for Systematic Reviews and Meta-Analyses. PRISMA flow diagram [Internet]. [place unknown]: PRISMA; c2022 [cited 2022 Aug 23]. Available from: http://www.prisma-statement.org/PRISMAStatement/FlowDiagram

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