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Impact of the degree of synergy between patient and nurse perceptions on the clinical outcome of pressure injury prevention: a mixed-methods systematic review protocol

Irhad Trozic ,[1] Lisa Fischer ,[1] Stefanie Deckert,[2] Kerstin Gmeinwieser[1]

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[1]Department for Digitalization and Nursing Science, University Hospital Augsburg, Augsburg, Germany
[2]Center for Evidence-Based Healthcare, University Hospital and Faculty of Medicine Carl Gustav Carus, TU Dresden, Dresden, Germany

Correspondence to
Dr Stefanie Deckert;
Stefanie.Deckert@ukdd.de

ABSTRACT

Introduction Pressure injuries are a common and significant concern in clinical practice, often serving as a vital quality indicator. While (clinical) practice guidelines have been established to offer recommendations for mitigating hospital-acquired pressure injuries, adherence among stakeholders remains inconsistent. The subjective perceptions of stakeholders, such as patients and nurses, may impede adherence to pressure ulcer prevention guidelines, potentially reducing the effectiveness of these interventions. However, there is currently insufficient evidence to comprehensively understand this influence. Therefore, this review aims to offer a broader understanding of how the perspectives of patients and nurses engaged in pressure injury prevention affect the effectiveness of specific interventions for pressure ulcer management.

Methods and analysis We will conduct a convergent, segregated mixed-methods systematic review and perform a narrative synthesis with a focus on evidence of the effectiveness of pressure injury prevention strategies and patient and nurse perceptions. Our search will encompass several databases, including the 'Centre for Reviews and Dissemination' (CRD) Database, Medline (via Ovid), CINAHL (via Ebsco) and Scopus (via Elsevier). Additionally, we will cross-check reference lists from all included systematic reviews. Two independent reviewers will screen titles, abstracts, and full texts and extract data from the included studies. The quality of methodology of systematic reviews will be assessed using 'A Measurement Tool to Assess Systematic Reviews-2' (AMSTAR 2) and the risk of bias using 'Risk of Bias in Systematic Reviews' (ROBIS). Qualitative studies will undergo critical appraisal using appropriate Joanna Briggs checklists. If it is feasible to pool data from included studies, we will synthesise them accordingly, using meta-analysis for quantitative reviews and meta-aggregation for qualitative studies. The results from both qualitative and quantitative analyses will be compared with derive new recommendations for healthcare practice aimed at enhancing the quality of care.

Ethics and dissemination Ethical approval is not required due to the nature of this intended review. The results of this review will be disseminated through publications, reports and conference presentations.

PROSPERO registration number CRD42023438792

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Our approach uniquely contextualises quantitative findings by integrating qualitative evidence.
⇒ We will compare studies examining nurse and patient experiences alongside their effectiveness.
⇒ Conducting separate syntheses of the evidence will enhance the reliability of our recommendations through increased scientific rigour.
⇒ This contextualisation will ensure that our findings reach a broader audience.
⇒ The multifaceted approach could lead to increased variance in data quality, potentially affecting the findings.

INTRODUCTION

According to the National Pressure Ulcer Advisory Panel, the European Pressure Ulcer Advisory Panel (EPUAP) and the Pan Pacific Pressure Injury Alliance (PPPIA), a pressure injury (PI) (also known as pressure sore, pressure ulcer or bedsore) is 'a localised injury to skin or underlying tissue usually over a bony prominence as a result of pressure or pressure in combination with shear'.[1] PIs occur when the soft tissue is compressed between the bony prominence and an external surface for a prolonged period. In keeping with the most recent international guidelines, we have used the term pressure 'injury' rather than 'ulcer' throughout this review, as the former more accurately describes both intact and ulcerated skin.[1]

PIs are the most common type of preventable complication in all care settings. Recent meta-analyses of hospitalised adults reported a pooled hospital-acquired PI rate of 8.4% globally.[2] The prevalence of PIs in Europe is 10.8%.[3]

PIs can affect patients and healthcare organisations. They can increase mortality rate, reduce quality of life and cause pain,

persistent and unresolved emotional distress and isolation and can change overall health outcomes.[4–6] PIs can also place a significant financial burden on healthcare systems due to prolonged hospital stays and complex treatment costs.[7 8]

Evidence-based interventions are required to prevent PIs. There are already guidelines (eg, EPUAP, NPIAP and PPPIA), systematic reviews and even some umbrella reviews on this topic. These, therefore, have been developed, to guide nurses in the implementation of evidence-based interventions. The umbrella reviews from Walker *et al*, Shi *et al* and Hill *et al* describe the effectiveness of preventative and curative treatments of PIs by including Cochrane reviews published up to 2020.[9–11] The aim of these reviews was to assess the evidence from studies that focused on the effect of PI treatment strategies. However, these reviews did not look at strategies for the prevention of PI or did not have enough good-quality evidence to make a conclusive interpretation of these strategies. Other limitations of these reviews include the exclusive focus on Cochrane reviews and the range of the search, which may be outdated. Therefore, further research is needed to fill the gap and update the evidence on the effectiveness of PI prevention strategies. Since 2020, research in this area has progressed. A new umbrella review of current systematic reviews is needed, including reviews other than Cochrane reviews.

Prevention of PIs is, therefore, essential. Furthermore, PIs are quality indicators for nursing practice and are often referred to as nursing-sensitive outcomes.[12] As PIs are directly influenced by the actions of nurses, they have a legal duty to prevent their occurrence.[13 14] Nurses in hospital settings implement interventions to prevent PIs using a variety of nursing interventions, for example, mobilisation, preventive skin care, preventive nutrition and pressure-distributing underlays.[1] Often, the implementation of these interventions is dependent on contextual factors such as staffing and time constraints, resource allocation, patient complexity as well as the qualifications and experiences of nurses, which may ultimately hinder their intended purpose.[15] The main barriers to prevent PIs are high workload and insufficiently competent staff, lack of resources and equipment.[16 17] This can lead to ambivalence between evidence-based and feasible prevention strategies.[18]

According to various authors, PI prevention is inconstant used as the prevalence shows.[2 3] Knowledge and beliefs are particularly important in implementing evidence-based practice in PI prevention.[16] Current guidelines cannot, therefore, cover the full range of individual behaviours and provide definitive strategies for improving care because of the nature of clinical practice, which relies on human beings with their own individuality.[15 19] There are qualitative studies looking at nurses' and patients' perspectives on PI prevention, but no review has been published so far. However, several qualitative reviews have been published that provide new evidence on patients' and nurses' experiences of living with a PI and nurses' knowledge of PI prevention.[20 21] Studies analysing nurses' perceptions show that PI prevention is challenging in practice and depends on attitudes, effective communication, strong leadership, simplicity of interventions, evidence-based knowledge and skills, risk assessment and teamwork.[22 23]

A study on patient experience in PI prevention found that most patients want to have a proactive role in PI prevention. However, they are highly dependent on caregivers and feel unseen when prevention needs are not met.[4]

In order to improve the PIs prevention and to provide conclusive recommendations to nurses, it is, therefore, necessary to assess the current high-quality quantitative evidence, on PI prevention and to combine it with the existing qualitative data in a Mixed Methods Systematic Review (MMSR). MMSR is a new emerging scientific approach in nursing science designed to provide new recommendations for clinical practice.[24 25] A few attempts have been made to combine the evidence from both quantitative and qualitative studies of PI prevention in a convergent, integrated approach.[13 26] However, this study is the first to integrate the results of already published systematic reviews summarising the evidence on the effectiveness of PI prevention strategies and qualitative study designs evaluating patients' and nurses' perceptions on such preventing interventions. To achieve our goal, we will use the Joanna Briggs Institute (JBI) method for an MMSR and umbrella reviews.[27 28]

Study objective

A convergent, segregated, mixed-methods review is intended to provide a more complete picture and a better understanding of whether and how stakeholder perceptions influence the effectiveness of PI prevention. This study can, therefore, support subsequent clinical decision-making and provide conclusive recommendations for healthcare practice. The research questions of this MMSR are (1) how PI prevention affects the clinical outcome of patients (effectiveness); (2) what the perception of nurses and hospitalised adult patients on PI prevention is and (3) how is the degree of synergy between nurses and patients perception affecting the effectiveness of PI prevention.

METHODS AND ANALYSIS

We adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA)[29] for writing this protocol. The systematic review is registered via PROSPERO (CRD42023438792) (online supplemental appendix 1).

Study selection criteria

The mixed-methods review will exclusively consider studies that meet the eligibility criteria established within the PICO (Patient-Intervention-Comparator-Outcome) framework for quantitative inquiry and the PICo

Table 1 PICO framework and PICo format of the research question

PICO/PICo	Quantitative	Qualitative
Patient/ Population /Context	Systematic reviews and meta-analysis of pressure injury prevention conducted in adults (>18 years) in a tertiary care setting	Qualitative, mixed-methods studies and opinion papers that focus on patients' (<18 years) and nurses' perceptions regarding specific pressure injury prevention applied in a tertiary care setting
Intervention/ Interest	Pressure injury prevention interventions used by qualified nurses, for example, mobilisation, preventive skin care, preventive nutrition, pressure-distributing underlays[1]	
Comparator	Comparison of the different pressure injury prevention strategies	
Outcome	Core outcome set for pressure injury prevention trials: (1) pressure injury occurrence (proportion of participants who develop a new pressure ulcer anywhere on the body); (2) pressure injury precursor signs and symptoms; (3) mobility; (4) acceptability and comfort of intervention; (5) adherence/compliance and (6) adverse events/ safety.[46]	

PICo, Population-Interest-Context; PICO, Patient-Intervention-Comparator-Outcome.

(Population-Interest-Context) format for the qualitative aspect (table 1).

Quantitative search approach

Types of studies

We will conduct an Umbrella Review, synthesising systematic reviews. In this process, we will determine the eligibility of included reviews using the PICO framework (population (P), intervention (I), comparison (C) and outcome (O)), as outlined in table 1. Reviews will be considered for inclusion if they pertain to patient groups receiving PI prevention in tertiary care settings. Prevention methods encompass repositioning, dressing, foam dressing, education, debridement, topical agent application and topical antibiotics/antiseptics. Inclusion criteria are not dictated by comparators or reported outcomes in the reviews we search for; instead, we will focus on systematic reviews that feature a comprehensive literature search, transparent study selection procedures and either a risk of bias assessment or critical appraisal of included studies. The search string has been adapted to a search string developed to retrieve systematic reviews.[30] Additional restrictions include the publication period, with only systematic reviews published between June 2012 and June 2023 being included, and language restrictions, which are limited to English or German (online supplemental appendix 2).

Qualitative search approach

Types of studies

This mixed-methods review will encompass a variety of qualitative study designs, including grounded theory, phenomenological studies, ethnographic methods, action research and studies using qualitative techniques such as interviews, focus groups and thematic analysis, as well as expert opinion papers. The search string has been adapted to a search string developed to find qualitative research.[31 32] Additionally, we are actively seeking studies employing mixed-methods designs. In these cases, the qualitative and quantitative components of such studies will be categorised and integrated into their respective synthesis branches.

Further criteria for inclusion: Studies must have been published in English or German between June 2012 and June 2023 (online supplemental appendix 3).

Search strategy

The literature for the quantitative and qualitative approach will be developed according to the Peer Review of Electronic Searches guideline[33] and in close cooperation with an experienced systematic searcher (SD). The following electronic databases will be searched

- Centre for Reviews and Dissemination (CRD) Database.
- Medline (via Ovid),
- CINAHL (via Ebsco).
- Scopus (via Elsevier).

Additionally, we will search manually for relevant studies by:

- Cross-checking the reference lists of all included systematic reviews and qualitative studies.

The search will include Medical Subject Headings (MeSH) terms and keywords with the components pressure injuries (population) and prevention strategies (intervention) and study types (Review or qualitative designs, respectively). See online supplemental materials for the full Medline search string. All initial records will be imported into EndNote V.20 (Clarivate Analytics Version, Pennsylvania, USA) to delete all duplicates prior to the selection process.

Study selection

Two independent researchers will screen all titles and abstracts of initial records. Second, the researchers will screen the full text against the prespecified inclusion criteria. The authors will record and report any studies

that do not meet the inclusion criteria (qualitative: KG and LF; quantitative: IT and LF). Discrepancies will be resolved by discussion. In case of disagreements, an independent arbitrator will resolve disagreements between the two independent researchers (qualitative: IT; quantitative: KG). The study process will be presented in a PRISMA flow chart.[34] Each screening will be piloted by a random sample of records and full texts, resp.

Appraisal of included reviews and studies

Two researchers will independently assess the methodological quality of reviews and studies. A third adjudicator will resolve any disagreements between the two researchers. For systematic reviews, 'A Measurement Tool to Assess Systematic Reviews - 2' (AMSTAR 2) is used to assess the methodological strengths and weaknesses of a systematic review. Several aspects of a systematic review are assessed, including whether the protocol was registered in advance, whether the literature search was conducted appropriately, whether study exclusions were justified, whether the risk of bias was assessed for included studies and whether meta-analyses were appropriate.[35] To assess the quality of included qualitative studies, we will use the JBI Critical Appraisal Checklist for Qualitative Research.[36] To assess the methodological quality of the mixed methods studies, we will use the Mixed Methods Appraisal Tool.[37] Finally, the JBI Critical Appraisal Checklist for Text and Opinion Papers is used to assess the methodological quality of opinion papers.[38]

Risk of bias

'Risk of Bias in Systematic Reviews' (ROBIS) will be used to evaluate the level of bias present within a systematic review. Briefly, the ROBIS tool assesses in three distinct phases the relevance of the research question; possible concerns with the systematic review conduct and judges the overall risk of bias for the systematic review (low, high and unclear).[39 40]

Data extraction

Citations stored in EndNote are exported in 'Research Information System' (RIS) format and uploaded to an intelligent cloud-based platform, Rayyan (Qatar Computing Research Institute, Doha, Qatar), for citation screening.[41] Studies that met the inclusion criteria will be extracted. An Excel spreadsheet will be developed for both research approaches (quantitative and qualitative). Using a random sample of three of the included studies for each approach, the data extraction will be pilot tested and revised if necessary.

Information according to the JBI Data Extraction Form for Reviews of Systematic Reviews and Research Syntheses[28] and JBI Qualitative data extraction tool[42] will be extracted from the included articles by one reviewer (IT) and double-checked by a second reviewer (LF):

Qualitative approach:

- Study details (author, year, journal and record number).
- Study description (methodology, method, phenomena of interest, setting, geographical and cultural, participants).
- Analysis (data analysis, author conclusions, findings and evidence).

Quantitative approach:

- Study details (author/year, objectives and with/without meta-analysis).
- Description of research question according to PICOS scheme.
- Inclusion and exclusion criteria search details (sources searched and search period).
- Description of studies included (number, publication period, designs and country).
- Applied critical appraisal tools and the results of conducting appraisal.
- Analysis (method of analysis, outcome assessed, results/findings, significance/direction and heterogeneity).

Any discrepancies will be resolved by discussion, if data are missing from the included full text or uncertainties related to the data the researchers contact the author responsible for the specific study to resolve the knowledge gap.

Data synthesis

According to the JBI methodology for MMSR, this review will take a convergent segregated approach to synthesis and integration. After the two syntheses have been completed, an interpolation of the evidence will take place.

Quantitative synthesis

We will conduct a meta-analysis using Review Manager (Cochrane, London, England) on the study data extracted from the original systematic reviews and meta-analyses, essentially re-running the meta-analysis. In cases where data are unavailable or insufficient for statistical analysis, we will extract data directly from the primary studies. In the initial stage, a summary statistic is calculated for each study, with the objective of describing the observed intervention effect in a uniform manner across all studies. In the subsequent stage, a summary (combined) intervention effect estimate is calculated as a weighted average of the intervention effects estimated in the individual studies. The meta-analysis for dichotomous outcomes relative risks and 95% CIs will be rerun. Comparable trial results will be pooled using the fixed-effect model and 95% CI. For continuous outcome data, we will present the mean difference (MD) with 95% CIs for studies that used the same assessment scale. If studies reporting continuous data used different assessment scales, we will report the standardised mean difference (SMD) with 95% CIs. For time-to-event data, such as time-to-pressure ulcer development, we present the HR along with its 95% CI. To assess the heterogeneity among the included studies, we will perform an initial statistical analysis, typically using Cochran's Q or I^2 statistic. Summary

effect estimates will be calculated for both fixed-effects and random-effects models, and we will present the distribution of effect estimates through a forest plot. Publication bias will be assessed and presented using a funnel plot. The risk of bias in the included reviews will be summarised in tabular format. We will employ a validated Grading of Recommendation, Assessment, Development and Evaluation tool to assess the strength of evidence from the included studies, and these assessments will be reported in the results section.[43] Results will be reported as mean differences or SMDs with 95% CIs for continuous data and as ORs with 95% CIs for categorical data. We will also provide the p value and measures of heterogeneity across the meta-analysis results in both graphical and tabular formats.[44]

Qualitative synthesis

The qualitative synthesis uses a meta-aggregative approach, based on the user guidance developed by the JBI. The aim of this method is to produce synthesised statements that support decision-making at the clinical or policy level. The resulting 'lines of action' in a meta-aggregative synthesis provide clear guidance for healthcare professionals in making practical decisions. This analysis is ideal for our study, emphasising the practicality and usability of the synthesised results. The aim is to provide useful information for clinical practice. Meta-aggregation consists of three phases. During the first phase, we extracted themes identified by the authors of the original study. In phase 2, the extracted themes from all studies are searched for commonalities. Categories are formed from similar themes and metaphors across all studies. The transition from findings to categories follows established qualitative research methods like constant comparative and thematic. The third phase involves formulating 'lines of action' or declarative statements.[45]

Interpretations of the results

Results obtained from both syntheses will be interpolated into new findings/recommendations. The quantitative results on the effectiveness of the PI prevention will be pooled with the perception gained from qualitative analysis.

Recommendations for practice

This review holds important implications for clinical practice. Nursing practice heavily relies on the subjective experiences of both patients and nurses. Currently, there is a limited body of literature that assesses how these subjective perceptions impact the clinical outcomes of PI prevention interventions. It is possible that patients and nurses may have unfavourable views of certain interventions, which could potentially diminish their effectiveness. Addressing such negative perceptions in clinical practice could enhance the overall effectiveness of these interventions and elevate the quality of care provided. This systematic review aims to provide valuable guidance to nurses in implementing appropriate PI prevention strategies.

Patient and public involvement

None.

ETHICS AND DISSEMINATION

The review is a synthesis of existing resources. Therefore, ethical approval was not required. The results of the review will be disseminated through publications, reports and conference presentations.

Contributors IT is the guarantor and drafted the manuscript together with LF. IT integrated the feedback provided by the other authors and finalised the manuscript accordingly. SD provided expertise for the search strategy, quality assessment and analysis framework. KG, SD and LF read, provided feedback and approved the final manuscript.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

ORCID iDs
Irhad Trozic http://orcid.org/0009-0002-1387-2417
Lisa Fischer http://orcid.org/0000-0003-4198-1389

REFERENCES

1 National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention and treatment of pressure ulcers/injuries: quick reference guide. 2019.
2 Li Z, Lin F, Thalib L, *et al*. Global prevalence and incidence of pressure injuries in hospitalised adult patients: A systematic review and meta-analysis. *Int J Nurs Stud* 2020;105:S0020-7489(20)30031-6.
3 Moore Z, Avsar P, Conaty L, *et al*. The prevalence of pressure ulcers in Europe, what does the European data tell us: a systematic review. *J Wound Care* 2019;28:710–9.
4 Latimer S, Chaboyer W, Gillespie B. Patient participation in pressure injury prevention: giving patient's a voice. *Scand J Caring Sci* 2014;28:648–56.
5 Song Y-P, Shen H-W, Cai J-Y, *et al*. The relationship between pressure injury complication and mortality risk of older patients in follow-up: A systematic review and meta-analysis. *Int Wound J* 2019;16:1533–44.
6 Jaul E, Barron J, Rosenzweig JP, *et al*. An overview of co-morbidities and the development of pressure ulcers among older adults. *BMC Geriatr* 2018;18:305.

7 Anand P, Kranker K, Chen AY. Estimating the hospital costs of inpatient harms. *Health Serv Res* 2019;54:86–96.
8 Demarré L, Van Lancker A, Van Hecke A, *et al*. The cost of prevention and treatment of pressure ulcers: A systematic review. *Int J Nurs Stud* 2015;52:1754–74.
9 Walker RM, Gillespie BM, McInnes E, *et al*. Prevention and treatment of pressure injuries: A meta-synthesis of Cochrane Reviews. *J Tissue Viability* 2020;29:227–43.
10 Hill JE, Edney S, Hamer O, *et al*. Interventions for the treatment and prevention of pressure ulcers. *Br J Community Nurs* 2022;27:S28–36.
11 Shi C, Dumville JC, Cullum N, *et al*. Beds, overlays and mattresses for preventing and treating pressure ulcers: an overview of Cochrane Reviews and network meta-analysis. *Cochrane Database Syst Rev* 2021;8:CD013761.
12 Kottner J, Hahnel E, Lichterfeld-Kottner A, *et al*. Measuring the quality of pressure ulcer prevention: A systematic mapping review of quality indicators. *Int Wound J* 2018;15:218–24.
13 Lin F, Wu Z, Song B, *et al*. The effectiveness of multicomponent pressure injury prevention programs in adult intensive care patients: A systematic review. *Int J Nurs Stud* 2020;102:S0020-7489(19)30290-1.
14 Martin D, Albensi L, Van Haute S, *et al*. Healthy skin wins: A glowing pressure ulcer prevention program that can guide evidence-based practice. *Worldviews Evid Based Nurs* 2017;14:473–83.
15 Coyer F, Cook J-L, Doubrovsky A, *et al*. Understanding contextual barriers and enablers to pressure injury prevention practice in an Australian intensive care unit: An exploratory study. *Aust Crit Care* 2019;32:122–30.
16 Taylor C, Mulligan K, McGraw C. Barriers and enablers to the implementation of evidence-based practice in pressure ulcer prevention and management in an integrated community care setting: A qualitative study informed by the theoretical domains framework. *Health Soc Care Community* 2021;29:766–79.
17 Etafa W, Argaw Z, Gemechu E, *et al*. Nurses' attitude and perceived barriers to pressure ulcer prevention. *BMC Nurs* 2018;17:14.
18 Gunningberg L, Stotts NA, Idvall E. Hospital-acquired pressure ulcers in two Swedish County Councils: cross-sectional data as the foundation for future quality improvement. *Int Wound J* 2011;8:465–73.
19 Zuo X-L, Meng F-J. A care bundle for pressure ulcer treatment in intensive care units. *Int J Nurs Sci* 2015;2:340–7.
20 Wu J, Wang B, Zhu L, *et al*. Nurses' knowledge on pressure ulcer prevention: An updated systematic review and meta-analysis based on the Pressure Ulcer Knowledge Assessment Tool. *Front Public Health* 2022;10:964680.
21 Ghorbani Vajargah P, Mollaei A, Falakdami A, *et al*. A systematic review of nurses' practice and related factors toward pressure ulcer prevention. *Int Wound J* 2023;20:2386–401.
22 Roberts S, McInnes E, Wallis M, *et al*. Nurses' perceptions of a pressure ulcer prevention care bundle: a qualitative descriptive study. *BMC Nurs* 2016;15:64.
23 Gaspar S, Botelho Guedes F, Vitoriano Budri AM, *et al*. Hospital-acquired pressure ulcers prevention: What is needed for patient safety? The perceptions of nurse stakeholders. *Scand J Caring Sci* 2022;36:978–87.
24 Stern C, Lizarondo L, Carrier J, *et al*. Methodological guidance for the conduct of mixed methods systematic reviews. *JBI Evid Synth* 2020;18:2108–18.
25 Bressan V, Bagnasco A, Aleo G, *et al*. Mixed-methods research in nursing - a critical review. *J Clin Nurs* 2017;26:2878–90.
26 Lizarondo L, Stern C, Carrier J, *et al*. Barriers and enablers to implementation of pressure injury prevention in hospitalized adults: a mixed methods systematic review protocol. *JBI Evid Synth* 2020;18:2134–9.
27 Lizarondo L, Stern C, Carrier J, *et al*. Chapter 8: mixed methods systematic reviews. In: Aromataris E, Munn Z, eds. *JBI manual for evidence synthesis: JBI*. 2020.
28 Aromataris E, Fernandez R, Godfrey C, *et al*. Chapter 10: umbrella reviews. In: Aromataris E, Munn Z, eds. *JBI manual for evidence synthesis: JBI*. 2020.
29 Moher D, Shamseer L, Clarke M, *et al*. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev* 2015;4:1.
30 Salvador-Oliván JA, Marco-Cuenca G, Arquero-Avilés R. Development of an efficient search filter to retrieve systematic reviews from PubMed. *J Med Libr Assoc* 2021;109:561–74.
31 Wong SS-L, Wilczynski NL, Haynes RB, *et al*. Developing optimal search strategies for detecting clinically relevant qualitative studies in MEDLINE. *Stud Health Technol Inform* 2004;107:311–6.
32 Walters LA, Wilczynski NL, Haynes RB, *et al*. Developing optimal search strategies for retrieving clinically relevant qualitative studies in EMBASE. *Qual Health Res* 2006;16:162–8.
33 McGowan J, Sampson M, Salzwedel DM, *et al*. PRESS peer review of electronic search strategies: 2015 guideline statement. *J Clin Epidemiol* 2016;75:40–6.
34 Page MJ, McKenzie JE, Bossuyt PM, *et al*. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Syst Rev* 2021;10:89.
35 Shea BJ, Reeves BC, Wells G, *et al*. AMSTAR 2: a critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both. *BMJ* 2017;358:j4008.
36 Lockwood C, Munn Z, Porritt K. Qualitative research synthesis: methodological guidance for systematic reviewers utilizing meta-aggregation. *Int J Evid Based Healthc* 2015;13:179–87.
37 Hong QN, Pluye P, Fàbregues S, *et al*. *Mixed Methods Appraisal Tool (MMAT)*. Canadian Intellectual Property Office, Industry Canada, 2018.
38 MCArthur A, Klugarova J, Yan H, *et al*. Chapter 4: systematic reviews of text and opinion. In: Aromataris E, Munn Z, eds. *JBI manual for evidence synthesis: JBI*. 2020.
39 Whiting P, Savović J, Higgins JPT, *et al*. ROBIS: A new tool to assess risk of bias in systematic reviews was developed. *J Clin Epidemiol* 2016;69:225–34.
40 Perry R, Whitmarsh A, Leach V, *et al*. A comparison of two assessment tools used in overviews of systematic reviews: ROBIS versus AMSTAR-2. *Syst Rev* 2021;10:273.
41 Ouzzani M, Hammady H, Fedorowicz Z, *et al*. Rayyan-a web and mobile app for systematic reviews. *Syst Rev* 2016;5:210.
42 Lockwood C, Porritt K, Munn Z, *et al*. Chapter 2: Systematic reviews of qualitative evidence In: Aromataris E, Munn Z, eds. *JBI manual for evidence synthesis JBI* 2020.
43 Guyatt GH, Oxman AD, Vist GE, *et al*. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ* 2008;336:924–6.
44 Belbasis L, Bellou V, Ioannidis JPA. Conducting umbrella reviews. *BMJ Med* 2022;1:e000071.
45 Hannes K, Lockwood C. Pragmatism as the philosophical foundation for the Joanna Briggs meta-aggregative approach to qualitative evidence synthesis. *J Adv Nurs* 2011;67:1632–42.
46 Lechner A, Coleman S, Balzer K, *et al*. Core outcomes for pressure ulcer prevention trials: results of an international consensus study: Classification: Outcomes and qualitative research. *Br J Dermatol* 2022;187:743–52.

Appendix 1. PRISMA-P (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) 2015 checklist: recommended items to address in a systematic review protocol

Section and topic	Item No	Page number	Checklist item
ADMINISTRATIVE INFORMATION			
Title:			
Identification	1a	1	Identify the report as a protocol of a systematic review
Update	1b	Not applicable	If the protocol is for an update of a previous systematic review, identify as such
Registration	2	1	If registered, provide the name of the registry (such as PROSPERO) and registration number
Authors:			
Contact	3a	1	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author
Contributions	3b	12	Describe contributions of protocol authors and identify the guarantor of the review
Amendments	4	Not applicable	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments
Support:			
Sources	5a	12	Indicate sources of financial or other support for the review
Sponsor	5b	Not applicable	Provide name for the review funder and/or sponsor
Role of sponsor or funder	5c	Not applicable	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol
INTRODUCTION			
Rationale	6	3-5	Describe the rationale for the review in the context of what is already known
Objectives	7	5	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)
METHODS			
Eligibility criteria	8	5-7	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review
Information sources	9	7-8	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage

Search strategy	10	8	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated
Study records:			
Data management	11a	8	Describe the mechanism(s) that will be used to manage records and data throughout the review
Selection process	11b	8	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)
Data collection process	11c		Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators
Data items	12	5-7	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications
Outcomes and prioritization	13	5-7	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale
Risk of bias in individual studies	14	9	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis
Data synthesis	15a	10-11	Describe criteria under which study data will be quantitatively synthesised
	15b	10-11	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I^2, Kendall's τ)
	15c	10-11	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)
	15d	10-11	If quantitative synthesis is not appropriate, describe the type of summary planned
Meta-bias(es)	16	Not applicable	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)
Confidence in cumulative evidence	17	10	Describe how the strength of the body of evidence will be assessed (such as GRADE)

From: Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart L, PRISMA-P Group. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. BMJ. 2015 Jan 2;349(jan02 1):g7647.

Appendix 2. Table 2 MEDLINE Quantitative Search Strategy

Ovid MEDLINE
1 exp pressure ulcer/ 2 pressure ulcer*.ti,ab 3 pressure injur*.ti,ab 4 pressure sore*.ti,ab 5 decubitus ulcer*.ti,ab 6 bed sore*.ti,ab 7 or / 1-6
8 hospital*.ti,ab 9 inpatient.ti,ab 10 exp inpatients/ 11 or / 8-10
12 systematic*.ti 13 review.ti 14 12 and 13 15 Systematic overview*.ti 16 Cochrane review*.ti 17 systemic review*.ti 18 scoping review.ti 19 scoping literature review.ti 20 mapping review.ti 21 Umbrella review*.ti 22 review of reviews.ti 23 overview of reviews.ti 24 meta-review.ti 25 integrative review.ti 26 integrated review.ti 27 integrative overview.ti 28 meta-synthesis.ti 29 metasynthesis.ti 30 quantitative review.ti 31 quantitative synthesis.ti 32 research synthesis.ti 33 Systematic literature search.ti 34 Systematic literature research.ti 35 meta-analyses.ti 36 metaanalyses.ti 37 metaanalysis.ti 38 meta-analysis.ti 39 meta-analytic review.ti 40 meta-analytical review.ti 41 or /14-40 42 7 and 11 and 41

Appendix 3. Table 3 MEDLINE Qualitative Search Strategy

Ovid MEDLINE
1 exp pressure ulcer/ 2 pressure ulcer*.ti,ab 3 pressure injur*.ti,ab 4 pressure sore*.ti,ab 5 decubitus ulcer*.ti,ab 6 bed sore*.ti,ab 7 or / 1-6
8 in-depth.ti,ab 9 indepth.ti,ab 10 face-to-face.ti,ab 11 exp interview/ 12 interview*.ti,ab 13 exp interviews as topic/ 14 focus group*.ti,ab 15 focusgroup*.ti,ab 16 exp focus groups/ 17 qualitative.ti,ab 18 ethnograph*.ti,ab 19 exp narration/ 20 exp qualitative research/ 21 exp personal narratives as topic/ 22 ethnological research.ti,ab 23 phenomenol*.ti,ab 24 grounded theory.ti,ab 25 exp grounded theory/ 26 grounded study.ti,ab 27 grounded studies.ti,ab 28 grounded research.ti,ab 29 grounded analysis.ti,ab 30 thematic analysis.ti,ab 31 phenomenologic*.ti,ab 32 hermeneutics.ti,ab 33 heuristic*.ti,ab 34 emic.ti,ab 35 etic.ti,ab 36 semiotic.ti,ab 37 data saturation.ti,ab 38 participant observation.ti,ab 39 action research.ti,ab 40 cooperative inquiry.ti,ab 41 co-operative inquiry.ti,ab 42 field study.ti,ab 43 field studies.ti,ab 44 field research.ti,ab 45 theoretical sampl*.ti,ab 46 purposive sampl*.ti,ab 47 lived experience*.ti,ab 48 content analysis.ti,ab

49 discourse.ti,ab
50 participant observation.ti,ab
51 action research.ti,ab
52 cooperative inquiry.ti,ab
53 co-operative inquiry.ti,ab
54 field study.ti,ab
55 field studies.ti,ab
56 field research.ti,ab
57 theoretical sampl*.ti,ab
58 purposive sampl*.ti,ab
59 lived experience*.ti,ab
60 content analysis.ti,ab
61 discourse.ti,ab
62 narrative analysis.ti,ab
63 heidegger*.ti,ab
64 colaizzi.ti,ab
65 spiegelberg.ti,ab
66 van manen*.ti,ab
67 van kaam.ti,ab
68 merleau ponty.ti,ab
69 husserl*.ti,ab
70 Foucault.ti,ab
71 Corbin.ti,ab
72 Strauss.ti,ab
73 Glaser.ti,ab
74 Opinion paper.ti,ab
75 opinion piece.ti,ab
76 Opinion article.ti,ab
77 expert opinion.ti,ab
78 expert perspective.ti,ab
79 Expert commentary.ti,ab
80 or / 8-79
81 7 and 80