



# Barriers and facilitators to implementing pressure injury prevention and management guidelines in acute care: A mixed-methods systematic review



Ching Shan Wan<sup>a,b,c,\*</sup>, Heilok Cheng<sup>a,b</sup>, Mika Musgrave-Takeda<sup>a,b</sup>, Mark Guosheng Liu<sup>a,b</sup>, Georgia Tobiano<sup>c,d</sup>, Jake McMahon<sup>a,b</sup>, Elizabeth McInnes<sup>a,b,c</sup>

<sup>a</sup> Nursing Research Institute, St Vincent's Health Network Sydney, St Vincent's Hospital Melbourne & Australian Catholic University, Australia

<sup>b</sup> School of Nursing, Midwifery and Paramedicine, Australian Catholic University, Melbourne, Victoria, Australia

<sup>c</sup> National Health and Medical Research Council Centre of Research Excellence in Wiser Wound Care, Menzies Health Institute Queensland, Griffith University, Gold Coast, Australia

<sup>d</sup> Gold Coast University Hospital, Gold Coast Health Nursing and Midwifery Education and Research Unit, Queensland, Australia

## ARTICLE INFO

### Article history:

Received 28 February 2023

Received in revised form 20 June 2023

Accepted 22 June 2023

### Keywords:

Evidence-based practice

Inpatients

Patient care

Pressure ulcer

Systematic review

## ABSTRACT

**Background:** Evidence-based pressure injury prevention and management is a global health service priority. Low uptake of pressure injury guidelines leads to compromised patient outcomes. Understanding clinicians' and patients' views on the barriers and facilitators to implementing guidelines and mapping the identified barriers and facilitators to the Theoretical Domains Framework and behaviour change techniques will inform an end-user and theoretically informed intervention to improve guideline uptake in the acute care setting.

**Objectives:** To synthesise quantitative and qualitative evidence on i) hospital clinicians' and inpatients' perceptions and experiences of evidence-based pressure injury practices and ii) barriers and facilitators to implementing guidelines.

**Design:** A convergent integrated mixed-methods systematic review was conducted using the JBI approach.

**Data source:** English language peer-reviewed studies published from 2009 to August 2022 were identified from MEDLINE, EMBASE, CINAHL, PsycINFO and Cochrane Central Library.

**Review methods:** Included studies reported: i) acute care hospital clinicians' and patients' perceptions and experiences of evidence-based pressure injury practices and ii) barriers and facilitators to implementing guidelines. The Mixed Methods Appraisal Tool was used for critical appraisal. Quantitative data was transformed into qualitated data, then thematically synthesised with qualitative data, comparing clinicians' and patients' views. Barriers and facilitators associated with each main theme were mapped to the Theoretical Domains Framework and allocated to relevant behaviour change techniques.

**Results:** Fifty-five out of 14,488 studies of variable quality (29 quantitative, 22 qualitative, 4 mixed-methods) met the inclusion criteria. Four main themes represent factors thought to influence the implementation of evidence-based guidelines: 1) nurse-led multidisciplinary care, 2) patient participation in care, 3) practicability of implementation and 4) attitudes towards pressure injury prevention and management. Most barriers identified by clinicians were related to the third theme, whilst for patients, there were multiple barriers under theme 2. Barriers were mainly mapped to the Knowledge domain and Environmental Context and Resources domain and were matched to the behaviour change techniques of "instruction on how to perform a behaviour" and "restructuring the physical environment". Most facilitators mentioned by clinicians and patients were related to themes 1 and 2, respectively, and mapped to the Environmental Context and Resources domain. All patient-related attitudes in theme 4 were facilitators.

**Conclusions:** These review findings highlight the most influential factors related to implementing evidence-based pressure injury care from clinicians' and patients' views and mapping these factors to the Theoretical Domains Framework and behaviour change techniques has contributed to developing a stakeholder-tailored implementation intervention in acute care settings.

**PROSPERO registration:** CRD42021250885.

© 2023 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

\* Corresponding author at: Level 5/215 Spring Street, Melbourne, Victoria 3000, Australia.  
E-mail address: [chingshan.wan@acu.edu.au](mailto:chingshan.wan@acu.edu.au) (C.S. Wan).

## What is already known

- Low uptake of pressure injury guidelines is common and can lead to compromised patient outcomes.
- The first step in developing an end-user informed intervention to improve guideline uptake is to identify published patients' and clinicians' views on barriers and facilitators to guideline uptake.
- No systematic review has yet synthesised qualitative and quantitative evidence from clinicians' and patients' views of how to improve pressure injury guideline uptake and mapped the findings to the Theoretical Domains Framework and behaviour change techniques.

## What this paper adds

- Clinicians and patients support a nurse-led multidisciplinary patient-centred intervention to promote patient participation that addresses organisational and individual barriers to evidence-based pressure injury care.
- Mapping barriers to the Theoretical Domains Framework and associated behaviour change techniques showed the need for an implementation strategy bundle to promote multidisciplinary care and patient participation and address practical and attitudinal barriers to guideline uptake.
- Different implementation strategies targeted to clinicians and patients are required in developing an end-user informed intervention.

## 1. Introduction

Pressure injury, defined as localised skin and/or underlying tissue damage resulting from pressure with/without shear (Pan Pacific Pressure Injury Alliance, 2019), is potentially preventable, yet is a leading hospital adverse event (Nghiem et al., 2022). It affects 12.8% of adult patients admitted to hospitals worldwide and is costly for the health system (Li et al., 2020; Pan Pacific Pressure Injury Alliance, 2019). Reported pressure injury cost varies, from hospital costs of \$26.8 billion in the United States in 2016 (Padula and Delarmente, 2019) to health service costs of £531 million in the United Kingdom in 2013 (Guest et al., 2017). In Australia, the pooled prevalence in hospitals was 9.0% from 2008 to 2018 (Li et al., 2020), for which a total hospital cost of \$9.11 billion was estimated (Nghiem et al., 2022).

Pressure injury-related harms to patients include pain, physical and social life restrictions, poor psychological wellbeing, reduced quality of life and increased financial burdens associated with treatment costs and time away from work (Jackson et al., 2016). Maintaining skin integrity, and intervening early when pressure injury develops to prevent further skin breakdown, significantly improves patient outcomes and reduces hospital costs (Al Aboud and Manna, 2018; Padula and Delarmente, 2019). Accordingly, the need for implementing evidence-based pressure injury prevention and management guidelines is a priority for governments and health providers (Australian Commission on Safety and Quality in Health Care, 2019; Canadian Patient Safety Institute, 2021; National Institute for Health and Care Excellence, 2015).

Although national and international pressure injury clinical guidelines have long existed (Munoz et al., 2020; National Institute for Health and Care Excellence, 2014; National Pressure Injury Advisory Panel, 2019; Pan Pacific Pressure Injury Alliance, 2019), low uptake of guidelines is an ongoing health service problem (McInnes et al., 2020; Samuriwo and Dowding, 2014). Clinicians' support for guidelines and improving clinicians' knowledge of pressure injury prevention and management do not always lead to practice change (Suva et al., 2018). The complex, resource-limited and priority-driven acute care hospital setting (Figueroa et al., 2019) poses challenges in implementing guidelines even when a programme has been established (Jankowski and Nadzam, 2011). Challenges include timely access to appropriate equipment to perform pressure injury care, maintaining turning schedules, identifying pressure injury risks accurately, and involving a multidisciplinary team

in shared decision-making (Bergquist-Beringer et al., 2013; Duvall et al., 2019; Jankowski and Nadzam, 2011; Phillips et al., 2018). Current reviews suggest multifaceted approaches are needed to address stakeholders' individual-, social- and organisational-level barriers and to promote enablers to increase guideline implementation and accelerate clinical practice change (Burton et al., 2021; Mitchell et al., 2021; van Dulmen et al., 2020).

Several randomised controlled trials (Jafari et al., 2018; Tayyib et al., 2015) and several controlled before–after studies (Avşar and Karadağ, 2018; Coyer et al., 2015; Uzun et al., 2009) have shown that multifaceted implementation programmes based on clinical guidelines decrease pressure injury incidence and time to pressure injury development in acute and intensive care settings. However, there is a lack of high-quality and theory-driven trials that have investigated the key components of an effective pressure injury guideline implementation intervention (Lin et al., 2020; Lovegrove et al., 2021). Identifying key elements of an implementation intervention requires using a bottom-up approach which involves understanding clinician and patient end-users' perspectives of the barriers and facilitators to guideline uptake and experiences of care (Craig et al., 2016; Klaic et al., 2022).

A theory-driven approach to intervention development has been shown to be more effective and sustainable than interventions developed without reference to a framework or theory (Celis-Morales et al., 2015; Teggart et al., 2022). A common approach is to map barriers and facilitators that are identified as having the potential to influence guideline uptake from review findings to the Theoretical Domains Framework and appropriate behavioural change technique (Cane et al., 2012; Michie et al., 2008) to inform the development of an evidence- and end-user informed guideline implementation strategy (Bérubé et al., 2015; Lavallée et al., 2018). The Theoretical Domains Framework has been used to inform a study addressing stakeholders' perceived barriers and enablers to implementing guideline recommendations in community care settings (Lavallée et al., 2018; Taylor et al., 2021). In acute care settings, as hospital clinicians are the main agents of clinical practice change, understanding their views on implementing guidelines may provide insights into barriers that impede practice change and inform strategies to facilitate guideline uptake (Baker et al., 2015). Similarly, understanding patients' perceptions and experiences of pressure injury care will also assist with informing strategies to improve patient-centred care (Ledger et al., 2020).

To our knowledge, no systematic reviews have identified and compared clinicians' and patients' views on barriers and facilitators to evidence-based pressure injury care in acute inpatient hospital settings and then mapped the findings to the Theoretical Domains Framework. As barriers and facilitators can be presented in a qualitative or quantitative format, the aim of this mixed-methods systematic review was to synthesise qualitative and quantitative evidence on i) hospital clinicians' and patients' views of barriers and facilitators to implementing pressure injury prevention and management guidelines and ii) map barriers and facilitators to the Theoretical Domains Framework and behavioural change techniques (Cane et al., 2015; Michie et al., 2013). This will inform the development of an end-user and theoretically informed patient-centred intervention to improve guideline uptake in the acute care setting.

## 2. Methods

### 2.1. Design

This mixed-methods systematic review was part of a broader systematic review aiming to identify, appraise and synthesise peer-reviewed evidence related to clinicians' and patients' views on pressure injury, surgical site infection and intravascular device wound infections. The review protocol was registered on the International Prospective Register of Systematic Reviews (PROSPERO 2021 CRD42021250885). The review was conducted using the convergent integrated approach with data transformation detailed in the JBI Manual for Evidence

Synthesis Handbook (Lizarondo et al., 2020). As the Cochrane Handbook guidelines on qualitative evidence synthesis provided more detailed descriptions of eligibility criteria, literature search, data extraction and analysis procedures, these steps were informed by the Cochrane Handbook (Noyes et al., 2022). This review is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-analysis Statement 2020 (Page et al., 2021) and American Psychological Association reporting standards for mixed-methods reviews (Levitt et al., 2018).

## 2.2. Eligibility criteria

Original peer-reviewed published qualitative, quantitative and mixed methods studies were included if they i) reported on hospital clinicians' and patients' perceptions and experiences of evidence-based pressure injury practices or barriers and facilitators to implementing guidelines or policies, ii) were conducted in acute care hospital wards, and iii) were published in English in peer-reviewed journals since 2009. Hospital clinicians are defined as health professionals who are directly involved in hospital patient care.

As this review is part of a programme of research to develop an intervention to improve the uptake of guidelines in acute care hospital wards, studies conducted in outpatient clinics, intensive care units, emergency units and operating theatres were excluded. Studies with student clinicians were excluded unless the results were presented separately for hospital clinicians of interest. Non-peer-reviewed journal articles and grey literature were excluded from this review.

## 2.3. Search strategy

Two reviewers with expertise in conducting systematic reviews (CSW and EM) and an experienced university librarian developed a search strategy. The PICO (population, phenomenon of interest and the context) framework guided the eligibility criteria and search strategy development (Lockwood et al., 2015). The PICO-structured eligibility criteria are presented in Table 1. Search term concepts related to: i) perceptions or experiences of preventing or managing ii) pressure injury iii) in acute hospitals were used in the search strategy. Medical subject headings and keywords were used for each search term concept depending on the database. Search term concepts were combined using Boolean "AND". Alternative spelling and synonyms were combined using Boolean "OR". A comprehensive literature search was developed for MEDLINE and adapted for four other databases: EMBASE, CINAHL, PsycINFO and Cochrane Central Library. The search strategies for all the databases are available in Supplementary Table 1.

The literature search was performed on 3rd May 2021, with a literature search update performed on 8th Aug 2022. As this review focused on barriers and facilitators to implementing guidelines and the pressure injury comprehensive international guideline was first published in 2009, retrieved publications were limited to 2009 onwards. References were imported to the Covidence systematic review software (Veritas Health Innovation, 2021) for screening, critical appraisal and data extraction.

Given the nature of qualitative research, it is not possible to merely rely on a database search to identify all relevant published qualitative studies (Thomas and Harden, 2008). Identification of relevant peer-reviewed publications from conference and dissertation abstracts (Thomas and Harden, 2008) is necessary. Conference and dissertation abstracts found in the literature search, ProQuest Dissertations & Theses Global, Networked Digital Library of Theses and Dissertations, Australasian Digital Theses through Trove and OpenGrey databases were used to identify additional relevant peer-reviewed publications. Similarly, the bibliographies of relevant systematic reviews and included studies were reviewed to identify additional relevant references.

## 2.4. Data extraction

Relevant data from all included studies were extracted using a modified version of the JBI data extraction form tailored to this systematic review. Data extraction included the first author's name, year of publication, study characteristics, participant characteristics, and reported qualitative and quantitative findings. Themes, findings on perceptions, experiences, barriers and facilitators, and participant quotations were extracted from qualitative studies. Barriers and facilitators referred to pressure injury prevention and management strategies, such as pressure injury risk assessment, repositioning, and support surfaces, were specified in the data extraction process to enable comparisons of patterns of mapped Theoretical Domains Framework domains between prevention and management strategies. Data from open-answer survey responses were extracted as qualitative data. Outcome measurement descriptions, result tables and narrative finding summaries were extracted from quantitative studies. Qualitative and quantitative data were extracted separately for mixed-methods studies.

Two reviewers conducted literature screening, data extraction and critical appraisal processes independently (CSW, HC or MM). Any disagreements were discussed, and further discrepancies were resolved by a third reviewer with domain knowledge and methodological expertise (EM).

## 2.5. Critical appraisal

As recommended by Lizarondo et al. (2020), the Mixed Methods Appraisal Tool was used to appraise the methodological quality of the included studies that consisted of the following designs: qualitative, randomised controlled trials, non-randomised studies, quantitative descriptive studies and mixed-methods studies (Hong et al., 2018).

## 2.6. Data transformation

Following methodological guidance for mixed-methods systematic reviews (Stern et al., 2020), a convergent integrated approach involving data transformation of quantitative findings was used. Qualitisation of quantitative data is deemed appropriate for transforming data into a mutually compatible format before data analysis to allow integration with qualitative data (Stern et al., 2020). For studies that used surveys

**Table 1**  
Study selection criteria based on the elements in the PICO questions.

	Population	Phenomena of interest	Context	Study type	Limits
Inclusion criteria	Hospital clinicians	Clinicians' views on preventing and managing PI. Barriers and facilitators to evidence-based practice for preventing and managing PI.	Medical, surgical, general, subacute, and rehabilitation wards.	Qualitative studies	English language Empirical research Published since 2009
	Patients aged ≥18	Patients' perceptions and experiences of preventing and managing PI.		Quantitative studies Mixed-methods studies	
Exclusion criteria	Caregivers Student clinicians	Wounds or infections other than PI. Studies only investigating the effectiveness of wound care products or devices.	Intensive care units, cardiac intensive care units, outpatient, palliative care, primary and community care.	Grey literature Conference abstracts Unpublished studies and dissertations	Not English Published prior to 2009

PI: pressure injury.

with pre-specified barriers and/or facilitators, to ensure the review presented representative and important findings, only pre-specified barriers and/or facilitators that more than 50 % of participants in the included study selected were considered as barriers and/or facilitators following a process used by other reviewers (Craig et al., 2016). One reviewer (CSW) was responsible for qualitying data. Original authors' narrative summaries of quantitative findings were used to cross-check with the qualityed data to ensure data transformation accuracy.

## 2.7. Data analysis

### 2.7.1. Thematic synthesis of findings

In the convergent integrated approach, the extracted qualitative and qualityed quantitative data carry equal weight (Harden and Thomas, 2010). Qualityed data were assembled and analysed with the qualitative data from original studies. A thematic synthesis approach (Thomas and Harden, 2008) recommended by the Cochrane Handbook (Noyes et al., 2022) was used to analyse and synthesise all findings. Findings were firstly line-by-line coded and then grouped by related codes to define 'descriptive' themes (Thomas and Harden, 2008). These 'descriptive' themes were presented as barriers and facilitators to implementing guidelines and were further aggregated and synthesised to generate overarching 'analytical' themes based on 'third order interpretation' (Thomas and Harden, 2008). These 'analytical' themes are the main themes, with barriers and facilitators presented under each main theme in the Results section. NVivo 12 (QSR International Pty Ltd, 2018) was used to aid data management throughout the thematic synthesis process.

Thematic synthesis was first conducted separately for the clinician and patient data by one reviewer (CSW) for all included studies, and a second reviewer (HC or ML) independently analysed a subset (10) of randomly selected studies. Any differences identified were discussed to reach an agreement, with disagreements resolved by a third senior reviewer (EM). Comparative data analysis (Gibbs, 2018) was then undertaken by comparing and contrasting barriers and facilitators analysed and derived from clinicians' and patients' views under each main theme. CSW led the comparative analysis, with close conferral with the research team's input to provide investigator triangulation and achieve consensus on findings.

### 2.7.2. Mapping barriers and facilitators to the Theoretical Domains Framework

The barriers and facilitators identified in each main theme retained the findings closest to the original findings from included studies (Thomas and Harden, 2008) and were classified into the relevant Theoretical Domains Framework domains (Cane et al., 2012). The Theoretical Domains Framework constructs (Cane et al., 2012) were used to allocate barriers and facilitators to the most appropriate domain. This process was conducted by one reviewer (CSW), followed by discussion and cross-checking with a senior reviewer with implementation science expertise (EM).

### 2.7.3. Behaviour change technique allocation

To identify the active components of effective interventions, the last phase was to map Theoretical Domains Framework-mapped barriers and facilitators to the most relevant behaviour change techniques using the matrix presented in Cane et al. (2015) that assigned relevant behaviour change techniques to each of the Theoretical Domains Framework domains and considering the six APEASE criteria (Affordability, Practicability, Effectiveness and cost-effectiveness, Acceptability, Side-effects and safety, Equity) described in the Behaviour Change Wheel (Michie et al., 2014) to enable the selection of the most appropriate intervention options, content and implementation options (Jenkins et al., 2018; Michie et al., 2014). Using a standardised behaviour change technique taxonomy label reporting system enhances the transparency and transferability of the findings (Michie et al., 2013). One reviewer conducted this allocation (CSW), and then discussed

and cross-checked it with a senior reviewer with implementation science expertise (EM).

## 3. Results

The initial database search yielded 14,480 studies. Following duplicate removal and title and abstract screening, full-text screening was undertaken on 548 studies and 42 studies were identified for inclusion (Fig. 1). An additional eight relevant studies were identified through hand searching from bibliographic data of included studies. The literature search update identified another five relevant studies. A total of fifty-five studies were included.

### 3.1. Study characteristics

Tables 2 and 3 show the study and participant characteristics of included studies (29 quantitative, 22 qualitative, 4 mixed-methods) involving hospital clinicians and patients, respectively. Studies reported on clinicians' or patients' perspectives exclusively, except for two studies that included both clinicians' and patients' views on pressure injury prevention (Horup et al., 2020; Latimer et al., 2021). Four clinician-related studies used sequential mixed-methods methodology to address several aims, of which the qualitative component relevant to this review was included (Martin et al., 2017; O'Brien and Cowman, 2011; Sving et al., 2020; Sving et al., 2012). Similarly, relevant qualitative data on patients' interviews from a pilot randomised controlled trial was included in this review (Roberts et al., 2016a, 2016b). Studies were conducted in a range of countries, including Australia (n = 12), United States (n = 8) and Sweden (n = 6). The sample sizes ranged from 23 to 1806 participants in quantitative studies and 5 to 131 participants in qualitative studies.

Of the 45 studies of clinicians' views, 26 quantitative studies used validated pressure injury knowledge and/or attitude questionnaires or self-developed surveys to investigate the knowledge, attitude and/or barriers to pressure injury prevention. Of those, only two studies also investigated pressure injury management (Fullbrook et al., 2019; Gunningberg et al., 2010). Of 15 clinician-related qualitative studies, 14 studies used semi-structured interviews or focus groups and one study used conversational interviews (Chaboyer and Gillespie, 2014) to explore views on pressure injury prevention. Three qualitative studies also explored pressure injury management (Barakat-Johnson et al., 2019; O'Brien and Cowman, 2011; Teo et al., 2019). The four clinician-related mixed-methods studies used surveys, focus groups and semi-structured interviews to investigate pressure injury prevention and management practices and views on pressure injury prevention and management (Balzer et al., 2014; Horup et al., 2020; Moir et al., 2022; Walker et al., 2019). Three studies specifically aimed at investigating clinicians' views on pressure injury risk assessment (Balzer et al., 2014; Gaspar et al., 2021) and support surfaces (Horup et al., 2020).

Of the 12 studies involving hospital patients' perspectives, nine were qualitative studies that used individual and semi-structured interviews or open-ended surveys that explored their views on pressure injury prevention received whilst in the hospital. Of the qualitative studies, all except one sought views on pressure injury management (Gourlan et al., 2020). Two of the three patient-related quantitative studies used validated questionnaires and/or self-developed surveys to investigate patient reported outcomes, participation in pressure injury prevention, and factors influencing pressure injury prevention involvement (Deakin et al., 2020; McInnes et al., 2014). Another investigated factors contributing to pressure injury management participation (Guihan and Bombardier, 2012). Two qualitative studies specifically investigated patients' views on support surfaces (Horup et al., 2020) and nutrition (Roberts et al., 2014).



### 3.2. Participant characteristics

Data from 7699 clinicians and 520 patients were reported. Of the 45 studies that recruited clinicians, 36 recruited only nurses; seven recruited various clinicians, including nurses and physicians and/or allied health; and two recruited only physicians. Twenty-six studies reported years of clinical practice, ranging from less than one year (Gunningberg et al., 2010) to 38 years (Chaboyer and Gillespie, 2014). It was not possible to compare views between health professions, as some participants' health disciplines were either not clearly reported in the participant demographics (Hommel et al., 2017; Horup et al., 2020; Jankowski and Nadzam, 2011; Martin et al., 2017; Walker et al., 2019) or description of the quantitative findings (Levine et al., 2012; Mishra and Mahmood, 2019). Of the 12 patient-related studies, they were all hospitalised patients and ten reported participants' ages ranging from 24 (Roberts et al., 2014) to 99 years old (Horup et al., 2020). Six studies reported recruiting patients with different levels of pressure injury risk, and four studies reported recruiting patients with existing or previous pressure injuries. All studies, except three (Gourlan et al., 2020;

Latimer et al., 2014; McInnes et al., 2014), provided information on pressure injury prevention and management strategies received by patients.

### 3.3. Methodological quality of included studies

Quality assessment results are presented in detail in Supplementary Table 2. Overall, of the 22 included qualitative studies, most of them showed coherence between the study aim, data collection, analysis and interpretation and provided details on data analysis and interpretation. Among those, ten studies provided no or unclear descriptions of data collection methods to justify how research questions were addressed.

Of the 29 included quantitative studies, most studies demonstrated use of appropriate measurement tools and statistical analysis to answer the research question. Thirteen studies had a low risk of nonresponse bias; and six demonstrated that the study sample was representative of the target population (Ebi et al., 2019, Getanda, 2016, Guihan and Bombardier, 2012, Li et al., 2022b, Mengist et al., 2022, Soban et al., 2017).

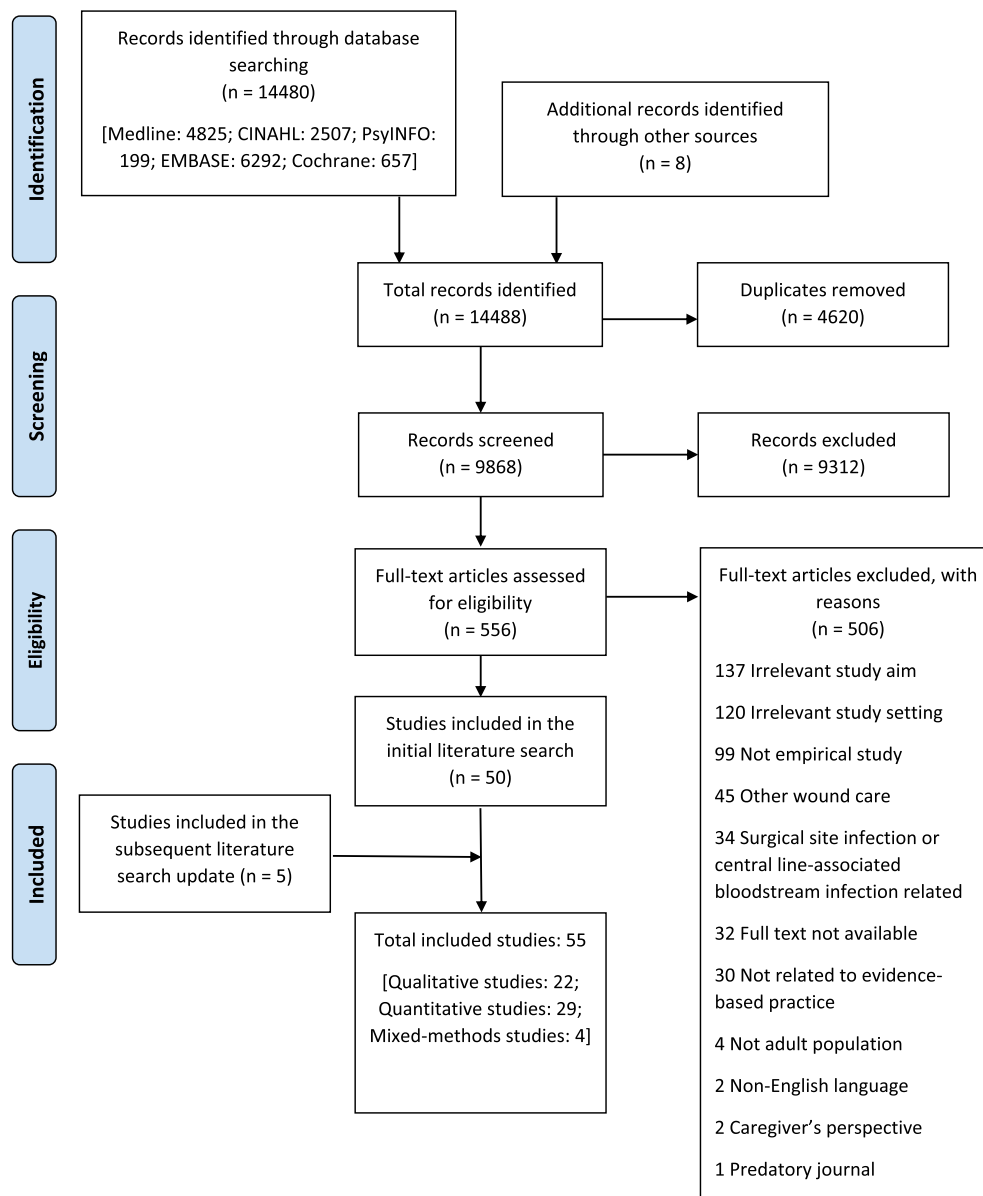


Fig. 1. PRISMA flow diagram.

**Table 2**

Study and participant characteristics of studies that involved hospital clinicians, stratified by study design.

Author(s), year	Country	Methodology			Participants			Study focus
		Setting	Recruitment date	Data collection method	Total number	Number in each health discipline	Years of practice (years)	
<i>Qualitative</i>								
<a href="#">Barakat-Johnson et al., 2019</a>	Australia	Acute and rehabilitation wards in 4 hospitals	May 2016 to Sep 2016	Semi-structured interviews and focus groups	18	18 nurses	Average: 11.9 (range 4–26, 1 missing data)	Nurses' experiences of PI prevention and management Barriers and facilitators of implementing a patient-centred PI prevention care bundle PI risk assessment use and risk monitoring Facilitators to PI prevention
<a href="#">Chaboyer and Gillespie, 2014</a>	Australia	1 orthopaedic and 1 general medical ward in a hospital	Not reported	Conversational interviews	20	20 nurses	Range: 1–38	
<a href="#">Gaspar et al., 2021</a>	Portugal	1 hospital	Feb 2020 to May 2020	Focus group	11	11 nurses	15.8 ± 11.6	
<a href="#">Hommel et al., 2017</a>	Sweden	6 hospitals	Nov 2014 to Dec 2014	Semi-structured interviews and focus groups	39	Not specified (nurses, physicians, and managers)	Not reported	
<a href="#">Jankowski and Nadzam, 2011</a>	United States	4 hospitals	Apr 2009 to Mar 2010	Meetings, interviews, random chart audit and feedback	Not reported	Not specified (nurses, dietitians, PTs, physicians, managers and healthcare aides <sup>a</sup> )	Not reported	Barriers and solutions to implement PI prevention programmes Perceptions of the feasibility and acceptability of a PI prevention care bundle Perceived roles in PI prevention and factors influencing PI prevention Perceptions of PI prevention programme
<a href="#">Latimer et al., 2021</a>	Australia	3 medical wards in a hospital	Sep 2019	Focus groups	20	20 nurses	Median 7.0 (IQR: 3, 10)	
<a href="#">Li et al., 2022a</a>	China	1 hospital	Aug 2020 to Dec 2020	Semi-structured interviews	27	27 nurses	Median 11.0 (IQR: 4, 21)	
<a href="#">Martin et al., 2017</a>	Canada	1 hospital	2013 to 2014	Semi-structured interviews and focus-groups	35	Not specified (nurses, dietitians, OTs, PTs and health care aides <sup>a</sup> )	Not reported	
<a href="#">O'Brien and Cowman, 2011</a>	Ireland	1 orthopaedic and 1 gerontology ward in a hospital	Nov 2007 to Dec 2007	Focus groups	13	13 nurses	Range: 1–7	Quality of nursing documentation of PI care
<a href="#">Roberts et al., 2016b</a>	Australia	Medical, surgical and rehabilitation wards in 4 hospitals	Not reported	Semi-structured interviews	18	18 nurses	Range: 3–30	Nurses' perceptions of the impact of a PI prevention care bundle
<a href="#">Soban et al., 2016</a>	United States	Medical and surgical wards in 6 hospitals	Nov 2011 to Feb 2013	Semi-structured interviews	48	48 nurses	Not reported	Key components of PI prevention programmes Attention to and perceptions of PI prevention
<a href="#">Sving et al., 2012</a>	Sweden	Medical, geriatric and orthopaedic wards in a hospital	Jan 2009 to Apr 2009	Observation and semi-structured interviews	9	9 nurses	Median: 2 Range: 2.5 months–9 years	
<a href="#">Sving et al., 2017</a>	Sweden	3 medical and 2 surgical wards in a hospital	Apr 2013 to Oct 2013	Semi-structured interviews and focus groups	36	31 nurses and 5 first-line managers	Median: 10 (IQR: 4, 20)	Experiences and perceptions of PI prevention
<a href="#">Sving et al., 2020</a>	Sweden	Medical and surgical wards in a hospital	Not reported	Semi-structured interviews and focus-groups	32	27 nurses and 5 managers	Not reported	Sustainability of PI prevention implementation intervention
<a href="#">Teo et al., 2019</a>	Singapore	1 general ward in a hospital	Oct 2017 to Dec 2017	Semi-structured interviews and focus-groups	24	24 nurses	11.4 ± 6.1	Factors influence PI prevention and management
<i>Quantitative</i>								
<a href="#">Beeckman et al., 2011</a>	Belgium	94 wards in 14 hospitals	Apr 2008	PUKAT and APuP	485	485 nurses	Not reported	PI knowledge and attitudes of PI prevention Knowledge and attitude of PI prevention
<a href="#">de Almeida Tavares et al., 2015</a>	Portugal	Medical and surgical wards in 5 hospitals	Feb 2011 to May 2011	PI subscale measure in GNKA	867	867 nurses	Not reported	

Table 2 (continued)

Author(s), year	Country	Methodology			Participants			Study focus
		Setting	Recruitment date	Data collection method	Total number	Number in each health discipline	Years of practice (years)	
de Meyer et al., 2019	Belgium	Geriatric and rehabilitation wards in 16 hospitals	Feb 2016 to Dec 2017	PUKAT	306	306 nurses	Not reported	Knowledge of PI prevention
Ebi et al., 2019	Ethiopia	10 hospitals	13–22 Aug 2018	PUKT and self-developed barriers survey	212	212 nurses	<2: 2.4 %; 2–4: 18.4 %; 5–10: 71.2 %; 11–15: 5.7 %; ≥16: 2.4 %	Knowledge and barriers to PI prevention
Fulbrook et al., 2019	Australia	1 hospital	Sep 2015 to Oct 2016	PZ-PUKT	273	273 nurses	Not reported	Knowledge of PI prevention and management
Getanda, 2016	Kenya	Orthopaedic and surgical wards in a hospital	Not reported	PZ-PUKT and self-developed survey	80	80 nurses	<1: 13 %; 1–5: 38 %; 6–10: 24 %; 11–14: 11 %; >15: 14 %	Knowledge and barriers of PI prevention
Grešš Halász et al., 2021	Slovakia	4 hospitals	Jan 2017 to Mar 2017	PUKAT and APuP	199	199 nurses	Not reported	Knowledge and attitude of PI prevention
Gul et al., 2017	Turkey	1 hospital	May 2015 to June 2015	Modified PUKT	308	308 nurses	7.3 ± 7.8	Knowledge of PI prevention
Gunningberg et al., 2010	Sweden	5 hospitals	Not reported	Self-developed 27-item survey	72	72 nurse managers	21.2 ± 8.1 (range: 0–37)	Perceptions of influential factors in PI prevention
Ilesanmi et al., 2012	Nigeria	Medical, surgical, neurological, and orthopaedic wards in a hospital	Not reported	PUKT	111	111 nurses	19.4 ± 0.8	Knowledge of PI prevention
Iranmanesh et al., 2013	Iran	Orthopaedic wards in 2 hospitals	Oct 2011 and Nov 2011	PUKT	57	57 nurses	6.9 ± 4.6	Knowledge of PI prevention
Jiang et al., 2020	China	10 hospitals	Jun 2017 to Nov 2017	PUKT, APuP, and PINB	1806	1806 nurses	7.8 ± 5.8	Knowledge, attitude and behaviour of PI prevention.
Kaddourah et al., 2016	Saudi Arabia	1 hospital	2014	PUKT and Staff Attitude Scale	105	65 nurses, 19 OTs, 14 PTs, 7 physicians	12.2 ± 7.3	Knowledge and attitude of PI prevention
Levine et al., 2012	United States	1 hospital	Oct 2009 to Apr 2010	PUKT and self-developed wound photograph test	23	23 physicians	Not reported	Knowledge of PI prevention
Li et al., 2022b	China	1 hospital	Jun 2020 to Sep 2020	PUKAT	404	404 nurses	10.4 ± 7.9	Knowledge of PI prevention
Malinga and Dlungwane, 2020	South Africa	Medical, surgical, and orthopaedic wards in 2 hospitals	May 2016 to Aug 2016	Self-developed survey	198	198 nurses	Not reported	Knowledge and attitude of PI prevention
Mengist et al., 2022	Ethiopia	4 hospitals	May 2021 to June 2021	PUPKAI-T	372	372 nurses	5.6 ± 4.9	Knowledge and practices of PI prevention
Mishra and Mahmood, 2019	India	Medical and surgical wards in 6 hospitals	Sep 2018 to Nov 2018	Modified PUKT	126	126 physicians	Not reported	Knowledge of PI prevention
Miyazaki et al., 2010	Brazil	1 hospital	Jan 2009 to Mar 2009	PUKT	386	386 nurses	9.9 ± 7.6	PI knowledge of prevention, staging, and wound description
Padula et al., 2015	United States	55 hospitals	Aug 2012 to Nov 2012	Self-developed survey	55	55 nurses	Not reported	Influential factors to prevent PI
Parisod et al., 2021a	Finland	2 hospitals	May 2018 to Jan 2019	APuP	213	213 nurses	≤6: 33 %; 6.1–14: 24 %; 14.1–25: 22 %; <25: 21 %	Attitude to PI prevention
Parisod et al., 2021b	Finland	2 hospitals	May 2018 to Jan 2019	PUPK	213	213 nurses	Not reported	Knowledge of PI prevention
Rodrigues et al., 2016	Brazil	Medical, surgical and infection wards in a hospital	Jan 2015 to Jun 2015	PUKT	69	69 nurses	<5: 54 %; 5–10: 6 %; 10–15: 20 %; 15–20: 4 %; 20–25: 10 %; >25: 3 %; missing: 3 %	Knowledge and perception of PI prevention
Sengul and Karadag, 2020	Turkey	Medical and surgical wards in 2 hospitals	Aug 2017 to Apr 2018	PUPKAI-T	308	308 nurses	Not reported	Knowledge of PI prevention

(continued on next page)

Table 2 (continued)

Author(s), year	Country	Methodology			Participants			Study focus
		Setting	Recruitment date	Data collection method	Total number	Number in each health discipline	Years of practice (years)	
Soban et al., 2017	United States	Medical and surgical wards in 116 hospitals	May 2014 to Dec 2014	Self-developed survey	116	116 nurses	Not reported	Strategies to help preventing PI
Tallier et al., 2017	United States	Surgical wards in 10 hospitals	Not reported	Modified PUKT and PUQ	62	62 nurses	≥5: 84 %; ≥10: 60 %	Knowledge and barriers to PI prevention
<i>Mixed-methods</i> Balzer et al., 2014	Germany	2 trauma wards in a hospital	Apr 2011 to May 2011	Patient characteristics from validated questionnaires and nurses' semi-structured Interviews	16	16 nurses	Median: 26	PI risk assessment use in prevention
Horup et al., 2020	Denmark	2 wards in 1 hospital	Jan 2017 to Jan 2018	Self-developed surveys and focus groups	68	Not specified (nurses, PTs, OTs and clinical assistants)	Not reported	Views on static overlay use to prevent PI
Moir et al., 2022	New Zealand	Not reported	Not reported	Focus groups and self-developed survey	23	9 nurses, 7 managers, 7 other health professionals	Not reported	Barriers and facilitators of nurse-led PI prevention
Walker et al., 2019	United States	Medical wards in 29 hospitals	Feb 2018 to Mar 2018	Self-developed survey and focus groups	Surveys: 29; focus groups: 18	Not specified (nurses and physicians)	Surveys: ≥3: 72 %; <3: 28 %; focus groups: ≥5: 61 %	Knowledge, practices and perspectives of PI management

APuP: Attitude Toward Pressure Ulcer Tool; GNKA: Geriatric Nursing Knowledge/Attitudes; OT: occupational therapists; PI: pressure injury; PINB: Pressure Injury Nursing Behavior Questionnaire; PT: physio therapists; PUKAT: Pressure Ulcer Knowledge Assessment Tool; PUKT: Pieper's Pressure Ulcer Knowledge Test; PUPKAT: Pressure Ulcer Prevention Knowledge Assessment Instrument; PUQ: Pressure Ulcer Questionnaire; PZ-PUKT: Pieper-Zulkowski Pressure Ulcer Knowledge Test.

<sup>a</sup> Healthcare aides included educators, transporters, supply/skin care product delivery staff, ancillary staff in radiology, dialysis, endoscopy and technicians.

None of the four mixed-methods studies (Balzer et al., 2014; Horup et al., 2020; Moir et al., 2022; Walker et al., 2019) clearly reported how the integration of qualitative and quantitative findings was achieved.

### 3.4. Themes

Four main themes were generated and are presented below supported by illustrative quotes and associated barriers and facilitators. The main themes are: 1) nurse-led multidisciplinary care, 2) patient participation in care, 3) practicability of guideline implementation and 4) attitudes towards pressure injury prevention and management. Supplementary Tables 3 and 4 show barriers and facilitators with allocated Theoretical Domains Framework domains and behaviour change techniques under each main theme. Supplementary Table 5 summarises and compares clinicians' and patients' views.

#### 3.4.1. Main theme 1: nurse-led multidisciplinary care

This main theme highlights the importance of nurse leadership in initiating, directing and facilitating pressure injury multidisciplinary care. The importance of intradisciplinary and multidisciplinary teamwork for evidence-based decision-making was emphasised in three qualitative studies (Hommel et al., 2017; Soban et al., 2016; Teo et al., 2019).

"As staff nurses, the number one most important thing we would be able to do is to assess the patients' needs for pressure injury prevention... when [junior nurses] encounter any problems,... [nurse practitioners] advise what the appropriate things to do."

Teo et al. (2019)

Across qualitative and quantitative studies, commonly reported facilitators to enhance nurse-led multidisciplinary care included improved awareness and knowledge of pressure injury prevention and management and communication across health disciplines to foster a

multidisciplinary approach to pressure injury care. Other facilitators included: clarifying each health discipline's roles and scope of practice in respect of pressure injury prevention and management; nominating a nursing clinical champion to drive, monitor and evaluate pressure injury prevention care; and creating and maintaining a supportive infrastructure to facilitate nursing leadership when integrating pressure injury care into routine clinical practices.

Only one study reported patients' views on multidisciplinary care. Some appreciated clinical support received from different health disciplines. In contrast, others reported receiving conflicting advice from different health disciplines, being unclear about the role of nutrition in pressure injury prevention, dietetics service not meeting their expectations of pressure injury care, or disliking the prescribed diet to address nutritional needs (Roberts et al., 2014).

#### 3.4.2. Main theme 2: patient participation in care

This main theme represents nurses' and patients' preferences for patient participation in hospital pressure injury care, with more evidence sourced from patient qualitative studies. Nurses who participated in pressure injury prevention implementation programmes with patient participation emphasised the importance of patient involvement in delivering patient-centred pressure injury prevention care (Barakat-Johnson et al., 2019; Chaboyer and Gillespie, 2014; Latimer et al., 2021; Roberts et al., 2016a, 2016b). They believed patient participation in pressure injury prevention improved clinician-patient communication, increased patient satisfaction, and reduced clinician workloads (Chaboyer and Gillespie, 2014; Roberts et al., 2016a, 2016b).

"If you're getting the patient to try to mobilise, try to move themselves in the bed and things like that, then it's less work on you really... it's going to end up benefiting [nursing staff] in the long run"

Chaboyer and Gillespie (2014)



**Table 3**  
Study and participant characteristics of studies that involved patients, stratified by study design.

Author(s), year	Country	Methodology			Participants				Study focus
		Setting	Recruitment date	Data collection method	Total number	Age, year	PI risk/wound status	PI prevention/management strategies	
<i>Qualitative</i> Gillespie et al., 2014	Australia	Medical and surgical wards in a hospital	Not reported	Semi-structured interviews	11	Not reported	Waterlow scores: $\geq 15$ (high risk): 27 % Range: 4–19	Repositioning, skin assessment, malnutrition prevention	Qualitative evaluation of a patient-centred PI prevention care bundle
Gourlan et al., 2020	France	9 spinal cord injury units	Dec 2012 to Feb 2013	Self-developed open-ended survey	131	Median: 48 (IQR: 33.5–58)	Previous PI: 70 %	Not reported	Perceptions of PI prevention and management
Horup et al., 2020	Denmark	Orthopaedic and geriatric ward in a hospital	Jan 2017 to Jan 2018	Structured interviews	12	Range: 51–99	Not reported	Support surfaces to prevent PI	Perceptions on support surfaces in preventing PI
Hultin et al., 2019	Sweden	Orthopaedic ward in a hospital	Nov 2016 to Feb 2017	Semi-structured interviews	31	81.0 $\pm$ 8.7	Median Modified Norton Scale: 20 (range: 17–20)	Continuous bedside pressure mapping system	Perceptions of patient participation in PI prevention
Latimer et al., 2014	Australia	4 medical wards in 2 hospitals	Not reported	Semi-structured interviews	20	Median: 65.5 (IQR: 56.5–68.7)	Multiple PIs on admission: 15 %	Not reported	Perceptions of patient participation in PI prevention
Latimer et al., 2021	Australia	3 medical wards in a hospital	Sep 2019	Semi-structured interviews	9	Median: 71 (IQR: 27–80)	Independently mobile: 56 %; no existing PI	Repositioning, skin assessment, malnutrition prevention	Perceptions of a PI prevention care bundle
Roberts et al., 2014	Australia	4 medical wards in 2 hospitals	Not reported	Semi-structured interviews	20	61.3 $\pm$ 12.6 (range: 24–80)	All participants had reduced mobility	Malnutrition prevention	Perceptions of the role of nutrition in PI prevention
Roberts et al., 2016a	Australia	3 medical wards in a hospital	Not reported	Interviews	5	Not reported	At risk of PI due to restricted mobility	Patient education and participation in nutritional care	Perceptions and acceptability of the PI prevention programme
Roberts et al., 2017	Australia	Medical and surgical wards in 4 hospitals	Nov 2014 to Mar 2015	Semi-structured interviews	19	68.8 $\pm$ 16.5 (range: 31–96)	All participants had reduced mobility	Repositioning, skin assessment, malnutrition prevention	Perceptions and experiences of a PI prevention care bundle
<i>Quantitative</i>									
Deakin et al., 2020	Australia	3 medical wards in a hospital	Nov 2019 to Dec 2019	Validated PPPIP and mMDTSM surveys	80	67.2 $\pm$ 18.3	Not reported	Repositioning, skin assessment, malnutrition prevention	Participation and satisfaction with a PI prevention care bundle
Guihan and Bombardier, 2012	United States	6 Veteran Affairs spinal cord injury centres	Nov 2003 to Jun 2005	Validated PI knowledge test, self-developed skin health belief and behaviour surveys	131	55.9 $\pm$ 9.9	Numbers of current PIs: 1: 63 %; 2: 22 %; $\geq 3$ PU: 15 % Median ulcer size: 26.0 cm <sup>3</sup>	PI self-management education and telephone counselling	The potentially modifiable medical and behavioural risk factors among veterans with Spinal Cord Injury.
McInnes et al., 2014	Australia	4 wards in 2 hospitals	Feb 2012 to May 2012	Self-developed survey	51	65.0 $\pm$ 16.6	About half of participants were at moderate-high risk of PI measured by the Waterlow or Braden tools. Current PI: 8 %	Not reported	Perceived roles in PI prevention and factors influencing patient participation in PI prevention

mMDTSM: modified multi-dimensional treatment satisfaction measure; PI: pressure injury; PPPIP: patient participation in pressure injury prevention.

From qualitative studies, nurses felt they were responsible for promoting patient participation by providing education and imparting skills to patients to perform pressure injury prevention strategies appropriately and independently (Chaboyer and Gillespie, 2014, Roberts et al., 2016a, 2016b). Nurses and allied health professionals believed accessibility to high-quality patient education resources facilitated patient participation and education on pressure injury prevention strategies (Chaboyer and Gillespie, 2014, Latimer et al., 2021, Martin et al., 2017, Roberts et al., 2016a, 2016b).

Similarly, six quantitative and qualitative studies of patient views stated that patient participation was facilitated with face-to-face pressure injury education, daily engagement with clinicians, and accessible and interactive educational resources delivering simple and succinct messages in video, leaflet and poster format to equip them with pressure injury prevention and management knowledge and skills (Gillespie et al., 2014; Gourlan et al., 2020; Hultin et al., 2019; Latimer et al., 2014; Latimer et al., 2021; McInnes et al., 2014). Other factors influencing patient participation included physical pain, discomfort

(Horup et al., 2020; McInnes et al., 2014), tiredness from medication and/or medical procedures (Roberts et al., 2017) and cognition and disability (Guihan and Bombardier, 2012; Latimer et al., 2014). Functionally dependent patients with pressure injury required a trustworthy caregiver capable of assisting pressure injury prevention and management (Gourlan et al., 2020; Latimer et al., 2014).

In qualitative studies of patient views, most patients at risk of or with a pressure injury expressed self-responsibility for their health. They preferred to be actively involved in pressure injury care in hospitals, including daily skin checks, repositioning, nutrition and decision-making facilitated by positive clinician interactions, which enhanced their perceived autonomy in care and self-efficacy in following optimal skin care practices (Hultin et al., 2019; Latimer et al., 2014; Roberts et al., 2016a, 2016b; Roberts et al., 2017).

"You have to be proactive about it. If you are not... then the decisions are made for you."

Latimer et al. (2014)

However, some patients at risk of or with a pressure injury felt clinicians were responsible for providing pressure injury care, preferred a passive role, and only wanted to be informed of the care plan rather than involved in shared-decision making (Latimer et al., 2014; Roberts et al., 2017).

"Well, [the staff] tell you what is going to happen [about care] and I don't say anything."

Latimer et al. (2014)

Patients' different expectations of involvement in pressure injury prevention and management influenced their preference for the level of participation (Latimer et al., 2014; Roberts et al., 2017). For instance, in two qualitative studies, those patients who had experienced pressure injury and knew pressure injury was preventable preferred to be more proactively involved in pressure injury care. Patients whose in-hospital pressure injury prevention care did not meet their expectations (indicated by unfulfilled mattress requests and the recurrence of pressure injury) found it particularly challenging to rebuild trusting relationships with clinicians, were frustrated with healthcare, and felt powerless to manage skin care (Gourlan et al., 2020; Latimer et al., 2014).

"It's disempowering... makes me want to ark up a little... I've asked numerous times 'what's happening?', and it's got to the point where I just stop asking, 'cos it's frustrating."

Latimer et al. (2014)

### 3.4.3. Main theme 3: practicability of guideline implementation

This main theme describes the practical difficulties of implementing pressure injury prevention and management guidelines from clinicians' perspectives, which was similar to patients' needs for clinicians' support to receive pressure injury care. Clinicians in 15 quantitative and qualitative studies expressed that they had limited capacity to fully adhere to pressure injury guidelines due to competing priorities and significant workload demands in addition to involving in pressure injury assessment, diagnosis, documentation and commencing pressure injury prevention and management strategies (Barakat-Johnson et al., 2019; Latimer et al., 2021; Sving et al., 2017; Sving et al., 2020). Five quantitative and qualitative studies reported organisational-level barriers to guideline uptake included the difficulty in accessing updated pressure injury guidelines and unavailability of practical consultancy support from wound care nurses (Barakat-Johnson et al., 2019; Getanda, 2016; Kaddourah et al., 2016; O'Brien and Cowman, 2011; Sving et al., 2012). Other organisational-level barriers included a shortage of pressure-relieving support surfaces, skin care products and repositioning aids (Jankowski and Nadzam, 2011; Soban et al., 2016; Sving et al., 2012).

Additionally, clinicians from qualitative, quantitative and mixed-methods studies reported individual-level barriers specific to different pressure injury prevention and management strategies, primarily insufficient knowledge of: using pressure injury risk assessment tools, performing skin assessment, preventive skin care and wound care, repositioning patients appropriately, and appropriate support surface options. In two studies, nurses were unaware of how to use nutritional screening tools to prompt dietitian referrals for patients at high risk of pressure injuries and at high risk of malnutrition (Jankowski and Nadzam, 2011; Jiang et al., 2020).

Facilitators of guideline implementation mentioned in three qualitative studies included regular pressure injury incidence audits, actionable care plans, regular care plan follow-up, and sharing successful case studies (Barakat-Johnson et al., 2019; Hommel et al., 2017; Roberts et al., 2016a, 2016b). Given the high staff turnover rate in hospitals, clinicians from quantitative and qualitative studies highlighted the importance of regular workshops on evidence-based knowledge updates and practice-based training on pressure injury prevention and management to refresh existing clinicians' knowledge or to train new clinicians in implementing guidelines (Barakat-Johnson et al., 2019; Ebi et al., 2019; Hommel et al., 2017; Parisod et al., 2021a, 2021b, Teo et al., 2019).

"[Educational courses] is kind of a refresher for us, because we already know the basic prevention all those already."

Teo et al. (2019)

Similarly, patients who had hospital-acquired pressure injury believed pressure injury was attributed to not receiving timely appropriate support surfaces.

"I probably didn't get an air mattress in time."

Latimer et al. (2014)

Patients from three qualitative studies and one quantitative study also expressed their reliance on clinicians to access affordable equipment or consumables and impart skills for prevention and early intervention of pressure injury as part of discharge planning and education (Gourlan et al., 2020; Hultin et al., 2019; Latimer et al., 2014; McInnes et al., 2014). Across assorted health conditions, prior knowledge and experience of pressure injuries, patients expressed requiring different types and levels of support to perform pressure injury prevention and management (Gillespie et al., 2014; Gourlan et al., 2020; Latimer et al., 2014; McInnes et al., 2014).

### 3.4.4. Main theme 4: attitudes towards pressure injury prevention and management

This main theme refers to the diverse beliefs held by clinicians and patients on the importance of pressure injury care over other hospital priorities that drove their attitudes and preferences for performing prevention and management strategies, reflected in eight clinician-related and three patient-related qualitative studies. Despite recognising the clinical significance of pressure injury prevention and management (Kaddourah et al., 2016; Rodrigues et al., 2016), clinicians in four quantitative and qualitative studies, particularly physiotherapists, ranked pressure injury as a lower priority among other clinical tasks, such as fall prevention and medical emergency procedures (Barakat-Johnson et al., 2019; Kaddourah et al., 2016; O'Brien and Cowman, 2011; Sving et al., 2012).

"We would love to be able to turn every patient hourly to second hourly. We just don't have that capacity within our staff to be able to do that because the patient's about to have a fall, or the patient that's occluding their airway, or the confused patient that you're trying to resettle takes up that time away from going, 'okay, let's go and turn this patient'."

Barakat-Johnson et al. (2019)

When hospital-acquired pressure injury occurred, nurses in two qualitative studies felt responsible for being unable to provide optimal pressure injury prevention and management care in a workplace with competing responsibilities, heavy workload, complex barriers, and time constraints (Barakat-Johnson et al., 2019; Sving et al., 2017).

“...when [pressure injuries] do develop past that stage two, there’s almost no stopping them. ... and it’s incredibly distressing for the staff, we’re always so upset, the family are beside themselves...”

Barakat-Johnson et al. (2019)

Some nurses who recognised pressure injury was preventable in two qualitative studies expressed the need to change the mindset from pressure injury treatment to prevention by implementing a new pressure injury prevention clinical routine and fostering a desirable work culture using a reflective audit and feedback mechanism (Sving et al., 2017; Teo et al., 2019).

Clinicians’ attitudes to the use of pressure injury assessment tools varied in four qualitative and mixed-methods studies, ranging from tools supporting clinical reasoning for assessment to preferring clinical judgement over tools to predict pressure injury risk and to choose appropriate support surfaces (Balzer et al., 2014; Barakat-Johnson et al., 2019; Horup et al., 2020; Sving et al., 2012).

“A lot of clinical judgement and autonomy has been taken away from nursing in a sense that we just go by numbers... and I think that whole clinical thinking and critical thinking has been taken away.”

Barakat-Johnson et al. (2019)

Patients in qualitative studies expressed similar attitudes to pressure injury. Some patients at risk of, or with, a pressure injury reported they participated in pressure injury care as they were concerned about the health consequences, including pain, abnormal smell and increasing comorbidities (Gillespie et al., 2014; Gurlan et al., 2020; Latimer

et al., 2014). Some patients who had experienced pressure injuries reported that returning to their everyday social life was a positive motivator to optimise skin health (Gurlan et al., 2020).

“While taking care of my skin I can enjoy life, go outside with my electric wheelchair and enjoy the nice days and sun to play p’etanque with my friends.”

Gurlan et al. (2020)

### 3.5. Theoretical Domains Framework domain allocation pattern

Fig. 2 provides an overview of the Theoretical Domains Framework domain allocation, represented by the identified barriers and facilitators in each pressure injury prevention and management strategy. The Theoretical Domains Framework domains that were allocated to specific barriers and facilitators differed slightly between the types of prevention and management strategies; there were few strategy-specific barriers and facilitators identified from the included studies. Different determinants of behaviour identified in each theme imply the need for different implementation strategies to address barriers or promote facilitators related to each theme. The clinician-reported barriers associated with impracticability of guideline implementation including a lack of updated knowledge of current pressure injury prevention guidelines (Knowledge domain) and a lack of resources such as appropriate pressure relieving devices and consumables to perform evidence-based strategies (Environmental Context and Resources domain). Clinicians viewed nurse-led multidisciplinary care as a factor that could facilitate guideline implementation and highlighted the importance of improving interdisciplinary collaboration in relation to pressure injury prevention (Environmental Context and Resources domain). For patients, lack of patient participation in care was an impeding factor to guideline implementation. Common barriers related to this included a lack of understanding of pressure injuries (Knowledge domain) and a lack of caregiver involvement and unfulfilled pressure relieving

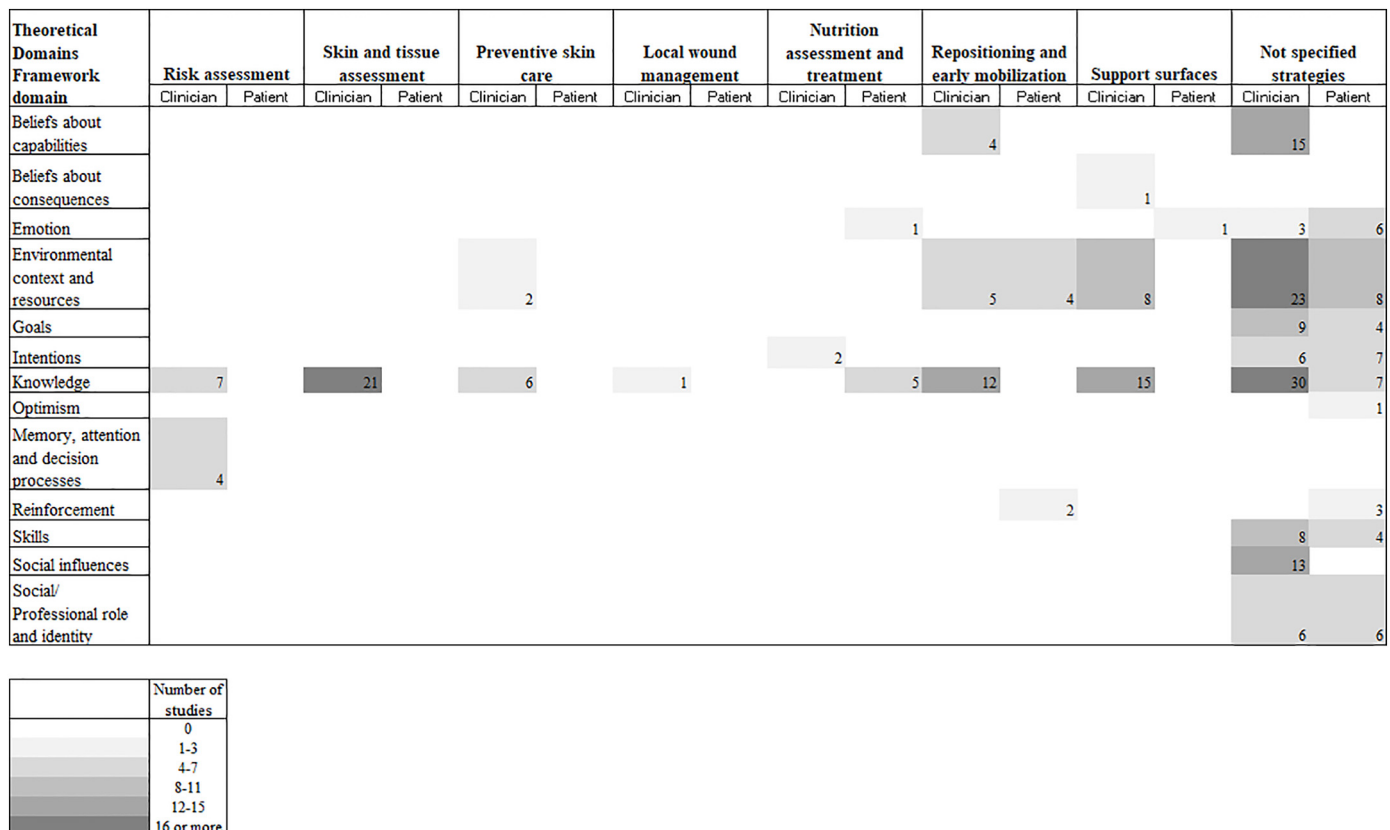


Fig. 2. Theoretical Domains Framework allocation by pressure injury prevention and management strategies.

support surface requests (Environmental Context and Resources domain). Patients and clinicians shared views about the lack of access to educational resources in the hospital setting (Environmental Context and Resources domain) and the lack of skills and knowledge of how to facilitate patient or caregiver participation (Skills domain). Patients reported positive attitudes towards participating in pressure injury prevention and management was an enhancing factor in guideline implementation.

### 3.6. Behaviour change technique allocation pattern

Seventeen patient-related and 32 clinician-related barriers and facilitators were mapped to 13 Theoretical Domains Framework domains and were then allocated to 21 behaviour change techniques. Fig. 3 shows the frequency of barriers and facilitators coded to specific behaviour change techniques allocated for each Theoretical Domains Framework domain. As barriers and facilitators identified by clinicians were mainly mapped to the Knowledge domain and Environmental Context and Resources domain, “instruction on how to perform a behaviour” and “restructuring the physical environment” were the two common behaviour change techniques to which these domains were mapped. Patient-related barriers and facilitators were commonly mapped to “health consequences”, “identity associated with changed behaviour”, “negative reinforcement” and “reframing”, indicating the need for different implementation strategies between clinicians and patients to address barriers or promote facilitators that alleviate guideline implementation challenges.

## 4. Discussion

This mixed-methods systematic review used an innovative approach to synthesise and compare clinicians' and patients' views on implementing guidelines and provides insights into factors believed to affect evidence-based pressure injury care from the viewpoints of acute care clinicians and patients. These factors have been mapped to the Theoretical Domains Framework and allocated behaviour change techniques as part of the development of an end-user patient-centred intervention that is theoretically and empirically informed. This has informed a theoretical basis for multifaceted intervention development to improve guideline implementation. Our findings show clinicians, primarily nurses, and patients believed nurse-led multidisciplinary care and patient participation facilitate optimal guideline implementation and enhance individualised patient-centred care. However, clinicians

raised concerns about the practicability of implementing aspects of guidelines mainly relating to pressure injury risk assessment, skin inspection and repositioning. These challenges were in turn related to both complex organisational- and individual-level barriers, leading to some uncertainty among clinicians about how to implement them. There was a convergence between clinicians' and patients' views on the lack of pressure injury knowledge, resources and how to facilitate patient and caregiver involvement in patient-centred care.

In this review, nurse-led multidisciplinary care was highlighted by clinicians, primarily nurses, as necessary for facilitating optimal guideline uptake. A multidisciplinary team approach, which refers to different health disciplines determining actionable strategies to achieve interprofessional collaboration (Scovil et al., 2019), is vital for optimal pressure injury prevention and management (Avsar et al., 2019). In a high staff turnover environment, clinical mentorship with interprofessional wound care experts allows inexperienced clinicians to develop the necessary knowledge and skills in facilitating multidisciplinary, evidence-based care provision (Suva et al., 2018). Nurses' role in holistic patient-centred skin care allows them to be primary advocates for patients' wound care (Delaney, 2018). As nurses rely on support from other health disciplines to maintain patients' skin integrity, multidisciplinary teamwork driven and coordinated by nurses appears appropriate (Samuriwo, 2012). An effective multidisciplinary team-based approach to pressure injury care has been found to improve patient outcomes and reduce hospital costs (Suva et al., 2018). In designing implementation programmes, clarifying the roles of different health disciplines in pressure injury care and equipping nurses with skills to facilitate nurse-led multidisciplinary care are essential. Further research is required to explore the perceived responsibilities among allied health and patients' views on multidisciplinary pressure injury care to inform strategies to improve nurse-led patient-centred multidisciplinary care.

In addition, this review shows that clinicians and patients desire patient participation in pressure injury care. Patient participation refers to “empowering and enabling patients to be actively engaged in the decision-making process” (Ledger et al., 2020). Patient involvement in decision-making is crucial because: patients are cared for in a complex and dynamic hospital setting where things are traditionally ‘done’ to the patient (Ledger et al., 2020); patient participation is fundamental in enacting patient-centred care and ensuring continuity of care (García-Sánchez et al., 2019; Kitson et al., 2013) and this can improve patient safety, self-efficacy, adherence to treatment plans, and

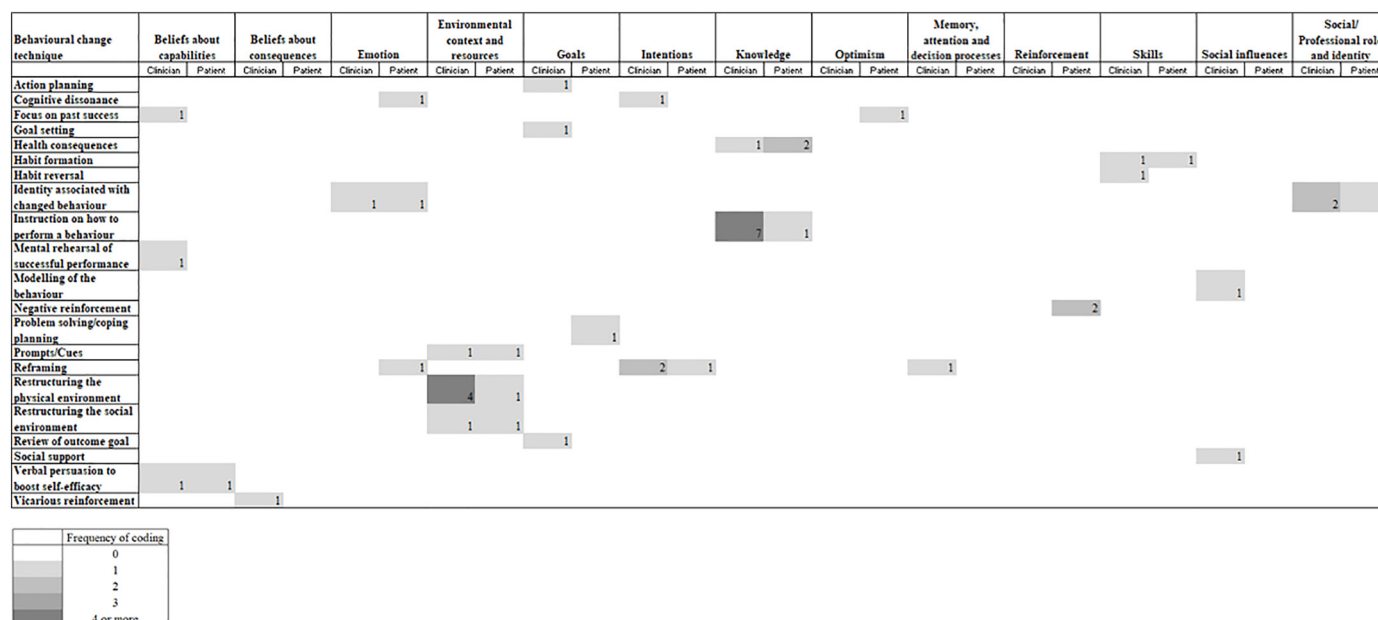


Fig. 3. Frequency of coding for each behavioural change technique for clinicians and patients.



satisfaction with healthcare services (Delaney, 2018; Ledger et al., 2020). However, there are many challenges in facilitating patient participation in nursing care (Tobiano et al., 2015). Many conditions need to be present for patient participation in direct ward care, including reciprocal clinician–patient interaction, information and knowledge exchange, treating patients as equal partners in care, and nurse advocacy for patient involvement in assessment and care planning (Sahlsten et al., 2008; Tobiano et al., 2016). Consistent with this review, equipping clinicians with patient participation skills and fostering a working environment that supports patient participation are critical components to support implementation programmes (Oxelmark et al., 2018).

Nurse-led multidisciplinary care and patient participation may help to address some organisational- and individual-level barriers related to the practicability of guideline implementation mentioned in this review and hence help alleviate negative attitudes towards guideline uptake. Regular workshops on knowledge updates and practice-based training on evidence-based prevention and management strategies targeted to a multidisciplinary team may help address some practical knowledge and skill barriers and improve interdisciplinary care. Fostering positive attitudes towards evidence-based care requires multi-level approaches, possibly including discipline-specific clinical champions who can promote self-reflexive learning, help bedside clinicians implement and sustain a pressure injury care team, and provide guidance and knowledge updates (Suva et al., 2018). Given the importance of patients' role in ensuring patient safety in hospitals (Castro et al., 2016; Seale et al., 2015), interventions that include components targeting both clinicians and patients are recommended to enable evidence-based care (Coyer et al., 2022).

This review used existing evidence on clinicians' and patients' barriers and facilitators to implementing guidelines to develop lists of targeted behaviour change techniques to facilitate effective research translation into practice. Behaviour change techniques targeting patients' views were selected based on interventions tailored and delivered by clinicians to improve patient participation and patient-centred care. However, most included studies provided information on barriers and facilitators applicable to the overall implementation of pressure injury guidelines without considering the potential differences in barriers and facilitators to implementing specific strategies such as repositioning and skin inspection. Situation-specific knowledge of impeding or facilitating factors contributing to guideline implementation is necessary to design an effective and tailored intervention (van Dulmen et al., 2020). This supports the need for more research to elucidate the barriers and facilitators to implementing specific prevention and management guideline recommendations. Whilst we have identified barriers to improving multidisciplinary care and patient participation in this review, it would be of value to conduct further research involving end-users as to which barrier is considered the most important and feasible to overcome from their perspective (Craig et al., 2017).

#### 4.1. Strengths and limitations

A strength is identifying clinician and patient views on pressure injury care helps researchers address issues of importance and clinical relevance to clinical and patient end-users (Crowe et al., 2015). Mapping stakeholders' perceived barriers and facilitators to the Theoretical Domains Framework and behaviour change techniques helps to systematically identify and target barriers and contribute to developing an effective intervention (Presseau et al., 2015). The use of the behaviour change technique taxonomy enhances the reportability and transferability of active components of an intervention that will be evaluated in future research. This review also helped highlight literature gaps in understanding barriers and facilitators to implementing guidelines, including nutrition, preventive skin care and wound dressings.

This review contains several limitations. Only including peer-reviewed English-written published studies may have excluded relevant non-English written or unpublished literature. This review provides a context-specific understanding of barriers and facilitators to

implementing guidelines in acute care to inform intervention development in similar clinical contexts. Therefore, the findings might not be generalisable to other healthcare contexts. This review is also limited by the methodological rigour of some of the included qualitative studies, that had unclear data collection methods and quantitative studies, which had issues with the representativeness of the target population and non-response bias risk. Therefore, the limitations of each included study have been acknowledged and presented, allowing readers to take this into consideration. The within-comparison of clinicians' views between health professions was not possible because most findings were from nurses, and studies that involved several health professions did not provide details about which health profession provided what findings. In addition, only one included study described patients' views on multidisciplinary care. More research is required to elucidate patients' preferences, expectations and experiences of multidisciplinary pressure injury care.

## 5. Conclusion

Synthesising and comparing clinicians' and patients' views on pressure injury guideline implementation using a mixed-methods systematic review approach have enabled the identification of key components of a patient-centred implementation intervention to improve guideline uptake. This bottom-up approach to implementation intervention development will help address issues of importance and relevance to clinical and consumer end-users. The findings from this review suggest that an implementation intervention in an acute care setting should develop strategies to enhance nurse-led multidisciplinary care, promote patient participation and address practical and attitudinal barriers. Clinicians who participated in implementation programmes and patients showed positive attitudes towards pressure injury prevention and preference for patient participation, suggesting an implementation intervention should address attitudinal barriers to pressure injury prevention and promote patient participation. Impeding and facilitating factors to improve the guideline uptake were specific to each theme, indicating the need for different implementation strategies. Strategies specific to clinicians and patients are also warranted. Further research is required to investigate the effectiveness and sustainability of a multicomponent patient-centred implementation intervention comprising these four key components identified from this review.

## Funding

CSW's and GT's salaries are funded by the NHMRC Centre of Research Excellence in Wiser Wound Care. This study was supported by the Australian Catholic University Faculty of Health Sciences Research Project Grant Scheme for Early and Mid-Career Researchers. The funders were not involved in the study design, data collection, data analysis, data interpretation or manuscript writing.

## CRediT authorship contribution statement

**Ching Shan Wan:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Project administration, Writing – original draft, Writing – review & editing. **Heilok Cheng:** Data curation, Formal analysis, Writing – review & editing. **Mika Musgrave-Takeda:** Data curation, Formal analysis, Writing – review & editing. **Mark Guosheng Liu:** Formal analysis, Writing – review & editing. **Georgia Tobiano:** Formal analysis, Writing – review & editing. **Jake McMahon:** Data curation, Writing – review & editing. **Elizabeth McInnes:** Conceptualization, Data curation, Supervision, Writing – review & editing.

## Data availability

Due to the nature of extracting data from published studies in a systematic review, data has already been made available.



## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Acknowledgments

We thank the Australian Catholic University senior librarian Ms. Lisa Gielis for assistance with developing and finalising the search strategies.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijnurstu.2023.104557>.

## References

- Al Aboud, A.M., Manna, B., 2018. *Wound Pressure Injury Management*. Australian Commission on Safety and Quality in Health Care, 2019. *Hospital-acquired Complications (HACs)* (Canberra).
- Avşar, P., Karadağ, A., 2018. Efficacy and cost-effectiveness analysis of evidence-based nursing interventions to maintain tissue integrity to prevent pressure ulcers and incontinence-associated dermatitis. *Worldviews Evid.-Based Nurs.* 15 (1), 54–61.
- Avsar, P., Patton, D., O'Connor, T., Moore, Z., 2019. Do we still need to assess nurses' attitudes towards pressure ulcer prevention? A systematic review. *J. Wound Care* 28 (12), 795–806.
- Baker, R., Camosso-Stefinovic, J., Gillies, C., Shaw, E.J., Cheater, F., Flottorp, S., Robertson, N., Wensing, M., Fiander, M., Eccles, M.P., et al., 2015. Tailored interventions to address determinants of practice. *Cochrane Database Syst. Rev.* 4.
- Balzer, K., Kremer, L., Junghans, A., Halfens, R., Dassen, T., Kottner, J., 2014. What patient characteristics guide nurses' clinical judgement on pressure ulcer risk? A mixed methods study. *Int. J. Nurs. Stud.* 51 (5), 703–716.
- Barakat-Johnson, M., Lai, M., Wand, T., White, K., 2019. A qualitative study of the thoughts and experiences of hospital nurses providing pressure injury prevention and management. *Collegian* 26 (1), 95–102.
- Beeckman, D., Defloor, T., Schoonhoven, L., Vanderwee, K., 2011. Knowledge and attitudes of nurses on pressure ulcer prevention: a cross-sectional multicenter study in Belgian hospitals. *Worldviews Evid.-Based Nurs.* 8 (3), 166–176.
- Bergquist-Beringer, S., Dong, L., He, J., Dunton, N., 2013. Pressure ulcers and prevention among acute care hospitals in the United States. *Jt. Comm. J. Qual. Patient Saf.* 39 (9), 404–414.
- Bérubé, M., Albert, M., Chauny, J.M., Contandriopoulos, D., DuSablón, A., Lacroix, S., Gagné, A., Laflamme, É., Boutin, N., Delisle, S., 2015. Development of theory-based knowledge translation interventions to facilitate the implementation of evidence-based guidelines on the early management of adults with traumatic spinal cord injury. *J. Eval. Clin. Pract.* 21 (6), 1157–1168.
- Burton, C., Williams, L., Bucknall, T., Fisher, D., Hall, B., Harris, G., Jones, P., Makin, M., McBride, A., Meacock, R., 2021. Theory and practical guidance for effective de-implementation of practices across health and care services: a realist synthesis. *Health Serv. Deliv. Res.* 9 (2).
- Canadian Patient Safety Institute, 2021. *Hospital Harm Improvement Resource: Pressure Ulcer* (Canada).
- Cane, J., O'Connor, D., Michie, S., 2012. Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implement. Sci.* 7 (1), 1–17.
- Cane, J., Richardson, M., Johnston, M., Ladha, R., Michie, S., 2015. From lists of behaviour change techniques (BCTs) to structured hierarchies: comparison of two methods of developing a hierarchy of BCTs. *Br. J. Health Psychol.* 20 (1), 130–150.
- Castro, E.M., Van Regenmortel, T., Vanhaecht, K., Sermeus, W., Van Hecke, A., 2016. Patient empowerment, patient participation and patient-centeredness in hospital care: a concept analysis based on a literature review. *Patient Educ. Couns.* 99 (12), 1923–1939.
- Celis-Morales, C., Lara, J., Mathers, J.C., 2015. Personalising nutritional guidance for more effective behaviour change. *Proc. Nutr. Soc.* 74 (2), 130–138.
- Chaboyer, W., Gillespie, B.M., 2014. Understanding nurses' views on a pressure ulcer prevention care bundle: a first step towards successful implementation. *J. Clin. Nurs.* 23 (23–24), 3415–3423.
- Coyer, F., Gardner, A., Doubrovsky, A., Cole, R., Ryan, F.M., Allen, C., McNamara, G., 2015. Reducing pressure injuries in critically ill patients by using a patient skin integrity care bundle (InSPIRE). *Am. J. Crit. Care* 24 (3), 199–209.
- Coyer, F., Cook, J.-L., Doubrovsky, A., Campbell, J., Vann, A., McNamara, G., Edward, K.-L., Hartel, G., Fulbrook, P., 2022. Implementation and evaluation of multilayered pressure injury prevention strategies in an Australian intensive care unit setting. *Aust. Crit. Care* 35 (2), 143–152.
- Craig, L.E., McInnes, E., Taylor, N., Grimley, R., Cadilhac, D.A., Considine, J., Middleton, S., 2016. Identifying the barriers and enablers for a triage, treatment, and transfer clinical intervention to manage acute stroke patients in the emergency department: a systematic review using the theoretical domains framework (TDF). *Implement. Sci.* 11 (1), 1–18.
- Craig, L.E., Churilov, L., Olenko, L., Cadilhac, D.A., Grimley, R., Dale, S., Martinez-Garduno, C., McInnes, E., Considine, J., Grimshaw, J.M., 2017. Testing a systematic approach to identify and prioritise barriers to successful implementation of a complex healthcare intervention. *BMC Med. Res. Methodol.* 17 (1), 1–14.
- Crowe, S., Fenton, M., Hall, M., Cowan, K., Chalmers, I., 2015. Patients', clinicians' and the research communities' priorities for treatment research: there is an important mismatch. *Res. Involvement Engagement* 1 (1), 1–10.
- de Almeida Tavares, J.P., Silva, A.L.d., Sá-Couto, P., Boltz, M., Capezuti, E., 2015. Portuguese nurses' knowledge of and attitudes toward hospitalized older adults. *Scand. J. Caring Sci.* 29 (1), 51–61.
- de Meyer, D., Verhaeghe, S., Van Hecke, A., Beeckman, D., 2019. Knowledge of nurses and nursing assistants about pressure ulcer prevention: a survey in 16 Belgian hospitals using the PUKAT 2.0 tool. *J. Tissue Viability* 28 (2), 59–69.
- Deakin, J., Gillespie, B.M., Chaboyer, W., Nieuwenhoven, P., Latimer, S., 2020. An education intervention care bundle to improve hospitalised patients' pressure injury prevention knowledge: a before and after study. *Wound Pract. Res.* 28 (4), 154–162.
- Delaney, L.J., 2018. Patient-centred care as an approach to improving health care in Australia. *Collegian* 25 (1), 119–123.
- Duvall, J., Karg, P., Brienza, D., Pearlman, J., 2019. Detection and classification methodology for movements in the bed that supports continuous pressure injury risk assessment and repositioning compliance. *J. Tissue Viability* 28 (1), 7–13.
- Ebi, W.E., Hirko, G.F., Mijena, D.A., 2019. Nurses' knowledge to pressure ulcer prevention in public hospitals in Wollega: a cross-sectional study design. *BMC Nurs.* 18 (1), 1–12.
- Figueroa, C.A., Harrison, R., Chauhan, A., Meyer, L., 2019. Priorities and challenges for health leadership and workforce management globally: a rapid review. *BMC Health Serv. Res.* 19 (1), 1–11.
- Fulbrook, P., Lawrence, P., Miles, S., 2019. Australian nurses' knowledge of pressure injury prevention and management: a cross-sectional survey. *J. Wound Ostomy Continence Nurs.* 46 (2), 106–112.
- García-Sánchez, F.J., Martínez-Vizcaino, V., Rodríguez-Martín, B., 2019. Barriers and facilitators for caregiver involvement in the home care of people with pressure injuries: a qualitative study. *PLoS One* 14 (12), e0226359.
- Gaspar, S., Botelho Guedes, F., Vitoriano Budri, A.M., Ferreira, C., Gaspar de Matos, M., 2021. Hospital-acquired pressure ulcers prevention: what is needed for patient safety? The perceptions of nurse stakeholders. *Scand. J. Caring Sci.* 00, 1–10.
- Getanda, A., 2016. Awareness of risk assessment and prevention of pressure ulcers amongst nurses working in surgical and orthopedic wards of a Kenyan national hospital. *Kenyan J. Nurs. Midwifery* 1 (1).
- Gibbs, G.R., 2018. *Analyzing Qualitative Data*. Sage.
- Gillespie, B.M., Chaboyer, W., Sykes, M., O'Brien, J., Brandis, S., 2014. Development and pilot testing of a patient-participatory pressure ulcer prevention care bundle. *J. Nurs. Care Qual.* 29 (1), 74–82.
- Gourlan, M., Pellechia, A., Robineau, S., Foulon, B., Gault, D., Lefort, M., Goossens, D., Mathieu, S., Laffont, I., Dupeyron, A., 2020. "What pressure ulcers mean to me?" Representations of pressure ulcer in persons with spinal cord injury: a qualitative study. *J. Tissue Viability* 29 (4), 324–330.
- Grešš Halász, B., Béréšová, A., Tkáčová, Ľ., Magurová, D., Lizáková, Ľ., 2021. Nurses' knowledge and attitudes towards prevention of pressure ulcers. *Int. J. Environ. Res. Public Health* 18 (4), 1705.
- Guest, J.F., Ayoub, N., McIlwraith, T., Uchegbu, I., Gerrish, A., Weidlich, D., Vowden, K., Vowden, P., 2017. Health economic burden that different wound types impose on the UK's National Health Service. *Int. Wound J.* 14 (2), 322–330.
- Guihan, M., Bombardier, C.H., 2012. Potentially modifiable risk factors among veterans with spinal cord injury hospitalized for severe pressure ulcers: a descriptive study. *J. Spinal Cord Med.* 35 (4), 240–250.
- Gul, A., Andsoy, I.I., Ozkaya, B., Zeydan, A., 2017. A descriptive, cross-sectional survey of Turkish nurses' knowledge of pressure ulcer risk, prevention, and staging. *Ostomy Wound Manage* 63 (6), 40–46.
- Gunningberg, L., Brudin, L., Idvall, E., 2010. Nurse managers' prerequisite for nursing development: a survey on pressure ulcers and contextual factors in hospital organizations. *J. Nurs. Manag.* 18 (6), 757–766.
- Harden, A., Thomas, J., 2010. Mixed methods and systematic reviews: examples and emerging issues. *Sage Handbook of Mixed Methods in Social & Behavioral Research* vol. 2, pp. 749–774.
- Hommel, A., Gunningberg, L., Idvall, E., Bååth, C., 2017. Successful factors to prevent pressure ulcers—an interview study. *J. Clin. Nurs.* 26 (1–2), 182–189.
- Hong, Q., Pluye, P., Fàbregues, S., Bartlett, G., Boardman, F., Cargo, M., Dagenais, P., Gagnon, M.-P., Griffiths, F., Nicolau, B., O'Catlain, A., Rousseau, M.-C., Vedel, I., 2018. *Mixed Methods Appraisal Tool (MMAT)*. Canadian Intellectual Property Office, Canada.
- Horup, M.B., Soegaard, K., Kjølhed, T., Fremmelevholm, A., Kidholm, K., 2020. Static overlays for pressure ulcer prevention: a hospital-based health technology assessment. *Br. J. Nurs.* 29 (12), S24–S28.
- Hultin, L., Karlsson, A.-C., Öhrvall, M., Gunningberg, L., 2019. Information and communication technology can increase patient participation in pressure injury prevention: a qualitative study in older orthopedic patients. *J. Wound Ostomy Continence Nurs.* 46 (5), 383–389.
- Ilesanmi, R.E., Ofi, B.A., Adejumo, P.O., 2012. Nurses' knowledge of pressure ulcer prevention in Ogun State, Nigeria: results of a pilot survey. *Ostomy Wound Manage* 58 (2), 24–32.
- Iranmanesh, S., Tafti, A.A., Rafiei, H., Dehghan, M., Razban, F., 2013. Orthopaedic nurses' knowledge about pressure ulcers in Iran: a cross-sectional study. *J. Wound Care* 22 (3), 138–143.
- Jackson, D., Hutchinson, M., Barnason, S., Li, W., Mannix, J., Neville, S., Piper, D., Power, T., Smith, G.D., Usher, K., 2016. Towards international consensus on patient harm: perspectives on pressure injury policy. *J. Nurs. Manag.* 24 (7), 902–914.

- Jafari, M., Adibi, H., Shayanfar, Z., Zohdi, M., Godarzi, Z., Yaseri, M., Najafpour, Z., 2018. Pressure ulcer rate in multidisciplinary hospital units after multifactorial intervention: a stepped-wedge, cluster randomized controlled trial. *J. Patient Saf.* 14 (3), e61–e66.
- Jankowski, I.M., Nadzam, D.M., 2011. Identifying gaps, barriers, and solutions in implementing pressure ulcer prevention programs. *Jt. Comm. J. Qual. Patient Saf.* 37 (6), 253–264.
- Jenkins, H.J., Moloney, N.A., French, S.D., Maher, C.G., Dear, B.F., Magnussen, J.S., Hancock, M.J., 2018. Using behaviour change theory and preliminary testing to develop an implementation intervention to reduce imaging for low back pain. *BMC Health Serv. Res.* 18 (1), 1–17.
- Jiang, L., Li, L., Lommel, L., 2020. Nurses' knowledge, attitudes, and behaviours related to pressure injury prevention: a large-scale cross-sectional survey in mainland China. *J. Clin. Nurs.* 29 (17–18), 3311–3324.
- Kaddourah, B., Abu-Shaheen, A.K., Al-Tannir, M., 2016. Knowledge and attitudes of health professionals towards pressure ulcers at a rehabilitation hospital: a cross-sectional study. *BMC Nurs.* 15 (1), 1–6.
- Kitson, A., Marshall, A., Bassett, K., Zeitz, K., 2013. What are the core elements of patient-centred care? A narrative review and synthesis of the literature from health policy, medicine and nursing. *J. Adv. Nurs.* 69 (1), 4–15.
- Klaic, M., Kapp, S., Hudson, P., Chapman, W., Denehy, L., Story, D., Francis, J.J., 2022. Implementability of healthcare interventions: an overview of reviews and development of a conceptual framework. *Implement. Sci.* 17 (1), 1–20.
- Latimer, S., Chaboyer, W., Gillespie, B., 2014. Patient participation in pressure injury prevention: giving patient's a voice. *Scand. J. Caring Sci.* 28 (4), 648–656.
- Latimer, S.L., Deakin, J.L., Chaboyer, W.P., Gillespie, B.M., 2021. Feasibility and acceptability of implementing a patient education pressure injury prevention care bundle in acute care: an interview study. *Wound Pract. Res.* 29 (3), 163–170.
- Lavallée, J.F., Gray, T.A., Dumville, J., Cullum, N., 2018. Barriers and facilitators to preventing pressure ulcers in nursing home residents: a qualitative analysis informed by the Theoretical Domains Framework. *Int. J. Nurs. Stud.* 82, 79–89.
- Ledger, L., Worsley, P., Hope, J., Schoonhoven, L., 2020. Patient involvement in pressure ulcer prevention and adherence to prevention strategies: an integrative review. *Int. J. Nurs. Stud.* 101, 103449.
- Levine, J.M., Ayello, E.A., Zulkowski, K.M., Fogel, J., 2012. Pressure ulcer knowledge in medical residents: an opportunity for improvement. *Adv. Skin Wound Care* 25 (3), 115–117.
- Levitt, H.M., Bamberg, M., Creswell, J.W., Frost, D.M., Josselson, R., Suárez-Orozco, C., 2018. Journal article reporting standards for qualitative primary, qualitative meta-analytic, and mixed methods research in psychology: the APA Publications and Communications Board task force report. *Am. Psychol.* 73 (1), 26–46.
- Li, Z., Lin, F., Thalib, L., Chaboyer, W., 2020. Global prevalence and incidence of pressure injuries in hospitalised adult patients: a systematic review and meta-analysis. *Int. J. Nurs. Stud.* 105, 103546.
- Li, Z., Marshall, A.P., Lin, F., Ding, Y., Chaboyer, W., 2022a. Knowledge of pressure injury in medical and surgical nurses in a tertiary level hospital: a cross-sectional study. *J. Tissue Viability* 31 (1), 24–29.
- Li, Z., Marshall, A.P., Lin, F., Ding, Y., Chaboyer, W., 2022b. Registered nurses' approach to pressure injury prevention: a descriptive qualitative study. *J. Adv. Nurs.* 78 (8), 2575–2585.
- Lin, F., Wu, Z., Song, B., Coyer, F., Chaboyer, W., 2020. The effectiveness of multicomponent pressure injury prevention programs in adult intensive care patients: a systematic review. *Int. J. Nurs. Stud.* 102, 103483.
- Lizarondo, L., Stern, C., Carrier, J., Godfrey, C., Rieger, K., Salmond, S., Apostolo, J., Kirkpatrick, P., Loveday, H., 2020. Chapter 8: mixed methods systematic reviews. In: Aromataris, E., Z. M. (Eds.), *JBI Manual for Evidence Synthesis*. JBI.
- Lockwood, C., Munn, Z., Porritt, K., 2015. Qualitative research synthesis: methodological guidance for systematic reviewers utilizing meta-aggregation. *Int. J. Evid. Based Healthcare* 13 (3), 179–187.
- Lovegrove, J., Fulbrook, P., Miles, S.J., Steele, M., 2021. Effectiveness of interventions to prevent pressure injury in adults admitted to acute hospital settings: a systematic review and meta-analysis of randomised controlled trials. *Int. J. Nurs. Stud.* 122, 104027.
- Malinga, S., Dlungwane, T., 2020. Nurses' knowledge, attitudes and practices regarding pressure ulcer prevention in the Umgungundlovu District, South Africa. *Afr. J. Nurs. Midwifery* 22 (2), 1–17.
- Martin, D., Albensi, L., Van Haute, S., Froese, M., Montgomery, M., Lam, M., Gierys, K., Lajeunesse, R., Guse, L., Basova, N., 2017. Healthy skin wins: a glowing pressure ulcer prevention program that can guide evidence-based practice. *Worldviews Evid.-Based Nurs.* 14 (6), 473–483.
- McInnes, E., Chaboyer, W., Murray, E., Allen, T., Jones, P., 2014. The role of patients in pressure injury prevention: a survey of acute care patients. *BMC Nurs.* 13 (1), 1–8.
- McInnes, E., Harvey, G., Hiller, J.E., Phillips, R., Page, T., Wiechula, R., 2020. Factors affecting procurement of wound care products: a qualitative study of hospital managers and clinicians' views. *Aust. Health Rev.* 45 (1), 66–73.
- Mengist, S.T., Geletie, H.A., Zewudie, B.T., Mewahegn, A.A., Terefe, T.F., Tsegaye Amlak, B., Tadesse, B., Gebreyesus, F.A., Tsehay, T., Solomon, M., 2022. Pressure ulcer prevention knowledge, practices, and their associated factors among nurses in Gurage Zone Hospitals, South Ethiopia, 2021. *SAGE Open Med.* 10, 20503121221105571.
- Michie, S., Johnston, M., Francis, J., Hardeman, W., Eccles, M., 2008. From theory to intervention: mapping theoretically derived behavioural determinants to behaviour change techniques. *Appl. Psychol.* 57 (4), 660–680.
- Michie, S., Richardson, M., Johnston, M., Abraham, C., Francis, J., Hardeman, W., Eccles, M. P., Cane, J., Wood, C.E., 2013. The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: building an international consensus for the reporting of behavior change interventions. *Ann. Behav. Med.* 46 (1), 81–95.
- Michie, S., Atkins, L., West, R., 2014. *The Behaviour Change Wheel: A Guide to Designing Interventions*. Silverback Publishing, Great Britain.
- Mishra, S.K., Mahmood, S., 2019. Assessing pressure ulcer knowledge of general and orthopedic surgical residents using the Pieper Pressure Ulcer Knowledge Test. *Int. J. Contemp. Surg.* 7 (2), 78–83.
- Mitchell, D., Bowles, K.-A., O'Brien, L., Bardoe, A., Haines, T., 2021. Health care staff responses to disinvestment—a systematic search and qualitative thematic synthesis. *Health Care Manag. Rev.* 46 (1), 44–54.
- Miyazaki, M.Y., Caliri, M.H.L., Santos, C.B.d., 2010. Knowledge on pressure ulcer prevention among nursing professionals. *Rev. Latinoam. Enfermagem* 18, 1203–1211.
- Moir, C., Taylor, P., Seaton, P., Snell, H., 2022. An evaluation of barriers and facilitators for a pressure injury prevention link nurse role: a mixed-methods study in New Zealand. *J. Wound Ostomy Continence Nurs.* 49 (4), 314–321.
- Munoz, N., Posthauer, M.E., Cereda, E., Schols, J.M., Haesler, E., 2020. The role of nutrition for pressure injury prevention and healing: the 2019 international clinical practice guideline recommendations. *Adv. Skin Wound Care* 33 (3), 123–136.
- National Institute for Health and Care Excellence, 2014. *Pressure Ulcers: Prevention and Management*. United Kingdom.
- National Institute for Health and Care Excellence, 2015. *Pressure Ulcers: Quality Standard [QS89]* (United Kingdom).
- National Pressure Injury Advisory Panel, 2019. *Clinical Practice Guideline for the Prevention and Treatment of Pressure Injuries* (United States of America).
- Nghiem, S., Campbell, J., Walker, R.M., Byrnes, J., Chaboyer, W., 2022. Pressure injuries in Australian public hospitals: a cost of illness study. *Int. J. Nurs. Stud.* 130, 104191.
- Noyes, J., Booth, A., Cargo, M., Flemming, K., Harden, A., Harris, J., Garsie, R., Hannes, K., Pantoja, T., Thomas, J., 2022. Chapter 21: qualitative evidence. In: JPT, Higgins, Thomas, J., Chandler, J., Cumpston, M., Li, T., Page, M.J., Welch, V.A. (Eds.), *Cochrane Handbook for Systematic Reviews of Interventions* Version 6.3. Cochrane. Available from [www.training.cochrane.org/handbook](http://www.training.cochrane.org/handbook) Available from (updated February 2022).
- O'Brien, J., Cowman, S., 2011. An exploration of nursing documentation of pressure ulcer care in an acute setting in Ireland. *J. Wound Care* 20 (5), 197–205.
- Oxelmark, L., Ulin, K., Chaboyer, W., Bucknall, T., Ringdal, M., 2018. Registered nurses' experiences of patient participation in hospital care: supporting and hindering factors patient participation in care. *Scand. J. Caring Sci.* 32 (2), 612–621.
- Padula, W.V., Delarmante, B.A., 2019. The national cost of hospital-acquired pressure injuries in the United States. *Int. Wound J.* 16 (3), 634–640.
- Padula, W.V., Valuck, R.J., Makic, M.B.F., Wald, H.L., 2015. Factors influencing adoption of hospital-acquired pressure ulcer prevention programs in US academic medical centers. *J. Wound Ostomy Continence Nurs.* 42 (4), 327–330.
- Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., Tetzlaff, J.M., Akl, E.A., Brennan, S.E., Chou, R., Glanville, J., Grimshaw, J.M., Hróbjartsson, A., Lalu, M.M., Li, T., Loder, E.W., Mayo-Wilson, E., McDonald, S., McGuinness, L.A., Stewart, L.A., Thomas, J., Tricco, A.C., Welch, V.A., Whiting, P., Moher, D., 2021. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 372, n71.
- Pan Pacific Pressure Injury Alliance, 2019. *Prevention and Treatment of Pressure Ulcers/Injuries*. European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel and Pan Pacific Pressure Injury Alliance.
- Parisod, H., Holopainen, A., Kielo-Viljamaa, E., Puukka, P., Beeckman, D., Haavisto, E., 2021a. Attitudes of nursing staff towards pressure ulcer prevention in primary and specialised health care: a correlational cross-sectional study. *Int. Wound J.* 19 (2), 399–410.
- Parisod, H., Holopainen, A., Koivunen, M., Puukka, P., Haavisto, E., 2021b. Factors determining nurses' knowledge of evidence-based pressure ulcer prevention practices in Finland: a correlational cross-sectional study. *Scand. J. Caring Sci.* 36 (1), 150–161.
- Phillips, W., Hershey, M., Willcutts, K., Dietzler-Otte, J., 2018. The effectiveness of the Braden Scale as a tool for identifying nutrition risk. *J. Acad. Nutr. Diet.* 118 (3), 385–391.
- Presseau, J., Ivers, N.M., Newham, J.J., Knittle, K., Danko, K.J., Grimshaw, J.M., 2015. Using a behaviour change techniques taxonomy to identify active ingredients within trials of implementation interventions for diabetes care. *Implement. Sci.* 10 (1), 1–10.
- QSR International Pty Ltd, 2018. NVivo.
- Roberts, S., Desbrow, B., Chaboyer, W., 2014. Patient perceptions of the role of nutrition for pressure ulcer prevention in hospital: an interpretive study. *J. Wound Ostomy Continence Nurs.* 41 (6), 528–534.
- Roberts, S., Desbrow, B., Chaboyer, W., 2016a. Feasibility of a patient-centred nutrition intervention to improve oral intakes of patients at risk of pressure ulcer: a pilot randomised control trial. *Scand. J. Caring Sci.* 30 (2), 271–280.
- Roberts, S., McInnes, E., Wallis, M., Bucknall, T., Banks, M., Chaboyer, W., 2016b. Nurses' perceptions of a pressure ulcer prevention care bundle: a qualitative descriptive study. *BMC Nurs.* 15 (1), 1–10.
- Roberts, S., Wallis, M., McInnes, E., Bucknall, T., Banks, M., Ball, L., Chaboyer, W., 2017. Patients' perceptions of a pressure ulcer prevention care bundle in hospital: a qualitative descriptive study to guide evidence-based practice. *Worldviews Evid.-Based Nurs.* 14 (5), 385–393.
- Rodrigues, G.C.A., de Melo Burity Vasconcelos, J., de Araújo Bustorff Melo, F.M., Vigolvin, L.P., de Sousa, A.T.O., da Costa Santos, I.B., de Souza Bandeira Correia, A., de Assis Gomes, S.K., dos Santos Oliveira, J., da Silva, C.R.R., 2016. Knowledge and opinions of nursing professionals about pressure ulcers prevention. *Int. Arch. Med.* 9.
- Sahlsten, M.J., Larsson, I.E., Sjöström, B., Plos, K.A., 2008. An analysis of the concept of patient participation. *Nursing Forum*. Wiley Online Library, pp. 2–11.
- Samuriwo, R., 2012. Pressure ulcer prevention: the role of the multidisciplinary team. *Br. J. Nurs.* 21 (Sup5), S4–S13.
- Samuriwo, R., Dowding, D., 2014. Nurses' pressure ulcer related judgements and decisions in clinical practice: a systematic review. *Int. J. Nurs. Stud.* 51 (12), 1667–1685.

- Scovil, C.Y., Delparte, J.J., Walia, S., Flett, H.M., Guy, S.D., Wallace, M., Burns, A.S., Wolfe, D. L., Wolfe, D., Kras-Dupuis, A., 2019. Implementation of pressure injury prevention best practices across 6 Canadian rehabilitation sites: results from the spinal cord injury knowledge mobilization network. *Arch. Phys. Med. Rehabil.* 100 (2), 327–335.
- Seale, H., Chughtai, A.A., Kaur, R., Crowe, P., Phillipson, L., Novytska, Y., Travaglia, J., 2015. Ask, speak up, and be proactive: empowering patient infection control to prevent health care-acquired infections. *Am. J. Infect. Control* 43 (5), 447–453.
- Sengul, T., Karadag, A., 2020. Determination of nurses' level of knowledge on the prevention of pressure ulcers: the case of Turkey. *J. Tissue Viability* 29 (4), 337–341.
- Soban, L.M., Finley, E.P., Miltner, R.S., 2016. Identifying patterns in implementation of hospital pressure ulcer prevention programs. *J. Wound Ostomy Continence Nurs.* 43 (3), 248–253.
- Soban, L.M., Kim, L., Yuan, A.H., Miltner, R.S., 2017. Organisational strategies to implement hospital pressure ulcer prevention programmes: findings from a national survey. *J. Nurs. Manag.* 25 (6), 457–467.
- Stern, C., Lizarondo, L., Carrier, J., Godfrey, C., Rieger, K., Salmond, S., Apóstolo, J., Kirkpatrick, P., Loveday, H., 2020. Methodological guidance for the conduct of mixed methods systematic reviews. *JBMEvid. Synth.* 18 (10), 2108–2118.
- Suva, G., Sharma, T., Campbell, K.E., Sibbald, R.G., An, D., Woo, K., 2018. Strategies to support pressure injury best practices by the inter-professional team: a systematic review. *Int. Wound J.* 15 (4), 580–589.
- Sving, E., Gunningberg, L., Högman, M., Mamhidir, A.G., 2012. Registered nurses' attention to and perceptions of pressure ulcer prevention in hospital settings. *J. Clin. Nurs.* 21 (9–10), 1293–1303.
- Sving, E., Fredriksson, L., Gunningberg, L., Mamhidir, A.G., 2017. Getting evidence-based pressure ulcer prevention into practice: a process evaluation of a multifaceted intervention in a hospital setting. *J. Clin. Nurs.* 26 (19–20), 3200–3211.
- Sving, E., Fredriksson, L., Mamhidir, A.-G., Högman, M., Gunningberg, L., 2020. A multifaceted intervention for evidence-based pressure ulcer prevention: a 3 year follow-up. *JBMEvid. Implement.* 18 (4), 391–400.
- Tallier, P.C., Reineke, P.R., Asadoorian, K., Choonoo, J.G., Campo, M., Malmgreen-Wallen, C., 2017. Perioperative registered nurses knowledge, attitudes, behaviors, and barriers regarding pressure ulcer prevention in perioperative patients. *Appl. Nurs. Res.* 36, 106–110.
- Taylor, C., Mulligan, K., McGraw, C., 2021. 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 Commun.* 29 (3), 766–779.
- Tayyib, N., Coyer, F., Lewis, P.A., 2015. A two-arm cluster randomized control trial to determine the effectiveness of a pressure ulcer prevention bundle for critically ill patients. *J. Nurs. Scholarsh.* 47 (3), 237–247.
- Teggart, K., Ganann, R., Sihota, D., Moore, C., Keller, H., Senson, C., Phillips, S.M., Neil-Sztramko, S.E., 2022. Group-based nutrition interventions to promote healthy eating and mobility in community-dwelling older adults: a systematic review. *Public Health Nutr.* 1–32.
- Teo, C.S.M., Claire, C.A., Lopez, V., Shorey, S., 2019. Pressure injury prevention and management practices among nurses: a realist case study. *Int. Wound J.* 16 (1), 153–163.
- Thomas, J., Harden, A., 2008. Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Med. Res. Methodol.* 8 (1), 1–10.
- Tobiano, G., Marshall, A., Bucknall, T., Chaboyer, W., 2015. Patient participation in nursing care on medical wards: an integrative review. *Int. J. Nurs. Stud.* 52 (6), 1107–1120.
- Tobiano, G., Bucknall, T., Marshall, A., Guinane, J., Chaboyer, W., 2016. Patients' perceptions of participation in nursing care on medical wards. *Scand. J. Caring Sci.* 30 (2), 260–270.
- Uzun, Ö., Aylaz, R., Karadag, E., 2009. Prospective study: reducing pressure ulcers in intensive care units at a Turkish medical center. *J. Wound Ostomy Continence Nurs.* 36 (4), 404–411.
- van Dulmen, S.A., Naaktgeboren, C.A., Heus, P., Verkerk, E.W., Weenink, J., Kool, R.B., Hooft, L., 2020. Barriers and facilitators to reduce low-value care: a qualitative evidence synthesis. *BMJ Open* 10 (10), e040025.
- Veritas Health Innovation, 2021. Covidence Systematic Review Software (Melbourne, Australia).
- Walker, C.A., Rahman, A., Gipson-Jones, T.L., Harris, C.M., 2019. Hospitalists' needs assessment and perceived barriers in wound care management: a quality improvement project. *J. Wound Ostomy Continence Nurs.* 46 (2), 98–105.