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REVIEW

Prevention and Care of Pressure Ulcers in Long-Term Bedridden Adult and Older Adult Patients in the Community: A Systematic Review

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Abstract: Pressure injuries remain a significant and costly complication among long-term bedridden adult and older adult patients, leading to increased morbidity, complications, and a diminished quality of life. This review aimed to summarize interventions for the prevention and care of pressure ulcers among long-term bedridden adult and older adult patients in the community. Fourteen databases were searched from March 2013 to March 2024, yielding 16 studies for final analysis. Two interconnected core elements were identified: 1) multidimensional intervention pathways and 2) three targeted preventive measures. The pathways include face-to-face education/training, home visits, digital tools (WeChat/smartphone apps), multidisciplinary collaboration, and remote follow-up. The targeted measures—position management with pressure-relief techniques, skin integrity maintenance, and nutritional/fluid support—were associated with improvements in PU-related outcomes: combined repositioning and pressure-relief devices were associated with lower PU incidence, temperature-controlled skin care with zinc oxide was associated with reduced skin redness, high-protein diets and omega-3 supplements were associated with improved skin resilience and barrier function, and integrated protocols (Braden-stratified repositioning/app monitoring) may improve care efficiency. Limitations included heterogeneity in study designs and outcome measures, incomplete reporting of implementation details, and limited geographical representation, as most were conducted in China (14/16), with only one study each from Finland and India. The certainty of evidence ranged from very low to moderate across outcomes; therefore, the findings should be interpreted cautiously. This review highlights potentially adaptable strategies for community-based PU prevention and care. It underscores the need for standardized, long-term studies to enhance the generalizability and sustainability of intervention strategies.

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Keywords: pressure ulcers, bedridden patients, long-term care, community health services, home care service, aged, systematic review

Introduction

The European Pressure Ulcer Advisory Panel defined pressure ulcers (PUs) as localized damage to the skin and/or underlying tissue, typically occurring over bony prominences, resulting from prolonged pressure or a combination of pressure and shear forces.[1] The complexity of managing pressure ulcers is compounded by various internal and external risk factors—including advanced age, malnutrition, chronic illnesses, circulatory insufficiency, immunosuppression, trauma, infection, medication effects, and hypoxia—which significantly hinder the healing process.[2] Consequently, maintaining skin integrity and effectively managing pressure ulcers remain significant challenges for healthcare providers.[3] In this context, the acquisition and application of robust, evidence-based knowledge by healthcare professionals and caregivers are essential for the accurate and comprehensive implementation of pressure ulcer prevention and management strategies, especially within community care settings.[4,5]

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In the last few decades, pressure injury studies have mainly focused on hospital-acquired pressure injuries-HAPI,[6] systematic review studies show a wide range of PU prevalence rates among hospitalized patients as 3.1% to 30.0% in the United States, 1% to 54% in Europe, 6% in Australia, and 2.7% to 16.8% in Asia.[7] Various preventive measures and treatments have been implemented in hospitals worldwide to reduce the prevalence of PU.[8–10] However, insufficient attention has been paid to community-acquired pressure injuries (CAPI) or pressure ulcers that occur at home or in nursing homes.[11] In many cases, PU has already been developed prior to hospital admission. A study conducted in New England (n = 1022) found that 70.6% of the patients who already had PU before hospital admission were living at home before entering an acute care hospital, and only 21.4% were receiving home care services prior to admission.[12] Other studies have shown that the prevalence of community-acquired PU ranges from 3.3% to 11.1%.[13] Community-acquired pressure injuries have been reported.[14] Recent review evidence suggests substantial variation in community-acquired pressure injury burden across settings, with reported point prevalence ranging from 0.02% to 10.8% and period prevalence from 2.7% to 86.4%[15] This issue may be particularly important in low- and middle-income settings, where community resources, equipment, and access to preventive care are often limited; for example, two systematic review in Africa reported a pooled pressure ulcer prevalence of approximately 11%.[16,17] People who have medical conditions that limit movement or who spend most of their time in bed or a chair are at high risk of developing pressure ulcers. This risk is not uniform across patient groups; for example, stroke-related immobility, spinal cord injury, and comorbidities such as diabetes are all associated with elevated PU risk, which may partly explain heterogeneity in prevention needs across studies.[18–20] However, prevention and care for pressure ulcers in these high-risk groups living in the community have rarely been studied and have not yet been reviewed systematically.

PU is associated with significant adverse outcomes, including severe pain, increased risk of infection, extended hospital stays, and even heightened mortality rates.[21] In community care, these consequences are often compounded by factors such as reduced access to specialized care, limited mobility, and the long-term use of medical devices like catheters and feeding tubes, which can exacerbate the risk of injury.[22] To address the high risk of PU among bedridden patients, a range of preventive and care strategies has been implemented in various settings. These include pressure-redistributing support surfaces, scheduled repositioning protocols, nutritional supplementation, and structured skin inspections.[23] The use of digital technologies, such as sensor-based monitoring systems, has also been explored to enhance early detection and promote adherence to repositioning schedules.[24] Nurse-led education programs and risk assessment tools, such as the updated Braden Quality Device Scale (Braden QD), are increasingly integrated into daily care routines.[25] However, despite these advancements, gaps remain in implementation fidelity, especially in community or home care settings where informal caregivers may lack training or resources.[26] In addition, existing digital and multidisciplinary community-based PU interventions remain limited by barriers such as digital literacy, unequal access to technology, and inconsistent care coordination across services.[27,28] Furthermore, evidence on which specific interventions are most effective under different care conditions remains fragmented. These limitations underscore the need for a comprehensive systematic review to synthesize recent evidence and inform best practices in pressure ulcer prevention and care for bedridden individuals. Thus, preventing and managing PU in this population necessitates a multifaceted approach.

In recent years, numerous studies and international guidelines have aimed to establish best practices for preventing and caring for pressure ulcers. International guidelines outline several interventions and practice recommendations for preventing PU.[1] Based on the five levels of evidence in the guidelines, from A (more than one high-quality study) to good practice statement (GPS), no studies have been reported on the evidence of nursing interventions related to the prevention of PU in long-term bedridden patients in the community. This gap highlights the urgent need for definitive, robust, and consistent evidence.[29] Despite widespread recognition of the problem, community care settings, where patients often experience prolonged periods of immobility, face additional challenges in consistently implementing these interventions.

In addition, research has demonstrated that the mere presence of clinical guidelines does not ensure adherence to best practices, as barriers such as insufficient training, lack of resources, and varying levels of staff compliance often impede implementation.[4,30,31] Therefore, a more structured and evidence-based approach is required to optimize care and minimize the occurrence of PUs in bedridden patients. The limited evidence for community-based PU prevention and care interventions, as highlighted in the EPUAP/NPIAP/PPPIA international clinical practice guideline,[32] was a key driver for the present review.

Review Aims

This systematic review aims to synthesize existing evidence on the prevention and care strategies of pressure ulcers.

Review Questions

What interventions and strategies are available for managing and treating pressure ulcers in long-term bedridden adult and older adult patients within the community, and how can these interventions and strategies be implemented?

Materials and Methods

Design

This study was conducted as a systematic review with narrative synthesis. The final review was reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) statement, and the review protocol was developed with reference to the PRISMA-P guidelines. Our processes started with formulating the review question and aim, defining the inclusion and exclusion criteria, developing the search strategy, locating and selecting relevant articles, assessing their quality, extracting data, and analyzing and interpreting the results (JBI, 2024).[33] Standardized critical appraisal instruments from the Joanna Briggs Institute (JBI), tailored to the research designs of the selected studies, were employed. Finally, the protocol to conduct the systematic review was published and prospectively registered with PROSPERO (CRD42024524789).

Search Strategy

To guide the systematic review, the PICO framework was utilized: the *Population* consists of long-term bedridden adult and older adult patients in community care; the *Intervention* focuses on nursing interventions for the prevention and care of pressure ulcers; the *Comparison* involves standard care practices where applicable; and the *Outcome* pertains to the effectiveness of strategies for preventing and treating pressure ulcers. The relevant keywords used in the search included "pressure ulcers", "pressure injury", "pressure sore", "nursing interventions", "program", "long-term bedridden patients", "aged", "adult", "older adult", "elderly" "community care", "prevention strategies", and "management strategies". To identify relevant studies, a comprehensive search was conducted across 14 databases, encompassing international, national, and grey literature sources to ensure balanced and comprehensive evidence. The databases included CINAHL, PubMed, MEDLINE, Cochrane Library, PsycINFO, SocINDEX, ERIC, IEEE Xplore, ScienceDirect, Scopus, ProQuest, CNKI, Wanfang, and Sinomed. The search focused on research publications related to nursing interventions or strategies for pressure ulcers, covering the period from March 2013 to March 2024. The following example search terms were used to access all possible and matched studies: ((((((((((("Pressure Ulcer"[Mesh]) OR (Pressure Ulcer*[Title/Abstract])) OR (Bedsore[Title/Abstract])) OR (Pressure Injur*[Title/Abstract])) OR (Pressure Sore[Title/Abstract])) OR (Decubitus Sore[Title/Abstract])) OR (Decubitus Ulcer[Title/Abstract])) OR (Skin Ulcer [Title/Abstract])) AND (((Bedridden Person OR Non-Mobile Person OR Bedridden Patients OR Bedridden Patient OR immobilized patients) OR ("Bedridden Persons"[Mesh])) OR ("Long-Term Care"[Mesh])))) AND (((Community Health Services OR Community Health Nursing OR Parish Nursing) OR ("Community Health Nursing"[Mesh])) OR ("Home Care Services"[Mesh] OR Home CareService OR Service, Home Care OR Care Services, Home OR Domiciliary Care OR Home Health Care OR Home Care))) OR ("prevent*" OR "treatment" OR "manage*"). Additionally, an ancestry search of the references of identified studies was also conducted, including a manual search of journals. Filters were articles published in the last 10 years.

Inclusion and Exclusion Criteria

The Inclusion criteria included 1) studies published in peer-reviewed journals, 2) studies conducted on long-term bedridden adult and older adult patients living in community settings, 3) studies evaluating prevention or care interventions for pressure ulcers, 4) randomized and non-randomized, controlled and non-controlled trials, quasi-experimental studies, or the studies that have an intervention study at a part of it 5) studies published in English or Chinese language and 6) studies with available full-text access. However, the studies with following characteristics including 1) studies

conducted on pediatric populations or non-community settings (eg, acute care hospitals, institutionalized settings), 2) studies focusing solely on surgical interventions or pharmacological treatments for pressure ulcers, 3) animal studies, review articles, editorials, letters, and conference abstracts, 4) studies with incomplete or unavailable full-text access and 5) studies with insufficient data for analysis, were excluded from this review. All articles required for this systematic review were retrieved in full text and included in the study.

Data Extraction

On the JBI data extraction form, we recorded the authors, study design, study setting, population and sample size, outcome/measurement, significant results/conclusions, and research notes for comments. Prior to starting the review, we practiced screening articles, extracting data, and assessing quality together to ensure that the processes and results we undertook were accurate. Two reviewers (LM & JT) independently assessed the full texts of the articles and applied the inclusion criteria for filtering by Rayyan, the reference management program. If a group's two reviewers could not agree with each other, a third independent reviewer (SB) met with the group to reach consensus. The appraisal process was employed to prevent errors and misinterpretations of research findings, thereby enhancing the quality of the systematic review. Moreover, we extracted data independently. The selected articles were divided into two groups, and each article was reviewed by two independent reviewers (Group 1: LM and WC, Group 2: CS and KR).

Quality Appraisal

The selected articles were reviewed using the Joanna Briggs Institute (JBI) standardized critical appraisal checklists to evaluate methodological quality. The checklist for randomized controlled trials (RCTs) comprised 13 items, while that for quasi-experimental studies included nine items. We developed a table to collect all relevant data from the studies, minimize the risk of errors in transcription, guarantee precision when checking information, and serve as a record for the review. The table was also used to identify themes across the studies. Reviewers' comments and data recording were collected and organized using Rayyan reference manager software. Each study was appraised against multiple criteria, including study design, risk of bias, and reliability of outcome measures. A scoring system was applied, with each criterion rated as 1 for "yes" and 0 for "no" or "unclear", and total score was provided at last column of the table.

Synthesis

The results from the studies were reported in a tabular form, providing a comprehensive overview that included a description of each study, its year, setting, design, sample size, interventions, duration of intervention, methods of distributing interventions, measurement techniques, and significant results or conclusions. We added a comments column to facilitate discussion and recommendations. Unfortunately, the extraction of quantitative data for meta-analysis was not possible due to the heterogeneity of study populations, variations in research designs, outcome measures, timing of measurements, and data analysis methods across the studies. We summarized the prevention and care strategies for long-term bedridden patients in older adults, incorporating additional discussion and suggestions.

Results

From the initial search results of 1976 articles, 295 duplicate records were removed. The titles and abstracts of the remaining 1681 records were then screened. During this stage, 1647 records were excluded based on title/abstract screening. As a result, 34 full-text articles were assessed for eligibility, of which 18 were excluded with reasons. Finally, 16 studies were included in the review for data extraction, critical appraisal, and synthesis (Figure 1).

Characteristics of the Articles

A total of 16 studies were included in this review, encompassing various designs that evaluated pressure ulcer prevention interventions in long-term bedridden patients within community and home settings. The study designs included four quasi-experimental studies and 12 randomized controlled trials (RCTs). These studies were conducted across three countries—China, Finland, and India—but the geographical distribution of the evidence was limited. Specifically, 14 of the 16 included studies were conducted in China,[34–47] with only one study from Finland[48] and one from India.[49]

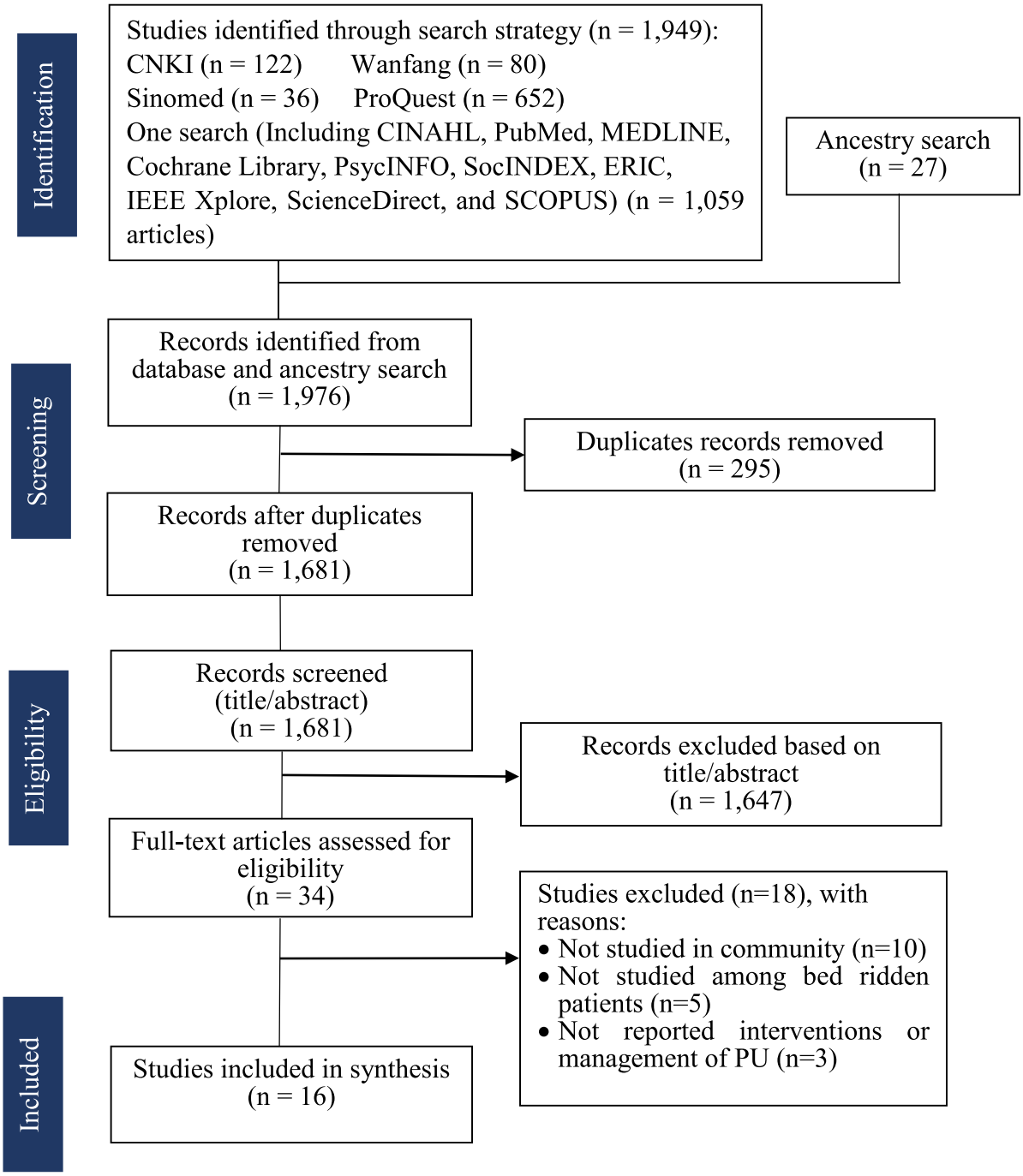

Figure 1 PRISMA Flow chart of the review process and results.

A total of 1821 patients across these 16 studies were included in this review, all of whom were long-term bedridden individuals, predominantly older adults receiving care in community and home-based environments.[34–49] The largest sample size was reported, comprising 232 patients,[48] while the smallest sample size was observed, which included 33 patients.[44] Most studies targeted older adults, with ages ranging from the adult to older bedridden patients; however, exact age ranges were not consistently reported across all studies.

The studies included a range of populations, including caregivers,[34,37–40,42–44,46,47,49] long-term bedridden patients,[35,37,39,40,45,46] and healthcare professionals such as nurses, doctors, and wound care specialists.[34,35,48] Caregivers were a key focus in many studies, particularly those involving older bedridden patients, especially those

with chronic conditions or multiple comorbidities[37–39,41.] The majority of the studies took place in home care or community settings,[35,37,45,49] while some also involved mixed settings that included hospitals.[34,36,37,40,45]

Some studies did not report on the length of patient follow-up; however, several studies, such as Ye et al (2018)[39,] provided data on the length of interventions, which typically ranged from several months to a year. Zhang et al (2014)[34,] for example, followed patients for one-month post-intervention to assess changes in knowledge, attitudes, and behavior, while Xu et al (2015)[37] extended their follow-up for over a year to evaluate the incidence of pressure ulcers and other complications.

The studies employed a variety of intervention delivery methods, ranging from face-to-face education and home visits to technological support like smartphone apps and WeChat. Detailed descriptions of the interventions and their delivery methods are presented (Table 1).

Methodological Appraisal of the Included Studies

The methodological appraisal showed that the included studies were generally of acceptable methodological quality (Tables 2 and 3). No study was rated as low quality. Nevertheless, several methodological limitations were identified. These included lack of a control group[34,36,] unclear intervention duration or outcome assessment timing,[35,36,41,42] short follow-up,[34,43,46] small sample sizes,[40,43,46] limited use of validated outcome measures,[42,43] and insufficient reporting of intervention fidelity or adherence.[45] These limitations may have increased the risk of bias in some studies. They should be taken into account when interpreting the review's findings—specifically, the certainty of the evidence across outcomes.

Certainty of Evidence Across Outcomes

The certainty of evidence was assessed using the GRADE approach[50] at the outcome level across the body of evidence, rather than at the level of individual studies (Table 4). Moderate-certainty evidence suggested that the interventions may reduce the incidence of pressure ulcers and improve Braden scores and caregivers' knowledge, attitudes, and practices. Low-certainty evidence suggested that the interventions may improve quality of life and satisfaction, and may also improve economic outcomes, including reduced PU-related medical expenses and hospitalization rates. However, the evidence regarding pressure ulcer severity or healing was of very low certainty, suggesting that the interventions' effects remain unclear. The main reasons for downgrading the certainty of evidence were risk of bias, inconsistency, and imprecision.

Measurement

The 16 studies in this review used nine main tools to evaluate the effectiveness of pressure ulcer prevention and care. The incidence of pressure ulcers was the most reported measure, used in all studies to assess whether interventions reduced the number of new cases. The Braden Pressure Ulcer Risk Assessment Scale was reported in six studies,[35,36,38,39,45,49] to evaluate patients' risk levels before and after interventions. The Katz Index was used to measure improvements in patients' daily living abilities.[49] Knowledge-Attitude-Practice (KAP) questionnaires were used to assess changes in caregivers' and patients' knowledge and behaviors related to pressure ulcer prevention in three studies.[34,44,45]

Nursing satisfaction and patient satisfaction scales were reported in studies evaluating care quality after interventions.[38,41,46] The quality of life was measured using the SF-36 in studies to assess overall patient well-being.[38,42,43] Additionally, economic cost tracking was used to evaluate changes in care and hospitalization expenses.[40,46]

Heterogeneity and Rationale for Narrative Synthesis

Significant clinical and methodological heterogeneity across the 16 included studies supported the use of a narrative synthesis. First, the included studies differed substantially in outcome measures and observation periods. Although some studies[39,45,49] used the Braden Scale to assess pressure ulcer (PU) risk, these findings were not pooled because follow-up durations varied considerably. For example, Kaur et al (2018)[49] followed patients for 12 months, whereas Ye (2018)[39] and Zhang et al (2020)[45] reported outcomes at shorter or less clearly comparable time points. Because PU risk is dynamic and may change over time with changes in immobility status and care exposure, combining results from such different follow-up periods could yield clinically misleading estimates. In addition, other studies used different outcome

Table 1 Data Extraction for the Included Studies

Author (Year): Countries	Study Design/ Setting	Population/Sample Size	Ways of Distributing Intervention/ Intervention Components	Outcome Measurement	Significant Result	Conclusions
No.01 Kaur et al (2018):[49] India	RCT/ Community	Patients aged >12 years/ Total 78 patients, randomized into intervention group 39 people and control group 39 people.	Pathways: Face-to-Face Training/Individual Counseling Intervention Components: 1) Nutrition Support 2) Position Management 3) Skin Care 4) Health Education 5) Device Assistance	1. Braden Scale 2. Number and stage of bedsores developed. 3. Katz Index of activities of daily living. 4. Compliance of caregivers with preventive practices.	1. Intervention group consistently showed greater reduction in the number of high-risk patients all domains. 2. There were no patients in either group had bedsores at final follow-up. 3. Both groups were 100% improve in mobility intervention group showed 87.2% and controlled group showed 74.4%.	Caregivers in both groups fully adhered to guidelines, though better outcomes were seen among intervention group; One-to-one training combined with a SIM is more effective than a SIM alone.
No.02 Zhang et al (2014)[34:] China	Quasi-experimental study/ Community	Patients aged 39–94 years/ Total 42 patients. There are 19 males, 23 females.	Pathways: Face-to-Face Intervention/ Model Demonstration/ Home Visit Intervention Components: 1) Nutrition Support 2) Position Management 3) Skin Care 4) Health Education: 5) Device Assistance	1. Knowledge: understanding of pressure ulcer care 2. Attitude: willingness to learn and improve habits 3. Practice: actual daily care behaviors 4. Incidence of pressure ulcer.	1. Knowledge: Baseline failure rate: 83.3% (35/42) Post-intervention failure rate: 23.8% (10/42), $p < 0.001$ 2. Attitude: Baseline failure rate: 35.7% (15/42) Post-intervention failure rate: 4.8% (2/42), $p < 0.001$ 3. Practice: Baseline failure rate: 88.1% (37/42) Post-intervention failure rate: 33.3% (14/42), $p = 0.019$ 4. New pressure ulcers Stage I: 9 cases Stage II: 3 cases	The intervention significantly improved caregivers' and patients' KAP and reduced new ulcer incidence and supported healing of existing ulcers.

(*Continued*)

Table 1 (Continued).

Author (Year): Countries	Study Design/ Setting	Population/Sample Size	Ways of Distributing Intervention/ Intervention Components	Outcome Measurement	Significant Result	Conclusions
No.03 Zhang et al (2023)[35]: China	RCT/ Community	Patients aged ≥ 70 years/ Total 160 patients, randomly divided into intervention group 80 people and control group 80 people.	Pathways: Face-to-Face Intervention/ Home Visit/Telephone Consultation Intervention Components: 1) Nutrition Support 2) Position Management 3) Skin Care 4) Health Education 5) Functional Exercise	1. Incidence of pressure ulcers 2. Time to first occurrence of pressure ulcers 3. Cure rate of pressure ulcers 4. Site of pressure ulcer occurrence	1. Incidence of pressure ulcers: intervention group 9.72% (7/72) control group 31.34% (21/67), P-value 0.025 2. Time to first pressure ulcer intervention group 6.25 ± 2.76 months control group 3.63 ± 0.85 months, P-value < 0.05 3. Cure rate intervention group 72.26 ± 12.85%; Control group 42.81 ± 7.27%, P-value < 0.05	Most ulcers occurred at the sacrum in both groups; Home-based nursing interventions significantly reduce the incidence and severity of pressure ulcers, delay their onset, and improve healing rates among elderly bedridden patients.
No.04 Zheng et al (2018)[36]: China	Quasi-experimental study/ Community	Patients aged ≥ 65 years/ Total 60 patients, there were pre-intervention 24 males, 36 females aged 77.52 ± 9.62 years and 56 people in post-intervention aged 76.89 ± 8.85 years.	Pathways: Face-to-Face Intervention/ Home Visit/WeChat Consultation /Telephone Contact/ Family Doctor Contract Service Intervention Components: 1) Nutrition Support 2) Position Management 3) Skin Care 4) Health Education 5) Multi-institutional Collaboration	1. Pressure ulcer incidence 2. Braden score 3. Pressure ulcer severity 4. Healing of ulcer	1. Incidence in pre-test there were 43.33% (26/60) and post-test 10.71% (6/56) patients developed ulcers p-value < 0.05 2. Braden > 12 scores significantly improved after intervention (28/56) patients, p-value < 0.05 3. Severity in pre-test were 37 ulcers, all stage II or above; 1 patient had 4 ulcers; post-test: 10 ulcers, all less severe; 4. 24/37 ulcers identified pre-test healed fully	The implementation of compact medical model significant reduction in the incidence, severity, improved patients', and Braden scores.

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No.05 Xu et al (2015)[37]: China	RCT/ Hospital to community	Patients aged ≥ 65 years/ Total 120 patients, randomly into intervention group 60 people and control group 60 people.	Pathways: Home Visit/ Group Intervention /Telephone Consultation Intervention Components: 1) Nutrition Support 2) Position Management 3) Skin Care 4) Health Education	1. Pressure ulcer incidence 2. Urinary tract infection incidence 3. Pneumonia incidence	1. Pressure ulcer incidence intervention group 10.00% (6/60) patients and control group 28.33% (17/60) patients, p-value = 0.013 2. Urinary tract infection incidence intervention group 3.33% (2/60) patients and control group 18.33% (11/60) patients, p-value = 0.008 3. Pneumonia incidence in intervention group 5.00% (3/60) patients and control group 25.00% (15/60) patients, p-value = 0.002	Home-based nursing intervention significantly reduced the incidence of complications such as pressure ulcers, urinary tract infections, and pneumonia in elderly bedridden patients, effectively improving patient prognosis.
No.06 Yang et al (2016)[38]: China	RCT/ Community	Patients aged ≥ 65 years/ Total 100 patients, randomly into intervention group 50 people and control group 50 people.	Pathways: Face-to-Face Intervention/ Home Visit Intervention Components: 1) Nutrition Support 2) Position Management 3) Skin Care 4) Health Education	1. Incidence of pressure ulcer 2. Nursing satisfaction 3. Quality of Life: Health Status Scale (SF-36)	1. The incidence of pressure ulcer in observation group was 6.0%, which was lower than 20.0% in control group. 2. The nursing satisfaction score of observation group was 98.36 ± 2.53, which was higher than that of control group (93.41 ± 2.14). 3. The scores of SF-36 scale in observation group were higher than those in control group.	Community-based nursing intervention can effectively reduce the incidence of pressure ulcers in long-term bedridden patients in the community and improve the quality of life of patients.
No.07 Ye et al (2018)[39]: China	RCT/ Community	Patients aged ≥ 60 years/ Total 96 patients, randomly into intervention group 48 people and control group 48 people.	Pathways: Face-to-Face Intervention/ Home Visit/WeChat Consultation /Telephone Follow-up Intervention Components: 1. Nutrition Support 2. Position Management 3. Skin Care 4. Health Education 5. Device Assistance	1. Caregiver pressure ulcer knowledge, skills and behavior. 2. Braden risk assessment scores. 3. Incidence of pressure ulcers	1. Pressure ulcer related knowledge, caring behavior and turning skills in the intervention group were (20.45 ±1.75, 43.68±3.81, 71.25±6.17) higher than those in the control group (16.21±1.49, 34.72±3.64, 7.25 ±5.83), respectively. 2. Braden risk assessment in intervention group (13.14±0.85) score was higher than control group (10.05±0.68) 3. Incidence of pressure ulcer at 6 months follow-up (6.25%) was lower than that of the control group (25%).	Community-home integrated nursing significantly improved caregivers' knowledge and preventive skills, effectively increased Braden scale scores, and reduced the incidence of pressure ulcers in elderly bedridden patients.

(*Continued*)

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Table 1 (Continued).

Author (Year): Countries	Study Design/ Setting	Population/Sample Size	Ways of Distributing Intervention/ Intervention Components	Outcome Measurement	Significant Result	Conclusions
No.08 Dong et al (2021)[47]: China	RCT/ community	Patients aged ≥ 65 years/ Total 200 patients, randomly into intervention group 100 people and control group 100 people.	Pathways: Face-to-Face Intervention/ Home Visit/WeChat Consultation /Telephone Follow-up Intervention Components: 1) Nutrition Support 2) Position Management 3) Skin Care 4) Health Education 5) Device Assistance	1. Pressure ulcer incidence 2. Nursing satisfaction	1. Pressure ulcer incidence at 1 month: intervention group 2.00% control group 3.00%, P-value 0.5536 At 3 months: intervention group 2.00% control group 8.00%, P-value 0.0495 At 6 months: intervention group 2.00% control group 10.00%, P-value 0.0172 2. Nursing satisfaction 100% in the intervention group and control group 92%, P-value 0.0038.	The community-linked stratified management model effectively enhanced nursing quality, reduced the risk of pressure injuries, and significantly improved patient satisfaction in long-term bedridden populations.
No.09 Wang et al (2020)[44]: China	Quasi-experimental study/ community.	Patients aged ≥ 65 years/ Total 33 patients, pretest 33 people and posttest 32 people.	Pathways: Face-to-Face Intervention/ Home Visit/Telephone Follow-up/Model Demonstration Intervention Components 1) Nutrition Support 2) Position Management 3) Skin Care 4) Health Education 5) Device Assistance	1. Knowledge 2. Attitude 3. Practice 4. Pressure ulcer incidence	1. Knowledge from 84.62% to 18.46%, P-value < 0.001 2. Attitude: from 40.00% to 3.08%, P-value < 0.001 3. Practice: from 64.62% to 23.08%, P-value = 0.018 4. Pressure ulcer incidence there were 12 cases of Stage I, 9 cases of Stage II ulcers, and 8 deaths.	Individualized health education significantly improved caregivers' knowledge, attitudes, and practices. It also reduced severity and incidence.
No.10 Bu et al (2020)[46]: China	RCT/ community	Patients aged ≥ 65 years/ Total 120 patients, randomly into intervention group 60 people and control group 60 people.	Pathways: Face-to-Face Intervention/ Home Visit/WeChat Platform /Individual Intervention Intervention Components: 1) Nutrition Support 2) Position Management 3) Skin Care 4) Health Education 5) Psychological Intervention	1. Pressure ulcer incidence 2. Nursing satisfaction	1. Pressure ulcer incidence in intervention group 12.5% and control group 30.0%, P-value = 0.032 2. Nursing satisfaction in intervention group 92.5% and control group 75%, P-value = 0.05	WeChat-based follow-up combined with family visits can reduce the incidence of pressure injuries among community-dwelling older adults with long-term bedridden conditions and improve nursing satisfaction, demonstrating favorable preventive effects.

No.11 Jiang et al (2018)[43]: China	RCT/ Community	Patients aged ≥ 65 years/ Total 120 patients, randomly into intervention group 60 people and control group 60 people.	Pathways: Face-to-Face Intervention/ Home Visit/WeChat/ Telephone Follow-up Intervention Components: 1) Nutrition Support 2) Position Management 3) Skin Care 4) Health Education 5) Device Assistance.	1. Pressure ulcer incidence 2. Caregivers' competency. 3. Caregiver quality of life using WHOQOL-BREF	1. Pressure ulcer incidence had a lower of 1.7%, control group 11.7% P-value < 0.05. 2. Caregivers' competency in the intervention group higher-pressure ulcer prevention, P < 0.01 3. Quality of Life in the intervention group significant improvement in physical and environmental domains P < 0.05.	Comprehensive nursing care program effectively reduced pressure ulcer incidence, enhanced caregiver skills and quality of life, and increased satisfaction with nursing services.
No.12 Zhang et al (2020)[45]: China	RCT/ Community	Patients aged ≥ 60 years/ Total 112 patients, randomly into intervention group 56 people and control group 56 people.	Pathways: Face-to-Face Intervention/ Home Visit/WeChat/ Telephone Follow-up Intervention Components: 1) Nutrition Support 2) Position Management 3) Skin Care 4) Health Education 5) Multi-institutional Collaboration	1. Braden scale for pressure ulcer risk. 2. Pressure ulcer incidence 3. Care giver knowledge, behavior, and skill competency.	1. Pressure ulcer incidence: 5.36% (3/ 56) people in intervention and control group 23.21% (13/56) people P-value < 0.05 2. Braden score is significantly higher in the intervention group at 2 months (13.16 ± 0.75 and control group 10.02 ± 0.59; P-value < 0.05)	Caregiver competency among intervention group had significantly higher post-intervention scores in knowledge, behavior, and skills P-value < 0.05 for all items.
No.13 Dong et al (2019)[40]: China	RCT/ Community	Patients aged ≥ 60 years/ Total 100 patients, randomly into intervention group 50 people and control group 50 people.	Pathways: Face-to-Face Intervention/ Smartphone App/ Telephone Follow-up /Individual Intervention Intervention Components: 1) Nutrition Support 2) Position Management 3) Skin Care 4) Health Education 5) Device Assistance	1. Pressure ulcer incidence 2. Hospital admission due to pressure ulcers. 3. Cost of pressure ulcer care at home and in hospital.	1. Pressure ulcer incidence: intervention group 6.0% (3/50) and control group 22.0% (11/50) P-value = 0.021 2. Hospitalization rate due to pressure ulcers: intervention group 0% and control group 0% 3. Average cost for pressure ulcer care at home: intervention group ¥150 ± 45.8 and control group ¥480 ± 67.0, P-value < 0.001 4. In-hospital treatment costs for pressure ulcers: intervention group incurred no cost, while control group averaged ¥1691.7 ± 896.1	Smartphone app–based out-of-hospital nursing may reduce pressure ulcer incidence, hospitalization, and related costs among high-risk bedridden patients, while improving communication between healthcare staff and patients.

(*Continued*)

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Table 1 (Continued).

Author (Year): Countries	Study Design/ Setting	Population/Sample Size	Ways of Distributing Intervention/ Intervention Components	Outcome Measurement	Significant Result	Conclusions
No.14 Fan (2019)[41]: China	RCT/ Community	Patients aged ≥ 60 years/ Total 168 patients, randomly into intervention group 84 people and control group 84 people.	Pathways: Face-to-Face Intervention/ Home Visit//Individual Intervention Intervention Components: 1) Nutrition Support 2) Position Management 3) Skin Care 4) Health Education 5) Psychological Intervention	1. Pressure ulcer incidence./ The comprehensive nursing intervention significantly improved pressure ulcer outcomes in bedridden older adults.	1. Intervention group: 94.05% (Cured: 53; Improved: 26; Ineffective: 5) 2. Control group: 82.14% (Cured: 37; Improved: 32; Ineffective: 15) (No insight information of results)	Comprehensive nursing intervention may improve pressure ulcer symptoms and increase the overall treatment effectiveness among community-dwelling older bedridden patients
No.15 Liu (2018)[42]: China	RCT/ Community	Patients aged ≥ 60 years/ Total 80 patients, randomly into intervention group 40 people and control group 40 people.	Pathways: Face-to-Face Intervention/ Home Visit/Individual Intervention Intervention Components: 1) Nutrition Support 2) Position Management 3) Skin Care 4) Health Education 5) Psychological Intervention	1. Dressing changes. 2. Wound healing time. 3. Wound size reduction. 4. Granulation growth.	1. Dressing changes: intervention group 13.26 ± 4.06 and control group 47.18 ± 5.15 2. Wound healing time: intervention group 11.58 ± 3.55 days and control group 21.50 ± 9.59 days 3. Wound size reduction: intervention group 4.02 ± 0.58 cm and control group 1.45 ± 0.20 cm 4. Granulation growth time: intervention group 5.15 ± 2.22 days and control group 8.43 ± 3.17 days All differences were statistically significant, P-value < 0.05	Comprehensive nursing intervention may improve treatment effectiveness, shorten wound healing time, reduce dressing changes, promote granulation tissue growth, and accelerate recovery among community-dwelling older bedridden patients with pressure ulcers.
No.16 Mäki-Turja-Rostedt et al (2023)[48]: Finland	Quasi/ Community	Bedridden patients/ Total 232 patients, randomly into intervention group 115 people and control group 117 people.	Pathways: Face-to-Face Intervention Intervention Components: 1) Nutrition Support 2) Position Management 3) Skin Care 4) Health Education 5) Device Assistance	1. Pressure ulcer staging	1. Pressure ulcer staging: intervention group 10.6% for baseline. After intervention in intervention group 9.4% and control group 21.3%, P-value = 0.27	PU and nutrition risk assessments Time and frequency of repositioning, Use of lifting belts and skin protection during transfers, Nutritional support was concluded to be effective and feasible in improving PU prevention quality in long-term care.

Table 2 JBI Critical Appraisal Checklists for Randomized Controlled Trials

Tufanaru, C., Munn, Z., Aromataris, E., Campbell, J., Hopp, L. (2020). Chapter 3: Systematic reviews of effectiveness. In: Aromataris E, Munn Z (Editors). JBI Manual for Evidence Synthesis. Available from https://synthesismanual.jbi.global														
Studies: total score	Was true randomization used for assignment of participants to treatment groups?	Was allocation to treatment groups concealed?	Were treatment groups similar at the baseline?	Were participants blind to treatment assignment?	Were those delivering treatment blind to treatment assignment?	Were outcomes assessors blind to treatment assignment?	Were treatment groups treated identically other than the intervention of interest?	Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	Were participants analyzed in the groups to which they were randomized?	Were outcomes measured in the same way for treatment groups?	Were outcomes measured in a reliable way?	Was appropriate statistical analysis used?	Was the trial design appropriate, and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?	Total (13)
No.01 Kaur et al (2018)[49]	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	11
No.03 Zhang et al (2023)[35]	Y	U	Y	U	N	N	Y	Y	Y	Y	Y	Y	Y	9
No.05 Xu et al (2015)[37]	Y	U	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	10
No.06 Yang et al (2016)[38]	Y	N	Y	U	N	N	Y	Y	Y	Y	Y	Y	Y	9
No.07 Ye et al (2018)[39]	Y	U	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	10
No.08 Dong et al (2021)[47]	U	U	Y	Y	U	U	Y	Y	Y	Y	Y	Y	Y	9
No.10 Bu et al (2020)[46]	U	U	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	9
No.11 Jiang et al (2018)[43]	Y	U	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	11
No.12 Zhang et al (2020)[45]	Y	U	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	11
No.13 Dong et al (2019)[40]	U	U	Y	U	U	U	Y	Y	Y	Y	Y	Y	Y	8
No.14 Fan (2019)[41]	U	U	Y	Y	Y	N	U	Y	Y	Y	Y	Y	Y	9
No.15 Liu (2018)[42]	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	10

Abbreviations: Y, Yes; N, No; U, Unclear.

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Table 3 JBI Critical Appraisal Checklists for Quasi-Experimental Studies

JBI Critical Appraisal Checklist for quasi-experimental studies. Tufanaru, C., Munn, Z., Aromataris, E., Campbell, J., Hopp, L. (2020). Chapter 3: Systematic reviews of effectiveness. In: Aromataris E, Munn Z (Editors). JBI Manual for Evidence Synthesis. Available from https://synthesismanual.jbi.global										
Studies/total score	Is it clear in the study what is the cause and what is the effect (ie, there is no confusion about which variable comes first)?	Were the participants included in any comparisons similar?	Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	Was there a control group?	Were there multiple measurements of the outcome both pre and postintervention/ exposure?	Was follow-up complete and if not, were differences between groups in terms of their follow-up adequately described and analyzed?	Were the outcomes of participants included in any comparisons measured in the same way?	Were outcomes measured in a reliable way?	Was appropriate statistical analysis used?	Total (9)
No.02 Zhang et al (2014)[34]	Y	Y	N	N	Y	Y	Y	Y	Y	7
No.04 Zheng et al (2018)[36]	Y	Y	N	N	N	Y	Y	Y	Y	6
No.09 Wang et al (2020)[44]	Y	Y	N	N	N	Y	Y	Y	Y	6
No.16 Mäki-Turja-Rostedt et al (2023)[48]	Y	Y	Y	Y	Y	Y	Y	U	Y	8

Abbreviations: Y = Yes; N = No; U = Unclear.

Table 4 GRADE Assessment of the Certainty of Evidence for Each Review Outcome

Outcomes	Contributing Studies[a] (Design)	Certainty of Evidence (GRADE)	Summary of Findings (Narrative Synthesis)
Incidence of PU	13 Studies (10 RCTs, 3 Quasi)	Moderate ⊕⊕⊕◯ Downgraded du e to: Risk of Bias ①	Moderate-certainty evidence suggests that the interventions may reduce the incidence of pressure ulcers. Across 13 studies, intervention groups generally reported lower PU incidence than comparison groups. For example, No.03 Zhang et al (2023)[35] reported a decrease from 31.3% to 9.7%, and No.10 Bu et al (2020)[46] (WeChat vs. visit) reported a decrease from 23.1% to 5.1%. A pooled effect estimate was not calculated because of substantial variation in intervention content and delivery.
PU Risk Level (Braden Score)	5 Studies (3 RCTs, 2 Quasi)	Moderate ⊕⊕⊕◯ Downgraded due to: Risk of Bias ①	Moderate-certainty evidence suggests that the interventions may improve Braden scores. Across five studies, intervention groups generally showed better Braden scores than comparison groups, indicating a possible reduction in patients' PU risk level from high to moderate or low (eg, No.01 Kaur et al (2018),[49] No.07 Ye et al (2018),[39] and No.12 Zhang et al (2020)[45]).
Caregiver's Competence (KAP)	8 Studies (4 RCTs, 4 Quasi)	Moderate ⊕⊕⊕◯ Downgraded due to: Risk of Bias ①	Moderate-certainty evidence suggests that the interventions may improve caregivers' knowledge, attitude, and practice (KAP). Across eight studies, caregivers in the intervention groups generally reported better KAP outcomes than those in the comparison groups, particularly when individualized guidance was provided (eg, No.02 Zhang et al (2014),[34] No.09 Wang et al (2020),[44] and No.11 Jiang et al (2018)[43]).
PU Severity (PU Stages/Healing Rate)	4 Studies (2 RCTs, 2 Quasi)	Very Low ⊕◯◯◯ Downgraded: Risk of Bias ①, Inconsistency ②, Imprecision ③	Very low-certainty evidence indicates that the effect of the interventions on PU severity or healing remains very uncertain. Although some studies reported fewer Stage III/IV ulcers or improved healing outcomes, the definitions and assessment criteria for "severity" and "healing" varied considerably across studies.
Quality of Life (QoL) and Satisfaction	4 Studies (3 RCTs, 1 Quasi)	Low ⊕⊕◯◯ Downgraded due to: Risk of Bias ①, Imprecision ③	Low-certainty evidence suggests that the interventions may improve quality of life and satisfaction among patients and caregivers. Some studies reported higher satisfaction (96.4%, No.11 Jiang et al (2018)[43]), and improvements in QoL scores (eg, SF-36, No.06 Yang et al (2016)[38]) were also noted; however, the evidence remains limited and imprecise.
Economic Costs	2 Studies (1 RCT, 1 Quasi)	Low⊕⊕◯◯ Downgraded: Risk of Bias ①, Imprecision ③	Low-certainty evidence suggests that technology-aided care may reduce PU-related medical expenses and hospitalization rates compared with routine care (eg, No.13 Dong et al (2019)[40]). However, the evidence remains limited because only two studies contributed to this outcome.

Notes: [Detailed Explanations for Downgrading]. ① Risk of Bias (Serious): Downgraded by 1 level. Although 12 studies were described as RCTs, most did not report the specific method for allocation concealment (eg, sealed envelopes) or blinding of outcome assessors. Nursing interventions are inherently prone to performance bias as blinding participants is impossible. ② Inconsistency (Serious): Downgraded by 1 level for "PU Severity". There was significant variation in how severity was classified and reported (eg, some used NPUAP stages while others used clinical efficacy rates like "Effective/Ineffective"), leading to clinical heterogeneity. ③ Imprecision (Serious): Downgraded by 1 level. For "QoL" and "Satisfaction", the total number of participants across the reporting studies was relatively small, and most studies did not provide 95% Confidence Intervals (CI), which limits the precision of the estimated effect. [Methodological Note & GRADE Definitions]. Certainty of evidence was assessed at the outcome level rather than the individual-study level, using an adapted GRADE approach for narrative synthesis. Certainty ratings were determined by considering study design, risk of bias, inconsistency, indirectness, and imprecision across the body of evidence contributing to each outcome. Because no pooled meta-analytic estimate was available for most outcomes, judgments were based on narrative synthesis of the included studies. GRADE certainty symbols: ⊕⊕⊕◯ = moderate certainty; ⊕⊕◯ ◯ = low certainty; ⊕◯ ◯ ◯ = very low certainty. GRADE Working Group grades of evidence: High certainty: We are very confident that the true effect lies close to that of the estimate of the effect. Moderate certainty: We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different. Low certainty: Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect. Very low certainty: We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect. [a] Study numbers correspond to those listed in Table 1 (NO.01–16).

indicators, including PU incidence,[35,36,47] caregivers' knowledge, attitude, and practice (KAP) scores[34,43,44] and wound healing outcomes,[42] which further limited direct comparison of effect magnitude across studies.

Intervention content and intensity also varied widely, ranging from traditional manual-based guidance[40] to more intensive system-level models such as the Tight Medical Alliance[36] and digital health approaches using WeChat

platforms or smartphone applications.[40,42] Finally, contextual heterogeneity was evident across study settings, from rural community home care[36] to international long-term care facilities[48] reflecting differences in baseline nursing resources, care structures, and patient characteristics. Taken together, these sources of heterogeneity made meta-analysis inappropriate and supported a narrative synthesis approach.

Prevention and Care for Pressure Ulcers in Long-Term Bedridden Patients

Pathways

The intervention pathways for pressure ulcer prevention and care in community-dwelling long-term bedridden adults and older adults form a multi-dimensional integrated system, mainly including face-to-face intervention including education and training[34–49] and Model Demonstration[34,43] as the foundational on-site guidance methods—through structured training, individualized guidance, educational materials, visual videos, and interactive workshops to improve patient and caregiver KAP, with enhanced retention and recall for different literacy groups; Home Visit[34–39,41–47] as the core follow-up measure, with frequency adjusted based on Braden Scale scores (weekly for ≤12, biweekly for 13–14, monthly for 15–16); WeChat/Smartphone App[36,39,40,43,45–47] as the technology-assisted tools breaking time and space limitations —featuring functions like education push, skin photo submission, Braden calculator, reminders, and teleconsultation to reduce incidence, hospitalization rates, and specialist response time; Group Intervention[37,46] for interactive experience sharing; Individual Intervention[40–42,46] tailored to personalized needs; Telephone Follow-up/Telephone Contact/ Telephone Consultation[35–37,39,40,43–45,47] as the convenient remote supplementary method; Family Doctor Contract Service[36] for collaborative support; and multidisciplinary collaboration integrating hospital, community, and family resources[36,39–42,45–48] —via case conferences, 24-hour hotlines, shared electronic health records, and standardized care pathways to improve coordination and reduce unnecessary hospital visits, jointly ensuring the continuity, pertinence and effectiveness of interventions.

Intervention Details

Position Management and Pressure-Relief Techniques

Seven studies[35,38,40,42,45,47,48] explored position optimization and pressure redistribution to reduce tissue ischemia. A study by Zhang et al (2023)[35] randomized 160 elderly patients into an experimental group (2-hour alternating supine-lateral positioning and alternating-pressure air mattresses) and a control group. The experimental group showed a lower pressure ulcer incidence (9.72% vs. 31.34%) and delayed initial ulcer onset (6.25±2.76 vs. 3.63±0.85 months). For pain-limited patients, pre-repositioning analgesia[38] increased cooperation from 32% to 78%. A rural-focused study[47] distributed low-cost foam pads, reducing sacral ulcer incidence by 52%. High-risk patients (Braden ≤12) who received 30° lateral tilt guidance[36] had a 6-month ulcer incidence of 1.7%, compared to 11.7% in controls. Mäki-Turja-Rostedt et al's (2023)[47] introduced smart pressure sensor mats for high-risk patients, triggering alerts when interface pressure exceeded 32 mmHg, which improved adherence to turning schedules from 58% to 89%. Digital posture correction tools[40,42] enhanced positioning accuracy by 27% (Supplement Table 1).

Skin Integrity Maintenance

Six studies[34,36,39,44,45,48] focused on skin care, including cleaning, incontinence management, early ulcer detection, and wound care. One Study[34] recommended cleaning with water (37–40°C) and neutral soap, and zinc oxide for incontinent patients, resulting in a 52% reduction in skin redness. A study by Zheng et al (2018)[36] trained caregivers to use the "press-test" (15-minute erythema fade test) for early detection and applied hydrocolloid/foam dressings for Stage I–II ulcers, achieving a 68% healing rate within 4 weeks. Hypoallergenic lotions[39] reduced skin cracking by 45% in xerotic patients, while draw sheets[35] minimized abrasions by 38%. A skin assessment checklist[45] improved the detection of ulcers in dark-skinned patients by 35%. Mäki-Turja-Rostedt et al's (2023)[48] validated a digital skin imaging system for early ischemia detection, which increased Stage I ulcer identification by 29% compared to visual inspection. Additionally, their standardized saline irrigation protocol reduced Stage II ulcer infection by 22% (Supplement Table 1).

Nutrition and Fluid Support

Five studies[35,38,40,42,48] linked nutrition to skin integrity and tissue repair. Study[26] recommended a daily protein intake of 1.2–1.5g/kg (eg, eggs, lean meat) and high-vitamin diets. Enteral supplements for patients with poor appetite[38] increased serum albumin levels (38.5±2.1 vs. 32.3±1.8g/L) and reduced ulcer incidence (10% vs. 28.33%). Weekly dietary counseling for malnourished patients (MNA <17)[31] shortened healing time by 30%. Low-cost rural meal plans[42] (eg, bean curd-egg stir-fry) improved dietary adherence from 32% to 68%. The Finnish study[38] emphasized omega-3 fatty acid supplementation (1g/day) for patients with chronic inflammation, improving skin barrier function by 24% and reducing ulcer recurrence by 18%. Their fluid intake protocol (1500–2000 mL daily) also reduced dry skin damage by 29% (Supplement Table 1).

Significant Outcomes

This systematic review identified nine primary instruments used across 16 included studies to measure significant key outcomes related to the prevention and care of pressure ulcers among long-term bedridden patients in community settings. These instruments included pressure ulcer incidence rates in all included studies, the Braden Pressure Ulcer Risk Assessment Scale,[34,36,38,39,45,49] the Katz Index of Independence in Activities of Daily Living,[49] Knowledge-Attitude-Practice (KAP) questionnaires,[34,44,45] nursing satisfaction scales,[38,43,46] patient satisfaction questionnaires,[41,46] the Quality-of-Life measures,[38,42,43] and economic cost tracking tools for care and hospitalization expenses.[40,46]

A reduction in the incidence of pressure ulcers was reported following interventions across the included studies, suggesting potential benefits of community and family-based care models. For example, Zhang et al (2023)[35] reported a reduction in pressure ulcer incidence from 31.34% to 9.72% following community-based family nursing interventions, while Xu et al (2015)[37] found a reduction from 25% to 6.25% after individualized health guidance interventions. Similarly, Kaur et al (2018)[49] reported a reduction in stage I pressure ulcers in an Indian community intervention, and Dong et al (2019)[40] reported a decrease in incidence from 22% to 6% through smartphone-based follow-up care.

Improvements in Braden Pressure Ulcer Risk Assessment scores were also observed. Yang et al (2016)[38] reported an improvement in Braden scores following intervention using a WeChat-assisted home visitation model, while Zhang et al (2023)[35] also reported better Braden scores, indicating a lower risk of pressure ulcers after family-centered community nursing care.

In addition to reducing the risk of pressure ulcers, improvements in patient mobility were reported as an outcome of the interventions. Kaur et al (2018)[49] reported that 87% of moderately dependent patients in the intervention group showed improved mobility post-intervention, as assessed using the Katz Index.

Educational interventions targeting caregivers appeared to improve caregiving efficiency and reduce caregiver burden as Zhang et al (2014)[34] and Wang et al (2020)[44] reported improvements in caregiver knowledge, attitudes, and practices, reflecting enhanced caregiving abilities.

Improvements in nursing and patient satisfaction were also observed in several studies,[38,41,46] suggesting enhanced care experiences in intervention groups. Yang et al (2016)[37] documented an increase in nursing satisfaction from 75% to 92.5% following interventions using WeChat in conjunction with home visits. Similarly, Bu et al (2020)[45] found that integrated hospital-community-family care models were associated with higher nursing satisfaction and overall care quality. Additionally, Fan (2019)[40] reported marked increases in patient satisfaction following comprehensive community nursing interventions.

Quality-of-life improvements were also reported as significant outcomes. Yang et al (2016)[38] and Liu (2018)[33] observed significant improvements in SF-36 Quality of Life scores among patients in the intervention groups, indicating possible enhancements in physical, social, and psychological well-being.

Economic cost reductions emerged as a notable outcome in studies that evaluated healthcare resource utilization. Dong et al (2019)[40] reported lower care-related expenses and hospitalization costs in groups using smartphone app-based interventions for pressure ulcer prevention. Similarly, Bu et al (2020)[46] highlighted reductions in overall care costs associated with fewer hospital admissions and more efficient community follow-up systems (Table 1).

Discussion

The primary aim of this systematic review was to synthesize current evidence of interventions or strategies for the prevention and management of pressure ulcers (PUs) in long-term bedridden adult and older adult patients within community care settings. While numerous studies have examined PU prevention in acute or institutional settings[9,25,51] research specific to community and home environments remains fragmented and underrepresented. To address this research gap, the present review summarized evidence regarding two interconnected core components of PU prevention and care in community settings: multi-dimensional intervention pathways and three targeted preventive measures. The latter encompasses position management with pressure-relief techniques, skin integrity maintenance, and nutritional and fluid support. This synthesis helps to reduce the fragmentation inherent in prior community-focused PU research and suggests a range of potentially adaptable strategies for use in diverse community care environments.

First, the multidimensional intervention pathway—integrating face-to-face education, home visits, digital tools (eg, WeChat/Smartphone Apps), multidisciplinary collaboration, and remote follow-up—aligns with the "person-centered continuity of care" model recommended by the European Pressure Ulcer Advisory Panel (EPUAP, 2019).[32] This comprehensive pathway addresses the well-recognized fragmentation in traditional community-based care. Evidence from the included studies suggests that structured face-to-face interventions, supplemented by model demonstrations and low-literacy-oriented visual materials, can improve caregivers' knowledge, attitudes, and practices (KAP) across various settings.[2,9,39,48] Meanwhile, the integration of digital support may help to remove temporal and geographical barriers: WeChat-based photo feedback[46] and smartphone wound-care applications[41] have been associated with reductions in pressure ulcer incidence from 22–30% to 6–12% in community-dwelling older adults. These findings align with telehealth evidence showing improved adherence to pressure-ulcer-preventive behaviors among community care recipients.[52] Furthermore, embedding multidisciplinary coordination—typically involving specialists, community nurses, and dietitians—may help strengthen care continuity. Mäki-Turja-Rostedt et al's (2023)[48] reported that shared electronic health records and team-based monitoring were associated with fewer preventable hospital visits, although this finding should be interpreted cautiously given the limited evidence base, an advantage not commonly achieved by single-pathway interventions highlighted in earlier reviews.

However, this multidimensional pathway is not without limitations that warrant targeted improvements. Disparities in digital accessibility and literacy remain a critical barrier: while digital tools may be more feasible in urban settings, rural or elderly caregivers with limited digital skills (eg, inability to upload skin photos or navigate apps) may be less able to benefit from such interventions, potentially widening health inequities.[53] Second, inconsistent intervention fidelity across components may limit potential benefits: face-to-face training may be standardized, but home visits and remote follow-up are prone to variability in frequency and quality due to community nurse workloads or inadequate monitoring[36,45.] Third, insufficient integration of caregiver burden is a notable gap—long-term caregiving stress can erode adherence to KAP gains, yet current pathways rarely include tailored psychological support or respite care referrals for caregivers.[41,44] Fourth, limited adaptability to resource-constrained settings may hinder broader implementation: multidisciplinary collaboration relies on well-coordinated healthcare systems, which are often lacking in low- and middle-income countries, while digital tools require reliable internet access that may not be universally available.[48]

Regarding position management, the combination of repositioning and pressure-relief devices (eg, 9.72% vs. 31.34% incidence) is consistent with biomechanical evidence that maintaining interface pressure below 32 mmHg can help mitigate tissue ischemia.[54] Innovations like Mäki-Turja-Rostedt et al's (2023)[48] smart pressure sensor mats, which were associated with adherence rates of up to 89%, demonstrate how technology can potentially reduce human error in turning schedules.[55] Yet, the lack of individualized protocols—especially for patients with pain or diabetes—remains a key challenge. This is evidenced by 28% refusal rates, highlighting a disconnect between standardized approaches and patient-centered needs.[56,57] Furthermore, rural disparities (device access <30%) emphasize that interventions must be contextually adaptive, and World Health Organization (WHO) has also highlighted the low-cost alternatives like foam pads to reduce sacral ulcers in resource-limited settings. A meta-analysis also supports the use of silicone foam dressings as a potentially effective strategy to reduce the incidence of stage II or higher pressure injuries, including sacral ulcers, by 52% compared to standard care.[58]

In terms of skin integrity maintenance, Zhang et al (2014)[34] found support for a reduction in skin redness associated with temperature-controlled cleaning and zinc oxide use, reinforcing the importance of preventive skin care in interrupting the progression of pressure ulcer development (NPIAP, 2022; Tan & Hu, 2023).[59,60] Moreover, the Mäki-Turja-Rostedt et al's (2023)[48] digital imaging system's reported 29% improvement in early detection addresses a longstanding limitation in visual assessments, particularly for patients with darker skin tones, where erythema-based diagnoses may miss 35% of cases (Miller et al, 2020).[61] However, caregiver difficulties in dressing management were also reported, which reflects a lack of standardized care pathways. This is consistent with international studies showing that inconsistent wound care can prolong healing by 30–40%, further underscoring the need for algorithm-driven guidance, such as determining dressing change frequency based on ulcer stage.[62]

Nutritional support continues to be a critical modifiable determinant of skin resilience, as evidenced by high-protein diets and enteral supplements that were associated with higher serum albumin levels (38.5 ± 2.1 g/L),[38] which may contribute to improved skin health and reducing pressure ulcer risk (Smith et al, 2020).[54] The Mäki-Turja-Rostedt et al's (2023)[48] study's finding that omega-3 supplementation was associated with improved skin barrier function by 24% provides new insights into the role of anti-inflammatory nutrition in preventing PU recurrence, expanding beyond traditional protein-focused strategies.[63,64] Nevertheless, key gaps remain, such as the absence of validated screening tools like the Mini Nutritional Assessment (MNA) in most studies (only four of the 16 studies[35,38,40,48] used it), as well as unclear protein doses for patients with renal insufficiency. These gaps reflect the broader issue of imprecision in nutritional care, aligning with the ESPEN guidelines, which caution against "one-size-fits-all" protocols, as malnutrition undertreatment or overtreatment can increase PU risk by 25–35%.[65]

One of the most compelling findings of this review is that integrated protocols may improve care efficiency, such as combining Braden-stratified repositioning, high-protein diets, and app monitoring.[40] These integrated approaches may provide benefits beyond individual interventions. Education enhances the utility of technology, as evidenced by WeChat videos improving repositioning accuracy to 89%, while multidisciplinary teleconsultations have been associated with shorter Stage II+ ulcer healing time by 35% (Miller et al, 2020).[61] The Finnish model,[48] which combines cross-sectoral teams, digital imaging, and omega-3 supplementation, was associated with a lower recurrence rate compared to single-modal care, emphasizing that PU prevention is likely to require coordinated rather than isolated interventions.[66]

Strengths and Limitations

This review reveals several strengths and limitations. A major strength lies in its focused attention on the under-researched population of community-dwelling, long-term bedridden adults and elderly individuals. By synthesizing studies from diverse regions, the review captures cross-cultural variations in care and addresses a critical evidence gap between institutional and community settings. Additionally, the systematic review benefited from the initial draft being thoroughly reviewed by the entire research team, including clinicians and methodological experts, ensuring both clinical relevance and methodological rigor. The involvement of library staff in the database searching process further strengthened the review by ensuring a comprehensive and precise literature search across multiple English databases.

This review also has several limitations. Heterogeneity in study designs, measurement tools, outcomes, and intervention methods limited the comparability of findings and hindered the ability to draw firm conclusions regarding the superiority of specific interventions or technologies. For example, different studies used different scales or indicators to assess outcomes such as pressure ulcer risk, caregiver competence, satisfaction, and quality of life, making it difficult to compare the magnitude of effect across studies. Furthermore, because community care is not a prominent component of healthcare services in many European and American countries, only one eligible study from these regions, conducted in Finland, was identified. In addition, 14 of the 16 included studies were conducted in China, with only one study from India, indicating limited geographical diversity in the evidence base and restricting the generalizability of the findings. In addition, many studies did not provide detailed implementation guidance—for example, the recommended frequency of repositioning or the precise use of pressure-relieving devices—thereby constraining the practical applicability of the findings. These limitations are also consistent with the moderate- to very low-certainty evidence identified across outcomes, particularly where risk of bias, inconsistency, and imprecision reduced confidence in the findings. Most studies had short follow-up periods (<1 year), with

limited data on intervention sustainability and long-term PU recurrence (2–3 years). In addition, few studies reported cost-effectiveness, which is important for scaling interventions in resource-constrained settings.

Conclusions and Recommendations

This systematic review (16 studies) identifies two interdependent core elements for community-based pressure ulcer (PU) care in long-term bedridden/older adults: multi-dimensional intervention pathways (face-to-face education, home visits, digital tools, multidisciplinary collaboration, remote follow-up) and targeted preventive measures (position management with pressure relief, skin integrity maintenance, and nutritional/fluid support). Together, may be associated with improvements in PU-related outcomes: single-component interventions reduced PU incidence by approximately 3%–22%, whereas multidimensional composite interventions were generally associated with larger reductions of about 15%–25%, along with about 2–3 point improvement in pressure ulcer risk scores and more sustained long-term effects. However, these findings should be interpreted cautiously because the certainty of evidence ranged from very low to moderate across outcomes. Limitations include heterogeneous study designs, limited representation of Western populations, incomplete reporting of implementation details, gaps in digital accessibility, and insufficient caregiver support, all of which may affect generalizability and translation into practice.

Based on the available evidence, several practical recommendations can be drawn. For clinical practice, healthcare providers may consider prioritizing prioritize multicomponent care models that combine multidimensional delivery pathways with targeted preventive measures. In community and home-based settings, bundled interventions supported by remote follow-up or digital tools may be particularly useful, whereas in institutional or centralized care settings, standardized nursing protocols combined with regular risk assessment may be more appropriate. In resource-limited areas, a basic model incorporating pressure-relief devices and essential caregiver skills training may represent a feasible first-line approach. Comprehensive caregiver support, including psychological counseling and respite care referral, may also be considered to improve implementation and sustainability. For health policy, efforts may be directed toward strengthening community healthcare infrastructure, expanding access to telehealth and pressure-relief devices, developing standardized national PU prevention and care guidelines, and enhancing workforce capacity through targeted professional training. Future research is needed to examine large-scale, multicenter randomized controlled trials with longer follow-up, greater standardization of outcome measures and intervention protocols, broader inclusion of diverse care settings and populations, and formal evaluation of the cost-effectiveness of integrated versus single-component interventions. In addition, studies should further develop and validate tailored intervention protocols for populations with distinct care needs.

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References

1. Gefen A, Brienza DM, Cuddigan J, Haesler E, Kottner J. Our contemporary understanding of the aetiology of pressure ulcers/pressure injuries. *Int Wound J*. 2022;19(3):692–704. doi:10.1111/iwj.13667
2. Frykberg RG, Banks J. Challenges in the treatment of chronic wounds. *Adv Wound Care*. 2015;4(9):560–582. doi:10.1089/wound.2015.0635

3. Oner B, Kilic M, Cakar V, Karadag A. Identification of nursing-sensitive indicators on pressure injuries/ulcers: a systematic review. *Nurs Inq*. 2025;32(2):e70007. doi:10.1111/nin.70007
4. Wan CS, Cheng H, Musgrave-Takeda M, et al. Barriers and facilitators to implementing pressure injury prevention and management guidelines in acute care: a mixed-methods systematic review. *Int J Nurs Stud*. 2023;145:104557. doi:10.1016/j.ijnurstu.2023.104557
5. Ramos FT, Oliveira RT, Avila MA, Andrade J, Moda Vitoriano Budri A, Alencar RA. Application of pressure injury preventive measures and bundles in home and community environments: a scoping review protocol. *BMJ Open*. 2025;15(3):e096224. doi:10.1136/bmjopen-2024-096224
6. Hahnel E, Lichterfeld A, Blume-Peytavi U, Kottner J. The epidemiology of skin conditions in the aged: a systematic review. *J Tissue Viability*. 2017;26(1):20–28. doi:10.1016/j.jtv.2016.04.001
7. Tubaishat A, Papanikolaou P, Anthony D, Habiballah L. Pressure ulcers prevalence in the acute care setting: a systematic review, 2000-2015. *Clin Nurs Res*. 2018;27(6):643–659. doi:10.1177/1054773817705541
8. Chaboyer W, Latimer S, Priyadarshani U, et al. The effect of pressure injury prevention care bundles on pressure injuries in hospital patients: a complex intervention systematic review and meta-analysis. *Int J Nurs Stud*. 2024;155:104768. doi:10.1016/j.ijnurstu.2024.104768
9. Gaspar S, Peralta M, Marques A, Budri A, Gaspar de Matos M. Effectiveness on hospital-acquired pressure ulcers prevention: a systematic review. *Int Wound J*. 2019;16(5):1087–1102. doi:10.1111/iwj.13147
10. Sullivan N, Schoelles KM. Preventing in-facility pressure ulcers as a patient safety strategy: a systematic review. *Ann Intern Med*. 2013;158(5 Pt 2):410–416. doi:10.7326/0003-4819-158-5-201303051-00008
11. van Leen MW, Schols JM, Hovius SE, Halfens RJ. A secondary analysis of longitudinal prevalence data to determine the use of pressure ulcer preventive measures in Dutch nursing homes, 2005-2014. *Ostomy Wound Manage*. 2017;63(9):10–20. doi:10.25270/owm.2017.09.1020
12. Singh C, Shoqirat N. Community-acquired pressure injuries in the acute care setting. *Adv Skin Wound Care*. 2021;34(1):1–4. doi:10.1097/01.ASW.0000732748.56041.cf
13. Corbett LQ, Funk M, Fortunato G, O'Sullivan DM. Pressure injury in a community population: a descriptive study. *J Wound Ostomy Continence Nurs*. 2017;44(3):221–227. doi:10.1097/WON.0000000000000320
14. Kirkland-Khyn H, Teleten O, Joseph R, Maguina P. A descriptive study of hospital- and community-acquired pressure ulcers/injuries. *Wound Manag Prev*. 2019;65(2):14–19. doi:10.25270/wmp.2019.2.1419
15. Aloweni F, Lim SH, Gunasegaran N, Ostbye T, Ang SY, Siow KCE. Community-acquired pressure injuries: prevalence, risk factors and effect of care bundles—an integrative review. *J Clin Nurs*. 2024;33(12):4618–4634. doi:10.1111/jocn.17431
16. Anthony D, Alosaimi D, Shiferaw WS, Korsah K, Safari R. Prevalence of pressure ulcers in Africa: a systematic review and meta-analysis. *J Tissue Viability*. 2021;30(1):137–145. doi:10.1016/j.jtv.2020.10.003
17. Zuniga J, Mungai M, Chism L, Frost L, Kakkar R, Kyololo OB. Pressure ulcer prevention and treatment interventions in Sub-Saharan Africa: a systematic review. *Nurs Outlook*. 2024;72(3):102151. doi:10.1016/j.outlook.2024.102151
18. Liao X, Ju Y, Liu G, Zhao X, Wang Y, Wang Y. Risk factors for pressure sores in hospitalized acute ischemic stroke patients. *J Stroke Cerebrovasc Dis*. 2019;28(7):2026–2030. doi:10.1016/j.jstrokecerebrovasdis.2019.02.033
19. Shiferaw WS, Akalu TY, Mulugeta H, Aynalem YA. The global burden of pressure ulcers among patients with spinal cord injury: a systematic review and meta-analysis. *BMC Musculoskelet Disord*. 2020;21(1):334. doi:10.1186/s12891-020-03369-0
20. Nasiri E, Mollaei A, Birami M, Lotfi M, Rafiei MH. The risk of surgery-related pressure ulcer in diabetics: a systematic review and meta-analysis. *Ann Med Surg Lond*. 2021;65:102336. doi:10.1016/j.amsu.2021.102336
21. Lin F, Wu Z, Song B, Coyer F, Chaboyer W. The effectiveness of multicomponent pressure injury prevention programs in adult intensive care patients: a systematic review. *Int J Nurs Stud*. 2020;102:103483. doi:10.1016/j.ijnurstu.2019.103483
22. Strazzieri-Pulido KC, González CV, Nogueira PC, Padilha KG, Santos VL. Pressure injuries in critical patients: incidence, patient-associated factors, and nursing workload. *J Nurs Manag*. 2019;27(2):301–310. doi:10.1111/jonm.12671
23. Tervo-Heikkinen T, Heikkilä A, Koivunen M, et al. Nursing interventions in preventing pressure injuries in acute inpatient care: a cross-sectional national study. *BMC Nurs*. 2023;22(1):198. doi:10.1186/s12912-023-01369-8
24. Kottner J, Cuddigan J, Carville K, et al. Pressure ulcer/injury prevention and treatment: current status, challenges, and future directions. *Int J Nurs Stud*. 2022;127:104153. doi:10.1016/j.ijnurstu.2021.104153
25. Gaspar S, Lobo MDJ, Sousa LB, Ribeiro O. Risk assessment tools for pressure ulcers: a systematic review update. *J Clin Nurs*. 2023;32(7–8):1632–1644.
26. Campbell KE, Woodbury MG, Houghton PE. Implementation of pressure injury prevention best practices in home care: a quality improvement initiative. *J Wound Ostomy Continence Nurs*. 2021;48(2):121–127.
27. Taylor C, Mulligan K, McGraw C. Barriers and enablers to the implementation of evidence-based practice in pressure ulcer prevention and management in an integrated community care setting: a qualitative study informed by the theoretical domains framework. *Health Soc Care Commun*. 2021;29(3):766–779. doi:10.1111/hsc.13322
28. Babaei N, Zamanzadeh V, Valizadeh L, et al. Barriers to the implementation of virtual care programmes for patients with chronic wounds: qualitative empirical research. *Nurs Open*. 2023;10(11):7301–7313. doi:10.1002/nop2.1983
29. Serafin A, Graziadio S, Velickovic V, et al. A systematic review of clinical practice guidelines and other best practice recommendations for pressure injury risk assessment in the United States. *Wound Repair Regen*. 2025;33(2):e70016. doi:10.1111/wrr.70016
30. Paquay L, Wouters R, Defloor T, Buntinx F, Debaillie R, Geys L. Adherence to pressure ulcer prevention guidelines in home care: a survey of current practice. *J Clin Nurs*. 2008;17(5):627–636. doi:10.1111/j.1365-2702.2007.02109.x
31. Woodhouse M, Worsley PR, Voegeli D, Schoonhoven L, Bader DL. How consistent and effective are current repositioning strategies for pressure ulcer prevention? *Appl Nurs Res*. 2019;48:58–62. doi:10.1016/j.apnr.2019.05.013
32. Kottner J, Cuddigan J, Carville K, et al. Prevention and treatment of pressure ulcers/injuries: the protocol for the second update of the international clinical practice guideline 2019. *J Tissue Viability*. 2019;28(2):51–58. doi:10.1016/j.jtv.2019.01.001
33. Aromataris E, Lockwood C, Porritt K, Pilla B, Jordan Z. JBI manual for evidence synthesis. JBI; 2024. Available from: https://synthesismanual.jbi.global. Accessed September 30, 2025.
34. Zhang C, Wang Q, Wu Q. Effect evaluation of individualized health guidance on pressure ulcer care for community long-term bedridden patients. *China Pract Med*. 2014;9(28):221–222.

35. Zhang R, Mu L. Role of home nursing intervention in reducing pressure ulcer incidence in elderly bedridden patients. *World Latest Med Inf Abstr*. 2023;23(70):86–89,95.
36. Zheng X, Han G, Wang X, Chen J. Effect of compact medical alliance model on reducing pressure ulcer incidence in rural home bedridden elderly. *Nurs Train J*. 2018;33(1):85–86.
37. Xu Z, Li X, Tan Y, Lin J, Liu Y. Influence of family nursing intervention on disease complications of elderly bedridden patients. *Chin J Geriatr Health Care*. 2015;13(4):92–93.
38. Yang Y. Observation on curative effect of community nursing on pressure ulcers in long-term bedridden patients. *Health Med Res Pract*. 2016;13 (4):77–78.
39. Ye H, Zhao Z. Effect of community-family integrated nursing in prevention of long-term bedridden pressure ulcer. *J Clin Med Pract*. 2018;22 (14):54–56.
40. Dong B, Pang X, Wang Y, Wang S. Evaluation of effect of smartphone apps in out-of-hospital patients with high risk of pressure ulcer. *Tianjin J Nurs*. 2019;27(3):257–259.
41. Fan Y. Influence of comprehensive nursing intervention on pressure ulcers in community elderly bedridden patients. *Spec Health*. 2019;30:221.
42. Liu L. Effect of comprehensive nursing intervention on pressure ulcer treatment in community elderly bedridden patients. *Cardiovasc Dis Prev Treat*. 2018;4:3–4.
43. Jiang W, Zhuang Y, Liu L, Wang X, Li H. Effect of extended nursing care on prevention of pressure injury in bedridden elderly. *Shanghai Nurs*. 2018;18(1):16–19.
44. Wang G. Effect of individualized health guidance on pressure ulcer care for community long-term bedridden patients. *World Latest Medical Information Digest*. 2020;5(13):18–19. Available from: https://d.wanfangdata.com.cn/periodical/CiBQZXJpb2RpY2FsQ0hJU29scjkyMDI2MDMwNjE2NTI1NxISemdianl5LWtwMjAyMDEzMDIyGgh0ZzlqMWE5eg%3D%3D.
45. Zhang T. Prevention effect of hospital-community-family integrated continuous nursing on pressure ulcers in long-term bedridden elderly patients. *Int J Nurs*. 2020;39(10):1895–1898.
46. Bu T, Tian J, Wang M, Zhou Q. Prevention effect of WeChat platform combined with home visit on pressure injuries in community elderly long-term bedridden patients. *Diet Health*. 2020;7(20):291–292.
47. Dong L, Wang M. Community-linked hierarchical management model for preventing pressure injuries in long-term bedridden patients. *Pharm Week*. 2021; 52(1):4–5. Available from: https://d.wanfangdata.com.cn/periodical/CiBQZXJpb2RpY2FsQ0hJU29scjkyMDI2MDMwNjE2NTI1NxIaUUtCSkJEMjAyMTIwMjIwNDAxMDAwMDU0NzAaCDYydWc5a2t4.
48. Mäki-Turja-Rostedt S, Leino-Kilpi H, Koivunen M, Vahlberg T, Haavisto E. Consistent pressure ulcer prevention practice: the effect on PU prevalence and PU stages, and impact on PU prevention—a quasi-experimental intervention study. *Int Wound J*. 2023;20(6):2037–2052. doi:10.1111/iwj.14067
49. Kaur S, Singh A, Tewari MK, Kaur T. Comparison of two intervention strategies on prevention of bedsores among the bedridden patients: a quasi-experimental community-based trial. *Ind J Palliat Care*. 2018;24(1):28. doi:10.4103/IJPC.IJPC_60_17
50. Hultcrantz M, Rind D, Akl EA, et al. The GRADE Working Group clarifies the construct of certainty of evidence. *J Clin Epidemiol*. 2017;87:4–13. doi:10.1016/j.jclinepi.2017.05.006
51. Lovegrove J, Fulbrook P, Miles SJ, Steele M. 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*. 2021;122:104027z. doi:10.1016/j.ijnurstu.2021.104027
52. Chen G, Wang T, Zhong L, et al. Telemedicine for preventing and treating pressure injury after spinal cord injury: systematic review and meta-analysis. *J Med Internet Res*. 2022;24(9):e37618. doi:10.2196/37618
53. Valaitis R, Cleghorn L, Vassilev I, et al. A web-based social network tool (GENIE) for supporting self-management among high users of the health care system: feasibility and usability study. *JMIR Form Res*. 2021;5(7):e25285. doi:10.2196/25285
54. Dumville JC, Hughes RA, Middleton V. Pressure relieving interventions for preventing and treating pressure ulcers. *Cochrane Database Syst Rev*. 2015;9:CD009362.
55. O'Neill AD, Jones MD, Williams LM. Technological interventions in pressure ulcer prevention: a review of smart devices and automated systems. *Int J Nurs Stud*. 2022;123:104040.
56. Donohue R, Klasko S. The eight dimensions of patient-centered care. American College of Healthcare Executives; 2021. Available from: https://www.ache.org. Accessed April 20, 2026.
57. DiGioia MD III, Anthony M, Clayton SB, Giarrusso MB. "What matters to you?": a pilot project for implementing patient-centered care. *Patient Exp J*. 2016;3(2):130–137. doi:10.35680/2372-0247.1121
58. Fu T, Wu X, Yu B. Efficacy of silicone foam dressings in preventing pressure injuries in the sacral and heel areas of patients: a meta-analysis. *Front Med*. 2025;12:1644290. doi:10.3389/fmed.2025.1644290
59. National Pressure Injury Advisory Panel. Prevention and treatment of pressure injuries: clinical practice guideline. NPIAP; 2022. Available from: https://www.npiap.com. Accessed April 20, 2026.
60. Tan SH, Hu X, Larson KW, Thompson SJ. The role of early-stage risk identification and skin care in preventing pressure ulcers in intensive care units. *J Wound Care*. 2023;32(3):159–165. doi:10.12968/jowc.2023.32.3.159
61. Miller K, Davies P, White D. Visual assessment of skin integrity: challenges and limitations in darker skin tones. *J Clin Nurs*. 2020;29 (7–8):1400–1410.
62. Oe M, Sato H, Shimizu T. Inconsistent wound care practices and their impact on pressure ulcer healing: a systematic review. *Int Wound J*. 2019;16 (3):621–630. doi:10.1111/iwj.13070
63. Heyland DK, Patel J, Suchner U. The role of nutrition in preventing pressure ulcers in hospitalized patients: a systematic review and meta-analysis. *JPEN J Parenter Enteral Nutr*. 2018;42(1):38–46.
64. Schilp JM, van der Veen WJ, de Lange RM. High-protein nutritional interventions for the prevention of pressure ulcers: evidence from a randomized controlled trial. *Clin Nutr*. 2019;38(2):853–860.
65. Barazzoni R, Bischoff SC, Boirie Y. ESPEN guidelines on nutrition in geriatrics. *Clin Nutr*. 2018;37(4):1430–1441. doi:10.1016/j.clnu.2017.06.020
66. Sving E, Jönsson B, Westergren A. The effectiveness of multidisciplinary interventions in preventing pressure ulcers: a meta-analysis. *J Clin Nurs*. 2020;29(15–16):2934–2943.