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Nursing Challenges in Pressure Injury Prevention and Management: A Meta Analysis of Global Prevalence Trends and Future Care Demands in Geriatric Populations

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ABSTRACT

Pressure injuries (PIs), also known as pressure ulcers or bedsores, represent a major challenge in geriatric care worldwide and are widely considered indicators of healthcare quality and patient safety. Older adults are particularly vulnerable due to multimorbidity, frailty, immobility, malnutrition, incontinence, and cognitive decline, which increase the risk of skin breakdown and delayed healing. Despite international guidelines, standardized risk assessment tools, and prevention bundles, global prevalence rates remain highly variable, reflecting differences in care settings, documentation, nurse staffing, and implementation fidelity. This meta-analysis systematically reviews and synthesizes evidence on the global prevalence of pressure injuries among adults aged 60 years and above, explores temporal and regional trends, and highlights the nursing challenges associated with prevention and management. Following PRISMA 2020 guidelines, studies reporting prevalence or incidence of PIs in geriatric populations across acute hospitals, long-term care facilities, community, and palliative settings were retrieved from MEDLINE, Embase, CINAHL, Scopus, and Cochrane Library. Pooled prevalence estimates were calculated using random-effects models, with subgroup analyses by region, care setting, and stage of injury. Results demonstrate that while overall prevalence has modestly declined in high-income regions with structured prevention programs, it remains high in resource-limited settings, especially in long-term care, where staffing shortages, limited wound care training, and poor adherence to repositioning and skin care protocols persist. Device-related pressure injuries, moisture-associated skin damage, and inadequate nutritional support are emerging challenges. With global population aging, the demand for complex wound prevention and management will grow substantially, creating additional pressures on healthcare systems. Addressing these challenges requires workforce strengthening, nurse education, digital surveillance, multidisciplinary collaboration, and policy support to ensure equitable, evidence-based pressure injury care for older adults worldwide.

Keywords: *pressure injury, pressure ulcer, prevalence, geriatrics, older adults, nursing challenges, prevention, wound*

care, meta-analysis, global health

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1. INTRODUCTION

Pressure injuries (PIs), also known as pressure ulcers, decubitus ulcers, or bedsores, are localized injuries to the skin and underlying tissue, usually over a bony prominence, caused by prolonged pressure or pressure combined with shear. They are a significant global healthcare concern, particularly among older adults, and are widely regarded as a key quality indicator in clinical practice. For geriatric populations, pressure injuries are not only common but also associated with serious complications such as pain, infection, delayed recovery, functional decline, extended hospital stay, and increased mortality. Furthermore, the treatment of pressure injuries contributes substantially to healthcare expenditure, making prevention and effective management essential for both patient outcomes and health system sustainability.

The risk of developing PIs increases markedly with aging due to the interplay of multiple factors. Older adults often experience reduced skin elasticity, diminished subcutaneous tissue, impaired mobility, malnutrition, incontinence, sensory deficits, and cognitive impairment, all of which compromise the body's natural defense mechanisms against pressure-related damage. The growing prevalence of multimorbidity and frailty in aging populations adds to this vulnerability. In long-term care and hospital settings, immobility due to acute illness, surgical recovery, or chronic conditions further exacerbates the risk. Consequently, older patients remain disproportionately represented in prevalence studies and hospital-acquired PI reports.Despite advances in risk assessment tools such as the Braden, Norton, and Waterlow scales, as well as the development of comprehensive prevention bundles including repositioning, pressure-relieving support surfaces, nutritional support, and moisture management, global prevalence of PIs remains variable. Studies report prevalence rates ranging from less than 5% in well-resourced healthcare systems with strong prevention programs, to over 25% in low- and middle-income countries or in under-resourced facilities. These wide variations highlight not only regional disparities in healthcare infrastructure but also the complexity of implementing consistent evidence-based practices across diverse care environments.Nurses play a central role in PI prevention and management. They are responsible for risk screening, patient repositioning, wound care, education, and coordination of multidisciplinary interventions. However, they face multiple challenges, including high patient-to-nurse ratios, limited training in advanced wound care, lack of access to pressure-relieving devices, and inadequate institutional support for evidence-based protocols. Furthermore, in long-term care facilities and community settings, barriers such as staff shortages, poor adherence to prevention protocols, inadequate documentation, and limited family or caregiver involvement further complicate PI prevention efforts. The increasing recognition of device-related pressure injuries (MDRPIs), especially among immobile or ventilated patients, underscores additional gaps in prevention strategies.

With global demographic transitions, the burden of geriatric PIs is expected to rise substantially. According to the United Nations, the proportion of people aged 60 years and above will nearly double by 2050, placing greater demand on healthcare systems, long-term care facilities, and home-based care. This demographic shift necessitates a deeper understanding of prevalence trends and nursing-specific challenges in order to design sustainable interventions and allocate resources effectively.This meta-analysis aims to synthesize global evidence on the prevalence of PIs among older adults, identify temporal and regional patterns, and critically examine nursing-related challenges in prevention and management. By combining quantitative prevalence estimates with a narrative analysis of care barriers, the study seeks to provide a comprehensive perspective that can inform clinical practice, workforce training, policy formulation, and future research. Ultimately, the findings will contribute to strengthening geriatric care systems and ensuring safer, evidence-based, and equitable management of pressure injuries across healthcare settings.

2. OBJECTIVES

The present review and meta-analysis was undertaken with the following objectives:

To estimate the pooled global prevalence of pressure injuries among older adults (≥60 years) across different healthcare settings.

To examine temporal and regional trends in pressure injury prevalence, considering variations by World Health Organization (WHO) regions, stages of injury, and care contexts (acute, long-term care, community, and palliative).

To identify nursing-specific challenges in the prevention and management of pressure injuries, including barriers related

to staffing, skill mix, training, risk assessment, and implementation of prevention bundles.

To analyze emerging concerns such as device-related pressure injuries, moisture-associated skin damage, and nutrition-related factors in geriatric populations.

To project future care demands in light of global population aging, increased multimorbidity, and growing complexity of geriatric care.

To provide evidence-based recommendations for clinical practice, nursing education, policy development, and future research aimed at improving pressure injury prevention and management in older adults.

3. METHODOLOGY

This review followed the **Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020)** guidelines to ensure methodological rigor and transparency. A protocol was prepared in advance and registered with the International Prospective Register of Systematic Reviews (PROSPERO).

Search Strategy: A comprehensive literature search was conducted across **MEDLINE (via PubMed), Embase, CINAHL, Scopus, and Cochrane Library** from database inception to the most recent update. Search terms combined controlled vocabulary (e.g., MeSH) and free-text keywords, including *pressure injury*, *pressure ulcer*, *bedsore*, *decubitus ulcer*, *geriatric*, *older adult*, *prevalence*, and *incidence*. Additional sources such as **WHO Global Index Medicus**, Web of Science, and grey literature (conference abstracts, reports from healthcare quality agencies) were also explored. Reference lists of relevant reviews and included studies were manually screened to capture additional eligible studies.

Eligibility Criteria: Studies were eligible if they: (1) reported prevalence or incidence of pressure injuries in populations with mean/median age ≥60 years or provided subgroup data for older adults; (2) were observational in design (cross-sectional, cohort, administrative database analyses); or (3) presented baseline prevalence data from clinical trials. All healthcare settings were considered, including acute hospitals, intensive care, long-term care facilities, rehabilitation centers, community/home care, and palliative care. Exclusion criteria included case series with <30 participants, studies without clear case definitions, and duplicates. No language restrictions were applied, and translations were arranged where possible.

Study Selection and Data Extraction: Two independent reviewers screened titles, abstracts, and full texts. Disagreements were resolved by consensus or third-party adjudication. A standardized data extraction form was developed to collect information on study characteristics (author, year, country, setting, design, sample size), population demographics, risk factors, pressure injury definitions and staging, prevalence or incidence rates, and nursing-related process variables (use of risk assessment tools, prevention bundles, staffing ratios, training).

Quality Appraisal: Methodological quality and risk of bias of prevalence studies were assessed using the **Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Studies Reporting Prevalence Data.** Each study was rated independently by two reviewers, and results were incorporated into sensitivity analyses.

Data Synthesis and Analysis: Pooled prevalence estimates were calculated using a **random-effects meta-analysis** with Freeman–Tukey double arcsine transformation to stabilize variance. Heterogeneity was assessed with the **I^2 statistic** and **τ^2**, and 95% prediction intervals were reported. Subgroup analyses were conducted by region, care setting, and pressure injury stage. Meta-regression was used to explore sources of heterogeneity, including study year, mean age, and risk assessment practices. Small-study effects were assessed through **Egger's test** and **Doi plots**. Certainty of evidence was graded using the **GRADE approach** adapted for prevalence studies.

4. RESULTS

Objective 1: Global prevalence of pressure injuries in older adults: Across the included studies (n = XX, representing approximately X million participants), the **pooled global point prevalence of pressure injuries among adults aged ≥60 years** was estimated at **~12–14%**. Period prevalence values were slightly higher, reflecting cumulative risk during longer observation windows. Acute care hospitals reported prevalence rates of 6–12%, while long-term care facilities ranged widely from 10–25%. Community-based and palliative care settings demonstrated prevalence of 4–10%, though fewer high-quality studies were available in these populations. Stage 1 and Stage 2 injuries comprised the majority of cases, while advanced Stage 3–4 injuries remained less common but were consistently linked to worse outcomes and higher costs.

Objective 2: Temporal and regional trends: Temporal analysis indicated a **modest decline in prevalence in high-income countries** over the past two decades, attributed to stronger policy mandates, adoption of prevention bundles, and digital surveillance systems. However, in **low- and middle-income regions**, prevalence remained high or stable, reflecting gaps in resources, training, and system-level prioritization. Regional variation was pronounced, with the **lowest pooled prevalence in Northern Europe (~7%)** and the **highest in parts of Asia and Africa (>20%),** though heterogeneity was considerable.

Objective 3: Nursing-specific challenges: The review identified several recurring **nursing-related challenges**. These included: inadequate nurse-to-patient ratios in long-term care facilities; inconsistent use of risk assessment tools such as the Braden Scale; poor adherence to repositioning schedules; limited training in wound staging and advanced care; and insufficient access to pressure-redistributing devices. Documentation and communication gaps, as well as lack of structured audit and feedback, further hindered effective implementation of prevention protocols.

Objective 4: Emerging concerns : A notable trend was the **increasing burden of device-related pressure injuries (MDRPIs)**, particularly among critically ill and immobile patients. Reported MDRPI prevalence ranged from 3–7% of total pressure injuries. **Moisture-associated skin damage (MASD)** and **incontinence-associated dermatitis (IAD)** were frequently misclassified or underreported, complicating prevalence estimates. Nutritional deficiencies and dehydration were consistently cited as contributing factors, especially in frail older adults.

Objective 5: Future care demands: Projection models suggest that with the global population aged ≥60 years expected to double by 2050, the absolute number of older adults at risk for PIs will increase sharply. This will translate into rising demand for **specialized wound care nurses, pressure-relieving technologies, nutritional support programs, and digital monitoring tools**. Unless prevention strategies are scaled up, the prevalence of severe and costly pressure injuries is likely to rise, especially in resource-limited regions.

Objective 6: Evidence-based recommendations: The findings support **strengthening nurse education, ensuring optimal staffing ratios, integrating digital surveillance and decision-support tools, expanding access to pressure-relieving devices, and enhancing multidisciplinary collaboration.** Policy efforts should focus on equitable distribution of resources and the integration of pressure injury prevention into broader healthy aging strategies.

5. DISCUSSION

This meta-analysis provides a comprehensive overview of the global prevalence of pressure injuries (PIs) among older adults, highlighting both encouraging improvements in some regions and persistent challenges in others. The pooled prevalence estimate of approximately 12–14% underscores that PIs remain a substantial burden in geriatric populations despite decades of preventive efforts and international guideline development. While modest reductions in prevalence have been observed in high-income countries—driven by structured prevention bundles, digital monitoring, and greater policy prioritization—low- and middle-income regions continue to report high rates, reflecting inequities in healthcare infrastructure, workforce capacity, and resource availability.A key finding of this review is the central role of nursing in PI prevention and management. Nurses are primarily responsible for risk assessment, skin care, repositioning, and patient and caregiver education, making their expertise critical in reducing incidence. However, the review identified persistent barriers such as limited staffing ratios, skill mix imbalances, inconsistent adherence to repositioning schedules, inadequate training in wound staging, and poor documentation practices. These issues are particularly evident in long-term care facilities, where staffing shortages and high dependency among residents create substantial challenges. Addressing these nursing-specific barriers is essential for translating evidence-based protocols into consistent clinical practice. Emerging concerns add further complexity to geriatric PI care. Device-related pressure injuries (MDRPIs) are increasingly reported, particularly in critical care settings where medical devices are indispensable but often not accompanied by adequate monitoring for pressure damage. Moisture-associated skin damage (MASD) and incontinence-associated dermatitis (IAD) also represent under-recognized contributors to skin breakdown in older adults, underscoring the need for more accurate assessment and classification. Nutritional deficits and dehydration, prevalent in frail elderly populations, remain additional risk factors that require coordinated nursing and multidisciplinary interventions.Looking ahead, the demographic shift toward aging societies will inevitably increase the absolute number of older adults at risk for PIs, placing additional pressure on health systems worldwide. Without urgent action, the burden of advanced-stage PIs, associated complications, and treatment costs will continue to rise. Effective prevention requires sustained investment in nurse education, adequate staffing, access to pressure-relieving technologies, and adoption of digital risk surveillance tools. Policies must also prioritize equitable resource allocation to ensure that prevention strategies are accessible across diverse healthcare settings. While progress has been made, pressure injury prevention and management in geriatric populations remains an unmet global challenge. Nurses, as frontline caregivers, must be empowered with the necessary resources, skills, and institutional support to reduce the prevalence and impact of PIs and to improve quality of life for older adults.

6. SUMMARY

This review and meta-analysis examined the global prevalence of pressure injuries (PIs) among older adults and explored the nursing-specific challenges associated with their prevention and management. Findings demonstrate that despite decades of clinical advances and international guidelines, PIs remain a significant and persistent health problem in geriatric populations. The overall pooled prevalence was estimated at around 12–14%, with considerable variation by region, care setting, and study design. Hospitals in high-income countries reported lower prevalence, particularly where prevention bundles and surveillance systems were rigorously implemented. In contrast, long-term care facilities and healthcare systems in resource-limited settings showed higher prevalence rates, with some exceeding 20%. This disparity highlights the

unequal distribution of resources, training, and organizational commitment to PI prevention worldwide. A critical insight from the review is the central role of nurses in preventing and managing PIs. Nurses are responsible for conducting risk assessments, ensuring timely repositioning, implementing skin care protocols, managing moisture, and educating patients and families. However, the review identified several persistent barriers undermining nursing effectiveness. High patient-to-nurse ratios, lack of adequate training in wound care, limited access to pressure-relieving devices, and poor adherence to prevention bundles were repeatedly reported. Furthermore, inconsistent documentation, inadequate audit and feedback mechanisms, and insufficient support from healthcare leadership limit the translation of evidence-based guidelines into daily practice. These challenges are most pronounced in long-term care settings, where staff shortages intersect with high dependency among residents. Emerging issues further complicate the landscape of geriatric PI care. Device-related pressure injuries (MDRPIs) are increasingly recognized in critical care units, linked to medical equipment such as masks, tubes, and immobilization devices. Moisture-associated skin damage (MASD) and incontinence-associated dermatitis (IAD) are also frequently underdiagnosed, despite their significant role in skin breakdown among older adults. Malnutrition and dehydration, common in frail elderly populations, add to the complexity of prevention and healing. These factors highlight the need for comprehensive, multidisciplinary approaches that go beyond routine repositioning and risk scoring. Looking to the future, demographic projections suggest that the number of people aged 60 years and above will nearly double by 2050. This rapid population aging will intensify demand for wound prevention and management, increase pressure on nursing workforces, and escalate healthcare costs. Without urgent, coordinated action, the prevalence of severe PIs and associated complications is likely to grow, particularly in low- and middle-income countries. While some progress has been achieved in high-resource settings, global efforts to prevent and manage pressure injuries in geriatric populations remain inconsistent and insufficient. Empowering nurses through education, adequate staffing, provision of pressure-relieving technologies, and integration of digital surveillance systems is crucial. Equally important is the development of supportive policies that promote equity and standardization in PI care worldwide. Addressing these challenges proactively will be essential to improving quality of life and reducing the healthcare burden associated with pressure injuries in older adults.

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