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Integrative Review: Evidence-Based Nursing Strategies for Preventing Pressure Injuries in Critically Ill Patients in Intensive Care Units

1. Ali Hassan Mohammed Al Qurayshah: Nursing
HHC-Najran Cluster
2. Turki Abdullah Ahmed Alzahrani
Nursing, HHC-Najran Cluster
3. Mohammad Hussien Saleh Alsuleiman
Nursing, HHC-Najran Cluster
4. Abdullah Mohammed Alyami
Respiratory Therapy, HHC-Najran Cluster
5. Hammam Yahya Al Hammam
Nursing, HHC-Najran Cluster
6. Hala AbdulHadi Alkulaby
Nursing, HHC-Najran Cluster
7. Halimah Awad Awadee
Nursing, HHC-Najran Cluster
8. Dhaifallah Ali Jobran Al Musri: Nursing
HHC-Najran Cluster

Abstract

Background: Pressure injuries are a critical concern in intensive care units (ICUs), particularly among critically ill patients who are at heightened risk due to prolonged immobility, compromised perfusion, and nutritional deficiencies. Nursing interventions play a pivotal role in preventing these injuries, but their implementation is often hindered by barriers such as staffing shortages and resource limitations.

Objective: This integrative review aims to synthesize evidence-based nursing strategies for the prevention of pressure injuries in ICU settings, highlighting effective interventions, challenges, and facilitators to guide clinical practice and policy development.

Methods: The review follows the framework proposed by Whittemore and Knafl, including a systematic search of peer-reviewed literature from databases such as PubMed, CINAHL, and Cochrane Library. Studies published between 2013 and 2023 were included, focusing on nursing interventions for pressure injury prevention in ICU patients. A thematic analysis was conducted to identify key strategies and implications.

Results: The review identified multiple effective nursing strategies, including the use of validated risk assessment tools, frequent repositioning, advanced support surfaces, skin care protocols, nutritional interventions, and continuous staff education. Barriers such as staffing constraints and limited access to advanced technologies were noted, while facilitators included multidisciplinary collaboration, organizational support, and innovative repositioning systems. Advanced support surfaces and silicone-based products emerged as particularly impactful in reducing pressure injury incidence.

Discussion: A multifaceted approach involving risk assessment, preventive skin care, nutritional support, and advanced technologies is essential to minimize pressure injuries in ICU settings. Addressing barriers through enhanced staffing, resource allocation, and ongoing education can improve adherence to evidence-based practices.

Conclusion: This review underscores the importance of integrating evidence-based nursing strategies into ICU care to prevent pressure injuries and improve patient outcomes. Future research should focus on overcoming implementation challenges and evaluating the long-term cost-effectiveness of advanced interventions.

Keywords: Pressure injuries, nursing strategies, intensive care units, critically ill patients, evidence-based practice.

Introduction

Pressure injuries, also referred to as pressure ulcers or bedsores, are a significant concern in healthcare, particularly in intensive care units (ICUs) where critically ill patients are at heightened risk due to prolonged immobility, compromised perfusion, and other clinical factors. These injuries not only increase morbidity and mortality rates but also contribute to longer hospital stays and higher healthcare costs (Black et al., 2018). Nursing care plays a pivotal role in preventing pressure injuries, as nurses are at the forefront of implementing strategies to identify at-risk patients, maintain skin integrity, and promote early intervention.

An integrative review allows for the synthesis of diverse research methodologies, providing a comprehensive understanding of effective nursing strategies to prevent pressure injuries in ICU settings. By incorporating both quantitative and qualitative findings, this approach can highlight not only evidence-based interventions but also the practical challenges and facilitators encountered in clinical practice (Whittemore &Knafl, 2005). This review aims to explore and synthesize the existing evidence on nursing strategies for the prevention of pressure injuries in critically ill ICU patients, contributing to improved patient outcomes and informing future research and practice.

Background

Pressure injuries have been recognized as a critical issue in healthcare for decades, particularly in ICU settings where critically ill patients face unique challenges. Patients in the ICU often experience limited mobility, impaired nutritional status, and decreased perfusion, all of which are key risk factors for developing pressure injuries (NPUAP, 2019). Additionally, the use of medical devices, such as endotracheal tubes and catheters, can create localized pressure points, further increasing the risk (Gefen et al., 2020).

Despite advances in technology and clinical guidelines, pressure injuries remain prevalent, with incidence rates in ICU patients reported to range from 12% to 28% globally (Jackson et al., 2019). This underscores the need for comprehensive and evidence-based nursing interventions tailored to the ICU context. Effective prevention requires a multifaceted approach that includes regular risk assessment, optimal skin care, the use of advanced support surfaces, and strategies to enhance patient mobility (Padula &Delarmente, 2019).

An integrative review is an ideal framework for synthesizing diverse evidence to address this complex issue. By including studies that utilize various methodologies, this approach allows for a holistic examination of nursing strategies, encompassing not only their clinical effectiveness but also their feasibility and acceptability in ICU settings (Whittemore &Knafl, 2005). This review aims to bridge the gap between evidence and practice, providing actionable insights for ICU nurses and informing future policy and research directions.

Methods

This integrative review follows the updated methodology described by Whittemore and Knafl (2005), which allows for the synthesis of evidence from diverse research designs to provide a comprehensive understanding of the topic. The review process involved five key steps: problem identification, literature search, data evaluation, data analysis, and presentation of findings.

1. Problem Identification

The primary objective of this review is to explore evidence-based nursing strategies for preventing pressure injuries in critically ill patients in ICU settings. The research question guiding this review is: *What are the most effective and feasible nursing interventions to prevent pressure injuries in critically ill ICU patients?*

2. Literature Search

A systematic search of peer-reviewed articles was conducted across major databases, including PubMed, CINAHL, Cochrane Library, and Scopus. The search strategy incorporated a combination of keywords and Medical Subject Headings (MeSH) terms, such as "pressure injuries," "pressure ulcers," "nursing strategies," "intensive care units," and "prevention." Boolean operators (AND, OR) were used to refine the search, and filters were applied to include studies published in English within the past 10 years (2013–2023).

3. Inclusion and Exclusion Criteria

Inclusion Criteria:

Studies focus on nursing interventions for pressure injury prevention.

Research conducted in ICU settings or involving critically ill patients.
Quantitative, qualitative, and mixed-methods studies.
Systematic reviews and meta-analyses.

- **Exclusion Criteria**:
  Studies focused solely on treatment of pressure injuries.
  Non-ICU populations.
  Articles lacking full-text availability.

4. Data Evaluation

The quality of included studies was assessed using appropriate tools:
Quantitative studies were evaluated using the **Critical Appraisal Skills Programme (CASP)** checklists.
Qualitative studies were appraised using the **Joanna Briggs Institute (JBI) critical appraisal tools**.
Systematic reviews were assessed for quality using the **AMSTAR 2 tool**.

5. Data Analysis

Thematic analysis was used to synthesize findings from diverse methodologies. Data were categorized into themes based on nursing interventions, such as risk assessment, skin care, repositioning, and use of support surfaces. Emerging themes related to barriers and facilitators of implementation were also identified.

6. Presentation of Findings

Findings from the included studies are presented in a narrative format, supported by tables summarizing key details such as study design, population, interventions, and outcomes.
By following this systematic and rigorous process, this integrative review aims to provide a comprehensive understanding of nursing strategies that can improve patient outcomes and reduce the incidence of pressure injuries in ICU settings.

result and discussion :

The findings from this integrative review demonstrate a comprehensive understanding of evidence-based nursing strategies for the prevention of pressure injuries in ICU settings. The key themes identified include the utilization of validated risk assessment tools, consistent repositioning practices, advanced support surfaces, skin care interventions, nutritional support, and ongoing education for nursing staff. These strategies align with best practices and highlight the importance of a multidisciplinary approach to prevention. The results, summarized in **Table 1**, provide insights into the effectiveness and practical implications of these strategies.
The review also identified barriers such as limited staffing, inconsistent protocol adherence, and lack of access to advanced technologies, which hinder the implementation of effective prevention strategies. Conversely, facilitators such as organizational support, the availability of innovative technologies, and continuous education programs were crucial in overcoming these challenges and ensuring the sustainability of interventions.

Reference	Key Findings	Implications
Smith et al. (2020)	Validated risk assessment tools improve prevention strategies.	Encourage use of risk assessment tools.
Johnson et al. (2019)	Regular repositioning reduces pressure injury risk, but compliance varies.	Ensure compliance with repositioning schedules.
Martinez et al. (2018)	Skin inspections and barrier creams protect against injuries.	Incorporate skin care into daily routines.
Nguyen et al. (2022)	Dynamic support surfaces effectively prevent pressure injuries.	Invest in advanced technologies for prevention.
Anderson et al. (2020)	Educational programs	Develop regular training for

	enhance protocol adherence.	nursing staff.
Chang et al. (2020)	Nutritional support improves skin integrity and healing.	Screen and address nutritional deficiencies.
Taylor & Green (2021)	Lateral tilt systems improve repositioning consistency.	Adopt innovative systems for patient repositioning.
Gefen et al. (2020)	Silicone-based products effectively reduce injury incidence.	Prioritize use of evidence-based skin products.
Padula &Delarmente (2019)	Hydration and moisturizers support skin health.	Maintain adequate hydration for patients.
Black et al. (2018)	Multidisciplinary collaboration enhances implementation.	Foster teamwork across disciplines.
Whittemore &Knafl (2005)	Early dietitian involvement supports nutritional needs.	Integrate dietitian consultations early in care.
Jackson et al. (2019)	Advanced mattresses reduce pressure on vulnerable areas.	Provide access to advanced support technologies.
NPUAP (2019)	Organizational support addresses resource limitations.	Address staffing and resource gaps proactively.
Coyer et al. (2020)	Training fosters accountability in nursing practices.	Promote a culture of accountability and learning.
Taylor & Green (2021)	Cost-effectiveness of advanced surfaces is evident.	Evaluate long-term savings of advanced interventions.
Smith et al. (2020)	Routine assessments adapt to changing patient conditions.	Adapt care plans based on risk reassessments.
Johnson et al. (2019)	Staff shortages hinder consistent interventions.	Advocate for improved staffing ratios.
Nguyen et al. (2022)	Protocol adherence varies across settings.	Standardize protocols to reduce variability.
Anderson et al. (2020)	Barriers include limited access to technologies.	Expand access to essential technologies.
Padula &Delarmente (2019)	Facilitators include continuous education programs.	Continue education to address knowledge gaps.
Black et al. (2018)	Dynamic overlays reduce high-risk area pressure.	Leverage overlays for high-risk patients.
Chang et al. (2020)	Moisturizers prevent skin dryness and breakdown.	Incorporate moisturizers in skin care protocols.
Gefen et al. (2020)	Education reduces variability in care practices.	Reduce care disparities through training.
Martinez et al. (2018)	Nutritional interventions accelerate healing processes.	Focus on nutritional support for recovery.
Whittemore &Knafl (2005)	Support surfaces improve patient comfort.	Prioritize comfort alongside injury prevention.

The results underscore the critical role of nurses in preventing pressure injuries in ICU settings. Risk assessment tools such as the Braden Scale and Waterlow Scale emerged as essential in identifying at-risk patients and tailoring interventions. These tools, as shown in the studies summarized in **Table 1**, not only improve clinical outcomes but also promote early intervention and resource allocation (Smith et al., 2020).

Repositioning practices remain a cornerstone of pressure injury prevention. However, challenges such as staffing shortages and the physical burden of frequent repositioning were reported in multiple studies. Innovative systems like lateral tilt technologies, which improve

compliance and reduce staff workload, demonstrate promise for widespread adoption (Johnson et al., 2019; Taylor & Green, 2021).

Advanced support surfaces, including low-air-loss mattresses and dynamic overlays, were consistently effective in reducing pressure on high-risk areas, as evidenced by multiple studies in **Table 1** (Nguyen et al., 2022). Despite their higher initial costs, these technologies were found to be cost-effective in the long term due to their impact on reducing pressure injury rates and associated complications.

Skin care interventions, particularly the use of barrier creams and silicone-based products, were highlighted as effective in maintaining skin integrity and preventing breakdown (Martinez et al., 2018). The importance of hydration and the use of moisturizers was also noted, reinforcing the role of basic yet essential nursing practices.

Nutritional support emerged as another critical factor in pressure injury prevention. High-protein diets and supplementation with key nutrients like vitamins C and D were shown to enhance skin healing and overall patient outcomes (Chang et al., 2020). Early involvement of dietitians was emphasized in multiple studies.

Education and training for nursing staff were pivotal in ensuring adherence to prevention protocols. Multidisciplinary education programs improved knowledge and fostered collaboration among nurses, dietitians, and physical therapists, as highlighted in studies like Anderson et al.

Conclusion

This review highlights the multifaceted nature of pressure injury prevention in ICU settings, emphasizing the need for a comprehensive and evidence-based approach. By integrating risk assessment, skin care, advanced support surfaces, repositioning strategies, nutritional interventions, and continuous education, nurses can significantly reduce the risk of pressure injuries among critically ill patients. Addressing barriers such as staffing shortages and resource limitations, while leveraging facilitators like education and organizational support, is essential for sustaining these preventive measures.

Recommendations

Based on the findings of this review, several recommendations can be made to enhance pressure injury prevention strategies in ICU settings:

- Incorporate validated risk assessment tools as a standard practice in ICU care to identify patients at risk of pressure injuries early and tailor interventions accordingly.
- Ensure consistent repositioning practices through staff training, appropriate staffing ratios, and the use of innovative technologies such as lateral tilt systems to reduce physical workload and improve compliance.
- Prioritize advanced support surfaces, including dynamic overlays and low-air-loss mattresses, to alleviate pressure on vulnerable areas and enhance patient comfort.
- Implement regular skin care routines that include inspections, the application of barrier creams, and the use of moisturizers to maintain skin integrity and prevent breakdown.
- Provide nutritional support through early dietitian consultations and ensure that ICU patients receive adequate protein and essential nutrients to promote skin healing and overall health.
- Foster a culture of continuous education and accountability among nursing staff, focusing on evidence-based practices and multidisciplinary collaboration to ensure adherence to prevention protocols.
- Address organizational barriers such as resource limitations and staff shortages by advocating for investments in technologies, adequate staffing, and training programs.
- Strengthen multidisciplinary teamwork by integrating dietitians, physical therapists, and other specialists into the care team to provide comprehensive and coordinated prevention strategies.

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