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Effectiveness of bed sore prevention strategies: a systematic review of evidence from nursing studies

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Abstract

Pressure ulcers, also known as bed sores, represent a significant challenge in healthcare, particularly for immobilized patients. These injuries can lead to severe complications, extended hospital stays, and increased healthcare costs. This systematic review evaluates the effectiveness of various prevention strategies for pressure ulcers, specifically focusing on evidence from nursing interventions. Nursing strategies such as repositioning, use of pressure-relieving devices, moisture management, and nutritional support are widely recommended; however, their practical implementation often yields inconsistent results. This review synthesizes current evidence to assess the impact of these strategies on pressure ulcer prevention, aiming to inform healthcare providers on best practices for integrating these measures effectively into patient care. Findings highlight the importance of a multidisciplinary approach and the need for continuous staff education to optimize patient outcomes and reduce the incidence of pressure ulcers.

Keywords: Pressure ulcers, bed sores, prevention strategies, nursing interventions, patient care, evidence-based practices, patient outcomes

Introduction

Despite all advances in health care, pressure ulcers (PUs) remain an old worldwide public health problem related to patient safety. Hospital-acquired PUs is one of the most harmful events in the clinical context. Pressure ulcers, commonly known as bed sores or decubitus ulcers, represent a major challenge in healthcare settings, particularly among immobilized or bedridden patients. These injuries develop when prolonged pressure on the skin and underlying tissues impede blood flow, leading to tissue damage and, in severe cases, open wounds susceptible to infection. Pressure ulcers not only compromise patient health and quality of life but also increase healthcare costs due to extended hospital stays, added treatments, and complex care needs [2].

Pressure ulcers are associated with a significant health burden, but they are preventable. Prevention of hospital-acquired pressure ulcers has become a priority for all healthcare settings, as it is considered a marker of the quality of care provided. Intensive care unit (ICU) patients are at increased risk of hospital-acquired pressure ulcers. Although published prevention strategies are available, there is little evidence about which strategies can be safely integrated into routine standard care and which have an impact on the prevention of hospital-acquired pressure ulcers [3].

Given the physical and financial burden associated with pressure ulcers, prevention has become a priority for healthcare providers and organizations globally. Nurses, being at the forefront of patient care, play a crucial role in implementing and managing pressure ulcer prevention strategies. Nursing interventions for bed sore prevention typically include repositioning, use of pressure-relieving devices, meticulous skin assessments, and moisture management. These evidence-based practices aim to mitigate the risk factors associated with pressure ulcer development and support early intervention [4].

Despite the abundance of prevention strategies, inconsistent results in their application underscore the need for a comprehensive examination of the evidence. Understanding the effectiveness of each strategy is vital to establish best practices, optimize nursing workflows, and ultimately improve patient outcomes [5]. This systematic review seeks to evaluate and synthesize existing evidence from nursing studies on bed sore prevention, examining the impact of various interventions on pressure ulcer incidence and exploring the practical implications of these findings for healthcare providers. By consolidating knowledge from diverse studies, this review aims to support evidence-based decision-making and promote the adoption of effective prevention strategies across clinical settings.

Literature Review

Pressure ulcers are a significant and persistent problem in healthcare, particularly in settings where patients experience limited mobility, such as hospitals, long-term care facilities, and home care environments. Various prevention strategies have been proposed and implemented to reduce the incidence of these ulcers. However, the effectiveness of these strategies has been subject to debate and varying results in clinical practice. This literature review aims to examine the body of evidence from nursing studies, focusing on the effectiveness of different prevention strategies for pressure ulcer development.

A bedsore is an ulcer in the outer layer of the skin (epidermis) and the underlying tissue (dermis) due to prolonged pressure. It can occur to anyone but is most common in bedridden people or those who use wheelchairs for long periods. It often appears against bony protrusion, in areas such as: (Hips, Buttocks, Back, Tailbone (coccyx), Ankles, Heels, Shoulders, back of the head, Elbows and Knees) [8].

The aims of repositioning are to reduce or relieve the pressure on the area at risk, maintain muscle mass and general tissue integrity and ensure adequate blood supply to the at risk area. Despite frequent repositioning for people at risk of pressure ulcers being accepted best practice, there is a lack of published evidence in this area. Other guidelines and reviews have relied on consensus opinion of best practice.

Pressure Ulcer Risk Factors

A pressure sore is caused by constant pressure applied to the skin over a period. Before exploring specific prevention strategies, it is important to recognize the multifactorial nature of pressure ulcer development. The skin of older people tends to be thinner and more delicate, which means an older person has an increased risk of developing a pressure sore during a prolonged stay in bed [9]. The risk factors contributing to the formation of pressure ulcers include immobility, poor nutrition, incontinence, advanced age, comorbidities (e.g., diabetes, vascular diseases), and compromised sensory perception. Various risk assessment tools, such as the Braden Scale, have been widely used by healthcare professionals to identify at-risk patients and guide prevention strategies. However, while these tools help with early identification, the effectiveness of prevention methods still requires careful evaluation [10].

Repositioning and Mobilization

Repositioning is one of the most widely utilized and recommended methods to prevent pressure ulcers. Regular repositioning helps alleviate sustained pressure on vulnerable areas of the body, such as the sacrum, heels, and elbows. Several studies have investigated the frequency of repositioning, with recommendations typically ranging from every two to four hours. A systematic review by *Smith et al.* (2019) found that repositioning, when combined with patient education and individualized care plans, significantly reduced the incidence of pressure ulcers in hospitalized patients. However, some studies highlight the challenges of maintaining repositioning schedules due to nursing workload and patient non-compliance.

Additionally, researches have shown that mobilizing patients, rather than just repositioning them, offers added benefits in preventing pressure ulcers. Early mobilization of patients who were at high risk for pressure ulcers was associated with a reduced incidence of these injuries, particularly among patients recovering from surgery or trauma. Despite these findings, barriers such as staffing shortages and the physical limitations of patients can impede the successful implementation of mobilization strategies.

Pressure-Relieving Devices

Selection of a device may depend on factors such as mobility of the individual, the results of skin assessment, the level of and site at risk, weight, staff availability and skill plus the general health and condition of the individual. It is also important that any device is able to be cleaned and decontaminated effectively. It is accepted that these devices should be used in conjunction with other preventative strategies such as repositioning [12]. The use of pressure-relieving devices, such as specialized mattresses, cushions, and overlays, has become a cornerstone in preventing pressure ulcers, especially for patients with limited mobility. Studies comparing the effectiveness of different types of pressure-relieving devices show mixed results. A study by Nixon, et al. (2019) indicated that high-specification foam mattresses were more effective than standard foam mattresses in reducing pressure ulcer risk in patients with moderate to high-risk assessments. On the other hand, many studies suggested that while pressure-relieving devices are helpful, they are not a standalone solution and must be used in conjunction with other preventive measures, such as repositioning [13].

Moreover, new innovations in pressure-relieving technologies, such as alternating pressure mattresses and air-fluidized beds, have demonstrated superior outcomes in preventing pressure

ulcers. However, cost and accessibility remain significant challenges, particularly in resource-limited settings.

Moisture Management

Moisture management, particularly the prevention of skin maceration caused by incontinence, is another critical component of pressure ulcer prevention. Prolonged exposure to moisture weakens the skin and increases the likelihood of ulcer formation. Woo, et al., (2017) found that skin care protocols, including the use of moisture barriers and regular skin assessments, significantly reduced the incidence of pressure ulcers in patients with incontinence. While studies have shown the effectiveness of moisture management in combination with repositioning and pressure-relieving devices, the implementation of comprehensive skin care programs in clinical settings has been inconsistent. Protecting the skin against moisture-associated damage is an important component of comprehensive skin and wound care. Based on a review of literature, the authors propose key interventions to protect and prevent damage in the skin folds, perineum, and areas surrounding a wound or stoma [14].

Nutrition and Hydration

Pressure ulcers can diminish global quality of life, contribute to rapid mortality in some patients and pose a significant cost to health-care organizations. Accordingly, their prevention and management are highly important. Nutritional deprivation and insufficient dietary intake are the key risk factors for the development of pressure ulcers and impaired wound healing. Unplanned weight loss is a major risk factor for malnutrition and pressure ulcer development. Suboptimal nutrition interferes with the function of the immune system, collagen synthesis, and tensile strength. No laboratory test can exactly define an individual's nutritional status. Adequate nutrition and hydration are essential for skin integrity and wound healing, but their role in ulcer pressure prevention is often overlooked. Malnutrition, particularly protein-energy malnutrition, is a known risk factor for pressure ulcer development. Saghaleini, et al., concluded that nutritional supplementation, including the use of oral protein supplements and vitamins, improved skin health and reduced the occurrence of pressure ulcers in high-risk patients. However, this intervention’s success largely depends on early identification of patients who are at risk of malnutrition and the ability to provide individualized nutritional support [9].

Education and Training

Effective education and training for healthcare providers and patients themselves are vital to the success of pressure ulcer prevention programs. Studies have consistently shown that nurses who are well-versed in pressure ulcer prevention protocols and who receive ongoing training are more likely to adhere to prevention guidelines and improve patient outcomes. Many studies highlighted the positive impact of regular staff education on pressure ulcer prevention practices, which resulted in a significant reduction in ulcer incidence across various hospital departments.

Patient education, including training patients on repositioning techniques and the importance of maintaining skin integrity, is equally important. However, the success of patient education depends on various factors, including cognitive abilities and the support system available to the patient at home.

Multidisciplinary Approaches

Multidisciplinary approaches to pressure ulcer prevention, which involve collaboration between nurses, physicians, dietitians, and physiotherapists, have been shown to yield better outcomes than isolated interventions. *Gasper et al.* (2019) emphasized the effectiveness of team-based care in managing high-risk patients. By combining expertise from different healthcare professionals, comprehensive care plans are developed that address multiple aspects of pressure ulcer prevention, including risk assessment, mobilization, nutrition, and skin care [2].

Conclusion

Based on this scoping review of literature, the authors propose key interventions to protect and prevent MASD including the use of barrier ointments, liquid polymers, and cyanoacrylates to create a protective layer that simultaneously maintains hydration levels while blocking external moisture and irritants. The literature supports a multi-faceted approach to pressure ulcer prevention that combines various nursing interventions. While repositioning, pressure-relieving devices, moisture management, and nutritional care have all been shown to reduce pressure ulcer risk, the best outcomes occur when these strategies are implemented together as part of a holistic care plan. Challenges remain, particularly in terms of resource limitations, adherence to prevention protocols, and the need for continuous staff education. Future research should continue to explore the effectiveness of different strategies, especially in diverse healthcare settings, and focus on optimizing the implementation of evidence-based practices to reduce the incidence of pressure ulcers and improve patient outcomes.

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