

Prevention of Pressure Ulcers Among the Elderly

Systematic Literature Review

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Abstract/Summary

Aim: This study aims to assess the preventive strategies aimed at preventing the occurrence of pressure ulcers among the elderly, with a specific emphasis on the role of nurses in these prevention approaches.

Methods: A comprehensive exploration of electronic databases was conducted, yielding ten articles that underwent analysis in this study. Imogene King's theory of goal attainment was applied to emphasize the significance of patient-nurse interaction in delivering patient-centered care.

Results: The findings were organized into two main themes. The initial theme explores preventive measures for the elderly, encompassing sub-themes like nutritional support, regular skin assessment and care, management of underlying conditions such as chronic illnesses, repositioning methods, and the utilization of pressure-relieving devices. The subsequent core theme concentrates on knowledge and awareness, involving sub-themes like educational initiatives and training, as well as effective communication and meticulous documentation.

Conclusion: The study concluded that preventing pressure ulcers among the elderly necessitates a multi-pronged approach that encompasses skin assessment, management of chronic conditions, proper nutrition and hydration, repositioning techniques, specialized devices, continuous education, effective communication, and meticulous documentation. By weaving these strategies together, nurses can significantly reduce the risk of pressure ulcers and promote the holistic well-being of elderly patients.

Language: English

Key words: Prevention, pressure ulcers, elderly people, bedsores, nursing intervention, knowledge, and education.

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1 Introduction

Aging results in many biological, physical, and physiological changes which have a direct effect on risks of diseases that eventually cause death. According to the World Health Organization (WHO), the global population is currently aging faster than before. For instance, in 2020 the number of people aged 60 years and above was higher than children younger than 5 years. It is estimated that between 2015 to 2050 that the elderly population would almost double from 12% to 22% (WHO, 2022). The demographics data from Finland shows that the population of people aged 65 years and above has grown substantially too. The Finnish Institute for Health and Wealth (THL) describes Finland's population as one of the oldest in Europe comprising of four historical eras existing concurrently (THL, 2023).

One of the most prevalent medical issues that the elderly experience are pressure ulcers also known as "bedsores" or "pressure sores" or "decubitus ulcers". Globally, the prevalence of pressure ulcers is about 12% (Zhang, et al., 2021) and more than eight percent (8%) of all nursing home patients have experienced a pressure ulcer at some point. Nursing homes still record more pressure ulcers cases than other health entities (Nursing Home Abuse Guide, 2023). Consequently, there is a financial burden when it comes to preventing and treating this condition as it associated with pain and a lot of discomfort decreasing the quality of life and death. Research done at the Aalto University estimates that the care for pressure ulcers takes up to 500 million euros in healthcare expenditures each year in Finland (Aalto University, 2022).

Over the years, the development of pressure ulcers has been viewed as an indication of a poor quality of nursing care. Florence Nightingale wrote in 1859 that if a patient has a bedsore, it was not the fault of the disease but of the nursing (Lyder & Ayello, 2008). In addition, various scholars have presented corroborating views that described this issue as a "visible mark of caregiver sin" and poor or lack of nursing care, and thus needing attention when caring for elderly (Lindhardt, Beck, & Ryg, 2020; Lyder & Ayello, 2008). It is therefore clear that prevention of pressure ulcers remains a nursing problem till now despite modern medical advancement. As a nursing student, I have gained experience working with elderly patients in nursing homes and hospitals. During my clinical rotations, I observed a significant number of elderly patients suffering from pressure ulcers, which cause pain and discomfort. The prevalence of pressure ulcers among the elderly is concerning, and despite advancements in healthcare, it remains a prevalent issue. My observations motivated me to conduct research on this topic and explore effective prevention strategies.

2 Background

This chapter presents the central concepts of this thesis, that include definition of pressure ulcers, classification of pressure ulcers, risk factors associated with development of pressure ulcers, common risk assessment tools and preventive strategies when it comes to pressure ulcers prevention.

2.1 Definition – What are pressure ulcers?

Pressure ulcers are also known as bedsores or decubitus ulcers. According to the National Cancer Institute (NCI) publication, pressure ulcers are damaged areas of the skin caused by constant pressure for a long time. The pressure tends to cause deficiency of nutrition and oxygen in these areas resulting to tissue necrosis (NCI, 2023). Other scholars have attributed pressure ulcers to compression of the capillaries that supply to the skin and subcutaneous tissues resulting to impediment of perfusion and ultimately tissue necrosis (Lyder & Ayello, 2008).

2.2 Classification of pressure ulcers

The stages of pressure ulcers are categorized based on the severity of the tissue damage. The National Pressure Ulcer Advisory Panel (NPUAP) describes the stages of bedsores as follows:

Stage 1: In this stage, the skin is intact but there may be non-blanchable erythema (redness) in light-skinned individuals or a blue or purple hue in dark-skinned individuals. The affected area may feel warmer or cooler than the surrounding skin, and there may cause discomfort or itching. This stage indicates that there is damage to the skin and underlying tissue and serves as a warning sign for further tissue damage if left unaddressed.

Stage 2: In this stage, there is partial-thickness loss of skin layers, which can include damage to the epidermis, dermis, or both. The ulcer is superficial and clinically presents as an abrasion, blister, or shallow crater. There may be mild to moderate pain or discomfort.

Stage 3: In this stage, there is full-thickness loss of skin involving damage or necrosis of subcutaneous tissue that may extend down to, but not through, underlying fascia. The ulcer is clinically a deep crater, and there may be undermining of adjacent tissue. Pain is generally more severe in this stage.

Stage 4: In this stage, there is complete loss of skin layers, with destruction, tissue necrosis, or damage to muscle, bone, or supporting structures (like tendon or joint capsule). Clinically, the ulcer is a deep cavity, and there may be exposed bone, tendon, or muscle. Pain is often severe and may require aggressive pain management.

In addition to these stages, there is an unstageable category in which the full extent of the tissue damage cannot be determined due to the presence of slough or eschar. The NPUAP also recognizes deep tissue injury as a potential precursor to the formation of a pressure ulcer (Bansal, Scott, Stewart, & Cockerell, 2005)

2.3 Risk factors associated with the development of pressure ulcers

There are several risk factors associated with the development of pressure Ulcers among elderly individuals. These factors fall into either intrinsic or extrinsic risk factors. Intrinsic factors are related to the individual's physical and medical conditions, while extrinsic factors are related to the environment and care provided to the individual.

2.3.1 Intrinsic risk factors

Age is a well-established factor that contributes to the development of pressure ulcers or bedsores. Numerous studies have shown that older adults are at a higher risk of developing bed sores than younger adults due to several age-related changes that occur in the skin and other body tissues. These changes include a reduction in skin thickness and elasticity, decreased blood flow, and slower wound healing. Elderly individuals who are bedridden or have limited mobility due to conditions such as stroke, spinal cord injury, or arthritis, are at a higher risk of developing bedsores. However, recent studies have also found that even short periods of immobility, such as sitting for prolonged periods, can increase the risk of developing bedsores (Margolis, Knauss, Bilker, & Baumgarten, 2003).

Poor nutrition can lead to weakened skin and tissue, making them more susceptible to pressure ulcers as there are lack of proteins, vitamins, and minerals (Shahin, et al., 2010). Obesity can also be a risk factor due to excess adipose tissue that can increase pressure on the skin and reduce blood flow. Individuals with urinary or fecal incontinence are at a higher risk of developing pressure ulcers as the moisture and bacteria can irritate the skin and cause it to breakdown. Studies have also found that the use of incontinence pads and briefs may increase the risk of bedsores, as they can increase moisture and friction on the skin (Beeckman, Lancker, Hecke, & Verhaeghe, 2014).

Certain chronic conditions like diabetes, hypertension, and cardiovascular disease can impact the blood circulation to the skin, rendering it more vulnerable to pressure ulcers. Cognitive impairment or dementia can hinder individuals from recognizing or expressing pain and discomfort, thereby reducing their inclination to change positions and alleviate pressure in specific areas. Smoking diminishes blood flow to the skin, thereby heightening the susceptibility to pressure ulcers. Moreover, certain medications like steroids and anticoagulants can elevate the risk of pressure ulcers by weakening the skin and impairing blood flow. (Anders, et al., 2010)

2.3.2 Extrinsic risk factors

Prolonged pressure on the skin and tissue can cause pressure ulcers. This pressure can be caused by lying or sitting in one position for too long, or by medical devices such as oxygen tubing and ventilator masks. Friction and shear forces, which occur when the skin is dragged across a surface or when there is movement between the skin and bones, can cause damage to the skin and tissue, increasing the risk of bedsores. Prolonged exposure to moisture can lead to skin breakdown and the development of pressure ulcers. This can be caused by incontinence, sweating, or inadequate wound care. Poor hygiene, including not frequently bathing or changing clothing and bedding, can lead to skin breakdown and the development of bedsores. Inadequate care, that comprise of improper positioning, inadequate nutrition, and inadequate wound care, can increase the risk of pressure ulcers (Lyder & Ayello, 2008).

2.4 Risk assessment of pressure ulcers

A risk assessment is essential to prevent the development of pressure ulcers among the elderly. There are some risk tools that are more commonly used in risk assessment; however, it is important to note that no single tool is fully reliable, and a combination of different tools and clinical judgment may be necessary for a comprehensive risk assessment.

2.4.1 Braden scale

The Braden scale is an important assessment tool in the healthcare industry, particularly in evaluating the risk of developing pressure ulcers. Developed by Barbara Braden and Nancy Bergstrom in 1987, the scale has six parameters that help determine a patient's risk of developing pressure ulcers. These parameters include sensory perception, moisture, activity, mobility, nutrition, and friction/shear. Sensory perception evaluates a person's ability to sense pressure and pain, which is essential in determining whether a patient is at risk of

developing pressure ulcers. The moisture component evaluates the degree to which a person's skin is exposed to moisture, which is a key factor in the development of pressure ulcers. Activity, on the other hand, assesses a person's level of physical activity, while mobility evaluates the ability to change positions independently. Both activity and mobility are important factors in determining the risk of developing pressure ulcers (Braden & Maklebust, 2005).

The nutrition component of the Braden scale evaluates the nutritional status of an individual, which is also a key factor in the development of pressure ulcers. Finally, friction and shear evaluate a patient's exposure to friction and shear forces, which can damage the skin and contribute to pressure ulcer development. Each parameter in the Braden Scale is scored, and the total score ranges from 6 to 23, with a lower score indicating a higher risk of developing pressure ulcers. Healthcare professionals widely use the Braden Scale to assess a patient's risk of developing pressure ulcers, and it is a valuable tool in ensuring that patients receive appropriate preventive measures to reduce their risk of developing pressure ulcers (Braden & Maklebust, 2005). Examples of Braden Scale can be found in Appendix.

2.4.2 Norton scale

The Norton scale, developed by nurse Doreen Norton in 1962, is a widely used tool for assessing a person's risk of developing pressure ulcers. The scale includes five parameters that can contribute to the development of pressure ulcers: physical condition, mental condition, activity, mobility, and incontinence. Physical condition assesses a person's overall physical health, with categories ranging from very poor to good. Mental condition evaluates cognitive function, with categories such as disoriented, confused, alert, and oriented. Activity assesses physical activity and includes categories such as bedridden, chair-bound, and walks occasionally. Mobility evaluates a person's ability to change positions independently, with categories such as completely immobile and partially immobile. Finally, incontinence evaluates the person's level of bowel and bladder control, with categories such as frequently incontinent and occasionally incontinent. Each parameter is scored, and the total score ranges from 5 to 20, with a lower score indicating a higher risk of developing pressure ulcers. (Leijon, Bergh, & Terstappen, 2013). Example of Norton Scale in Appendix.

2.4.3 Waterlow scale

The Waterlow scale is a comprehensive tool that was developed in 1985 by a clinical nursing teacher. It assesses 11 parameters like age that affect the development of pressure ulcers with

older people are at higher risk. Therefore, individuals over the age of 64 receive additional points. Sex is another parameter to consider as women are at higher risk for developing pressure ulcers than men. Thus, women receiving additional points.

A person's weight is parameter as people who are underweight, or overweight are at higher risk for developing pressure ulcers. As a result, the Scale allocates additional points to individuals that are underweight or overweight. Additional points are given to individuals who are immobile or have limited mobility as they are at higher risk for developing pressure ulcers. Skin type is also a parameter used as individuals with fragile skin are at a higher risk for developing pressure ulcers. Points are given according to the type of skin. The medical history of an individual is considered as certain medical conditions are at higher risk for developing pressure ulcers. Terminal cachexia and multiple organ failure lead with 8 points in this scale. Other parameters include continence, appetite, medication, tissue malnutrition, and neurological deficit.

The scores for each category are added together to give a total Waterlow scale score. The total score ranges from 1 to 64, with higher scores indicating a higher risk for pressure ulcer development. (Chamanga, 2010). Example of Waterlow scale found in Appendix.

2.5 Prevention strategies for pressure ulcers

Prevention of pressure ulcers or bedsores is a multifaceted approach which began in the Florence Nightingale era as she recognized the importance of preventing pressure ulcers and she was one of the first to document the link between pressure ulcers and poor patient outcomes (Lyder & Ayello, 2008). While some prevention methods have been refined and improved over time, the basic principles of prevention remain the same.

In elderly individuals, early assessments are important and so is using Pressure Ulcer Prevention Protocol which is a systematic approach to preventing pressure ulcers. The protocol typically involves several preventive measures that are aimed at reducing the pressure on vulnerable areas of the body where the bone is near the surface, such as the buttocks, heels, hips, and shoulders, as shown in Figure 1 below.

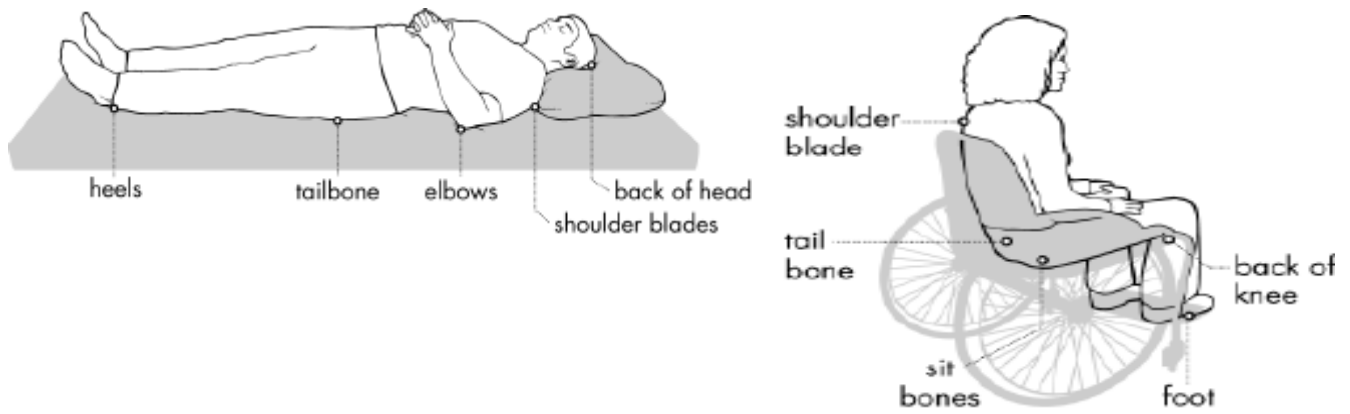


Figure 1: Areas that are susceptible to pressure ulcers.

Source: <https://msktc.org/sci/factsheets/areas-high-risk-developing-pressure-sores>

Implementing a Pressure Ulcer Prevention Protocol can significantly reduce the incidence of pressure ulcers among the elderly. The protocol should be tailored to the individual's needs and updated regularly based on the individual's condition. There are key components that embodies the prevention protocol for pressure ulcer, these include: regular skin assessments, repositioning, pressure-relieving device, and skin care. This research intends to discuss in detail these components and other prevention strategies.

3 Research objective

The aim is to contribute to the knowledge and understanding of pressure ulcers among the elderly population and to provide practical recommendations for pressure ulcers prevention.

3.1 Research question

What is the role of nurses in pressure ulcers prevention among the elderly?

4 Theoretical framework

A theoretical framework is a structured approach that outlines the concepts, principles, and theories used to explain and interpret phenomena in a particular field of study. Theoretical frameworks provide a conceptual framework to guide research and can help researchers to organize their thoughts, develop hypotheses, and interpret findings (Alligood, 2018).

(Lederman & Lederman, 2015) describes theoretical framework as a way to justify the importance and significance of research work whether qualitative or quantitative or both. (Anfara & Mertz, 2014) views a theoretical framework serves as a tool in research that elucidates the connections between different variables, highlights deficiencies in current knowledge, and directs the formation of research inquiries, hypotheses, and approaches. Moreover, it enables researchers to place their investigation in a larger theoretical context and facilitates the analysis of findings and the generation of suggestions.

This research will use Imogene King's theory of goal attainment. Which is a nursing theory that focuses on the relationship between the nurse, the patient, and the patient's environment. The theory guides nurses in their interactions with patients by emphasizing a collaborative process that aims to achieve mutually agreed-upon health goals. This process involves working closely with patients and taking their individual needs into account to promote optimal health outcomes (Gonzalo, 2023).

King's theory is based on three interacting systems: personal, interpersonal, and social. The personal system includes the patient's individual characteristics, such as their age, and health status. The interpersonal system involves the relationship between the nurse and the patient, including communication and the establishment of mutual goals. The social system encompasses the larger societal factors that can influence a patient's health, such as culture, family, and community (Parker & Smith, 2001). These systems play a vital role in forming a realistic care plan aimed at pressure ulcers prevention for an elderly patient.

Figure 2 depicted below illustrates a conceptual system that offers a comprehensive approach to the study of systems, emphasizing their interconnected nature rather than viewing them as independent components. It was specifically developed to provide insight into the complex systems in which nurses operate and to clarify the relationships among the various components of those systems (King, 2007) .

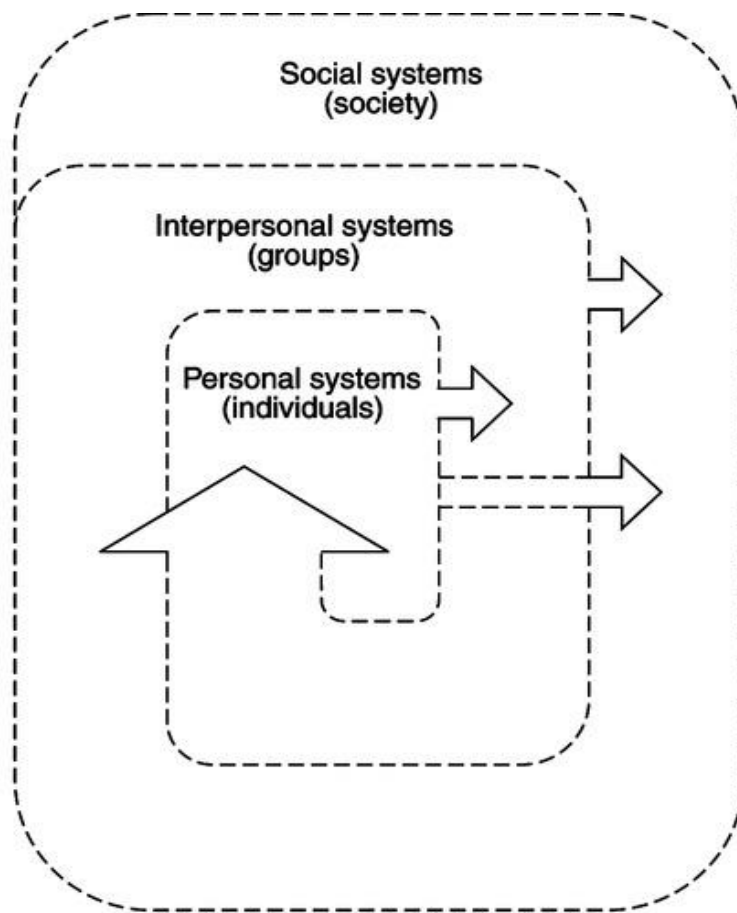


Figure 2: Dynamic conceptual systems:

Source: <https://journals.sagepub.com/doi/10.1177/0894318407299846>

The Theory of Goal Attainment by Imogene King can be applied to the nursing process, which involves assessment, diagnosis, planning, implementation, and evaluation. In the assessment phase, King's theory helps the nurse gather information about the patient's systems. In the diagnosis phase, it helps identify health needs and barriers to goal attainment. In the planning phase, it supports the development of a tailored plan of care. In the implementation phase, it guides the provision of interventions to achieve goals. In the evaluation phase, it assesses plan effectiveness and informs any necessary adjustments. Overall, the Theory of Goal Attainment enhances patient-centered care (Gonzalo, 2023).

5 Research methodology

Research methodology encompasses a structured and systematic approach used to carry out research and attain dependable and valid outcomes. It encompasses the overall planning, design, and implementation of a research study, including the methods and techniques utilized for data collection and analysis. Its main objective is to ensure that the research study is conducted in a meticulous, well-organized, and unbiased manner, while optimizing the reliability and validity of the findings. Moreover, it serves as a framework that enables researchers to address their research questions, examine specific phenomena, or test hypotheses (Kathori, 2004). Research methodologies comprise a range of techniques and for this research qualitative systematic literature review was used.

5.1 Qualitative systematic literature review

According to (Glasziou & Glasziou, 2001; Thomas & Harden, 2008; Chandler, et al., 2019) a qualitative systematic literature review is a methodical and comprehensive analysis of existing literature within a specific field, focusing on qualitative research studies. It involves identifying, selecting, appraising, and synthesizing relevant qualitative studies. Researchers follow a systematic process, including defining the research question, conducting a thorough search, selecting studies based on predetermined criteria, appraising study quality, extracting data, synthesizing findings, and providing an interpretation and summary of the results. This type of review contributes to understanding subjective experiences, identifying patterns and themes, and generating new theoretical perspectives or frameworks.

5.2 Data collection

The data used was collected through a comprehensive search of electronic databases, including PubMed, CINAHL Complete, EBSCO, and Medline. Keywords were used such as “Prevention,” “pressure ulcers,” “elderly people,” “bedsores,” “nursing intervention,” “knowledge,” and “education.” The search was limited to articles published in English within the past ten years (2013-2023).

5.2.1 Data selection criteria

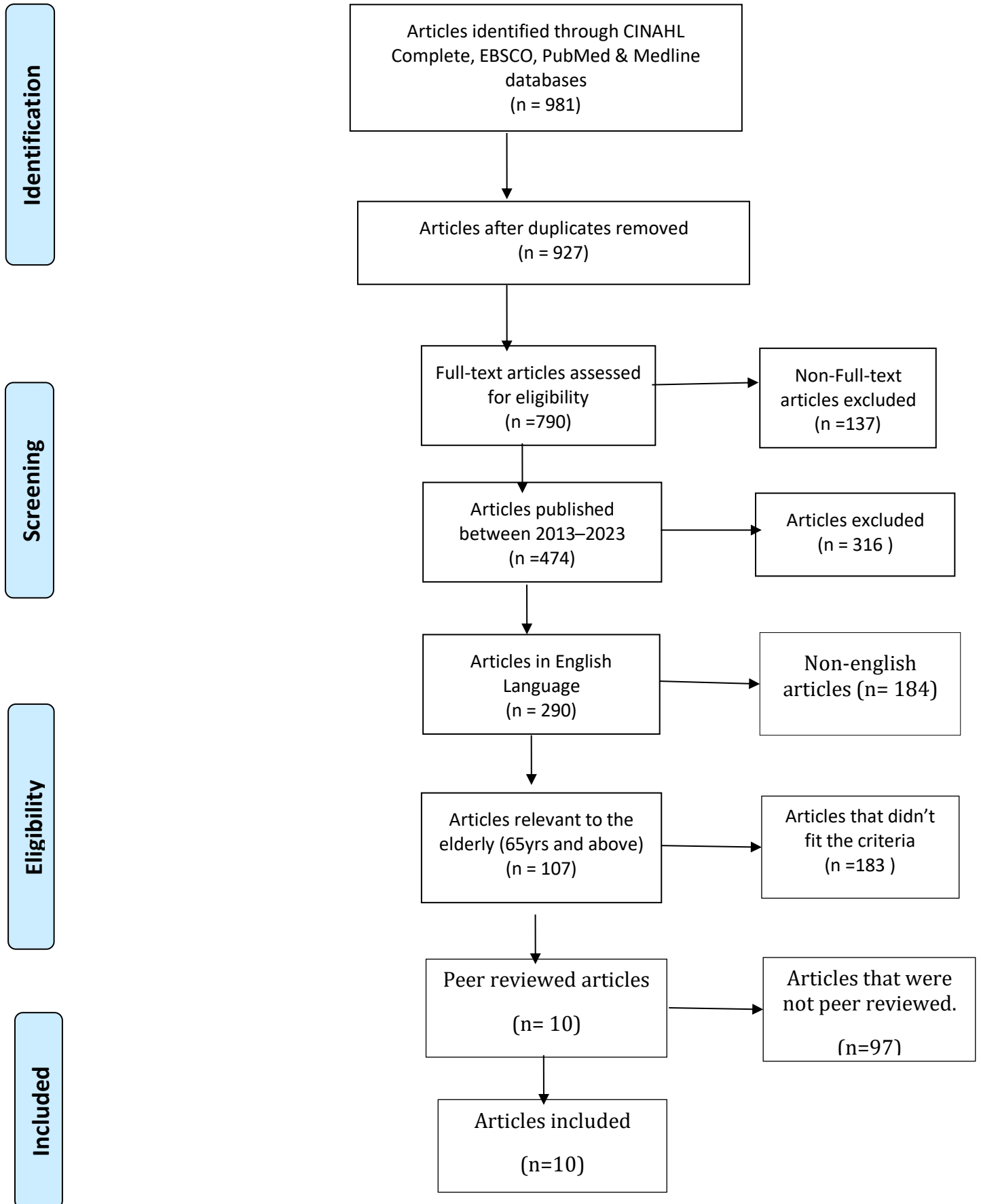
The selection of articles included screening of titles and abstracts to identify potentially relevant articles. Articles were retrieved and assessed for eligibility using pre-defined inclusion and exclusion criteria as shown in Table 1 below.

Table 1: Data selection criteria

Data Selection Criteria (Inclusion)	Data Selection Criteria (Exclusion)
<ol style="list-style-type: none">1. Relevant articles that directly addressed or explored factors, strategies, interventions, or experiences related to pressure ulcer prevention among the elderly.2. Included articles involving elderly individuals (typically aged 65 and above) who are at risk of pressure ulcers or have experienced pressure ulcers, as well as healthcare professionals involved in their care.3. Articles written in the English language.4. Peer-reviewed articles5. Full text articles6. Articles that had qualitative research studies, such as interviews, focus groups, or case studies, that provided insights into subjective experiences, perspectives, and meanings related to pressure ulcer prevention.	<ol style="list-style-type: none">1. Irrelevant articles that did not address pressure ulcers prevention among the elderly.2. Excluded studies that primarily involve individuals outside the elderly population or studies that focus solely on pediatric or adult populations.3. Excluded duplicate articles to avoid redundancy in the review process.4. Exclude studies that are inaccessible or unavailable for thorough analysis.5. Articles written in other languages.6. Articles not available as full text and not peer-reviewed7. Exclude studies that are inaccessible or unavailable for thorough analysis.8. Excluded quantitative articles, and experiment.

A PRISMA flowchart, as depicted in Figure 3 below, was used to visually illustrate the data selection process, starting from the initial search results, and concluding with the final 10 articles used for this research.

Figure 3: PRISMA Flow Diagram



5.3 Qualitative content analysis (QCA)

According to (Selvi, 2019), qualitative content analysis is defined as a robust analytical method used for the systematic and contextual interpretation of subjective content within qualitative data. This analysis can be approached from either an inductive or deductive standpoint. Inductive means drawing a general conclusion from specific observation while deductive means applying general principle to reach specific conclusions. (Azungah, 2018) For this thesis, an inductive qualitative analysis approach was chosen, allowing themes and sub-themes to naturally emerge during data analysis. The process involved organizing the content, identifying patterns or themes, and interpreting the data to gain insights into the phenomena under investigation.

In this thesis, data from the 10 articles underwent a thorough analysis. This involved a comprehensive review of each article's objectives, methodologies, and findings. It was followed by identifying common themes or topics that emerged across the articles and developing a coding system to categorize the data. The coded data was organized into meaningful categories and sub-categories, facilitating the exploration of similarities, and differences. The ultimate goal of this analysis was to gain a comprehensive understanding of the role of nurses in the prevention of pressure ulcers among the elderly.

5.4 Ethical considerations

Ethical considerations refer to the principles and guidelines that researchers must bear in mind when designing, conducting, and reporting their studies. These considerations ensure that research is conducted in an ethical manner, respects the rights and welfare of participants, and upholds the integrity of the research process. Ethical considerations encompass various aspects, including informed consent, privacy and confidentiality, beneficence and non-maleficence, respect for autonomy and dignity, fairness and equity, responsible use of data, transparency, and adherence to relevant ethical guidelines and regulations. Addressing ethical considerations is essential for maintaining the trust and integrity of research, protecting the well-being of participants, and ensuring that research is conducted in a morally and socially responsible manner (Bhandari, 2021; Hassan, 2023).

Ethical considerations in research are of utmost importance in Finland, and they are governed by national and international guidelines and regulations. Researchers in Finland have a responsibility to acquaint themselves with the specific ethical guidelines and regulations applicable to their research field. The National Advisory Board on Research

Ethics in Finland (TENK) plays a crucial role in providing guidance and assistance to researchers, fostering ethical research practices across various disciplines (TENK, 2020). Adhering to the mentioned guidelines, all information derived from external sources in this research has been appropriately acknowledged through proper citation and referencing.

6 Presentation of the results

Data was collected by conducting a thorough analysis of 10 qualitative and peer-reviewed scientific research articles, where common themes and sub-themes to address the research question were successfully identified. The collected data was categorized into two primary themes. The first theme explores **preventive measures for elderly individuals**, encompassing sub-themes such as nutrition, regular skin assessment and care, underlying conditions like chronic diseases, repositioning techniques, and the utilization of pressure-relieving devices. The second main theme focuses on **knowledge and awareness**, including sub-themes like education and training as well as communication and documentation. Visual representation of the information in Figure 4 below.

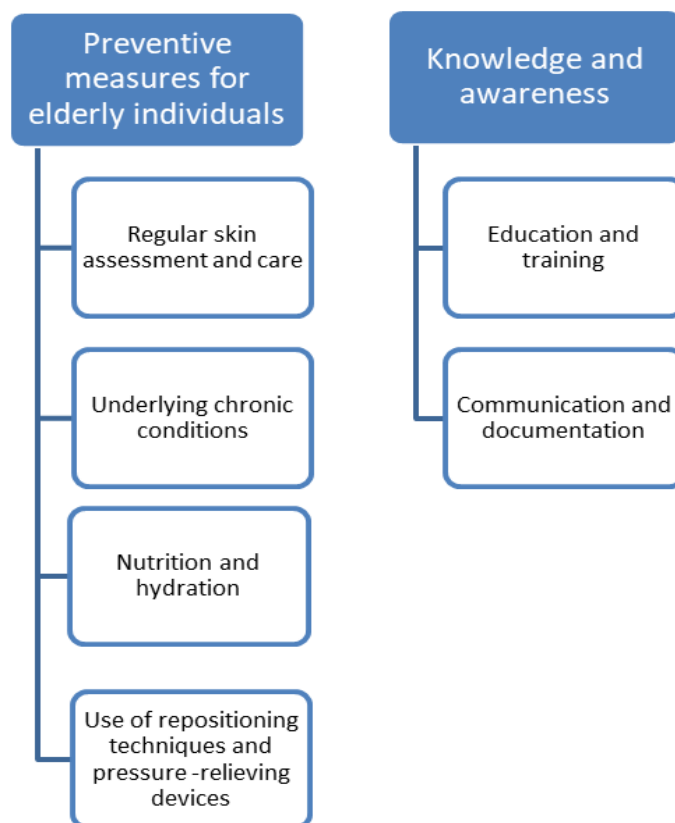


Figure 4: Themes and Sub-themes

6.1 Preventive measurements for elderly individuals

Preventive measurements for pressure ulcers in the elderly involve implementing strategies to minimize the risk of developing these painful and debilitating wounds. These interventions include regular skin assessment and care, underlying chronic condition, nutrition and hydration, repositioning techniques, and utilization of pressure -relieving devices.

6.1.1 Regular skin assessment and care

Pressure ulcers are a common condition among older adults who are bedridden or confined to a wheelchair. These ulcers occur due to prolonged pressure on the skin, which can result in damage to the underlying tissue. Regular skin assessments are an essential aspect of preventing pressure ulcers among the elderly. To prevent pressure ulcers, nurses should conduct frequent skin assessments to identify high-risk areas. These examinations entail a comprehensive evaluation of the skin, checking for signs of redness, discoloration, tenderness, or any other indications of skin damage. If any such signs are detected, immediate measures should be taken to relieve pressure on the affected area (Mitchell, 2018).

“Skin assessment is vital to prevent skin damage, manage existing PUs or prevent further breakdown, and skin fragility should be identified at each risk assessment. Practitioners should assess all vulnerable regions such as the sacral area, bony prominences.” (Mitchell, 2018).

Maintaining good skin care is crucial for preventing adverse skin conditions such as pressure ulcers. The relationship between skin care and prevention of pressure ulcers is evident. Effective moisture and incontinence management plays a vital role in keeping the skin dry and clean, which is essential for warding off pressure ulcers. Prolonged exposure to moisture, especially in combination with pressure, friction, and shear forces, can significantly increase the risk of pressure ulcers. The moisture weakens the skin’s protective barrier, making it more susceptible to damage and breakdown, particularly in areas susceptible to pressure sores (Jaul, Barron, Rosenzweig, & Menczel, 2018; Beeckman, Van Lancker, Van Hecke, & Verhaeghe, 2014).

“Among 3000 patients admitted to home care, incontinence was associated with prevalence of pressure ulcers.” “Moisture can cause direct chemical damage on the skin and can act

indirectly, reducing the load needed to cause tissue damage.” (Jaul, Barron, Rosenzweig, & Menczel, 2018).

“Exposure to moisture can lead to moisture-associated skin damage in the sacral area as a result of inflammation of the epidermis and dermis.” (Beeckman, Lancker, Hecke, & Verhaeghe, 2014).

The use of skincare products that are specifically designed to prevent pressure ulcers can be beneficial in preventing pressure ulcers among the elderly. It helps maintain the skin’s integrity and reduces the risk of damage caused by prolonged pressure. Key considerations include moisturizing the skin to prevent dryness and cracking, choosing gentle and appropriate skincare products, applying them regularly to vulnerable areas, and using proper techniques to minimize skin friction and shear forces (Gaspar, Peralta, Marques, Budri, & Gaspar de Matos, 2019).

“Applying topical agents, like a cream or an ointment on skin, is one of the strategies to prevent PUs.” (Gaspar, Peralta, Marques, Budri, & Gaspar de Matos, 2019).

6.1.2 Underlying chronic conditions

As individuals age, the likelihood of having underlying conditions tends to increase. These conditions can include diabetes, neurodegenerative disorders, cardiovascular diseases, chronic pulmonary diseases, renal diseases, and others. When combined with age-related physiological changes, these conditions can further impact skin health and make older individuals more susceptible to developing pressure ulcers. To effectively prevent pressure ulcers in the elderly, it is essential to address the unique challenges presented by these underlying chronic conditions. This highlights the importance of taking a holistic approach that considers the interplay between age-related changes, underlying conditions, and the specific care needs of older individuals. By considering these factors, nurses can mitigate the risk of pressure ulcers and promote optimal skin health in the elderly population. (Jaul, Barron, Rosenzweig, & Menczel, 2018).

“Identifying the impacts of comorbidities is important in understanding the development of pressure ulcers.” “Managing chronic diseases and their complications is the core of prevention and treatment for avoidable or unavoidable pressure ulcers.” (Jaul, Barron, Rosenzweig, & Menczel, 2018)

6.1.3 Nutrition and hydration

Nutrition and hydration are critical factors in preventing pressure ulcers among the elderly. Proper nutrition is vital for maintaining healthy skin, as malnutrition or nutrient deficiencies can weaken the skin's structure and impede healing, increasing susceptibility to pressure ulcers. Protein plays a key role in skin health by supporting tissue repair and regeneration, while essential vitamins and minerals such as vitamins A, C, and E, zinc, and copper contribute to collagen synthesis, antioxidant protection, and immune function, all crucial for preventing and healing pressure ulcers. Sufficient calorie intake is also necessary to meet energy demands and support tissue maintenance. Collaborating with nutritionists enables the development of personalized meal plans that ensure the elderly receive adequate nutrition, promoting optimal skin health and reducing the risk of pressure ulcers. (Saghaleini, et al., 2018; Jaul, Barron, Rosenzweig, & Menczel, 2018).

“Malnutrition impairs immune and hormonal function, causes skin changes, reduces subcutaneous tissues and cause muscle atrophy, all increasing vulnerability to pressure ulcers.” (Jaul, Barron, Rosenzweig, & Menczel, 2018).

“High-protein oral nutritional supplements have shown to effectively reduce the incidences of pressure ulcers in patient at risk by 25%.” (Saghaleini, et al., 2018).

Adequate hydration helps maintain skin elasticity and prevents dryness, a contributing factor to pressure ulcers. Dehydration reduces blood flow to the skin, making it more prone to damage and impairing wound healing. Elderly individuals face increased dehydration risks due to physiological changes, medications, decreased thirst sensation, or limited mobility. To address this, regular monitoring, and encouragement of fluid intake, offering a variety of beverages, and considering individual preferences and swallowing difficulties are essential. Nurses should also consider underlying medical conditions, consulting with doctors to determine appropriate fluid intake levels for each elderly individual. Promoting proper hydration is a crucial nursing practice that significantly reduces pressure ulcer risks and supports overall skin health in older adults. (Saghaleini, et al., 2018; Mitchell, 2018).

“Adequate intake of fluids is necessary to support the blood flow to wounded tissues and to prevent additional skin breakdown” (Saghaleini, et al., 2018).

6.1.4 Use of repositioning techniques and pressure -relieving devices

Repositioning helps redistribute pressure on the skin, particularly for elderly individuals who are bedridden or have limited mobility. Nurses should encourage or assist these individuals in changing positions every two-three hour (Jual & Menzel, 2014). Various techniques can be employed based on mobility capabilities and the type of bed or chair. Turning involves shifting the patient's position, such as from back to side, to alleviate pressure on the skin. Elevating entails raising the patient's feet or head to reduce pressure on specific areas of the body. Tilting involves inclining the bed or chair to redistribute pressure on the patient's body. Clearly, repositioning is not enough alone and should be accompanied with the use of specialized pressure-relieving devices designed to reduce pressure on vulnerable areas. By distributing it across a larger surface area and providing cushioning and support. Examples of such devices include mattresses, overlays, cushions, wheelchair seating, heel protectors, and positioning devices. The selection of appropriate devices should be based on patients' needs and risk factors, and healthcare professionals can offer guidance on their proper use and maintenance. (Mitchell, 2018; Jaul, Barron, Rosenzweig, & Menczel, 2018).

"It is important to change the position of a patient even when using pressure relieving devices." "Use of relief mattresses is associated with delay in pressure ulcers development". (Jual & Menzel, 2014)

6.2 Knowledge and awareness

Knowledge and awareness are vital for nurses to actively engage in preventing pressure ulcers and promoting the well-being of their patients. This involves acquiring knowledge through education and training, utilizing early detection techniques, and maintaining effective communication and documentation practices.

6.2.1 Education and training

Nurses require a vast knowledge to prevent pressure ulcers as it touches different aspects of a patient's life. Therefore, education and training for nurses is crucial for the successful implementation of a Pressure Ulcer Prevention Protocol. Knowledge on the causes, risk factors, and prevention strategies of pressure ulcers to provide adequate care and support to

elderly individuals at risk is important. Understanding the basic anatomy and physiology of the skin and underlying tissues is crucial in preventing pressure ulcers. Accurate risk assessment is essential too and there is a need to know how to conduct a thorough risk assessment to identify individuals at risk for pressure ulcers like using the Braden scale.

A study conducted in two hospital districts in Finland highlighted the importance of ensuring that all nurses, regardless of their position or level of experience in caring for pressure ulcers, possess comprehensive knowledge and receive adequate support to develop a positive attitude towards prevention. The study emphasized that even nurses in lower-level positions who infrequently encounter pressure ulcers should be equipped with the necessary skills and mindset to effectively contribute to prevention efforts. (Parisod, Holopainen, Koivunen, Puukka, & Haavisto, 2021).

“There is a need to strengthen nursing staff knowledge of pressure ulcers prevention especially classification and preventive activities related to repositioning and pressure relief devices.” (Parisod, Holopainen, Koivunen, Puukka, & Haavisto, 2021)

Another study conducted in a public hospital in Wollega, Ethiopia echoed similar sentiments, emphasizing the importance of continuous education and quality improvement in maintaining high-quality care for individuals at risk for pressure ulcers. The study stressed that healthcare professionals should stay updated with the latest evidence-based practices and actively engage in regular education and training programs to enhance their knowledge and skills in pressure ulcer prevention. (Ebi, Hirko, & Mijena, 2019).

“Nurses who read articles on pressure ulcers and receive training about pressure ulcers had a higher knowledge score compared to those that did not”. (Ebi, Hirko, & Mijena, 2019).

“Education of health care staff is an important component of PU prevention.” (Gaspar, Peralta, Marques, Budri, & Gaspar de Matos, 2019)

6.2.2 Communication and documentation

Effective communication and documentation are pivotal in preventing pressure ulcers and enhancing patient safety among the elderly. It also facilitates smooth multidisciplinary approach involving healthcare professionals, caregivers, and family members. Accurate and clear documentation helps ensure consistent care, early detection of risk factors, and timely interventions. Nurses should learn not only how to document clearly and precisely but also

how to integrate with other strategies of care like nutrition, underlying medical conditions and use of pressure relieve devices to improve the patient's outcome. (Vowden & Vowden, 2015)

According to (Thoroddsen, Sigurjonsdottir, Ehnfors, & Ehrenberg, 2013) the patient record has historically been and continues to be the primary information source for assessing healthcare quality. However, the way it is presented and recorded can bring a challenge in retrievability for broader and scalable utilization. (Vowden & Vowden, 2015) highlighted that there exists a gap between the risk assessment and care planning due to the lack of proper communication and documentation.

Both studies revealed deficiencies in this aspect of patient care, leading to suboptimal utilization of evidence-based practices. Consequently, this deficiency hinders meaningful contributions to the scientific community and clinical practice, as well as compromising patient safety.

“There is a requirement for a universal documentation system that is managed within nursing time allocation and allows contemporaneous data entry with dynamic risk assessment and care provision.” (Vowden & Vowden, 2015)

7 Discussion

This section explores the interpretation of the research findings, explaining the alignment between the chosen theoretical framework and the research itself. It further illustrates how these components collectively address the research's primary aim and question, which revolves around the role of nurses in preventing pressure ulcers among the elderly.

7.1 Discussion of the results

It is clear from the results pressure ulcers remain a big problem to-date and preventing pressure ulcers among the elderly demands a comprehensive approach that involves vigilant care, knowledge dissemination, and effective communication. Regular skin assessments are pivotal to this process. Nurses must conduct thorough evaluations, checking for any signs of redness, discoloration, or tenderness that might indicate skin damage due to prolonged pressure. Swift action should follow any discovery of such symptoms, relieving pressure on

the affected area to prevent further harm. Equally important is maintaining proper skin care, as the link between skin health and pressure ulcer prevention is evident. Managing moisture and incontinence becomes essential, as prolonged exposure to moisture can weaken the skin's protective barrier, increasing vulnerability to pressure ulcers. By identifying risk factors in vulnerable regions, such as the sacral area and bony prominences, nurses can effectively avoid pressure ulcers (Mitchell, 2018; Jaul et al., 2018; Beeckman et al., 2014).

Considering underlying chronic conditions is vital when addressing pressure ulcer prevention in the elderly. Aging often brings with it a large number of chronic ailments such as diabetes, cardiovascular diseases, and neurodegenerative disorders, all of which can exacerbate skin vulnerability. Therefore, a holistic approach that combines the interplay of these conditions, age-related changes, and personalized care becomes essential. Through this approach, nurses can tailor prevention strategies to cater to these specific challenges and mitigate pressure ulcer risks among the elderly (Jaul et al., 2018).

The role of nutrition and hydration in pressure ulcer prevention cannot be overstated. Proper nutrition, encompassing proteins and vital vitamins, contributes to robust skin health by supporting tissue repair and collagen synthesis. Ensuring adequate calorie intake is equally vital to meet energy needs and maintain tissue integrity. Moreover, nurses should collaborate with nutritionists to formulate personalized meal plans, guaranteeing that the elderly receive the necessary nutrients to support skin health and reduce pressure ulcer risk. Adequate hydration also plays a critical role, as dehydration can compromise skin elasticity and impair wound healing. By monitoring fluid intake and addressing individual needs and limitations, nurses can ensure that older adults stay optimally hydrated (Saghaleini et al., 2018).

Implementing repositioning techniques and utilizing pressure-relieving devices are key strategies for preventing pressure ulcers among the bedridden or immobile elderly. Regular repositioning every few hours helps redistribute pressure, preventing the buildup of pressure in particular areas. This approach should be coupled with specialized devices like cushions, mattresses, and heel protectors designed to cushion vulnerable regions. The selection and proper use of these devices require healthcare professionals' expertise to ensure their effectiveness in reducing pressure ulcer risk (Mitchell, 2018; Jaul & Menzel, 2014).

To effectively prevent pressure ulcers, nurses must arm themselves with adequate education and training. This knowledge encompasses understanding the causes, risk factors, and prevention strategies related to pressure ulcers. Gaining insight into skin anatomy and risk assessment tools like the Braden scale is crucial. Education ensures that nurses can actively

participate in prevention efforts and provide optimal care to elderly individuals at risk (Parisod et al., 2021; Ebi et al., 2019).

Lastly, robust communication and meticulous documentation supports successful pressure ulcer prevention. Effective communication guarantees coordinated care among healthcare professionals, caregivers, and family members, while thorough documentation facilitates consistent care and early risk detection. The integration of various care strategies within documentation enhances patient outcomes, ensuring that no aspect of prevention is overlooked (Vowden & Vowden, 2015).

7.2 Discussion of the theoretical framework

In the realm of elder care, preventing pressure ulcers among this vulnerable population is a multifaceted endeavor that requires a comprehensive approach. Imogene King's Goal Attainment Theory offers valuable insights into how nurses can effectively combat the development of pressure ulcers while promoting the overall well-being of the elderly.

At the core of this approach is the recognition that each elderly individual is unique, requiring a thorough understanding of their needs and aspirations (Parker & Smith, 2001). Just as King's theory emphasizes patient perspectives, nurses must diligently assess risk factors such as chronic conditions, limited mobility, and nutritional requirements. By doing so, they can collaboratively set goals that focus on maintaining healthy skin and mitigating risk factors.

Effective communication, a cornerstone in King's theory, becomes paramount in pressure ulcer prevention. Nurses must work closely with patients, caregivers, and interdisciplinary teams to advance open dialogues about risk factors, care plans, and preventive strategies. Sharing insights about skin assessments, repositioning techniques, pressure-relieving devices, and nutrition is essential for ensuring a unified approach to prevention.

Just as King's theory emphasizes continuous education for goal attainment, nurses must stay abreast of evidence-based practices in pressure ulcer prevention. Through training programs and educational initiatives, they equip themselves with the knowledge and skills needed to make informed decisions and provide patient-centered care.

Documentation, a central principle of both King's theory and pressure ulcer prevention, plays a pivotal role in tracking progress and accountability. In the same way nurses document interventions and outcomes to evaluate goal attainment, meticulous records of skin

assessments, repositioning schedules, nutritional plans, and other preventive measures are critical for maintaining consistent care and facilitating effective communication.

By embracing a holistic approach, nurses align with King's theory that acknowledges the interconnectedness of physical, psychological, emotional, and social factors in nursing care. Addressing underlying chronic conditions, ensuring proper nutrition and hydration, and implementing pressure-relieving devices demonstrate a commitment to comprehensive care that resonates with King's holistic principles.

Ultimately, the successful prevention of pressure ulcers signifies the attainment of shared goals and the delivery of quality care. Similarly, to King's theory, the absence or effective management of pressure ulcers indicates that nursing interventions have successfully upheld skin integrity and enhanced the overall well-being of the elderly individuals under the nurses' care. Through this integration of theory and practice, nurses empower themselves to actively engage in pressure ulcer prevention while upholding the principles of patient-centered care.

7.3 Discussion of the methodology's strengths, and limitations

The use of the qualitative content analysis method in this study was suitable as it contributed to addressing the research question and achieving the study's aim. Research on pressure ulcer prevention in the elderly holds immense value for evidence-based healthcare, enhancing patient care, and shaping the direction of future research in this field. This method's strengths lie in its rigorous approach that systematically identifies, selects, and evaluates relevant studies to minimize biases. By synthesizing diverse studies, it offers valuable insights, promoting impartial evaluation. Transparent methodologies used build credibility and trust in the outcomes. This research identifies the best prevention practices through comprehensive evidence analysis, aiding healthcare professionals and policymakers in making informed decisions and preventing redundant studies. Basically, systematic research efficiently contributes to knowledge advancement, gap-filling, and refining existing insights in pressure ulcer prevention.

However, it's important to acknowledge limitations. For instance, the quality of a systematic research review is dependent upon the caliber of the studies incorporated. If the primary studies vary in quality or are of low quality, the conclusions drawn from the systematic review could be jeopardized. The criteria used to include or exclude studies in a systematic review may inadvertently introduce bias. The choices made by researchers regarding which

studies to incorporate can sway the overall findings. By restricting the search to studies published in specific languages, there's a potential for language bias to emerge, possibly leading to the oversight of studies conducted in other languages or regions. In some cases, certain studies might not present all relevant data or outcomes, posing challenges for reviewers to accurately assess their complete impact. Moreover, certain interventions aimed at preventing pressure ulcers might be intricate, encompassing numerous components. This complexity might not be fully captured by systematic reviews, potentially overlooking the intricate interplay among these components.

8 Conclusion

In conclusion, this review highlights the critical role of nurses in the prevention of pressure ulcers among the elderly. As the global population continues to age, pressure ulcers have become a significant and persistent healthcare challenge, causing not only financial burdens but also pain and discomfort while impacting the overall quality of life for affected individuals.

The multifaceted approach outlined in this review highlights several key elements, from vigilant care and regular skin assessments to addressing risk factors, nutrition, and hydration. Additionally, repositioning techniques, specialized devices, education, and training are essential components in the fight against pressure ulcers. Effective communication and meticulous documentation are integral to ensuring a cohesive approach to prevention.

Nurses stand at the forefront of this effort. They play a paramount role in the successful implementation of strategies aimed at reducing pressure ulcer incidences among the elderly. Through their patient-centered care, nurses can address the complex challenges posed by diverse medical conditions and limited mobility in elderly patients. Knowledge, training, and vigilance equip nurses to identify risk factors, initiate preventive measures, and educate patients and caregivers effectively.

The collaborative efforts of healthcare professionals, caregivers, and policymakers are essential to achieving substantial reductions in pressure ulcers within the elderly population. Nurses are the keystone of this collaboration, leading the charge in crafting and executing patient-specific care plans. Despite the challenges posed by complex patient needs, time constraints, and limited resources, nurses must remain steadfast in their dedication to

providing holistic care. Ongoing education and training are critical in helping nurses adapt to evolving patient conditions and refine their prevention strategies. Effective communication, documentation, and coordination among the healthcare team are vital to ensuring a comprehensive and cohesive approach to pressure ulcer prevention, enhancing consistency in care.

In reality, the significance of nurses in the prevention of pressure ulcers among the elderly cannot be overstated. Nurses should have unwavering commitment, expertise, and collaborative efforts to pave the way for improved patient outcomes and an enhanced quality of life for the elderly population. As healthcare systems continue to evolve, recognizing and supporting the critical role of nurses in pressure ulcer prevention remains essential for delivering compassionate, effective, and patient-centered care.

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Appendices

Appendix 1: Braden scale for predicting pressure sore risk.

BRADEN SCALE FOR PREDICTING PRESSURE SORE RISK								
Patient's Name	Evaluator's Name				Date of Assessment			
SENSORY PERCEPTION ability to respond meaningfully to pressure-related discomfort	1. Completely Limited Unresponsive (does not moan, flinch, or grasp) to painful stimuli, due to diminished level of consciousness or sedation. OR limited ability to feel pain over most of body	2. Very Limited Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness OR has a sensory impairment which limits the ability to feel pain or discomfort over 1/2 of body.	3. Slightly Limited Responds to verbal commands, but cannot always communicate discomfort or the need to be turned. OR has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities.	4. No Impairment Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort.				
MOISTURE degree to which skin is exposed to moisture	1. Constantly Moist Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.	2. Very Moist Skin is often, but not always moist. Linen must be changed at least once a shift.	3. Occasionally Moist: Skin is occasionally moist, requiring an extra linen change approximately once a day.	4. Rarely Moist Skin is usually dry, linen only requires changing at routine intervals.				
ACTIVITY degree of physical activity	1. Bedfast Confined to bed.	2. Chairfast Ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.	3. Walks Occasionally Walks occasionally during day, but for very short distances, with or without assistance. Spends majority of each shift in bed or chair	4. Walks Frequently Walks outside room at least twice a day and inside room at least once every two hours during waking hours				
MOBILITY ability to change and control body position	1. Completely Immobile Does not make even slight changes in body or extremity position without assistance	2. Very Limited Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.	3. Slightly Limited Makes frequent though slight changes in body or extremity position independently.	4. No Limitation Makes major and frequent changes in position without assistance.				
NUTRITION usual food intake pattern	1. Very Poor Never eats a complete meal. Rarely eats more than 1/2 of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement OR is NPO and/or maintained on clear liquids or IV's for more than 5 days.	2. Probably Inadequate Rarely eats a complete meal and generally eats only about 1/2 of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement. OR receives less than optimum amount of liquid diet or tube feeding	3. Adequate Eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy products) per day. Occasionally will refuse a meal, but will usually take a supplement when offered. OR is on a tube feeding or TPN regimen which probably meets most of nutritional needs	4. Excellent Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.				
FRICTION & SHEAR	1. Problem Requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures or agitation leads to almost constant friction	2. Potential Problem Moves feebly or requires minimum assistance. During a move skin probably slides to some extent against sheets, chair, restraints or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides down.	3. No Apparent Problem Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair.					
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Appendix 2: Norton pressure sore scale

The Norton Pressure Sore Risk-Assessment Scale Scoring System

The Norton Scoring system, shown below, and created in England in 1962, has been the first pressure sore risk evaluation scale to be created, back in 1962, and for this it is now criticized in the wake of the results of modern research. Its ease of use, however, makes it still widely used today.

To evaluate the Norton Rating for a certain patient look at the tables below and add up the values beside each parameter which apply to the patient. The total sum is the Norton Rating (NR) for that patient and may vary from 20 (minimum risk) to 5 (maximum risk).

(Indicatively, a Norton Rating below 9 means Very High Risk, 10 to 13 means High Risk, 14 to 17 medium risk and above 18 means low risk)

Physical Condition	Good	4
	Fair	3
	Poor	2
	Very Bad	1
Mental Condition	Alert	4
	Apathetic	3
	Confused	2
	Stuporous	1
Activity	Ambulant	4
	Walks with help	3
	Chairbound	2
	Bedfast	1
Mobility	Full	4
	Slightly Impaired	3
	Very Limited	2
	Immobile	1
Incontinence	None	4
	Occasional	3
	Usually Urinary	2
	Urinary and Fecal	1

Generally, the risk factor is coded this way:

Greater than 18	Low Risk
Between 18 and 14	Medium risk
Between 14 and 10	High Risk
Lesser than 10	Very High Risk

Another rating system getting more and more popularity is the **Braden Scale**, created in the USA, more recent and precise than the Norton scale, which evaluates factors such as sensory perception, skin wetness, nutrition and such.

Appendix 3: Waterlow pressure ulcer prevention scale

WATERLOW PRESSURE ULCER PREVENTION/TREATMENT POLICY						
RING SCORES IN TABLE, ADD TOTAL. MORE THAN 1 SCORE/CATEGORY CAN BE USED						
BUILD/WEIGHT FOR HEIGHT	SKIN TYPE VISUAL RISK AREAS	SEX AGE	MALNUTRITION SCREENING TOOL (MST) (Nutrition Vol.15, No.6 1999 - Australia)			
AVERAGE BMI = 20-24.9	HEALTHY	0 MALE 1	A - HAS PATIENT LOST WEIGHT RECENTLY		B - WEIGHT LOSS SCORE	
ABOVE AVERAGE BMI = 25-29.9	DRY	1 FEMALE 2	YES - GO TO B		0.5 - 9kg = 1	
OBESSE BMI = 30	OEDEMATOUS	1 54 - 69 1	NO - GO TO C		5 - 10kg = 2	
BELOW AVERAGE BMI < 20	CLAMMY, PYREXIA	1 50 - 64 2	UNSURE - GO TO C		10 - 15kg = 3	
BMI = W(kg)/H ² (m ²)	DISCOLOURED GRADE 1	2 65 - 74 3	AND SCORE 2		> 15kg = 4	
	BROKEN/SPOTS GRADE 2-4	3 75 - 80 4	C - PATIENT EATING POORLY OR LACK OF APPETITE		UNSURE = 2	
		3 61 + 5	NO = 0, YES = 1		NUTRITION SCORE	
					If > 2 refer for nutrition assessment / intervention	
CONTINENCE	MOBILITY	SPECIAL RISKS				
COMPLETE/CATHETERISED	FULLY RESTLESS/RIGIDITY	TISSUE MALNUTRITION		NEUROLOGICAL DEFICIT		
URINE INCONT.	1 APATHETIC	8 TERMINAL CACHEXIA		8 DIABETES, MS, CVA		
FAECAL INCONT.	2 RESTRICTED	8 MULTIPLE ORGAN FAILURE		8 MOTOR/SENSORY		
URINARY + FAECAL INCONTINENCE	3 BEDBOUND e.g. TRACTION CHAIR/BOUND e.g. WHEELCHAIR	5 SINGLE ORGAN FAILURE (RESP, RENAL, CARDIAC)		5 PARAPLEGIA (MAX OF 6)		
		5 PERIPHERAL VASCULAR DISEASE		5 MAJOR SURGERY or TRAUMA		
		5 ANAEMIA (Hb < 8)		5 ORTHOPAEDIC/SPINAL		
		1 SMOKING		5 ON TABLE > 2 HR†		
				8 ON TABLE > 6 HR†		
				1 MEDICATION - CYTOTOXICS, LONG TERM/HIGH DOSE STEROIDS, ANTI-INFLAMMATORY MAX OF 4		
				† Scores can be discounted after 48 hours provided patient is recovering normally		
SCORE 10+ AT RISK 15+ HIGH RISK 20+ VERY HIGH RISK						
<small>© J Waterlow 1985 Revised 2005* Obtainable from the Nock, Stoke Road, Herneade TAUNTON TA5 5LX * The 2005 revision incorporates the research undertaken by Queensland Health. www.judy-waterlow.co.uk</small>						

Appendix 4: Articles summary chart

	Bibliographic data (Article Title, Author & Publication date)	Aim	Method	Results
1	Adult pressure area care: preventing pressure ulcers. Aby Mitchell (2018)	Prevention strategies	Systematic qualitative data analysis by analysis of several articles	The articles discussed SSKIN which is five-point PU prevention strategies. These elements are Surface, Skin, Keep moving, Incontinence and moisture and Nutrition and hydration.
2	A Systematic Review and Meta-Analysis of Incontinence-	The aim of this analysis was to identify the association	A systematic review and	The analysis indicates a likely association between IAD, its most important etiological

	<p>Associated Dermatitis, Incontinence, and Moisture as Risk Factors for Pressure Ulcer Development.</p> <p>Dimitri Beeckman, Aurelie Van Lancker, Ann Van Hecke, & Sofie Verhaeghe (2014)</p>	<p>between incontinence-associated dermatitis (IAD), its most important etiologic factors (incontinence and moisture), and pressure ulcers (PUs).</p>	<p>meta-analysis were performed</p>	<p>factors, and the development of PUs</p>
3	<p>Effectiveness on hospital-acquired pressure ulcers prevention: a systematic review</p> <p>Susana Gaspar, Miguel Peralta, Adilson Marques, Aglécia Budri & Margarida Gaspar de Matos (2019)</p>	<p>This study aimed to evaluate the evidence available regarding effective approaches to PU prevention in hospitalized adults, using the range of decreasing incidence to measure effectiveness</p>	<p>Systematic Reviews and Meta-Analysis</p>	<p>The conclusion drawn from the article indicates that the implementation of multiple interventions in the prevention of pressure ulcers (PUs) yields greater effectiveness compared to relying on a single intervention.</p>
4	<p>An overview of comorbidities and the development of pressure ulcers among older adults.</p> <p>Efraim Jaul, Jeremy Barron, Joshua P.</p>	<p>To describe chronic and acute conditions which are risk factors in elderly patients for developing pressure ulcers.</p>	<p>Systematic qualitative literature analysis</p>	<p>Individuals with chronic diseases such as diabetes, stroke, and advanced dementia are at a higher risk of developing pressure ulcers (PUs) and understanding the risk factors stemming from chronic diseases and</p>

	Rosenzweig & Jacob Menczel (2018)			associated health conditions is crucial in preventing and managing PUs.
5	Pressure Ulcer and Nutrition. Seied Hadi Saghaleini, Kasra Dehghan, Kamran Shadvar, Sarvin Sanaie, Ata Mahmoodpoor & Zohreh Ostadi (2018)	The aim of the present article is to review the current evidence related to hydration and nutrition for bedsore prevention and management in adults.	Systematic qualitative literature analysis	Nutritional deprivation, insufficient dietary intake and dehydration are the key risk factors for the development of pressure ulcers and impaired wound healing.
6	Pressure Ulcers in the Elderly, as a Public Health Problem. Efraim Jaul & Jacob Menzel (2014)	The aim of this study is to emphasize the importance of prevention in reducing the prevalence and burden of pressure ulcers among the frail elderly population.	Systematic qualitative literature analysis	The aging population, along with comorbidities and disability, has led to a higher occurrence of pressure ulcers in the elderly. Hospitalization rates and associated complications are also elevated. Prevention of pressure ulcers requires awareness and understanding of medical aspects. Ongoing education for medical staff, caregivers, and family members is crucial for effective

				prevention and treatment of pressure ulcers.
7	<p>Factors determining nurses' knowledge of evidence-based pressure ulcer prevention practices in Finland.</p> <p>Heidi Parisod, Arja Holopainen, Marita Koivunen, Pauli Puukka and Elina Haavisto (2021)</p>	<p>This study aimed to assess the knowledge level of nursing staff regarding evidence-based pressure ulcer prevention practices in primary and specialized care</p>	<p>A correlational cross-sectional qualitative study.</p>	<p>In this study, the pressure ulcer prevention knowledge of registered nurses, practical nurses, and ward managers (N = 554) was assessed, with an average score of 24.40 out of a maximum of 35. There was no significant difference in knowledge based on the type of unit (primary or specialized care) where participants worked. However, factors such as attitudes, current position, frequency of caring for patients with pressure ulcers, and self-evaluated training needs independently contributed to the variation in knowledge scores (p-values < 0.05).</p>
8	<p>Nurses' knowledge to pressure ulcers prevention in public hospitals in Wollega.</p> <p>Werku Etafa Ebi, Getahun Fetensa Hirko & Diriba</p>	<p>The aim of this study was to assess the nurses' knowledge to pressure ulcer prevention in public hospitals in Wollega.</p>	<p>A cross-sectional qualitative study design</p>	<p>The analysis of the study revealed that 91.5% of the participants had inadequate knowledge regarding pressure ulcer prevention. The mean knowledge score for nurses in all themes and</p>

	Ayala Mijena (2019)			per item was 11.31 (SD = 5.97) and 0.43 (SD = 0.22), respectively. Significant factors associated with knowledge improvement were reading articles ($p < 0.001$) and receiving training ($p = 0.003$).
9	Documentation in pressure ulcer prevention and management. Vowden Kathryn & Vowden Peter (2015).	This article reviews issues related to the documentation of pressure ulcer risk assessment and prevention.	Systematic Reviews	It concluded that documentation must be adequate and written in a way that others can follow and understand thus the need for a universal documentation process.
10	Accuracy, completeness, and comprehensiveness of information on pressure ulcers recorded in the patient record. Asta Thoroddsen, Guðrún Sigurjónsdóttir, Margareta Ehnfors, & Anna Ehrenberg (2013)	Aim to describe the accuracy, completeness, and comprehensiveness of information on pressure ulcers documented in patient records.	A cross-sectional descriptive study performed in 29 wards at a university hospital in Iceland	The prevalence of pressure ulcers was 21%. Information in patient records lacked accuracy, completeness, and comprehensiveness. Only 60% of the identified pressure ulcers were documented in the patient records. The lack of accuracy was most prevalent for stage I pressure ulcers.