

PRESSURE INJURY PREVENTION: A SCOPING REVIEW OF NURSES' KNOWLEDGE, ATTITUDES, AND PRACTICES

Siti Zuhaidah Shahadan ¹

Wan Nur Faqihah Wan Mohd Amizi²

Mohamad Firdaus Mohamad Ismail ³

¹Department of Medical Surgical Nursing, Kulliyah of Nursing, International Islamic University Malaysia, Kuantan Pahang, (E-mail: sitizuhaidah@iium.edu.my)

²Klinik Rakyat Temerloh, Jalan Ahmad Shah, Bandar Sri Semantan, 28000 Temerloh, Pahang (E-mail: wn.faqihah@live.iium.edu.my)

³Department of Professional Nursing Studies, Kulliyah of Nursing, International Islamic University Malaysia, Kuantan Pahang, (E-mail: firdausismail@iium.edu.my)

Article history

Received date : 20-12-2024
Revised date : 21-12-2024
Accepted date : 6-1-2025
Published date : 15-2-2025

To cite this document:

Shahadan, S. Z., Wan Mohd Amizi, W. N. F & Mohamad Ismail, M. F. (2025). Pressure injury prevention: A scoping review of nurses' knowledge, attitudes, and practices. *Journal of Islamic, Social, Economics and Development (JISED)*, 10 (69), 184 - 203.

Abstract: *Pressure injuries are a significant concern in healthcare settings, impacting patient outcomes and quality of care. Nurses play a crucial role in preventing these injuries, yet knowledge, attitudes, and practices (KAP) among nurses remain inconsistent globally. This scoping review examines the levels of knowledge, attitudes, and practices related to pressure injury prevention among nurses and identifies influencing factors. A systematic search of scholarly articles was conducted using ProQuest Health & Medical Complete and ScienceDirect databases, complemented by a manual search of reference lists. Inclusion criteria were studies published within the past five years, available in English, and focused on KAP related to pressure injury prevention among nurses. The PRISMA framework guided the selection of 22 studies for this review. Studies demonstrated variability in KAP levels, with gaps noted in the knowledge of pressure injury aetiology, classification, and prevention strategies. Positive attitudes toward prevention were associated with training, education, and experience. Practices varied, with higher levels observed among critical care nurses and those with access to updated guidelines. Regional differences highlighted the need for targeted interventions in low-resource settings. The findings emphasize the need for standardized training programs, evidence-based guidelines, and policy initiatives to enhance nurses' KAP in pressure injury prevention. Future research should validate the developed KAP framework and assess its effectiveness in clinical settings.*

Keywords: *Pressure Injury, Knowledge, Attitudes, Practices, Nursing*

Introduction

The National Pressure Ulcer Advisory Panel (NPUAP) and the European Pressure Ulcer Advisory Panel (EPUAP) define a pressure injury as a localized injury to the skin or underlying tissue, typically situated over a bony prominence, resulting from pressure, or a combination of pressure and shear (European Pressure Ulcer Advisory Panel et al., 2019). This definition is further supported by Visconti et al. (2023), who characterize pressure injuries as focal damage to the skin, underlying tissue, or mucous membranes caused by intense and prolonged pressure, or both. Pressure injuries may also be referred to as pressure ulcers, pressure sores, bedsores, or decubitus ulcers. It is important to note that, according to Norton et al. (2017), the National Pressure Ulcer Advisory Panel has updated the term “pressure ulcer” to “pressure injury.”

Pressure injuries have emerged as a significant health concern within healthcare settings, particularly for nurses. Each year, approximately 700,000 patients are impacted by pressure injuries (Tesfa et al., 2022). These injuries manifest as unusual discoloration in the skin, characterized by a non-blanchable redness that does not turn white when pressed. In addition to this warning sign, pressure injuries can lead to swelling, pus formation, blisters, and skin damage that exposes underlying fat, muscle, tendon, or bone. Such injuries are often accompanied by pain and an increased risk of infection. The presence of pressure injuries not only affects patients physically—through pain and the potential for infection—but also significantly impacts their overall quality of life. Patients may experience psychological, emotional, spiritual, social, and financial ramifications, which collectively have a profound influence on their well-being (Roussou et al., 2023).

Pressure injuries can develop in any healthcare setting, including both critical care units and general wards. However, the risk of these injuries is notably higher in critical care settings due to several factors, such as severity of illness, limited mobility, and complex medical conditions. According to Tesfa et al. (2022), approximately 186,617 patients acquire pressure injuries in acute care wards. Ebi et al. (2019) also reported that the incidence of pressure injuries in critical care patients ranges from 1.9% to 59%. Preventing pressure injuries is extremely important, as Wu et al. (2022) note that 95% of all pressure injuries are preventable. Consequently, nurses play a crucial role among healthcare professionals in the proactive prevention of pressure injuries in hospitalized patients, given their direct and continuous care. Wu et al. (2022) emphasized that nurses working in clinical environments and regularly interacting with patients at high risk for pressure injuries bear the responsibility for ensuring safe preventive measures are taken for at-risk individuals.

Nurses must possess a sufficient level of knowledge and a positive attitude toward pressure injury prevention. However, research conducted globally indicates a prevalent lack of knowledge and poor attitudes, as well as inconsistencies in practice among nurses regarding the prevention of pressure injuries (Halász et al., 2021). These inconsistencies contribute to suboptimal patient care, increased risk of pressure injuries, and extended hospital stays. Having accurate and relevant knowledge significantly influences nurses' awareness and understanding of pressure injury prevention. This knowledge assists nurses in making informed decisions about which patients require prevention measures, what appropriate methods should be employed, and how to implement them effectively (Wu et al., 2022). Furthermore, knowledge plays a critical role in shaping nurses' attitudes and behaviors in practicing pressure injury prevention. While many nurses demonstrate positive attitudes toward prevention, their actual practices do not always align with evidence-based recommendations (Yan et al., 2022).

Continuous education and training are vital to ensure that nurses remain updated with the current clinical practice guidelines, thus providing high-quality care to their patients. Training can greatly enhance nurses' ability to care for patients at risk of pressure injuries while keeping them informed about current prevention strategies (Yan et al., 2022).

Therefore, it is essential to integrate knowledge and positive attitudes with consistent practice to improve patient outcomes and achieve optimal results in pressure injury prevention. With pressure injuries leading to prolonged hospital stays and increased mortality risk, assessing and improving nurses' knowledge, attitudes, and practices (KAP) is essential. Identifying the most critical gaps and effective interventions will contribute to standardized training programs and policy reforms, ultimately improving patient outcomes in diverse healthcare settings. This scoping review aims to synthesize existing literature on the topic, identify knowledge gaps, and highlight areas for targeted interventions, training programs, and policy development to improve nursing practices in pressure injury prevention.

Methodology

Search strategies

Scholarly articles were searched from two databases, ProQuest Health & Medical Complete and ScienceDirect. Additionally, a manual search of reference lists was also used to search the related articles. In this scoping review, ProQuest Health & Medical Complete and ScienceDirect were the primary databases used for the literature search, chosen for their extensive peer-reviewed coverage in healthcare and nursing related to pressure injury prevention. ProQuest offers a wide collection of nursing journals, while ScienceDirect is prominent in medical research. However, excluding other databases may have limited insights into nurses' practices and broader clinical research. Despite this, the combination of the selected databases and manual reference searches ensured a thorough review of relevant literature.

The keywords used in the search were specified using Boolean operators. The Boolean operator "AND" and "OR" are used between the keywords "Title (knowledge) AND Title (attitude) AND Title(practice) AND Title (nurses) AND Title (prevention) AND Title (pressure injur*) AND OR Title (pressure ulce*) OR Title (pressure sor*) OR Title (decubitus)". The resources were filtered by English language, date of publication within five years and full-text format. The researcher used the PICO framework to set the inclusion and exclusion criteria (See Table 1).

Table 1: PICO Framework

Framework items	Keywords
P Patient, population, or problem	Nurses, nursing students
I Intervention, Prognosis, Factor, or Exposure	Knowledge of pressure injury prevention
C Comparison or intervention (if appropriate)	-
O Outcome you would like to measure or achieve	Attitude and practice of pressure injury prevention

Figure 1 shows the PRISMA flow diagram of the search results. This flow diagram outlines the systematic process of study selection, including the number of records identified, screened, and excluded, as well as the final studies included in this scoping review. Initially, 4,971 studies were identified in two databases. After applying the inclusion criteria, 650 studies remained. Following the screening of abstracts for eligibility, 11 studies were selected for this review. Additionally, a manual search of the reference lists yielded another 11 studies.

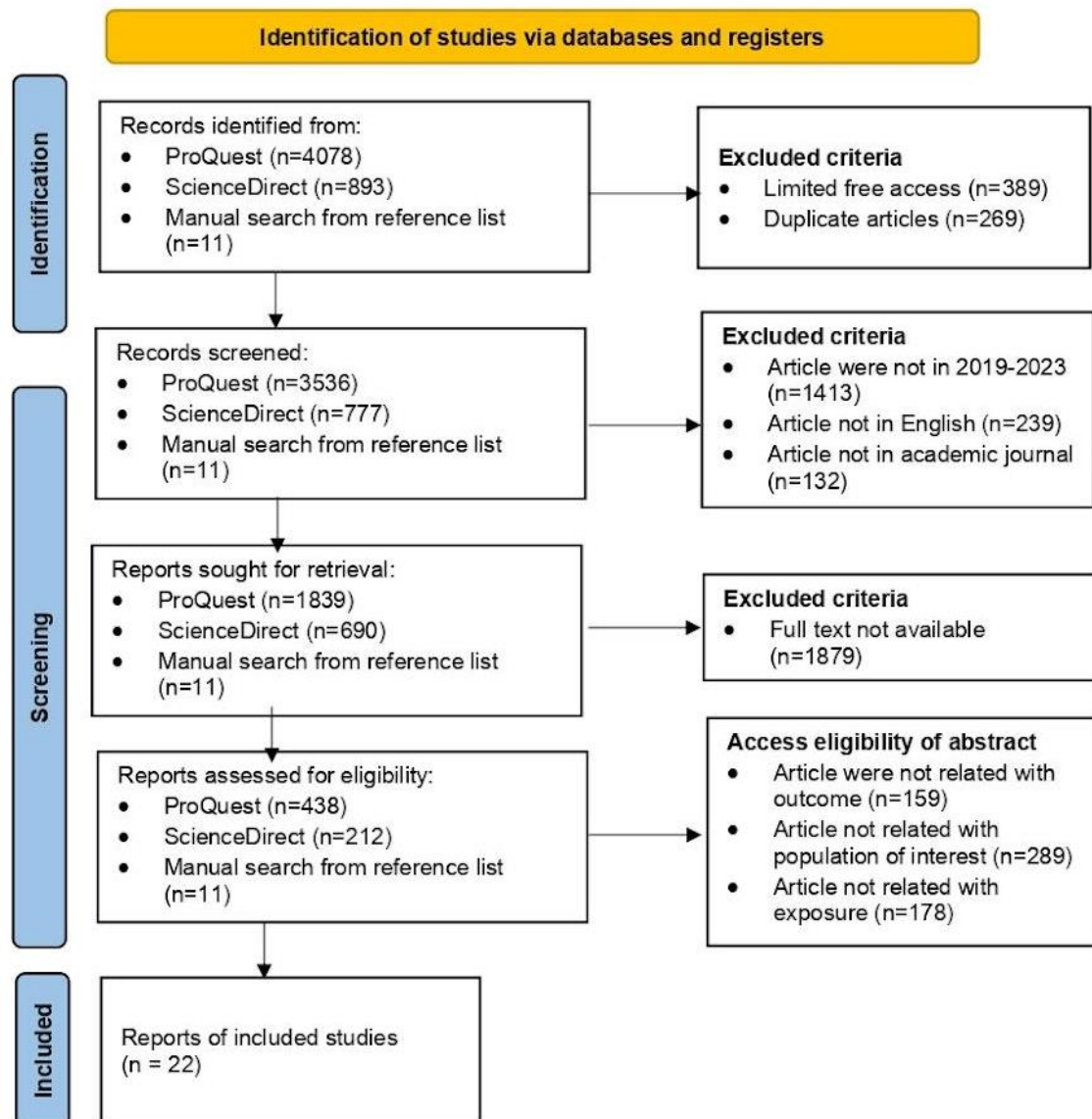


Figure 1: PRISMA Flow Diagram

Results

Characteristics of the included studies

A total of 22 studies were incorporated into this scoping review. Among these, eight studies were conducted in Western countries, specifically in Pomerania, Portugal, the United Kingdom, and Australia (Fulbrook et al., 2019; Szymanski et al., 2020; Murugiah et al., 2020;

Fernandes et al., 2021; Alshahrani et al., 2021; Liu et al., 2022; Avgerinou et al., 2022; Mather et al., 2022). Conversely, the studies by Ebi et al. (2019), Muhammed et al. (2020), Tesfa et al. (2022), and Abrahams et al. (2023) were conducted in Southwestern countries, while research by Ghafoor et al. (2020) and Zhang et al. (2021) focused on Northwestern countries. Furthermore, the studies by Aydogan et al. (2019), Lotfi et al. (2019), and Kopuz et al. (2019) were carried out in Southeast Europe. The scope of research in Southeast Asia was limited, with only four studies conducted: one in Indonesia (Sari et al., 2021) and three in Malaysia (Isa et al., 2019; Sham et al., 2020; Azhar et al., 2022).

Participants across the 22 studies predominantly consisted of nurses, healthcare workers, and nursing students. Recruitment encompassed diverse departments, including the Intensive Care Unit (ICU), Medical Ward, and General Surgical Ward. Nursing students were included from their first year through to their final year, representing various educational levels, including diploma, degree, and master's programs. The sample sizes across the studies varied significantly, ranging from 50 to 1,102 participants. All studies employed quantitative research methodologies, utilizing an array of statistical analyses, which included one-way ANOVA, Spearman correlation, Fisher's exact test, independent t-test, chi-square test, Wilcoxon Mann-Whitney test, Kruskal-Wallis test, Kolmogorov-Smirnov test, and multiple linear regression. A comprehensive overview of the characteristics of each study is presented in Table 4. This table summarizes the characteristics of the 22 studies included in this review, detailing authorship, study design, population demographics, sample sizes, and statistical methods used to assess knowledge, attitudes, and practices related to pressure injury prevention.

Table 2: Study characteristics of the included studies (N=22)

Title	Author	Year of publication	Study design	Population	Sample size	Independent variables	Dependent variables	Statistical test
The knowledge and attitudes regarding pressure ulcer prevention among healthcare support workers in the UK	Liu L, Kelly J, Di Cesare M	2023	Cross-sectional	Healthcare workers	164	Demographic factors (age, gender, healthcare worker role, clinical setting)	Knowledge and attitude towards pressure injury prevention among healthcare workers	Kolmogorov-Smirnov test
Students' knowledge, attitude and practices towards pressure ulcer prevention and management	Abrahams F, Daniels E, Niikondo H, Amakali K, Daniels E	2023	Cross-sectional	Nursing students	50	Demographic factors (age, gender, marital status), length of time allocated in the ward, last time listened to a lecture on pressure ulcer, last time read an article or book on pressure ulcer	Knowledge, attitude and practices (KAP) towards preventing and managing pressure ulcers	Fisher exact test

Title	Author	Year of publication	Study design	Population	Sample size	Independent variables	Dependent variables	Statistical test
A systematic review of nursing students' attitude and related factors towards pressure ulcer prevention	Hermis A, Mollaei A, Ghorbani P, Vajargah P, Karkhah S, Takasi P, Firooz M, Hosseini S, Alizadeh H, Otaghvar H, Raziani Y	2023	Systematic review	10 articles	6454 nursing students		Levels of knowledge, attitudes and practices towards pressure ulcer prevention and management, Relationship between the attitude and knowledge of nursing students towards pressure injury prevention	-
Knowledge, Attitude and Perceived Barrier towards Pressure Ulcer Prevention among Critical Care Unit Nurses in Klang Valley Public Hospitals	Azhar S, Ahmad Sharoni S, Fauzi R, Isa Akma Shohor N, Seman N	2022	Cross-sectional	Staff nurses (Critical Care Unit, CCU)	275	Demographic factors (age, gender, education, working experience)	Knowledge and attitude towards pressure injury prevention	Multiple linear regression
Intensive Care Nurses' Knowledge, Practice and Attitudes Related to Pressure Ulcer Prevention: A Single Tertiary Center in Greece	Avgerinou I, Kalemikerak is I, Vasiopoulos G, Kelesi M, Maria P, Petsios K, Dousis E	2022	Cross-sectional	Staff nurses (Intensive Care Unit, ICU)	107	Demographic factors (age, gender, education, working experience)	Knowledge and attitude towards pressure injury prevention	Kolmogorov-Smirnov test
Pressure ulcer prevention knowledge, practices, and their associated factors among nurses in Gurage Zone Hospitals, South Ethiopia, 2021	Tesfa Mengist S, ABebe Geletie H, Zewudie B, Mewahegn A, Terefe T, Tsegaye Amlak B, Tadesse B, Geze Tenaw S, Mesfin Y	2022	Cross-sectional study	Staff nurses	372	Demographic factors (age, gender, education, working experience)	Knowledge and practice towards pressure injury prevention	Fisher exact test
Australian First-Year Nursing Student Knowledge and Attitudes on Pressure Injury Prevention: A Three-Year Educational Intervention Survey Study	Mather C, Jacques A, Prior S	2022	Cross-sectional study	Nursing students	1102	Demographic factors (gender, age), additional educational intervention	Knowledge and attitudes on Pressure injury prevention	One Way ANOVA

Title	Author	Year of publication	Study design	Population	Sample size	Independent variables	Dependent variables	Statistical test
Knowledge, attitude, and practice of nurses in intensive care unit on preventing medical device-related pressure injury: A cross-sectional study in western China	Zhang Y, He L, You L, Pei J, Nan R, Chen H, Wang X, Du Y, Yan H, Dou X	2021	Cross-sectional	Staff nurses (ICU)	1002	Demographic factors (age, gender, education, working experience, position)	Knowledge, attitude, and practice towards pressure injury prevention	One Way ANOVA and independent t-test
Knowledge and Attitude of Community Nurses on Pressure Injury Prevention: A Cross-sectional Study in an Indonesian	Sari S, Everink I, AMir Y, Lohrmann C, Halfens R, Moore Z, Beeckman D, Schols J	2021	Cross-sectional	Staff nurses (community)	235	Demographic factors (age, gender, education, working experience)	Knowledge and attitude towards pressure injury prevention	One Way ANOVA and independent t-test
Pressure injury prevention: attitudes and knowledge of nursing students	Fernandes C, Lima A, Santos M	2021	Cross-sectional	Nursing students	100	Sociodemographic characteristics (gender, age), academic year, number of clinical teachings conducted, training on pressure injury	Knowledge and attitudes towards the prevention of pressure injury	Wilcoxon Mann-Whitney's U, Kruskal-Wallis test
Knowledge and Attitude of Nursing Students on the Prevention of Pressure Ulcers	Alshahrani S, Qureshi A, Paulsamy P, Venkatesan K, Sethuraj P	2021	Cross-sectional	Nursing students	50	Sociodemographic (gender), type of ward currently work, previous pressure ulcer knowledge	Level of knowledge and attitudes towards prevention of pressure ulcer	Chi-square test
Knowledge and Practices of Student Nurses towards Prevention and Management of Pressure ulcers in Allied Hospitals of Rawalpindi	Ghafoor N, Munir R, Niazi I, Azhar F	2021	Cross-sectional	Nursing students	264	Years of study	Knowledge and practices regarding pressure ulcer prevention and management	Chi-square test

Title	Author	Year of publication	Study design	Population	Sample size	Independent variables	Dependent variables	Statistical test
Medical University								
Nurses' knowledge of pressure ulcer and its associated factors at Hawassa University comprehensive specialized hospital Hawassa, Ethiopia, 2018	Muhammed E, Bifftu B, Temachu Y, Walle T	2020	Cross-sectional	Staff nurses	356	Demographic factors (age), working experience	Knowledge towards pressure injury prevention among nurses	Independent t-test
Knowledge, practice, and perceived barrier of pressure ulcer prevention among nurses in a public hospital in Selangor	Sham F, Izni D, Sharif B, Binti Moksin N, Selamat H	2020	Cross-sectional	Staff nurses (ICU, CCU, Medical, Surgical and Orthopaedic Ward)	220	Demographic factors (age, gender, level of education, working experience)	Knowledge and practice towards pressure injury prevention	Chi-square and Independent t-test
A descriptive study of Turkish Intensive Care Nurses' Pressure Ulcer Prevention Knowledge, Attitudes, and Perceived Barriers to care	Aydogan S, Caliskan N	2019	Cross-sectional	Staff nurses (ICU)	390	Demographic factors (gender, level of education, working experience, additional education and training)	Knowledge and attitude towards pressure injury prevention among nurses	Mann-Whitney U and Kruskal-Wallis
Australian Nurses' Knowledge of Pressure Injury Prevention and Management: A Cross-sectional Survey	Fulbrook P, Lawrence P, Miles S	2019	Cross-sectional	Staff nurses	306	Demographic factors (position and qualifications)	Knowledge towards pressure injury prevention	Mann-Whitney U and Kruskal-Wallis
Iranian nurses' knowledge, attitude and behaviour on skin care, prevention and management of pressure injury: A descriptive cross-sectional study	Lotfi M, Aghazadeh A, Asgarpour H, Nobakht A	2019	Cross-sectional	Staff nurses	214	Demographic factors (education background and working experience)	Knowledge and attitude towards pressure injury prevention	One way ANOVA, Mann-Whitney U and Kruskal-Wallis

Title	Author	Year of publication	Study design	Population	Sample size	Independent variables	Dependent variables	Statistical test
Evaluation of Nurses' Knowledge about Risk Monitoring and Risk Prevention for Pressure Ulcers	Kopuz E, Karaca A	2019	Cross-sectional	Staff nurses	250	Demographic factors (age, education background and working experience)	Knowledge towards pressure injury prevention	Chi-square test and one way ANOVA
Nurses' knowledge to pressure ulcer prevention in public hospitals in Wollega: A cross-sectional study design	Ebi W, Hirko G, Mijena D	2019	Cross-sectional	Staff nurses	220	Demographic factors (age, gender, education background and working experience)	Knowledge towards pressure injury prevention	Chi-square test and one way ANOVA
Knowledge and attitude on pressure ulcer prevention among nursing students in UITM Selangor Puncak Alam Campus	Isa R, Syafiah A, Azman Z, Nur T, Mat A	2019	Cross-sectional study	Nursing students	157	Demographic factors (gender, age, education level, year of study)	Knowledge and attitude among on pressure injury prevention	Spearman correlation
The knowledge of pressure ulcer among nursing students and related factors	Murugiah S, Ramuni K, Das U, Hassan H, Abdullah S	2020	Cross-sectional	Nursing students	108	Demographic factors (level of education)	Level of knowledge of pressure ulcer among nursing students	Independent t-test
Knowledge of nursing students on the subject of pressure ulcers prevention and treatment	Szymański, S., Porebska, E., & Sipak-Szmigiel, O. (2020).	2020	Not stated	Nursing students	203	Sociodemographic factors (age)	Level of knowledge on the prevention and treatment of pressure ulcer	Kolmogorov-Smirnov, fisher-exact test, one way Anova, spearman's correlation

Discussion

Level of Knowledge on Pressure Injury Prevention

Understanding pressure injury prevention requires recognizing the processes and risk factors that contribute to these injuries, maintaining skin integrity, minimizing the duration of pressure on intact skin, and ensuring adequate nutrition. According to a study by Tesfa et al. (2022), 183 out of 359 nurses in Gurage Zone Hospitals exhibited poor knowledge regarding pressure injury prevention, achieving a mean score of $42.38\% \pm 2.843$. Similarly, research conducted by Azhar et al. (2022) revealed that 195 out of 275 critical care nurses in Klang Valley had an unsatisfactory level of knowledge, with a mean score of $11.29\% \pm 4.98$. This is further supported by a study among intensive care nurses in Greece, where nearly all participants self-

reported limited education and knowledge related to pressure injury prevention, yielding a mean score of $16.5\% \pm 3.743$ (Avgerinou et al., 2022). Additionally, Muhammed et al. (2020) highlighted a similarly poor level of knowledge regarding pressure injury prevention among nurses at Hawassa University Hospital in Ethiopia.

In contrast, a study conducted among nurses in Istanbul revealed that their knowledge level regarding pressure injury prevention was above the average, with a mean score of 52.95% (Kopuz et al., 2019). Similarly, research among nurses in Iran found a moderate level of knowledge about pressure injury prevention, reflected by a mean score of 27.23% (Lotfi et al., 2019). In Selangor, another study reported that a significant majority of nurses (95%) demonstrated an adequate level of knowledge in this area, as noted by Sham et al. (2020). On the other hand, a study focusing on nursing students by Ghafoor et al. (2021) found a moderate mean knowledge score of 58.78%. This finding was corroborated by Szymanski et al. (2020), which indicated that more than half of the respondents (57.64%) had a moderate understanding of pressure injury prevention, while 28.57% were classified as having good knowledge, and 6.90% had either high or low knowledge. However, these results stand in contrast to the study conducted by Abrahams et al. (2023), which found that a majority of respondents (70%) possessed good knowledge of pressure injury prevention, achieving a score of 78%.

Furthermore, the study evaluated the knowledge of pressure injury prevention among nurses and nursing students. A total of nine studies employed the same questionnaire tool, known as the Pressure Ulcer Knowledge Assessment Instrument (PUKAT 2.0). This included one study focused on healthcare support workers, four involving nurses, and five pertaining to nursing students (Ebi et al., 2019; Aydogan et al., 2019; Isa et al., 2019; Sari et al., 2020; Murugiah et al., 2020; Fernandez et al., 2021; Alshahrani et al., 2021; Liu et al., 2022; Mather et al., 2022). The survey assesses six crucial factors: the etiology and development of pressure injuries, classification and observation, risk assessment, nutrition, and preventive measures to minimize both the incidence and duration of pressure injuries. However, five studies utilized different questionnaires to evaluate the knowledge of pressure injury prevention specifically among nursing students.

Knowledge on the Etiology and Development of Pressure Injury

A comprehensive understanding of pressure injury prevention hinges on knowing their etiology and development, emphasizing the causes and processes involved in their formation. This understanding can be evaluated through six questions that present statements about pressure injuries, accompanied by options for correct and incorrect answers. Research conducted by Liu et al. (2022) revealed that healthcare support workers in the United Kingdom possess limited knowledge regarding the etiology and development of pressure injury prevention, with a mean score of just 37%. Likewise, a study involving nurses in public hospitals in Wollega reported an even lower mean score of 27% in this domain (Ebi et al., 2019). Additionally, a study by Aydogan et al. (2019) among intensive care nurses in Turkey demonstrated similarly low scores, particularly on questions pertaining to the etiology and development of pressure injuries, with a mean score of 38.67%. Fernandes et al. (2021) conducted a study among nursing degree students in Portugal, which indicated that a significant majority possessed a high level of knowledge regarding the etiology and prevention of pressure injuries, achieving an average score of 78.0%. In contrast, a study by Murugiah et al. (2020) that included both degree and diploma nursing students found that the majority, at 84.7%, demonstrated low knowledge of pressure ulcer prevention. Additionally, two other studies reported that the

majority of respondents exhibited moderate knowledge, with scores of 58.0% and 41.2% (Isa et al., 2019, and Alshahrani et al., 2021).

Knowledge on The Classification and Observation of Pressure Injury

Classification and observation of pressure injuries were part of the questionnaires used to measure nursing students' knowledge regarding their ability to accurately classify and observe pressure injuries. This section consisted of five questions with statements about pressure injuries, offering correct and incorrect answer choices. Ebi et al. (2019) and Liu et al. (2022) reported that nurses in public hospitals in Wollega and healthcare support workers in the United Kingdom (UK) had the lowest scores in knowledge related to pressure injury classification and observation, with scores of 14.2% and 24%, respectively. In contrast, Fernandes et al. (2021) found that the majority of degree nursing students in Portugal demonstrated a high level of knowledge in classifying and observing pressure injuries, with 80.5% of respondents answering correctly. Similarly, Isa et al. (2019) and Alshahrani et al. (2021) highlighted that most nursing students possessed adequate knowledge of pressure injury classification and observation, achieving total correct answer scores of 47.6% and 44.5%, respectively. However, a study conducted at a Health Campus in Kelantan by Murugiah et al. (2020) revealed that 73.5% of nursing students had insufficient ability to classify and observe pressure injuries.

Knowledge on Pressure Injury Risk Assessment

Possessing the knowledge and skills to assess the risk of pressure injuries is essential for their prevention. This area includes two questions, each with binary right or wrong answer choices. Previous studies by Sari et al. (2021) and Liu et al. (2022) revealed that community nurses in Bandung and healthcare support workers in the United Kingdom have a low understanding of risk assessment related to pressure injury prevention, with scores of 27.6% and 39.0%, respectively. Additionally, research conducted by Isa et al. (2019) found that nursing students at Universiti Teknologi Mara (UiTM), Selangor Puncak Alam Campus, achieved a mere 24.2% total of correct answers when it came to risk assessment knowledge. In contrast, two studies indicate that nursing students possess a moderate level of knowledge regarding the risk assessment for preventing pressure injuries (Murugiah et al., 2020; Alshahrani et al., 2021). Furthermore, Fernandes et al. (2021) documented that nursing students in Portugal exhibited a good understanding of risk assessment pertaining to pressure injury prevention.

It is essential to recognize that an increase in shear can stem from heightened friction, which consequently raises the risk of pressure injuries. To address this issue, it is vital to adopt strategies that minimize friction and shear, including proper positioning techniques and specialized pressure-relieving equipment. Healthcare providers, especially nurses, have the opportunity to proactively prevent pressure injuries and enhance patient outcomes by understanding the interplay between friction and shear. This discussion encompasses seven questions, each formulated with both correct and incorrect answer choices. A study conducted by Sari et al. (2021) revealed that only 20.8% of community nurses in Bandung demonstrated adequate knowledge in this area. Similarly, research among healthcare workers in the United Kingdom highlighted a low level of understanding related to pressure reduction, with a mean score of $0.40\% \pm 0.18$ (Liu et al., 2022). On the other hand, some studies indicate that most nursing students have a solid grasp of how to mitigate shear in pressure ulcer prevention (Fernandes et al., 2021). This finding contrasts with two other studies, which found that the majority of nursing students lack a comprehensive understanding of how to reduce pressure to prevent pressure injuries (Isa et al., 2019; Murugiah et al., 2020). However, a study by

Alshahrani et al. (2021) suggests that the average nursing student possesses a moderate level of awareness on this topic.

In addition to the amount of pressure applied, the duration of that pressure is critical in preventing the occurrence or exacerbation of pressure injuries. Prolonged pressure and shear forces can damage both the skin and the underlying tissues, leading to the development of pressure injuries. Therefore, it is essential for nurses to possess a comprehensive understanding of preventive measures aimed at minimizing both the duration of pressure and shear, as well as the intensity of the pressure exerted. Research findings indicate a concerning trend: Ebi et al. (2019) reported that nurses in Wollega demonstrated inadequate knowledge regarding preventive measures to reduce pressure duration, with a mean score of only $0.29\% \pm 0.18$. Similarly, Murugiah et al. (2020) found that 58.2% of nursing students exhibited a low level of understanding concerning the importance of reducing shear duration to prevent pressure injuries. Conversely, some studies suggest that most nursing students possess moderate knowledge on the topic; for instance, Alshahrani et al. (2021) found that students recognized that minimizing pressure duration could help prevent the formation of pressure injuries. This perspective is echoed by Isa et al. (2019), which reported a 57.6% average score of correct responses among nursing students. Furthermore, Fernandes et al. (2021) documented that a majority of nursing students recognized the significance of reducing pressure duration as a critical factor in preventing pressure injuries.

Knowledge of the Role of Nutrition in Pressure Injury Prevention

As frontline caregivers, nurses play a crucial role in patient care, making it essential to understand nutrition and its significant impact on pressure injury prevention. Nutrition is fundamental in supporting tissue viability and maintaining skin health. Research has shown that nurses in Wollega possess adequate knowledge regarding nutrition's role in pressure injury prevention, with a mean score of 2.65 ± 0.87 (Ebi et al., 2019). In addition, community nurses in Bandung and healthcare support workers in the United Kingdom demonstrated high levels of knowledge, achieving scores of 54.0% and 66.0%, respectively (Sari et al., 2021; Liu et al., 2022). Furthermore, intensive care nurses in Turkey recorded the highest knowledge scores related to nutrition and pressure injury prevention, with a mean score of 66% (Aydogan et al., 2019). According to Fernandes et al. (2021), nearly all nursing students exhibited good knowledge in this area, with an impressive 81.5% answering questions correctly. This finding is corroborated by another study by Isa et al. (2019). Additionally, further research has confirmed these results, revealing that a significant majority of nursing students—67.5% (Alshahrani et al., 2021) and 71.4% (Murugiah et al., 2020)—answered nutrition-related questions on pressure injury prevention correctly.

Level of Attitude on Pressure Injury Prevention

A series of studies evaluated the attitudes toward pressure injury prevention among nurses, healthcare workers, and nursing students. Specifically, seven studies conducted by Aydogan et al. (2019), Isa et al. (2019), Lopez-Franco et al. (2020), Alshahrani et al. (2021), Fernandes et al. (2021), Liu et al. (2022), and Azhar et al. (2022) employed the same assessment tool: the Attitude Pressure Ulcer Prevention (APUP) questionnaire. This questionnaire encompasses five key components: personal competency in preventing pressure injuries, the prioritization of pressure injury prevention, the effects of pressure injuries, responsibility for preventing such injuries, and confidence in the effectiveness of preventive measures. Lopez-Franco et al. (2020) found that nurses at a university hospital in Spain had a positive attitude toward pressure injury

prevention, achieving a score of 83.3%. This positive trend was also observed by Liu et al. (2022), who reported that healthcare workers in the United Kingdom demonstrated a favorable attitude, with a mean score of 75.6%. Similarly, Aydogan et al. (2019) indicated that intensive care nurses in Turkey displayed a positive attitude toward pressure injury prevention. Conversely, Azhar et al. (2022) revealed that of the 275 critical care nurses surveyed in Klang Valley, 219 exhibited an unsatisfactory attitude toward pressure injury prevention.

Additionally, two studies by Avgerinou et al. (2022) and Sari et al. (2021) highlighted the positive attitudes of Intensive Care Nurses in Greece and community nurses in Bandung regarding pressure injury prevention. These studies utilized different questionnaire tools to assess attitudes toward this important issue. In contrast, Lotfi et al. (2019) found that the attitude level among nurses in Iran toward preventing pressure injuries was moderate, with a mean score of 38.55%. The study by Isa et al. (2019) revealed that the highest total scores were related to the nurses' sense of responsibility for pressure injury prevention, achieving a score of 69.1%. Furthermore, this study also reported that nursing students exhibited a positive attitude toward preventing pressure ulcers, with a mean score of 75.3%. Moreover, another study by Abrahams et al. (2023) employed a different assessment tool and similarly indicated that nursing students possess a commendable attitude towards pressure injury prevention.

Level of Practice on Pressure Injury Prevention

Proactively practicing pressure injury prevention is essential for maintaining and enhancing patients' health. Four studies have assessed the levels of practice in preventing pressure injuries, with three focusing on nurses (Sham et al., 2020; Avgerinou et al., 2022; Tesfa et al., 2022) and one examining nursing students (Abrahams et al., 2023). Avgerinou et al. (2022) found that most Intensive Care Nurses in Greece displayed good practices in pressure injury prevention. Similarly, Tesfa et al. (2022) reported that 210 out of 359 nurses in Gurage Zone Hospitals, Ethiopia, demonstrated effective practices for pressure injury prevention. A study conducted among nurses in Selangor by Sham et al. (2020) indicated that the majority (96.8%) successfully practiced pressure injury prevention. Additionally, Abrahams et al. (2023) revealed that 94% of nursing students in their study also exhibited commendable practices in preventing pressure injuries.

Association Between the Level of Knowledge with Attitude and Practice Towards Pressure Injury Prevention

The investigation into the relationship among various variables—including attitudes and practices toward pressure injury prevention, duration of educational studies, and educational level—has revealed noteworthy insights regarding the level of knowledge concerning pressure injury prevention among nurses and nursing students. Several studies have been undertaken to examine the association between these variables and the level of knowledge in this domain. The relationship between knowledge and attitudes toward pressure injury prevention has been scrutinized in multiple studies, comprising one study involving healthcare workers and three studies focused on nursing students (Isa et al., 2019; Liu et al., 2022; Alshahrani et al., 2021; Fernandes et al., 2021). Notably, the research conducted among healthcare professionals indicated that higher attitude scores were significantly associated with better knowledge scores related to pressure injury prevention ($p < 0.005$) (Liu et al., 2022). Additionally, Alshahrani et al. (2021) identified a positive moderate correlation between knowledge and attitudes among nursing students concerning pressure injury prevention ($p < 0.05$). In concordance, the findings from Fernandes et al. (2021) exhibited a significant association between the level of knowledge

and attitudes toward pressure injury prevention among nursing students in Portugal ($p < 0.002$). Conversely, Isa et al. (2019) reported a non-significant relationship between knowledge and attitudes regarding pressure injury prevention among nursing students ($r = -0.132$, $p > 0.1$).

Furthermore, two studies have investigated the interplay between knowledge and practice regarding pressure injury prevention: one among nurses, conducted by Tesfa et al. (2022), and another among nursing students by Ghafoor et al. (2021). Tesfa et al. (2022) observed a significant association between the level of knowledge and practice concerning pressure injury prevention among nurses in Gurage Zone Hospitals. This finding was corroborated by Ghafoor et al. (2021), who identified a significant correlation between knowledge and practices ($p < 0.000$) among nursing students. In addition, a comparative study assessed the level of knowledge regarding pressure injury prevention between the Bachelor of Nursing program, which entails three years of study, and the Master of Nursing program, requiring two years. Szymanski et al. (2020) reported a significant difference in knowledge levels associated with the duration of studies ($p < 0.001$), indicating that graduates from the Master of Nursing program exhibited a higher level of knowledge compared to those from the Bachelor of Nursing program.

Moreover, examining the association between educational level and knowledge regarding pressure injury prevention revealed significant differences, particularly between diploma and degree-level nursing education. As noted by Murugiah et al. (2020), a significant association was found, with degree-level education correlating with a superior level of knowledge compared to diploma-level education ($p < 0.001$). This underscores the critical influence of educational attainment on the knowledge of pressure injury prevention among nursing professionals.

Factors Associated with the Level of Knowledge, Attitude and Practice towards Pressure Injury Prevention

The correlation between various associated factors and the level of knowledge regarding pressure injury prevention among nurses and healthcare workers has been extensively documented in seven studies (Ebi et al., 2019; Lotfi et al., 2019; Sari et al., 2021; Sham et al., 2020; Liu et al., 2022; Tesfa et al., 2022; Avgerinou et al., 2022). Ebi et al. (2019) identified a significant association between participation in pressure injury prevention training and the knowledge level of nurses in Wollega, reporting a p-value of less than 0.003. This study suggests that nurses who receive training on pressure injury prevention possess a higher level of knowledge than those who do not. Supporting this finding, Sari et al. (2021) demonstrated a correlation among community nurses in Bandung, indicating that additional training on pressure injury prevention was associated with enhanced knowledge levels ($p < 0.05$). Furthermore, Lotfi et al. (2019) and Liu et al. (2022) reported significant associations between training in pressure injury prevention and knowledge levels among nurses in Iran and healthcare workers in the United Kingdom, with p-values of less than 0.001 and 0.003, respectively. In addition, two studies explored the association between educational background and knowledge levels related to pressure injury prevention (Lotfi et al., 2019; Tesfa et al., 2022). Both studies concluded that nurses with a master's degree or higher exhibited significantly elevated knowledge levels regarding pressure injury prevention ($p < 0.04$). Moreover, a study focused on community nurses in Bandung indicated a significant relationship between years of work experience and knowledge levels in preventing pressure

injuries (Sari et al., 2021), with the highest knowledge scores found among nurses with 6 to 20 years of experience ($p < 0.009$).

Additionally, Tesfa et al. (2020) conducted a study examining the correlation between adherence to guidelines for preventing pressure injuries and the associated knowledge levels among nurses. Their findings indicated a significant relationship, with $p < 0.042$, revealing that nurses accustomed to utilizing guidelines possessed a higher level of knowledge compared to those who did not employ such guidelines. In a separate study, Avgerinou et al. (2022) assessed Intensive Care Unit (ICU) nurses in Greece to evaluate the correlation between knowledge of pressure injury treatment and knowledge of prevention strategies. The study found a positive association ($p < 0.001$), suggesting that ICU nurses demonstrated greater proficiency in treating pressure injuries than in preventing their development. Lastly, two studies conducted among nurses and healthcare workers assessed the relationship between departmental affiliation and knowledge levels in pressure injury prevention. Both Sham et al. (2020) and Liu et al. (2022) highlighted significant associations between knowledge levels and different working departments ($p < 0.001$ and $p < 0.03$, respectively), indicating that nurses and healthcare workers operating in acute care settings exhibited significantly higher knowledge levels than those in primary care departments.

Numerous studies have been conducted to evaluate the association between various factors and the attitudes of nurses and healthcare workers toward pressure injury prevention. A notable investigation by Aydogan et al. (2019) among Intensive Care Unit nurses in Turkey found a significant correlation between gender and attitudes toward pressure injury prevention, indicating that female nurses demonstrated a higher level of positive attitude compared to their male counterparts. Furthermore, Lopez-Franco et al. (2020) reported a substantial difference in the attitude scores of nurses in Spain who received advanced training in pressure injury prevention, as opposed to those who only underwent basic training, with a p-value of less than 0.0001. Similarly, a study conducted among nurses in Iran revealed a significant association between receiving training on pressure injury prevention and improved attitudes, with a p-value of less than 0.000 (Lotfi et al., 2019). In contrast, Liu et al. (2022) reported findings that indicated no significant difference in attitude scores between healthcare workers who had received training and those who had not. Additionally, two studies sought to explore the relationship between academic background and attitudes toward pressure injury prevention among nurses. Aydogan et al. (2019) identified a significant association between the educational attainment of Intensive Care Unit nurses in Turkey and their attitudes toward pressure injury prevention ($p < 0.05$). Correspondingly, Sari et al. (2021) highlighted a significant relationship between academic qualifications and attitudes toward pressure injury prevention among community nurses, with a p-value of less than 0.003, indicating that a higher level of education correlates with more favorable attitudes. Moreover, research conducted in Malaysia's Klang Valley (Lotfi et al., 2019) and Iran (Azhar et al., 2022) examined the relationship between nursing experience and attitudes toward pressure injury prevention. Both studies concluded that there exists a significant association between years of work experience and attitudes regarding pressure injury prevention ($p < 0.019$ and $p < 0.05$, respectively). Furthermore, the professional role within the nursing field appears to influence attitudes toward pressure injury prevention. According to Lopez-Franco et al. (2020), a significant association ($p < 0.001$) was found between professional category and attitude levels, revealing that registered nurses exhibited slightly higher attitude scores compared to assistant nurses.

A study conducted among nurses examined the relationship between various factors and the level of practice regarding pressure injury prevention. Tesfa et al. (2020) highlighted the link between educational background and workload with the effectiveness of pressure injury prevention practices. The findings revealed a significant correlation between the academic qualifications of nurses in Gurage Zone Hospitals and their level of engagement in pressure injury prevention ($p < 0.038$). Notably, nurses holding a bachelor's degree demonstrated a 2.6 times higher level of practice compared to those with a diploma. Additionally, the study found a significant relationship between workload and practice levels in pressure injury prevention ($p < 0.032$), indicating that nurses with heavier workloads tended to engage in pressure injury prevention practices less frequently than their counterparts with lighter workloads.

Four studies have been conducted among nursing students to explore the relationship between demographic factors, including age and gender, and the level of knowledge, attitudes, and practices related to pressure injury prevention (Szymanski et al., 2020; Alshahrani et al., 2021; Mather et al., 2022; Abrahams et al., 2023). Abrahams et al. (2023) reported no significant association between demographic factors of age and gender and the levels of knowledge, attitude, and practice in pressure injury prevention among degree nursing students ($p > 0.05$). Similarly, Alshahrani et al. (2021) presented findings that aligned with this conclusion. Likewise, Szymanski et al. (2020) indicated that there was no relationship between gender and attitudes toward pressure injury prevention among nursing students ($p > 0.66$). In contrast, Mather et al. (2022) identified a significant difference between gender and mean attitude scores regarding pressure injury prevention ($p < 0.001$), with male nursing students in Australia scoring consistently higher than their female counterparts. Additionally, this study noted a significant association between age and attitudes toward pressure injury prevention ($p < 0.001$), revealing that nursing students older than 25 years achieved higher scores. One study explored the relationship between the year of study and the level of knowledge and practices related to pressure injury prevention among nursing students. Ghafoor et al. (2021) found a significant association, indicating that as students progress in their studies, their knowledge and practices concerning pressure injury prevention improve ($p < 0.001$). According to the findings, third-year nursing students demonstrated a higher level of knowledge and practice in preventing pressure injuries compared to first-year students.

The gaps identified in this study stem from a limited number of research efforts, specifically involving critical care nurses in the ICU. Only four studies have been conducted in this context (Aydogan et al., 2019; Sham et al., 2020; Azhar et al., 2022; Avgerinou et al., 2022) across various countries. In contrast, other studies primarily focused on non-critical care nurses in general wards from different nations. The scant research involving both critical and non-critical care nurses fails to adequately represent the global knowledge, attitudes, and practices regarding pressure injury prevention among nurses worldwide. Furthermore, among the aforementioned studies, only two were conducted in Malaysia (Sham et al., 2020; Azhar et al., 2022), indicating a significant dearth of research on the knowledge, attitudes, and practices related to pressure injury prevention among the nursing profession in Malaysia. Notably, only one study suggests that nurses in Malaysia possess a high level of knowledge, attitude, and practice concerning pressure injury prevention (Sham et al., 2020). Therefore, it is insufficient to generalize findings to the broader nursing population in Malaysia. The lack of comprehensive data regarding the knowledge, attitudes, and practices of nurses in the country could hinder the development of effective interventions and continuous nursing education

programs. It is essential to recognize these gaps in order to formulate more strategies that will contribute to positive patient outcomes and reduce the incidence of pressure injuries.



Figure 2: The KAP Framework for Pressure Injury Prevention

Figure 2 illustrates the framework that emerges from this review and encompasses the interplay among three pivotal components: Knowledge, Attitude, and Practice in achieving the central objective of pressure injury prevention, particularly among nursing professions. Sociodemographic factors, including age, gender, educational background, work experience, and training participation, serve as critical elements influencing individuals' KAP and pressure injury prevention.

Conclusion

This framework, along with the findings of this review, provides significant practical applications in healthcare settings by integrating knowledge, attitudes, and practices regarding pressure injury prevention with nurses' sociodemographic factors. Utilizing this framework, training and education programs can be developed to address gaps related to age, gender, educational background, work experience, and attendance at training sessions. Furthermore, the framework facilitates data-driven decision-making to tackle workforce disparities, such as requiring regular training for all staff levels.

One limitation of this study is the reliance on only two databases for the literature search, which may have restricted the scope by excluding potentially relevant studies indexed in other comprehensive and specialized databases. Future studies should expand the search strategy to include a wider range of databases to ensure a more comprehensive and diverse representation

of the literature. Besides, studies to validate the developed KAP framework for pressure injury prevention in clinical settings are warranted, targeting interventions at specific staff members who require training, which could prove to be cost-effective. Enhancing nurses' knowledge, attitudes, and practices regarding pressure injury prevention in clinical environments will improve patient care. Additionally, research should investigate the cost-effectiveness of interventions based on the framework, assessing whether investments in training and preventive tools result in measurable reductions in pressure injury prevalence and associated healthcare costs.

References

- Abrahams, F. R., Daniels, E. R., Niikondo, H. N., & Amakali, K. (2023). Students' knowledge, attitude and practices towards pressure ulcer prevention and management. *Health SA Gesondheid*, 28. <https://doi.org/10.4102/hsag.v28i0.2180>
- Alshahrani, B., Middleton, R., Rolls, K., & Sim, J. (2023). Critical care nurses' knowledge and attitudes toward pressure injury prevention: A pre and post intervention study. *Intensive and Critical Care Nursing*, 79, 103528. <https://doi.org/10.1016/j.iccn.2023.103528>
- Avgerinou, I., Kalemikerakis, I., Vasilopoulos, G., Kelesi, M., Maria, P., Petsios, K., & Dousis, E. (2022). Original Article Intensive Care Nurses' Knowledge, Practice and Attitudes Related to Pressure Ulcer Prevention: A Single Tertiary Center in Greece Case. *International Journal of Caring Sciences*, 15, 2–780. <https://www.internationaljournalofcaringsciences.org/docs/6.%20dousis.pdf>
- Aydogan, S., & Caliskan, N. (2019). A Descriptive Study of Turkish Intensive Care Nurses' Pressure Ulcer Prevention Knowledge, Attitudes, and Perceived Barriers to Care. *Wound Management & Prevention*, 65(2), 39–47. <https://pubmed.ncbi.nlm.nih.gov/30730304/>
- Azhar, W., Khuzaimah, S., Sharoni, A., Fauzi, R., Isa, R., Shohor, A., & Seman, N. (2022). Knowledge, Attitude and Perceived Barrier Towards Pressure Ulcer Prevention Among Critical Care Unit Nurses in Klang Valley Public Hospitals. *Malaysian Journal of Medicine and Health Sciences*, 18(SUPP8), 59–65. <https://doi.org/10.47836/mjmhs18.8.9>
- Ebi, W.E., Hirko, G.F. & Mijena, D.A. Nurses' knowledge to pressure ulcer prevention in public hospitals in Wollega: a cross-sectional study design. *BMC Nurs* 18, 20 (2019). <https://doi.org/10.1186/s12912-019-0346-y>
- European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel, & Pan Pacific Pressure Injury Alliance. (2019). Prevention and treatment of pressure ulcers/injuries : Clinical practice guideline : The international guideline 2019. National Pressure Injury Advisory Panel. <https://epuap.org/download/8566/>
- Fernandes, C. S., Lima, A., & Santos, M. (2021). Pressure injury prevention: attitudes and knowledge of nursing students / Prevenção de lesões por pressão: atitudes e conhecimento de estudantes de enfermagem. *Journal of Nursing and Health*, 11(3). <https://doi.org/10.15210/jonah.v11i3.20924>
- Fulbrook, P., Lawrence, P., & Miles, S. (2019). Australian Nurses' Knowledge of Pressure Injury Prevention and Management. *Journal of Wound, Ostomy and Continence Nursing*, 46(2), 106–112. <https://doi.org/10.1097/won.0000000000000508>
- Ghafoor, N., Munir, R., Niazi, I. M. K., & Azhar, F. (2021). Knowledge and Practices of Student Nurses towards Prevention and Management of Pressure ulcers in Allied Hospitals of Rawalpindi Medical University. *Journal of Rawalpindi Medical College*, 25(3), 323–327. <https://doi.org/10.37939/jrmc.v25i3.1413>
- Halász, B. G., Bérešová, A., Tkáčová, L., Magurová, D., & Lizáková, Ľ. (2021). Nurses' Knowledge and Attitudes towards Prevention of Pressure Ulcers. *International Journal of*

- Environmental Research and Public Health, 18(4).
<https://doi.org/10.3390/ijerph18041705>
- Hermis, A. H., Mollaei, A., Vajargah, P. G., Karkhah, S., Takasi, P., Firooz, M., Hosseini, S. J., Otaghvar, H. A., & Raziani, Y. (2023). A systematic review of nursing students' attitude and related factors towards pressure ulcer prevention. *International Wound Journal*, 20(8), 3404-3416. <https://doi.org/10.1111/iwj.14191>
- Isa, R., Azman, N. A. S. Z. ., & Tuan Mat , . T. N. A. . (2020). Knowledge and attitude on pressure ulcer prevention among nursing students in UiTM Selangor Puncak Alam Campus . *Healthscope: The Official Research Book of Faculty of Health Sciences, UiTM, 1*. Retrieved from <https://healthscopefsk.com/index.php/research/article/view/11>
- Kopuz, E., & Karaca, A. (2019). Evaluation of Nurses' Knowledge about Risk Monitoring and Risk Prevention for Pressure Ulcers. *Clinical and Experimental Health Sciences*, 9(2), 157-165. <https://doi.org/10.33808/clinexphealthsci.563897>
- Liu, L. Q., Kelly, J., Di Cesare, M., Allan, H. T., & Traynor, M. (2022). The knowledge and attitudes regarding pressure ulcer prevention among healthcare support workers in the UK: A cross-sectional study. *Journal of Tissue Viability*, 32(1). <https://doi.org/10.1016/j.jtv.2022.11.004>
- Lotfi, M., Aghazadeh, A. M., Asgarpour, H., & Nobakht, A. (2019). Iranian nurses' knowledge, attitude and behaviour on skin care, prevention and management of pressure injury: A descriptive cross-sectional study. *Nursing Open*, 6(4), 1600-1605. <https://doi.org/10.1002/nop2.365>
- Mather, C., Jacques, A., & Prior, S. J. (2022). Australian First-Year Nursing Student Knowledge and Attitudes on Pressure Injury Prevention: A Three-Year Educational Intervention Survey Study. *Nursing Reports*, 12(3), 431-445. <https://doi.org/10.3390/nursrep12030042>
- Muhammed, E.M., Bifftu, B.B., Temachu, Y.Z. et al. (2020) Nurses' knowledge of pressure ulcer and its associated factors at Hawassa University comprehensive specialized hospital Hawassa, Ethiopia, 2018. *BMC Nurs* 19, 51 (2020). <https://doi.org/10.1186/s12912-020-00446-6>
- Murugiah, S., Ramuni, K., Das, U., Hassan, H. C., & Abdullah, S. K. B. F. (2020). The knowledge of pressure ulcers among nursing students and related factors. *Enfermería Clínica*, 30, 41-45. <https://doi.org/10.1016/j.enfcli.2019.11.019>
- Norton L, Parslow N, Johnston D, Ho C, Afalavi A, Mark M, et al. Best practice recommendations for the prevention and management of pressure injuries. In: *Foundations of Best Practice for Skin and Wound Management. A supplement of Wound Care Canada; 2017. 64 pp.* Retrieved from: www.woundscanada.ca/docman/public/health-care-professional/bpr-workshop/172-bpr-prevention-andmanagement-of-pressure-injuries-2/file.
- Roussou, E., Fasoi, G., Stavropoulou, A., Kelesi, M., Vasilopoulos, G., Gerogianni, G., & Alikari, V. (2023). Quality of life of patients with pressure ulcers: A systematic review. *Medicine and Pharmacy Reports*, 96(2), 123-130. <https://doi.org/10.15386/mpr-2531>
- Sari, S. P., Everink, I. H., Amir, Y., Lohrmann, C., Halfens, R. J., Moore, Z., Beeckman, D., & Schols, J. M. (2021). Knowledge and Attitude of Community Nurses on Pressure Injury Prevention: A Cross-sectional Study in an Indonesian City. *International Wound Journal*, 18(4), 422-431. <https://doi.org/10.1111/iwj.13527>
- Sham, F., Sharif, D. I. B., Moksini, N. binti, & Selamat, H. (2020). Knowledge, Practice and Perceived Barrier of Pressure Ulcer Prevention Among Nurses In A Public Hospital In Selangor. *Malaysian Journal of Public Health Medicine*, 20(Special1), 325-335.

- <https://doi.org/10.37268/mjphm/vol.20/no.Special1/art.738>
- Szymański, S., Porębska, E., & Sipak-Szmigiel, O. (2020). Knowledge of nursing students on the subject of pressure ulcers prevention and treatment. What we know about pressure ulcers?. *Polish Journal of Surgery*, 92(3), 22-25.
- Tesfa Mengist, S., Abebe Geletie, H., Zewudie, B. T., Mewahegn, A. A., Terefe, T. F., Tsegaye Amlak, B., Tadesse, B., GebreEyesus, F. A., Tsehay, T., Solomon, M., Chekole Temere, B., Geze Tenaw, S., & Mesfin, Y. (2022). Pressure ulcer prevention knowledge, practices, and their associated factors among nurses in Gurage Zone Hospitals, South Ethiopia, 2021. *SAGE Open Medicine*. <https://doi.org/10.1177/20503121221105571>
- Visconti, A. J., Sola, O. I., & Raghavan, P. V. (2023). Pressure Injuries: Prevention, Evaluation, and Management. *American Family Physician*, 108(2), 166–174. <https://www.aafp.org/pubs/afp/issues/2023/0800/pressure-injuries.html>
- Wu, J., Wang, B., Zhu, L., & Jia, X. (2022). Nurses' knowledge on pressure ulcer prevention: An updated systematic review and meta-analysis based on the Pressure Ulcer Knowledge Assessment Tool. *Frontiers in Public Health*, 10. <https://doi.org/10.3389/fpubh.2022.964680>
- Yan, B., Dandan, H., & Xiangli, M. (2022). Effect of training programmes on nurses' ability to care for subjects with pressure injuries: A meta-analysis. *International Wound Journal*, 19(2), 262-271. <https://doi.org/10.1111/iwj.13627>
- Zhang, Y., He, L., Gou, L., Pei, J., Nan, R., Chen, H., Wang, X., Du, Y., Yan, H., & Dou, X. (2021). Knowledge, attitude, and practice of nurses in intensive care unit on preventing medical device-related pressure injury: A cross-sectional study in western China. *International Wound Journal*, 18(6), 777–786. <https://doi.org/10.1111/iwj.13581>