

## Understanding Nurses' Knowledge and Attitudes toward Perioperative Pressure Injury Prevention

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### Abstract

This study evaluated operating room nurses' knowledge and attitudes toward perioperative pressure injury (PI) prevention. Among 211 nurses surveyed using the Pressure Ulcer Knowledge Assessment Tool and Attitude towards Pressure Ulcer Prevention instruments, average knowledge scores were low (31.74%), especially in prevention and etiology, while attitudes were moderately positive (65%). No significant correlation was found between knowledge and attitude, although knowledge varied significantly by ethnicity, education level, and job position. The findings underscore the need for focused training to enhance PI prevention knowledge, suggesting that attitude alone is insufficient. Targeted professional development and structured in-service programs are vital for effective PI prevention

**Keywords:** nurses, perioperative, pressure injury, prevention

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### 1.0 Introduction

Pressure injuries (PIs), also known as pressure ulcers or bedsores, are localized damage to the skin and underlying tissue caused by prolonged pressure, often occurring over bony prominences. In surgical settings, particularly the operating room (OR), these injuries pose a significant challenge due to the immobility and physiological stress patients experience during procedures (Peng et al., 2024). Operating room-related pressure injuries (ORPIs) typically develop within 48 to 72 hours postoperatively and are commonly classified as Stage 1, Stage 2, or deep tissue injuries, presenting as non-blanchable erythema, purple discoloration, or blistering (You et al., 2021; Khong et al., 2019).

Numerous factors contribute to the development of ORPIs, including prolonged immobility, anesthesia-induced sensory loss, fasting-related nutritional deficits, high American Society of Anesthesiologists (ASA) scores, and intraoperative hypotension or hypothermia (Betts et al., 2022). Environmental elements such as inappropriate support surfaces, inadequate offloading, and the use

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of positioning devices further exacerbate the risk (Yoshimura et al., 2020). For instance, a two-hour surgery may result in over six hours of immobility, significantly increasing the likelihood of tissue damage (You et al., 2021). The incidence of pressure injuries during surgery varies but remains consistently high. Surgeries lasting longer than two hours carry a minimum 9% risk, with rates rising to over 13% for procedures exceeding seven hours (Chen et al., 2019; You et al., 2021). These injuries not only compromise patient health but also lead to extended hospital stays, increased treatment costs, and reduced quality of life (Cebeci & Senol Çelik, 2022).

Preventing ORPIs requires a comprehensive approach across the perioperative continuum, including preoperative risk assessments, intraoperative monitoring, and postoperative care. Nurses play a pivotal role in this process, as their knowledge and attitudes directly influence adherence to preventive measures such as repositioning, skin assessments, and the use of pressure-relieving devices (Shahadan et al., 2025). However, barriers like insufficient training, time constraints, and competing priorities often hinder effective implementation (Wan et al., 2023).

In Malaysia, studies have emphasized the importance of addressing lifestyle factors such as nutrition and physical activity in PI prevention, highlighting the need for localized interventions (Azhar et al., 2022; Shahadan et al., 2025). This study aims to assess the knowledge and attitudes of OR nurses regarding PI prevention, with the goal of identifying gaps and informing targeted educational strategies to improve patient outcomes.

## 2.0 Literature Review

The critical role of operating room nurses in preventing pressure injuries is widely recognized, emphasizing the importance of their knowledge and attitudes in identifying at-risk patients. Evidence-based nursing practice is vital for effective PI prevention, enhancing patient safety and outcomes (Khong et al., 2020). However, studies reveal that OR nurses often demonstrate insufficient knowledge in key domains, particularly in risk assessment and preventive measures.

Khong et al. (2020) found that despite extensive experience among nurses, their overall knowledge scores remained low, with only 8.9% scoring above 60% on the Pressure Ulcer Knowledge Assessment Tool (PUKAT). Similarly, Kandemir et al. (2020) reported low scores on the Modified Pieper Pressure Ulcer Knowledge Test (MPPUKT), though recent training was positively associated with higher knowledge. Kaya and Erol Ursavas (2023) highlighted that even with low knowledge scores, nurses held positive attitudes toward PI prevention, with factors such as gender and use of international guidelines influencing knowledge levels.

Cebeci and Çelik (2021) revealed that many OR nurses lacked post-graduate education on PI prevention, contributing to poor knowledge and documentation practices. Nurses who conducted intraoperative risk assessments demonstrated better knowledge, indicating the benefits of practical application. Meyer et al. (2019) further confirmed global knowledge deficiencies among nurses, emphasizing the role of higher education and wound care training in improving competency. These findings underscore the need for ongoing professional development and adherence to evidence-based guidelines.

Attitudes also play a pivotal role in PI prevention. Positive attitudes foster better compliance with preventive practices, although confidence in personal competence remains a concern. Khong et al. (2020) and Jung and Yun (2019) found that nurses generally held favorable attitudes but reported a lack of confidence and inadequate training. These gaps between attitude and behavior highlight the necessity for comprehensive educational interventions aimed at boosting both competence and confidence.

The relationship between attitude and knowledge is complex. While overall attitude and knowledge scores were not strongly correlated, specific attitude items—such as personal responsibility and the perceived importance of PI prevention—were significantly linked to knowledge in prevention domains (Kandula, 2025). This suggests that attitudes can influence knowledge acquisition and fostering positive beliefs about responsibility and empowerment may enhance learning outcomes (Kandemir et al., 2022).

Demographic variables such as age, gender, and years of experience showed no significant association with knowledge or attitude scores. However, self-reported experiences in PI prevention correlated with both, emphasizing the value of experiential learning (Klaas & Serebro, 2024). Additionally, a notable challenge is the lack of risk assessment tools specifically designed for OR-related PIs. While general tools like the Braden scale are used, their effectiveness in the OR context is limited, highlighting the need for specialized instruments (Tervo-Heikkinen et al., 2023).

In conclusion, the literature points to significant knowledge gaps among OR nurses, despite positive attitudes toward PI prevention. Addressing these gaps through continuous education, experiential learning, and the development of OR-specific risk assessment tools is essential for improving PI prevention practices and enhancing patient safety.

## 3.0 Research Methodology

This cross-sectional study was conducted between January and March 2024 across five operating rooms (ORs) within a government hospital located in Kuala Lumpur, Malaysia. The primary aim was to assess operating room nurses' knowledge and attitudes toward pressure injury (PI) prevention. A total of 211 nurses participated in the study. The sample size was calculated using the Raosoft sample size calculator, ensuring a 95% confidence level and a 5% margin of error to achieve statistical reliability. Inclusion criteria required nurses to have a minimum of six months of experience working in the operating room and to voluntarily consent to participate. Nurses who were on leave during the data collection period were excluded to maintain consistency in sampling.

Data collection was facilitated through a self-administered questionnaire distributed electronically via Google Forms. Prior to distribution, unit heads from each of the five operating rooms were briefed on the study's objectives, procedures, and ethical considerations. This briefing was also extended to all participating nurses to ensure transparency and informed participation. Nurses

were instructed to complete the questionnaire outside of their working hours to minimize response bias and ensure thoughtful engagement with the survey items. Informed consent was obtained from all participants, and confidentiality was maintained throughout the study.

The research instrument was a structured questionnaire adapted from validated tools used in previous studies. It comprised three main sections: demographic information, knowledge of pressure injury prevention, and attitudes toward pressure injury prevention. The knowledge component was assessed using the Pressure Ulcer Knowledge Assessment Tool (PuKAT 2.0), which consists of 27 multiple-choice questions. These items were designed to evaluate nurses' understanding across six core domains: etiology of pressure injuries, classification and staging, risk assessment, nutritional factors, preventive strategies, and considerations for specific patient populations. Each question provided four response options, including an "I do not know the answer" choice, allowing researchers to differentiate between knowledge gaps and uncertainty.

To ensure a comprehensive evaluation of cognitive understanding, the knowledge section was structured according to Benjamin Bloom's taxonomy. This framework spans various cognitive levels, from basic recall and comprehension to higher order thinking skills such as analysis, evaluation, and synthesis. A benchmark score of 60% or higher was established to indicate sufficient knowledge of pressure injury prevention principles.

The attitude section of the questionnaire utilized the Attitude towards Pressure Ulcer Prevention (APuP) instrument, which includes 13 items rated on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). This tool measures five key domains: perceived personal competency in preventing pressure injuries, prioritization of PI prevention in clinical practice, perceived impact of pressure injuries on patient outcomes, personal responsibility for implementing preventive measures, and confidence in the effectiveness of prevention strategies. A mean score of 75% or higher was interpreted as reflecting a positive attitude toward pressure injury prevention.

Both the PuKAT and APuP instruments have demonstrated strong psychometric properties in previous research. In this study, internal consistency was assessed using Cronbach's alpha, yielding values of 0.73 for PuKAT and 0.74 for APuP, indicating acceptable reliability for both scales.

Ethical approval for the study was obtained from the Research Ethics Committee of Universiti Teknologi MARA (REC/02/2023 [ST/MR/48]) and the Malaysian Ministry of Health's Medical Research Ethics Committee (MREC) [NMRR ID-23-03528-ULW (IIR)]. Additionally, formal permission to conduct the study was granted by the hospital director (500/PJI (18/4/55)) and the head of nursing supervision. All ethical guidelines were strictly adhered to, including voluntary participation, informed consent, and data confidentiality.

Data analysis was performed using IBM SPSS Statistics for Windows, Version 29. Prior to statistical analysis, the dataset was cleaned to ensure completeness and accuracy. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize demographic characteristics and scores related to knowledge and attitudes. Reliability testing was conducted to confirm the internal consistency of the instruments used.

To explore relationships between variables, correlational analyses were conducted, focusing on the association between nurses' knowledge and their attitudes toward pressure injury prevention. These analyses provided insights into whether higher levels of knowledge were linked to more positive attitudes, thereby informing potential areas for targeted educational interventions.

Overall, the methodology employed in this study ensured a rigorous and ethical approach to data collection and analysis, providing a reliable foundation for understanding the current state of knowledge and attitudes among operating room nurses regarding pressure injury prevention.

## 4.0 Findings

### 4.1 Characteristic of the Respondents

A total of 211 operating room nurses from five surgical units in a Kuala Lumpur government hospital were surveyed. The average age was 33.76 years, with 52.1% aged 25–35. Women comprised 90.5%, and Malays made up 80.5% of the sample. Most nurses (91.5%) held diplomas and worked in direct patient care (89.1%). About 38.4% had over 10 years of OT experience. Pressure ulcer education primarily came from continuous education (53.3%) and hospital training (33.0%), with fewer nurses attending professional programs or conferences. These results reflect the nurses' strong clinical presence and commitment to enhancing skills in pressure injury prevention. (Table 1)

Table 1: Characteristics of the respondents (n: 211)

| Variables                             | Frequency (n) | Percentage (%) |
|---------------------------------------|---------------|----------------|
| Age (years old) Mean: 33.76; SD: 7.33 |               |                |
| Min: 23                               |               |                |
| Max: 57                               |               |                |
| Less than 25 years old                | 25            | 11.8           |
| 25-34.9 years old                     | 110           | 52.1           |
| 35-50 years old                       | 67            | 31.8           |
| More than 50 years old                | 9             | 4.3            |
| Gender                                |               |                |
| Male                                  | 20            | 9.5            |

|                                 |     |      |
|---------------------------------|-----|------|
| Female                          | 191 | 90.5 |
| Ethnic                          |     |      |
| Malay                           | 170 | 80.6 |
| Chinese                         | 7   | 3.3  |
| Indian                          | 14  | 6.6  |
| Others                          | 20  | 9.5  |
| Educational level               |     |      |
| Diploma                         | 193 | 91.5 |
| Degree                          | 17  | 8.1  |
| Master                          | -   | -    |
| Others                          | 1   | 0.5  |
| Working Site                    |     |      |
| General OT                      | 38  | 18.0 |
| Day-care OT                     | 56  | 26.5 |
| Urology OT                      | 46  | 21.8 |
| Neurosurgery OT                 | 32  | 15.2 |
| Emergency and Trauma OT         | 39  | 18.5 |
| Working Experiences in the Unit |     |      |
| 0-5 years                       | 71  | 33.6 |
| 6-10 years                      | 59  | 28.0 |
| More Than 10 years              | 81  | 38.4 |
| PU-related education            |     |      |
| Yes                             | 181 | 85.8 |
| No                              | 30  | 14.2 |
| Type of PU-related education    |     |      |
| Continuous Education            | 147 | 53.3 |
| Professional Education Program  | 20  | 7.2  |
| Education in the hospital       | 91  | 33.0 |
| Academic conference / symposium | 18  | 6.5  |

#### 4.2 Pressure Ulcer Knowledge

Table 2 presents a summary of the pressure ulcer knowledge assessment among operating room (OR) nurses, with a mean total score of 31.74%. The highest scores were observed in the areas of classification and observation (36.98%) and risk management (36.25%). These results indicate that nurses had relatively better knowledge in recognizing and categorizing pressure ulcers, as well as in understanding risk management strategies.

However, the lowest scores were recorded in the prevention of pressure ulcers (24.48%) and the aetiology of pressure ulcers (29.24%), suggesting that these are areas where OR nurses had the least knowledge. The significant gap in knowledge between the classification/observation and prevention/aetiology sections underscores the need for focused education and training in pressure ulcer prevention strategies and the underlying causes of pressure ulcers.

The findings highlight the importance of enhancing education on prevention and aetiology to improve nurses' overall knowledge on pressure ulcers. Addressing these gaps could lead to better-informed nursing practices and contribute to more effective prevention strategies, ultimately reducing the incidence of pressure ulcers in surgical settings. These insights can inform future training programs to strengthen nurses' understanding of pressure ulcer prevention and management.

Table 2: The Summary of answer for Pressure Ulcer Knowledge Assessment

| No                                             | Question                                                                                                                                                                                                                                                        | Frequency | Percentage |
|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------|
| <b>THEME 1: AETIOLOGY</b>                      |                                                                                                                                                                                                                                                                 |           |            |
| 1                                              | What is a cause of pressure ulcers?                                                                                                                                                                                                                             | 158       | 74.9       |
| 2                                              | A patient sit with the head of bed elevated to 60 degrees. What happens when his skin sticks to the underlying surface when he slides down in bed?                                                                                                              | 41        | 19.4       |
| 3                                              | What is the international prevalence of pressure ulcers in hospitals?                                                                                                                                                                                           | 71        | 33.6       |
| 4                                              | Excessively moist skin (due to e.g. incontinence or wound exudate) combined with increased body temperature are associated with pressure ulcer development.                                                                                                     | 47        | 22.3       |
| 5                                              | CASE: A patient is sitting in a chair in the morning (1 h) and in the afternoon (1 h). The rest of the day he spends in bed. He can't mobilize himself. When does this patient have the highest risk to develop a pressure ulcer (if no prevention is applied)? | 60        | 28.4       |
| 6                                              | Individual patient characteristics are associated with how the skin and underlying tissues react to pressure and shear.                                                                                                                                         | 39        | 18.5       |
| 7                                              | The use of soap can erode the skin barrier, thereby increasing the risk of superficial skin damage                                                                                                                                                              | 16        | 7.6        |
| Mean Score                                     |                                                                                                                                                                                                                                                                 |           | 29.24      |
| <b>THEME 2: CLASSIFICATION AND OBSERVATION</b> |                                                                                                                                                                                                                                                                 |           |            |
| 8                                              | CASE: You observe a new blister on the heel of a bedbound patient. Neither non-blanchable erythema nor an ulcer has been previously documented.                                                                                                                 | 29        | 13.7       |
| 9                                              | What is referred to as a pressure ulcer category I?                                                                                                                                                                                                             | 77        | 36.5       |

| 10                                     | Which of these stages of pressure ulcers may require debridement?                                                                                                                                                                                                                                                                                                                                                     | 132       | 62.6       |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------|
| 11                                     | CASE: The nurse observes a bony structure in a wound. This pressure ulcer would be classified as a stage:                                                                                                                                                                                                                                                                                                             | 74        | 35.1       |
| Mean Score                             |                                                                                                                                                                                                                                                                                                                                                                                                                       |           | 36.98      |
| THEME 3: RISK ASSESSMENT               |                                                                                                                                                                                                                                                                                                                                                                                                                       |           |            |
| 12                                     | CASE: A patient is recently admitted to your nursing unit. The patient has no signs of skin redness (blanchable/non- blanchable). When completing the risk assessment tool, the score indicates that there is no risk for pressure ulcer development. No prevention is needed. However, you are very surprised because your clinical experience tells you that this patient is at risk. What are you going to do now? | 19        | 9.0        |
| 13                                     | Which of these statements about the frequency of skin assessment in hospitals is correct?                                                                                                                                                                                                                                                                                                                             | 134       | 63.5       |
| Mean Score                             |                                                                                                                                                                                                                                                                                                                                                                                                                       |           | 36.26      |
| THEME 4: NUTRITION                     |                                                                                                                                                                                                                                                                                                                                                                                                                       |           |            |
| 14                                     | CASE: A 23-year-old previously healthy male was recently admitted to the hospital with a spinal cord injury (car accident). He is immobile and has no problems eating or drinking. Is nutritional supplementation needed to reduce the risk for pressure ulcers?                                                                                                                                                      | 56        | 26.5       |
| 15                                     | Indicate the nutritional elements that are most essential to prevent pressure ulcers.                                                                                                                                                                                                                                                                                                                                 | 87        | 41.2       |
| Mean Score                             |                                                                                                                                                                                                                                                                                                                                                                                                                       |           | 33.85      |
| THEME 5: PREVENTION OF PRESSURE ULCERS |                                                                                                                                                                                                                                                                                                                                                                                                                       |           |            |
| 16                                     | What percent of patients with an increased risk to develop pressure ulcers receive adequate prevention in hospitals?                                                                                                                                                                                                                                                                                                  | 44        | 20.9       |
| 17                                     | CASE: Your colleague informs you that she positioned a patient in bed in a semi-Fowler position. What does this mean?                                                                                                                                                                                                                                                                                                 | 28        | 13.3       |
| 18                                     | Which repositioning protocol is most effective to prevent pressure ulcers? Starting with the patient supine, then ...                                                                                                                                                                                                                                                                                                 | 83        | 39.3       |
| 19                                     | The use of a ring cushion (donuts) is effective to prevent pressure ulcers when patients are seated.                                                                                                                                                                                                                                                                                                                  | 24        | 11.4       |
| 20                                     | How should bed linen be used to prevent pressure ulcers?                                                                                                                                                                                                                                                                                                                                                              | 7         | 3.3        |
| No                                     | Question                                                                                                                                                                                                                                                                                                                                                                                                              | Frequency | Percentage |
| 21                                     | Indicate the most effective technique to position a patient when seated.                                                                                                                                                                                                                                                                                                                                              | 57        | 27.0       |
| 22                                     | CASE: Your patient is lying on a pressure redistributing foam mattress. Do you take other measures to prevent pressure ulcers on the heels?                                                                                                                                                                                                                                                                           | 126       | 59.7       |
| 23                                     | How does repositioning prevent pressure ulcers?                                                                                                                                                                                                                                                                                                                                                                       | 44        | 20.9       |
| Mean Score                             |                                                                                                                                                                                                                                                                                                                                                                                                                       |           | 24.48      |
| THEME: SPECIFIC PATIENT GROUPS         |                                                                                                                                                                                                                                                                                                                                                                                                                       |           |            |
| 24                                     | CASE: When repositioning your ICU patient from supine to lateral on the right side at 30 degrees, the PCO2 decreases and the heart rate increases, which triggers the alarms to ring. What are you going to do?                                                                                                                                                                                                       | 64        | 30.3       |
| 25                                     | Which of these statements is true about the development of pressure ulcers in the operating room?                                                                                                                                                                                                                                                                                                                     | 28        | 13.3       |
| 26                                     | Which factor has the lowest priority (when it comes to pressure ulcer prevention) when installing a patient on the surgical table?                                                                                                                                                                                                                                                                                    | 38        | 18.0       |
| 27                                     | Indicate the location on the body where babies have the highest risk to develop a pressure ulcer.                                                                                                                                                                                                                                                                                                                     |           |            |
| Mean Score                             |                                                                                                                                                                                                                                                                                                                                                                                                                       |           | 29.63      |
| Mean Total Score                       |                                                                                                                                                                                                                                                                                                                                                                                                                       |           | 31.74      |

#### 4.3 Attitude towards Pressure Ulcer Prevention

The Attitude towards Pressure Ulcer Prevention (APuP) scale assesses operating room (OR) nurses' attitudes across five domains: personal competency, priority of prevention, impact PI, responsibility in prevention, and confidence in the effectiveness of prevention (Table 3).

Results show that nurses generally feel confident in their ability to prevent pressure ulcers, with a mean score of 3.09 for personal competency. They also agree that PI prevention should be a priority, scoring 3.14 in that domain. In terms of the impact of PIs, nurses recognize their financial and societal consequences, with a mean score of 2.84. Regarding responsibility, nurses see themselves as accountable for preventing pressure ulcers, scoring 3.03, and are confident in the preventability of PIs in high-risk patients, with a mean score of 2.98.

Overall, nurses demonstrated a positive attitude towards pressure ulcer prevention, with an overall mean attitude score of 65%. However, the domain with the lowest mean score was responsibility, indicating the need for further emphasis on nurses' accountability in preventing pressure ulcers. These findings highlight the importance of promoting continuous education and fostering a culture of responsibility in PI prevention within the OR setting.

Table 3: The Attitude Towards Pressure Ulcer Prevention (APUP)

| No                                | Domains and items                                           | Mean (SD)   |
|-----------------------------------|-------------------------------------------------------------|-------------|
| Personal competency to prevent PI |                                                             |             |
| 1                                 | I feel confident in my ability to prevent pressure ulcers   | 3.09 (0.53) |
| 2                                 | I am well trained to prevent pressure ulcers                | 2.98 (0.52) |
| 3                                 | PI prevention is too difficult. Others are better than I am | 2.34 (0.67) |
| Total Mean                        |                                                             | 2.80 (0.57) |

| Priority of PI prevention                     |                                                                   |             |
|-----------------------------------------------|-------------------------------------------------------------------|-------------|
| 4                                             | Too much attention goes to the prevention of PI                   | 2.61 (0.68) |
| 5                                             | PI prevention is not that important                               | 1.81 (0.71) |
| 6                                             | PI prevention should be a priority                                | 3.14 (0.64) |
| Total Mean                                    |                                                                   | 2.52 (0.68) |
| Impact of PI                                  |                                                                   |             |
| 7                                             | A PI almost never causes discomfort for a patient                 | 2.17 (0.85) |
| 8                                             | The financial impact of PI on a patient should not be exaggerated | 2.48 (0.73) |
| 9                                             | The financial impact of PI on society is high                     | 2.84 (0.60) |
| Total Mean                                    |                                                                   | 2.50 (0.73) |
| Responsibility in PI prevention               |                                                                   |             |
| 10                                            | I am not responsible if a PI develops in my patients              | 1.91 (0.71) |
| 11                                            | I have an important task in PI prevention                         | 3.03 (0.56) |
| Total Mean                                    |                                                                   | 2.47 (0.64) |
| Confidence in the effectiveness of prevention |                                                                   |             |
| 12                                            | PIs are preventable in high-risk patients.                        | 2.98 (0.65) |
| 13                                            | PIs are almost never preventable                                  | 2.15 (0.76) |
| Total Mean                                    |                                                                   | 2.57 (0.71) |

#### 4.4 The relationship between pressure ulcer knowledge assessment and the attitude towards prevention

The findings of the study indicate that there is no statistically significant relationship between nurses' level of knowledge regarding pressure ulcers and their attitudes towards pressure ulcer prevention. The correlation coefficient of -0.09 suggests a weak negative correlation, but the p-value of 0.17 indicates that this relationship is not statistically significant (Table 4).

This means that even though the level of knowledge among respondents may be relatively low, it does not have a significant impact on their attitudes towards pressure ulcer prevention. In other words, nurses may not necessarily demonstrate a more positive attitude towards pressure ulcer prevention despite having a higher level of knowledge about the topic.

There could be several reasons for this lack of relationship. It is possible that other factors, such as personal beliefs, organizational culture, or workload, play a more significant role in shaping nurses' attitudes towards pressure ulcer prevention. Additionally, attitudes are complex and multifaceted constructs that may be influenced by various internal and external factors beyond just knowledge alone.

These findings suggest that efforts to improve pressure ulcer prevention should not solely focus on increasing nurses' knowledge but should also consider addressing other factors that may influence their attitudes and behaviors towards prevention practices. This could include providing training and resources, fostering a supportive organizational culture, and addressing barriers to implementation in clinical practice.

Table 4: The relationship between pressure ulcer knowledge assessment and the attitude towards pressure ulcer prevention

|                |       |                         | PuKAT | APUP  |
|----------------|-------|-------------------------|-------|-------|
| Spearman's rho | PuKAT | Correlation Coefficient | 1.00  | -0.09 |
|                |       | Sig. (2-tailed)         | .     | 0.17  |
|                |       | N                       | 211   | 211   |
|                | APUP  | Correlation Coefficient | -0.09 | 1.00  |
|                |       | Sig. (2-tailed)         | 0.17  | .     |
|                |       | N                       | 211   | 211   |

#### 4.5 The association between the characteristics of the respondents with the pressure ulcer knowledge assessment and the attitude towards pressure ulcer prevention.

The study found no significant associations between respondents' age, gender, working area, working experience in the unit, and pressure ulcer-related education with their level of pressure ulcer knowledge. However, there were associations observed with ethnicity, educational level, and job position. Malay respondents, nurses with a diploma education level, and those in the U29 job position demonstrated knowledge levels below 60% regarding pressure ulcers. Conversely, there was a nurse of Indian ethnicity, with a degree education level, and working as a nurse with a U32 grade, who achieved a score of more than 60%.

When it comes to attitudes towards pressure ulcer prevention, no demographic factors were found to be associated. However, the study revealed that a higher percentage of respondents scored more than 75%, indicating a positive attitude towards pressure ulcer

prevention across all demographic groups. This suggests that demographic characteristics do not influence nurses' attitudes towards pressure ulcer prevention, and overall, their attitudes appear to be positive.

## 5.0 Discussion

This study offers critical insights into operating room (OR) nurses' knowledge and attitudes toward PI prevention, revealing persistent gaps that hinder optimal patient care. While the findings indicate that OR nurses generally exhibit positive attitudes toward PI prevention, significant knowledge deficiencies remain, particularly in areas such as risk assessment and pressure injury staging both essential for early identification and effective intervention (Khong et al., 2020; Kaya & Erol Ursavas, 2023). These gaps mirror trends observed in recent studies, which suggest that even experienced nurses may struggle to apply best practices due to limited understanding of clinical guidelines and evidence-based protocols (Cebeci & Senol Çelik, 2022; Kandemir et al., 2022).

The demographic profile of the study participants reflects a predominantly young nursing workforce, with a mean age of 33.76 years and over half (52.1%) aged between 25 and 35. This age distribution suggests a mix of early-career and moderately experienced nurses, which may influence their clinical decision-making and approach to PI prevention (Khong et al., 2020). The gender composition, with both male and female nurses represented, highlights the profession's inclusivity. Educationally, most nurses held diplomas, while a smaller proportion possessed higher academic qualifications such as bachelor's or master's degrees. This variation in educational attainment underscores the need for tailored educational interventions that accommodate different levels of academic preparation and clinical experience (Cebeci & Senol Çelik, 2022; Liu et al., 2024). Despite the generally positive attitudes toward PI prevention, the study identified a disconnect between nurses' confidence in their competency and their perceived responsibility for PI prevention. This discrepancy may reflect an underlying lack of knowledge, which could hinder proactive engagement in preventive care (Kaya & Erol Ursavas, 2023). While positive attitudes are essential for fostering a culture of patient safety, they must be supported by adequate clinical knowledge to translate into effective practice. Interventions focusing solely on attitude enhancement may be insufficient unless accompanied by efforts to improve nurses' understanding of PI risk factors, staging, and evidence-based prevention strategies (Cesca et al., 2024).

Previous research supports the notion that nurses' knowledge significantly influences their ability to implement effective PI prevention measures. Black (2019) emphasized that nurses with comprehensive knowledge are better equipped to identify at-risk patients and apply appropriate interventions. However, the current study also highlights that knowledge alone does not guarantee improved outcomes. Notably, no significant relationship was found between nurses' knowledge and their attitudes toward PI prevention (Khong et al., 2020), suggesting that attitudes may be shaped by factors beyond formal education, such as personal values, workplace culture, and professional experiences. Therefore, educational interventions should address both cognitive and affective domains to foster holistic improvements in PI prevention practices (Kandemir et al., 2022; Asiri et al., 2025).

The study also revealed that demographic factors including education level, job position, and ethnic background significantly influenced nurses' knowledge of PI prevention. Nurses with higher educational qualifications demonstrated better knowledge, indicating that advanced education may enhance clinical competence in this area (Gbadamosi et al., 2023). This finding supports the implementation of continuing education programs and professional development initiatives aimed at bridging knowledge gaps, particularly among nurses with lower academic credentials. Additionally, demographic factors may affect access to training resources, potentially exacerbating disparities in knowledge and practice (Khong et al., 2020; Shahadan et al., 2025). In contrast, no significant association was found between demographic variables and attitudes toward PI prevention, suggesting that attitudes may be more closely linked to intrinsic motivations and organizational influences than to formal education or job role (Kandemir et al., 2022; Cesca et al., 2024).

Recent studies have emphasized the importance of multifaceted interventions in improving PI prevention outcomes. For example, Kandula (2025) found that educational programs, care bundles, and positioning strategies significantly reduced PI prevalence and improved nursing practices. Similarly, Sankovich et al. (2019) demonstrated that targeted education and feedback improved nurses' accuracy in staging and documentation, although practical competency still required reinforcement. These findings underscore the need for structured, evidence-based training that combines theoretical knowledge with hands-on practice.

Given these findings, the study underscores the importance of continuous professional development and the need for healthcare institutions to implement targeted educational interventions. These programs should be designed to meet the diverse needs of nurses based on their demographic characteristics, educational backgrounds, and clinical roles. Practical, hands-on training combined with evidence-based learning modules can enhance nurses' skills and confidence in PI prevention (Mathews, 2024). Moreover, fostering an organizational culture that promotes interdisciplinary collaboration, open communication, and shared responsibility for patient outcomes is essential for improving nurses' attitudes and engagement in PI prevention efforts (Kandemir et al., 2022).

## 6.0 Conclusion & Recommendations

In conclusion, this study highlights the significant gaps in knowledge and attitudes regarding pressure ulcer (PU) prevention among operating room (OR) nurses. Despite positive attitudes toward PU prevention, many nurses demonstrated inadequate knowledge, particularly in areas such as risk assessment and preventive measures. These findings suggest that while nurses may recognize the importance of PU prevention, there is a need for targeted educational interventions to improve their understanding and skills in this area. Demographic factors, such as education level and job position, were found to influence nurses' knowledge, indicating the necessity of tailoring training programs to meet the needs of diverse groups. However, the study also revealed that attitudes toward

PU prevention were less influenced by these factors, implying that personal beliefs and experiences play a more significant role. To address these challenges, healthcare institutions should focus on comprehensive educational strategies, including both knowledge enhancement and attitude development. By fostering a culture of patient safety and prevention, institutions can empower nurses to actively engage in PU prevention and improve patient outcomes in the perioperative setting.

However, this study is limited as it was carried out in only one government hospital, reducing the applicability of its results to other settings. Additionally, reliance on self-reported questionnaires may have introduced response bias. Further research is needed to explore the effectiveness of specific training programs, as well as the impact of institutional policies and interdisciplinary collaboration on PU prevention practices.

## Acknowledgement

This study was funded by Universiti Teknologi MARA internal grant, 600-RMC/GIP 5/3 (084/2021). We sincerely thank the Director of the Ministry of Health for their support, and the operating room nurses and healthcare institution for their participation and assistance in this study

## Paper Contribution to Related Field of Study

This study contributes to the body of knowledge on pressure injury prevention by identifying a critical gap between OR nurses' attitudes and their actual knowledge levels. Despite generally positive attitudes, low knowledge scores emphasize the need for enhanced educational strategies and ongoing training. The findings support the development of tailored professional development programs, improved clinical guidelines, and competency assessments. This research informs nursing education, policy, and practice by advocating for structured interventions to improve patient safety and care quality in surgical settings.

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