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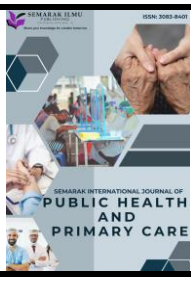

Transforming Nursing Education: Evaluating Knowledge and Practices in Pressure Ulcer Prevention among Undergraduate Nursing Students at the International Islamic University Malaysia (IIUM)

Norlinda Abd Rashid[1,*], Nur Hamizah Md Esa[2]

[1] Department of Basic Medical Sciences for Nursing, Kulliyyah of Nursing, International Islamic University Malaysia, Jalan Sultan Haji Ahmad Shah, Indera Mahkota, 25200 Kuantan, Pahang, Malaysia
[2] KMI Kuantan Medical Centre, Jalan Tun Razak, Bandar Indera Mahkota, 25200 Kuantan, Pahang, Malaysia

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ABSTRACT

Pressure ulcers are a significant concern in healthcare settings, particularly for immobile patients. Nursing students play a key role in preventing these injuries, making their preparedness essential for improved patient outcomes. Gaps in the practical application of pressure ulcer prevention knowledge among nursing students may hinder their clinical effectiveness. This study assessed the knowledge and practices of undergraduate nursing students at the International Islamic University Malaysia (IIUM), Kuantan Campus, regarding pressure ulcer prevention. A cross-sectional study was conducted using the Pieper-Zulkowski Pressure Ulcer Knowledge Test (PZ-PUKT) 2016 questionnaire. Convenience sampling was used to recruit 160 students. Data were analysed using SPSS version 27. Of the participants (response rate: 70.48%), 71.25% demonstrated high knowledge, but only 16.25% achieved satisfactory practice scores, with poor practice observed in 83.75%. There was no significant association between the year of study and knowledge or practice levels. These findings highlight the need for improved practical training and curricular enhancements to align theoretical knowledge with clinical practice in pressure ulcer prevention.

1. Introduction

Pressure ulcers, also referred to as bedsores or pressure injuries, are localised injuries to the skin and underlying soft tissue, typically developing over areas of bony prominences as a result of sustained pressure, friction, or shearing forces. These injuries may manifest as intact skin or open wounds, often causing significant pain and discomfort to patients. The clinical implications of pressure ulcers extend beyond physical suffering, as they also contribute to increased healthcare costs due to the resources required for their management and treatment. Nurses, as frontline healthcare providers, play a critical role in mitigating the occurrence of pressure ulcers through vigilant care and proactive prevention strategies [1].

* *Corresponding author.*
E-mail address: anatomi@iium.edu.my

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Hospitalisation is a recognised marker of frailty, particularly in patients with limited mobility, activity, or sensory perception, all of which elevate the risk of pressure ulcer development [2]. These patients are particularly vulnerable to static or dynamic friction, necessitating early preventive interventions. The selection of appropriate support surfaces is vital in redistributing body weight, enhancing patient comfort, and reducing the likelihood of tissue damage. Effective surfaces achieve an optimal balance between minimising shear forces and distributing pressure evenly, thereby maximising contact areas and improving patient outcomes [3].

The prevalence of pressure ulcers has risen significantly in recent years, with discharge rates reaching 12.3% in some settings [4]. Globally, over 2.5 million patients are affected annually, with approximately 60,000 deaths attributed to complications arising from pressure ulcers [5]. This stark data highlights the dynamic nature of pressure ulcer progression during hospitalisation and underscores the need for a holistic approach to patient care that spans the entire hospitalisation period.

Despite the well-documented significance of pressure ulcers, knowledge deficits persist among nursing professionals. These deficiencies, as reported in numerous studies, reflect a widespread issue of inadequate education and insufficient competency in pressure ulcer prevention and management [6]. Addressing these gaps is imperative to ensure the delivery of comprehensive, effective patient care and to enhance clinical outcomes through systemic improvements in nursing education and practice. Research has consistently shown that nursing professionals, especially those in training, often lack comprehensive understanding and practical skills related to pressure ulcer prevention. These knowledge deficits pose a risk to patient safety and hinder the delivery of effective care. As future healthcare providers, nursing students must be equipped with the necessary knowledge and competencies to prevent, identify, and manage pressure ulcers effectively, yet studies indicate that current nursing education programmes may not fully address these critical areas.

At the International Islamic University Malaysia (IIUM), nursing undergraduate students are the next generation of frontline healthcare workers. They will play an essential role in providing patient care and implementing prevention strategies for pressure ulcers in clinical settings. However, there has been limited research focused on assessing the specific knowledge, attitudes, and practices (KAP) of IIUM nursing students in relation to pressure ulcer prevention. Identifying gaps in their understanding and readiness to implement preventative measures is therefore crucial to ensuring that they are well-prepared to contribute to improved patient outcomes upon graduation.

The significance of this study lies in its potential to address these gaps within the nursing curriculum at IIUM. By assessing the knowledge and preparedness of nursing students regarding pressure ulcer prevention, this research aims to provide insights into how the existing curriculum can be enhanced. Identifying areas for improvement will allow for the development of targeted interventions, such as focused educational modules, clinical training, or simulation exercises, designed to improve students' understanding and competence. These educational interventions will ultimately help ensure that IIUM nursing students are equipped with the skills necessary to manage pressure ulcers effectively and prevent their occurrence, thus contributing to better patient care and reducing healthcare costs associated with these injuries.

By bridging the existing knowledge gap, this study has the potential to strengthen the nursing education system, improving the quality of care provided by future nurses. Furthermore, addressing the issue of pressure ulcer prevention will support broader public health goals, helping to mitigate the incidence of these injuries and enhancing overall patient well-being in Malaysia's healthcare system.

2. Methodology

2.1 Study Design

This study employed a quantitative cross-sectional design to investigate the knowledge and practices related to pressure ulcer prevention among undergraduate nursing students at the International Islamic University Malaysia (IIUM) Kuantan campus. Participants were selected based on specific inclusion and exclusion criteria. Eligible participants included Malaysian undergraduate nursing students who had attended clinical placements. Exclusion criteria encompassed students currently on study leave, those with prior work experience as staff nurses, and individuals unwilling to participate.

Participants were approached both online and in person to maximise recruitment and ensure diverse participation. Informed consent was obtained from all participants before data collection to ensure ethical compliance.

2.2 Sample Size Determination

The sample size was calculated using the Raosoft Sample Size Calculator, which is widely recognised for determining adequate sample sizes in cross-sectional studies [7]. Parameters used for the calculation included a 5% margin of error, a 95% confidence interval, and a response distribution of 50%. Based on these criteria, the recommended sample size for this study was determined to be 227 participants, ensuring robust statistical power and representativeness of the target population.

2.3 Measurements and Tools

The assessment of knowledge and practice related to pressure ulcer prevention among participants was conducted using the Pieper-Zulkowski Pressure Ulcer Knowledge Test (PZ-PUKT) 2016 questionnaire, adapted from Thomas and Nain [8]. This instrument was designed to comprehensively evaluate respondents across three sections:

i. Part A**:** Sociodemographic background, gathering essential demographic and academic data.
ii. Part B**:** Knowledge related to pressure ulcers, further divided into subtopics covering critical aspects of pressure ulcer prevention and management, including risk factors, risk assessment, skin care, nutrition, mechanical loading management, and educational interventions. Each question required responses categorised as either "correct" or "incorrect." For scoring, "correct" responses were assigned 1 mark, while "incorrect" responses received 0 marks.
iii. Part C**:** Practice related to pressure ulcers, evaluated through a Likert-scale format with responses ranging from "never" (scored 0) to "always" (scored 4).

The scoring criteria for knowledge and practice were systematically defined. For knowledge, respondents scoring above 80% were classified as having high knowledge, scores between 70–79% indicated moderate knowledge, and scores below 69% denoted low knowledge. For practice, respondents scoring 82.1% or higher were deemed to have good practice, while scores below 82.1% reflected poor practice.

This structured approach ensured a robust and objective evaluation of respondents' proficiency in pressure ulcer prevention, facilitating reliable comparisons and insights into the preparedness of nursing students. The PZ-PUKT has been validated in previous studies, offering a reliable framework for assessing both theoretical knowledge and practical application in clinical settings [9].

2.4 Variables

In this study, the independent variable is the year of study, which is categorised into four groups: Year 1, Year 2, Year 3, and Year 4 undergraduate nursing students. The dependent variables are the levels of knowledge and practice related to pressure ulcer prevention among these students at the International Islamic University Malaysia (IIUM). These variables were assessed to determine if there were any significant differences in knowledge and practices across the different academic years.

2.5 Ethical Considerations

The study received ethical approval from both the Kulliyyah of Nursing Post Graduate Research Committee (KNPGRC) and the IIUM Research Ethics Committee (IREC) prior to data collection. Informed consent was obtained from all participants, and the confidentiality and anonymity of all responses were maintained throughout the study. The survey was distributed via Google Forms, with the researcher also approaching potential respondents in person to enhance participation rates. At the beginning of the survey, participants were provided with a detailed explanation of the study's purpose and the significance of their involvement, ensuring full transparency. A consent form was included in the survey, and participants were informed that their participation was entirely voluntary. They were assured that they could withdraw from the study at any point without any consequences. Any incomplete responses were excluded from the analysis to maintain data integrity.

2.6 Participant Recruitment and Data Collection

Participants were selected using specific inclusion and exclusion criteria determined by the researcher. Only undergraduate nursing students enrolled at IIUM, Kuantan campus, were eligible for participation. Volunteers who met these criteria were provided with a consent form, which outlined their rights and the study's objectives. Confidentiality was assured, and participants were reminded that their involvement would not influence their academic standing in any way. If any respondent provided incomplete or inconsistent data, their responses were automatically excluded from the data analysis. This was done to ensure that only valid, complete responses were considered in the final analysis.

2.7 Data Analysis

Data collected from the Google Forms were exported and analysed using the Statistical Package for Social Sciences (SPSS) version 27. The results were organised into standardised tables for each section of the questionnaire. Descriptive statistics were employed to present the categorical data, such as the proportions of respondents in different categories, and to summarise the overall knowledge and practice levels related to pressure ulcer prevention.

To assess the internal reliability of the questionnaire, Cronbach's alpha coefficient was calculated for both sections of the survey. To test the association between the year of study and the level of knowledge and practice related to pressure ulcer prevention, inferential statistical tests were performed, including the Chi-square test and One-Way ANOVA. A p-value was calculated for each test to determine whether the results supported the null or alternative hypothesis. If the p-value exceeded 0.05, it was concluded that the level of knowledge and practice concerning pressure ulcer prevention was not significantly influenced by the year of study.

3. Results

3.1 Sociodemographic Data

A total of 160 undergraduate nursing students participated in the study, yielding a response rate of 70.48% from the original sample of 227. Of the respondents, the majority were female (82.5%, n=132), while 17.5% (n=28) were male. The sociodemographic characteristics of the respondents are presented in Table 1.

Regarding the distribution of year of study, the largest proportion of participants were from Year 4 (39.4%, n=63), followed by Year 2 students (23.8%, n=38). Year 3 and Year 1 students represented 20% (n=32) and 16.9% (n=27) of the sample, respectively.

In terms of clinical experience, a significant number of students had participated in clinical placements. A total of 18.8% (n=30) of respondents had attended clinical placements for less than four weeks, while 24.4% (n=39) had placements lasting between four and eighteen weeks. The majority of respondents (56.9%, n=91) reported having more than eighteen weeks of clinical experience. These findings indicate that the participants generally had substantial exposure to clinical settings, which may influence their knowledge and practice in pressure ulcer prevention.

Table 1
Sociodemographic data (n=160)

Variables	Frequency (n)	Percentage (%)
Gender		
Male	28	17.5
Female	132	82.5
Age (years)		
19-20	17	10.6
21-22	68	42.5
23-24	69	43.1
25-26	4	2.5
≥ 27	2	1.2
Year of study		
Year 1	27	16.9
Year 2	38	23.8
Year 3	32	20.0
Year 4	63	39.4
Number of weeks attended to clinical placement		
Less than 4 weeks	30	18.8
4 weeks – 18 weeks	39	24.4
More than 18 weeks	91	56.9

3.2 The Level of Knowledge & Practice Related to Pressure Ulcers Prevention

The results of this study, as shown in Table 2, highlight the levels of knowledge and practice related to pressure ulcer prevention among IIUM undergraduate nursing students. The levels of knowledge were classified into three categories: low knowledge for scores below 69, moderate knowledge for scores between 70 and 79, and high knowledge for scores of 80 or higher. In terms of practice, students were classified as having poor practice if their scores were below 82.1, and good practice if their scores were 82.1 or higher.

Among the 160 nursing students surveyed, spanning Year 1 to Year 4, the majority demonstrated high levels of knowledge regarding pressure ulcer prevention. Specifically, 71.25% (n=114) of the students achieved high knowledge scores, while 19.38% (n=31) exhibited moderate knowledge, and

9.38% (n=15) demonstrated low knowledge. In contrast, the findings regarding practice were less favourable. A significant proportion, 83.75% (n=134), exhibited poor practice in pressure ulcer prevention, whereas only 16.25% (n=26) showed good practice.

In summary, while the majority of nursing students across all academic years exhibited high levels of knowledge concerning pressure ulcer prevention, their practical application of this knowledge was notably inadequate. The results underscore a concerning discrepancy between theoretical knowledge and clinical practice, highlighting an area for targeted improvement in nursing education.

Table 2
The level of knowledge & practice related to pressure ulcers prevention (n=160)

Variable	Frequency (n)	Percentage (%)
Knowledge related to pressure ulcers prevention		
Low (< 69)	15	9.38
Moderate (70-79)	31	19.38
High (≥ 80)	114	71.25
Practice related to pressure ulcers prevention		
Poor (< 82.1)	134	83.75
Good (≥ 82.1)	26	16.25

3.3 The Association between the Year of Study and the Level of Knowledge Related to Pressure Ulcers Prevention

The results presented in Table 3 illustrate the association between the year of study and the level of knowledge regarding pressure ulcer prevention among the 160 nursing students surveyed. Year 2 students exhibited the highest proportion of students with a high level of knowledge, at 76.32%, followed by Year 3 students at 71.88%, Year 1 students at 70.37%, and Year 4 students at 68.25%. The distribution of students with moderate knowledge was relatively consistent across all years, ranging from 15.79% to 22.22%. Similarly, the proportion of students with low knowledge remained comparable across the years, with Year 4 having the highest percentage at 11.11%, and Year 1 the lowest at 7.41%.

The total number of students in each academic year varied, with Year 4 students representing the largest group at 39.38%, while Year 1 students accounted for the smallest group at 16.88%. Despite these variations in knowledge levels across the years, statistical analysis revealed a p-value of 0.870, indicating no statistically significant association between the year of study and the level of knowledge concerning pressure ulcer prevention.

These findings suggest that although there are some differences in the knowledge levels between the academic years, these differences are not statistically significant. This implies that the year of study does not have a meaningful impact on the students' knowledge of pressure ulcer prevention.

Table 3
The association between the year of study and the level of knowledge related to pressure ulcers prevention (n=160)

Variables	Level of knowledge			Total (%)	p-value
	High (%)	Moderate (%)	Low (%)		
Year of Study					
Year 1	19 (70.37)	6 (22.22)	2 (7.41)	27 (16.88)	0.870
Year 2	29 (76.32)	6 (15.79)	3 (7.89)	38 (23.75)	
Year 3	23 (71.88)	6 (18.75)	3 (9.38)	32 (20.00)	
Year 4	43 (68.25)	13 (20.63)	7 (11.11)	63 (39.38)	

3.4 The Association between the Year of Study and the Level of Practice Related to Pressure Ulcers Prevention

The analysis of the association between the year of study and the level of practice related to pressure ulcer prevention among 160 IIUM undergraduate nursing students is presented in Table 4. In Year 1, only 11.11% of students demonstrated good practice, while a significant 88.89% exhibited poor practice. This group consisted of 27 students, accounting for 16.88% of the total sample. In Year 2, 10.53% of students showed good practice, with the remaining 89.47% displaying poor practice. This cohort included 38 students, making up 23.75% of the respondents.

Year 3 revealed a notable shift, with 31.25% of students demonstrating good practice, while 68.75% exhibited poor practice. This group represented 20% of the sample, with a total of 32 students. In Year 4, 14.29% of students displayed good practice, and 84.13% showed poor practice. The Year 4 cohort comprised 63 students, which represented 39.38% of the respondents.

The p-value for the analysis was 0.075, suggesting no statistically significant association between the year of study and the level of practice related to pressure ulcer prevention, although the difference approached statistical significance. The results reveal some variability in practice levels across the different years of study, with Year 3 students exhibiting the highest proportion of good practice.

Table 4
The association between the year of study and the level of practice related to pressure ulcers prevention (n=160)

Variables	Level of practice		Total (%)	p-value
	Good (%)	Poor (%)		
Year of Study				
Year 1	3 (11.11)	24 (88.89)	27 (16.88)	0.075
Year 2	4 (10.53)	34 (89.47)	38 (23.75)	
Year 3	10 (31.25)	22 (68.75)	32 (20.00)	
Year 4	9 (14.29)	54 (84.13)	63 (39.38)	

4. Discussion

4.1 Level of Knowledge Related to Pressure Ulcer Prevention

This study evaluated the level of knowledge related to pressure ulcer prevention among 160 undergraduate nursing students at the International Islamic University Malaysia (IIUM). The findings revealed that 71.25% of the participants demonstrated a high level of knowledge, with scores ranging from 23 to 28 out of a possible maximum. Students achieving a minimum score of 22.4 (80% correct answers) were categorised as having high knowledge. This suggests that the majority of IIUM nursing students possess a solid theoretical foundation in pressure ulcer prevention, with 114 students scoring above the threshold.

Assessing the knowledge and attitudes of nursing students is essential for identifying educational gaps and improving curricular designs. Research consistently highlights the importance of equipping nursing students with adequate knowledge to address critical patient care challenges, such as pressure ulcer prevention [14]. For instance, Portuguese nursing students demonstrated sufficient understanding of factors such as etiology, classification, risk assessment, and preventive measures, including strategies to reduce pressure and shear [14]. Similarly, a study conducted in Istanbul reported that 98.8% of nurses correctly identified interventions for pressure ulcer prevention,

showcasing the effectiveness of their educational programmes [15]. These findings align with this study's results, affirming the generally high levels of knowledge among nursing students globally.

Despite these encouraging findings, it is important to recognise that not all students achieve the desired level of competence in pressure ulcer prevention. Several studies suggest that gaps in knowledge may stem from inconsistent adherence to guidelines, inadequate emphasis on practical application, or insufficient understanding of specific preventive measures. For example, research highlights deficiencies in areas such as patient positioning, teaching patients to self-reposition, and selecting the appropriate preventive interventions [16,17]. A lack of familiarity with the advantages and disadvantages of different devices used for pressure ulcer prevention further underscores the need for targeted educational interventions [16].

The gap between theoretical knowledge and its clinical application remains a critical concern. While the majority of nursing students understand the principles of pressure ulcer prevention, challenges in translating this knowledge into practice have been documented [16,17]. Inconsistent implementation of evidence-based practices may be attributed to factors such as limited clinical exposure, insufficient emphasis on hands-on training, and a lack of confidence among students. For instance, Iranian nurses demonstrated suboptimal behaviours despite possessing adequate knowledge, suggesting that knowledge alone is insufficient to drive effective practice [16].

To address these challenges, nursing education must prioritise the integration of theoretical knowledge with practical skills. This includes enhancing simulation-based training, reinforcing the importance of adhering to evidence-based guidelines, and fostering critical thinking to enable students to make informed decisions in real-world clinical settings. Additionally, embedding topics on the effective use of support surfaces, risk assessment tools, and positioning techniques into curricula could further empower nursing students to prevent pressure ulcers effectively.

The findings of this study contribute to the growing body of literature emphasising the need for a comprehensive approach to nursing education. By bridging the gap between knowledge and practice, educators can equip future nurses with the competencies necessary to reduce the incidence of pressure ulcers, ultimately improving patient outcomes and quality of care.

4.2 Level of Practice Related to Pressure Ulcer Prevention

This study evaluated the level of practice regarding pressure ulcer prevention among 160 undergraduate nursing students at IIUM. The findings revealed that only 16.25% of participants achieved scores indicative of good practice, with scores ranging from a minimum of 73 to a maximum of 88. Students achieving at least 82.1% correct responses, equivalent to a minimum score of 72.3, were classified as having good practice. However, the majority of students (83.75%) demonstrated poor practice, highlighting significant gaps in the application of theoretical knowledge to clinical scenarios. These results align with findings from an Iranian study, which reported moderate behaviours among nurses in managing pressure ulcers, influenced by their work experience [19].

A critical factor contributing to the poor level of practice may be the insufficiency of practical training specifically focused on pressure ulcer management. Studies have shown that the integration of clinical scenario simulation into nursing education significantly enhances students' practical competencies. For example, students exposed to scenario-based simulations performed better in managing pressure ulcers compared to those receiving traditional teaching methods [20]. This finding suggests that practical, hands-on learning experiences are crucial for bridging the gap between knowledge and practice, and that the current educational approach at IIUM may require refinement to improve students' clinical preparedness.

4.3 Association between Year of Study and Level of Knowledge Related to Pressure Ulcer Prevention

The study found no statistically significant association between the year of study and the level of knowledge related to pressure ulcer prevention ($p = 0.870$). This finding aligns with previous research conducted in a public hospital in Selangor, where nurses across different levels of experience did not exhibit significantly different levels of knowledge regarding pressure ulcer prevention [21]. Similarly, Ebi *et al.,* [22] found no association between the source of education and knowledge scores among nurses, further supporting the observation that formal education alone may not sufficiently enhance knowledge in this domain.

Contrastingly, other studies have reported a positive correlation between advanced years of study, additional training experiences, and higher levels of knowledge. For instance, Ghobadi-Larimi *et al.,* [19] highlighted that nursing students in their final years of education exhibited significantly higher mean knowledge scores compared to those in earlier years [16,18]. Similarly, Szymański *et al.,* [21] observed that senior students displayed greater awareness of pressure ulcer prevention, suggesting that prolonged exposure to clinical and academic training may enhance knowledge acquisition.

Despite these contrasting findings, it is evident that gaps in knowledge persist among nursing students. A significant proportion of students lack awareness of critical tools and methods for identifying patients at risk for pressure ulcers, with some studies indicating that up to 78% of respondents were unfamiliar with assessment tools [23]. This knowledge gap underscores the need for enhanced educational strategies that prioritise the integration of evidence-based guidelines and practical skills into nursing curricula.

4.4 Association between Year of Study and the Level of Practice Related to Pressure Ulcer Prevention

The results of this study revealed that 134 nursing students, or 83.75% of the sample, scored below 82.1% in their assessment of practice, categorising them as having poor practice in pressure ulcer prevention. Despite the majority of students demonstrating high knowledge levels regarding pressure ulcer prevention, this knowledge did not translate into effective clinical practice. Statistical analysis showed a p-value of 0.075, which is greater than the significance threshold of 0.05, indicating no significant association between the year of study and the level of practice among undergraduate nursing students.

These findings align with similar studies, which also highlight a discrepancy between knowledge and practice in pressure ulcer prevention. For example, a study conducted among nurses in a public hospital in Selangor reported that 96.8% of respondents exhibited good practices toward pressure ulcer prevention. However, statistical analysis revealed no significant relationship between practice levels and exposure to pressure ulcers, suggesting that factors beyond clinical experience may influence practice [24].

In contrast, a study from Namibia reported that 94% of nursing students demonstrated commendable practices in preventing pressure ulcers. This finding emphasises the role of a strong foundation in positive attitudes and knowledge as a precursor to effective practice [23]. These results underscore the importance of integrating both theoretical and practical components into nursing education to ensure that knowledge is effectively applied in clinical settings.

Further supporting evidence from a study conducted in Iran showed a significant relationship between the level of knowledge and practice among nurses, as well as an association with education level and work experience [16]. This highlights the critical role of continuous education and hands-on experience in improving clinical practice. The contrast between these findings and the current

study suggests that while knowledge is necessary, additional factors such as curriculum design, clinical supervision, and institutional support may influence the practical application of pressure ulcer prevention strategies.

The lack of significant association between the year of study and practice levels in this study may reflect gaps in the clinical training environment or insufficient emphasis on practical application during nursing education. Addressing these gaps requires a multifaceted approach, including the integration of simulation-based learning, enhanced clinical mentorship, and robust assessment frameworks that prioritise both knowledge acquisition and clinical competence. By fostering an environment where knowledge is seamlessly translated into practice, nursing education can better prepare students to meet the demands of patient care and reduce the incidence of pressure ulcers in healthcare settings.

4.5 Implications for Education and Practice

The results of this study highlight the critical need for a re-evaluation of nursing education strategies. While theoretical knowledge among IIUM students is relatively high, the poor level of practice underscores a disconnect between what is taught and what is implemented in clinical settings. Incorporating more advanced teaching methodologies, such as clinical scenario simulations, may enhance both knowledge retention and practical competency. Moreover, consistent reinforcement of evidence-based guidelines through workshops and clinical rotations could bridge the gap between knowledge and practice, ensuring that future nurses are well-equipped to manage pressure ulcers effectively.

Addressing these gaps is vital not only for improving individual competencies but also for enhancing patient outcomes. Pressure ulcers remain a significant cause of morbidity and healthcare costs globally, and the role of nursing students as future practitioners cannot be understated. By adopting innovative educational approaches and fostering a culture of continuous learning, nursing schools can better prepare their students to tackle this critical aspect of patient care.

5. Limitations

This study provides valuable insights into nursing students' knowledge and practice related to pressure ulcer prevention; however, several limitations must be acknowledged to contextualise the findings and guide future research. The study focused exclusively on nursing students from a single university, which restricts the generalisability of the findings to other educational institutions or regions. The homogeneity of the sample may not fully capture the diverse perspectives and practices of nursing students from different cultural, institutional, or geographical contexts. Including a broader demographic sample in future studies, encompassing students from multiple universities and disciplines, could provide a more comprehensive understanding of knowledge and attitudes related to pressure ulcer prevention.

The reliance on self-reported questionnaires poses a risk of response bias, as participants may have been inclined to provide socially desirable answers rather than their genuine knowledge or practices. This limitation could potentially skew the data and affect the reliability of the findings. To mitigate this, future research should consider triangulating self-reported data with objective assessments, such as direct observation or practical examinations, to validate reported practices.

While the quantitative approach employed in this study offers a valuable overview, it does not capture the nuanced perspectives of nursing students regarding their attitudes and challenges in pressure ulcer prevention. Incorporating qualitative methods, such as focus groups or in-depth

interviews, could provide richer insights into the underlying reasons for the gap between knowledge and practice. These methods could also identify barriers that nursing students face in applying their knowledge effectively in clinical settings.

Addressing these limitations offers a pathway for enhancing the scope and depth of future studies in this area. Firstly, expanding the sample size and demographic diversity by including nursing students from various universities and disciplines would improve the generalisability of findings. Secondly, integrating qualitative methods alongside quantitative approaches could provide a more holistic understanding of the factors influencing knowledge and practice. Finally, recognising the potential biases of self-reported data and employing triangulation through multiple data sources or methods would strengthen the validity of future research findings.

By addressing these limitations, future studies can build on the current findings to develop targeted interventions, refine educational strategies, and ultimately improve clinical practices in pressure ulcer prevention across diverse nursing populations.

6. Conclusions

In conclusion, pressure ulcer prevention is a crucial component of patient care, yet it is often deprioritised in clinical practice, with initial assessments sometimes missed or delayed during hospital admissions. The findings of this study highlight a significant gap between knowledge and practice among undergraduate nursing students at IIUM. Thus, nursing students may be equipped with the necessary theoretical knowledge, challenges remain in translating that knowledge into effective clinical application.

Additionally, the lack of a significant association between the year of study and levels of knowledge or practice suggests that factors beyond academic progression, such as clinical exposure, training quality, and mentorship may be more influential in shaping students' practical skills. To improve patient outcomes and reduce the incidence of pressure ulcers, nursing education programmes must focus not only on enhancing theoretical knowledge but also on ensuring that students can effectively apply this knowledge in clinical practice. Bridging the gap between knowledge and practice is essential for preparing future nurses to deliver high-quality care and prevent preventable complications like pressure ulcers.

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