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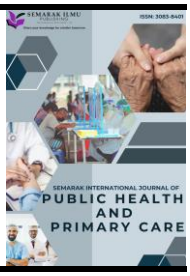

Evaluating Nurses' Knowledge, Attitudes, and Practices (KAP) in Modern Wound Care Techniques and Their Impact on Patient Healing Outcomes in Government Hospitals

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ABSTRACT

Wound healing is a complex biological process requiring precise management to facilitate tissue regeneration and minimize complications such as infection. The advent of modern wound dressings, designed to create an optimal healing environment, has transformed wound care practices. Despite these advancements, discrepancies in nurses' knowledge, attitudes, and practices (KAP) toward modern wound care techniques in government hospitals present a significant challenge. This study evaluates the KAP of nurses toward modern wound dressing, investigates barriers to its implementation, and explores the influence of demographic factors on KAP levels. A quantitative, descriptive study was conducted in Hospital Tanjong Karang, Selangor, with 73 nurses from medical and multidisciplinary wards. Data were collected using a structured questionnaire comprising sections on demographics, knowledge, attitudes, and practices. A pilot study confirmed the reliability of the instrument (Cronbach's α = 0.85). Descriptive statistics, item-wise analyses, and one-way ANOVA were employed to analyze the data. The results revealed a generally high level of knowledge (mean score: 27.23/32), though gaps existed in specialized areas such as foam and hydrogel dressings. Attitudes were predominantly positive, with a mean agreement rate of 73.7%. Practices exhibited strong adherence, with an implementation rate of 98.1%. Significant positive correlations were found between knowledge and practice (r = 0.353, $p < 0.01$), indicating that higher knowledge levels enhance clinical application. However, knowledge and attitudes showed no significant association, highlighting the influence of additional factors like workplace culture and experience. Demographic factors, including unit and experience, displayed no statistically significant impact on KAP, though trends suggested variability in knowledge levels across units. In conclusion, while nurses demonstrate high competency in modern wound care, targeted training is necessary to address specific knowledge gaps and enhance uniformity in practice. Institutional support, continuous education, and addressing attitudinal barriers are essential for optimizing wound management and improving patient outcomes. This study underscores the critical role of tailored interventions in bridging the gap between knowledge and practice in nursing.

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1. Introduction

Wound healing is a dynamic process involving several stages: haemostasis, inflammation, proliferation, and remodelling. Effective wound care is essential for promoting tissue regeneration and preventing complications such as infections. Modern wound dressings, developed through technological advancements, have transformed wound management by maintaining an optimal healing environment. These dressings are designed to facilitate faster healing by keeping wounds moist, reducing infection risks, and enhancing patient comfort. In government hospitals, nurses play a critical role in wound care management. However, their knowledge and perceptions of modern wound dressing techniques vary widely. This study aims to assess the current level of knowledge among nurses working in government hospitals and identify barriers that may hinder the adoption of these advanced dressing techniques.

Existing literature highlights significant variability in nurses' knowledge, attitudes, and practices (KAP) regarding modern wound care techniques. Research has predominantly focused on the clinical outcomes of advanced dressings, with limited emphasis on understanding the preparedness and barriers faced by nurses in adopting these techniques. In government hospitals, where resources and training opportunities can vary widely, such barriers may negatively impact patient outcomes. However, studies specifically addressing these challenges within the context of government healthcare settings remain scarce. This study aims to bridge this gap by assessing the current level of knowledge among nurses in government hospitals, examining their attitudes and practices toward modern wound care techniques, and identifying barriers to implementation. By addressing these gaps, this research seeks to contribute to the evidence base needed to improve wound care practices and enhance patient healing outcomes.

1.1 Background of Study

Wound healing is indeed a dynamic and complex process that progresses through four stages: haemostasis, inflammation, proliferation, and remodelling [1]. Each stage involves a series of cellular and molecular events crucial for effective tissue regeneration and restoration of function. Haemostasis is the initial response to injury, aiming to stop bleeding through vasoconstriction and clot formation. The subsequent inflammatory phase involves immune cells like macrophages and neutrophils, which clear debris and pathogens while releasing cytokines that facilitate the next stages of healing.

Modern dressings, a product of high-tech innovations in wound care, play a pivotal role in this framework. These dressings are designed not just to cover wounds but to actively contribute to the healing process. By maintaining a moist wound environment, modern dressings support local immune responses, enhance angiogenesis, and ultimately accelerate healing [2]. This contrasts with traditional dressings, which often aimed merely to absorb exudate and protect the wound from external contaminants. Modern wound dressings come in various forms, including films, foams, hydrogels, and hydrocolloids. These dressings are either semi-occlusive or occlusive, providing a barrier against bacterial penetration while maintaining the necessary moisture levels to facilitate healing [3]. They are designed to optimize the wound environment, reduce the risk of infection, and promote more efficient healing processes.

The nursing role in wound care is critical and demands a high level of expertise and knowledge. Nurses must be adept at assessing wounds, choosing appropriate dressings, and applying them correctly to prevent complications such as infections. The cost implications of wound infections are significant, impacting both patients and healthcare systems through prolonged hospital stays,

increased antibiotic use, and greater consumption of medical resources [4]. To mitigate these issues, interdisciplinary collaboration is essential. Nurses, being on the front lines of patient care, require comprehensive training in modern wound management techniques, highlight the importance of providing nurses with unbiased training and empowering them to implement effective wound care policies and procedures within healthcare teams [5]. This approach ensures that nurses are well-prepared to handle the complexities of wound management and can contribute significantly to patient outcomes.

1.2 Problem Statement

Healthcare settings such as primary hospitals play a pivotal role in delivering essential medical services to large patient populations. Within these settings, wound care, particularly wound dressing, is a fundamental aspect of primary healthcare. Therefore, assessing nurses' knowledge and perceptions of wound care is crucial for enhancing their practice and ensuring optimal patient outcomes.

A study by Tegegne *et al.,* [3] and Thomas *et al.,* [6] highlights varying levels of knowledge among nurses regarding different types of wound dressings. While all participants were familiar with standard or regular dressings, and a significant majority (83.6%) understood lipido-colloid with silver dressings, there was a noticeable gap in knowledge concerning more specialized dressings. For instance, knowledge about alginates and hydrogels was low, with only 20.1% and 23.4% of participants, respectively, demonstrating understanding. The lowest knowledge level was observed for foam dressings, with just 18.1% of nurses aware of their use. This indicates a need for targeted education and training to bridge these knowledge gaps. Welsh and Lynn [7] points out that the current expectations placed on medical staff, particularly in government hospitals, often do not allow sufficient time for nurses to familiarize themselves with new technologies or protocols related to modern wound dressings. This time constraint can hinder the effective adoption and implementation of advanced wound care practices. Several studies also underscore a general insufficiency in nurses' knowledge about wound care, including areas such as pressure ulcer grading, awareness of clinical guidelines/protocols, and dressing selection.

Ogunfowokan *et al.,* [8] conducted a study using a self-developed questionnaire to measure nurses' knowledge and perception of wound care. At baseline, the mean knowledge and perception scores were 13±7.6 and 31.8±5.7, respectively, indicating that 60.1% of the nurses had poor knowledge. This further emphasizes the need for educational interventions to improve wound care competencies among nurses. Comparing modern wound dressings to conventional ones, research shows that modern dressings are generally more comfortable for patients. Mahyudin *et al.,* [9] assessed patient comfort by looking at the frequency of wound care and pain experienced during wound care. Patients treated with modern dressings required less frequent wound care and reported lower pain levels compared to those treated with conventional dressings. This suggests that modern dressings not only promote better healing outcomes but also enhance patient comfort and reduce the emotional and physical burden associated with wound care.

Aldousari *et al.,* [10] found that nurses with higher levels of education had significantly better wound care practices. Advanced aseptic techniques and general knowledge were also statistically associated with the nurses' age and educational level. This indicates that continuous professional development and higher education levels contribute to more effective wound care practices. The pain scale experienced by patients during wound care is an important indicator of the effectiveness and comfort of the dressing used. Modern wound dressings tend to be less painful compared to conventional dressings, as they maintain a moist environment that facilitates healing and reduces

discomfort. Addressing pain and patient comfort is crucial, as these factors significantly impact the overall patient experience and satisfaction with wound care.

In conclusion, enhancing nurses' knowledge and perceptions related to wound care is essential for improving wound management practices in healthcare settings. Focused education and training programs can address existing knowledge gaps, particularly regarding specialized dressings such as alginates, hydrogels, and foams. By equipping nurses with the necessary skills and knowledge, healthcare systems can ensure more effective wound care, better patient outcomes, and optimized use of healthcare resources.

1.3 Research Objectives

1.3.1 General objectives

To evaluate the current knowledge, attitudes, and practices of nurses regarding modern wound dressing in a government hospital setting, and to explore the relationships between these factors and nurses' characteristics in medical and multidiscipline wards.

1.3.2 Specific objectives

i. To assess the current level of knowledge nurses, have about modern wound dressing in the government hospital.
ii. To determine the association between Knowledge, Attitude, and Practice regarding modern wound dressing among nurses working in the medical and multidiscipline ward at government hospital
iii. To determine the difference between Knowledge, Attitude, and Practice regarding modern wound dressing with nurses' characteristics in medical and multidiscipline wards at government hospital.

1.3.3 Research hypothesis

There is a significant association between the knowledge, attitudes, and practices of nurses regarding modern wound dressing in medical and multidisciplinary wards of government hospitals.

2. Methodology

2.1 Study Design

The study employed a quantitative, cross-sectional research design to evaluate nurses' knowledge, attitudes, and practices (KAP) concerning modern wound care techniques at Hospital Tanjong Karang, Selangor. This design was selected for its suitability in assessing the prevalence and relationships of specific variables within a defined population at a single point in time.

2.2 Study Population

The study population comprised 201 staff nurses, specifically those in the U29 and U32 grades, employed within a selected healthcare facility. These nurses were drawn from one Medical Ward and three Multidisciplinary Wards, ensuring a representative sample of diverse clinical areas where modern wound care techniques are frequently applied. The inclusion of both U29 and U32 grades reflects a range of professional experience and expertise, as these grades encompass junior and

senior staff nurses actively engaged in direct patient care. A universal sampling approach was adopted to include all eligible nurses within the selected wards, maximizing the study's comprehensiveness and reducing sampling bias. This method ensured the capture of variations in knowledge, attitudes, and practices across different work settings and professional hierarchies.

2.3 Study Instrument

A structured questionnaire was developed for this study, designed in English to ensure uniformity and clarity. The instrument consists of four sections: A, B, C, and D, each tailored to address specific aspects of the research objectives. Section A gathers socio-demographic information, including age, position, work experience, academic qualifications, and unit assignment. For Sections B, C, and D, the questions were carefully adopted and adapted from validated instruments used in previous studies, ensuring both reliability and relevance to the current research context.

A pilot study was conducted to assess the internal consistency of the data collection tools using Cronbach's alpha reliability test. The Internal consistency of the instrument was determined using Cronbach's Alpha coefficient and a score of 0.85 was obtained. Previous studies use Cronbach's alpha coefficient to measure a set of survey items' internal consistency, or reliability and quantify the level of agreement on a standardized 0 to 1 scale. Higher values indicate higher agreement between items. High Cronbach's alpha values indicate that response values for each participant across a set of questions are consistent.

2.4 Data Collection

The data for this study was collected through a Google Form questionnaire, which was distributed to respondents and submitted via email. During the data collection process, we accompanied the participants to provide immediate clarification if they had any questions regarding the questionnaire. This approach aimed to reduce misunderstanding and ensure accurate responses. Additionally, the use of a self-administered electronic questionnaire provided a degree of anonymity, which can help mitigate social desirability bias by allowing participants to answer more candidly.

3. Results

The findings are based on data collected from 73 nurses working in medical and multidisciplinary wards. The chapter begins by outlining the demographic characteristics of the participants. It then delves into a detailed analysis of the nurses' knowledge, attitudes, and practices related to modern wound dressing techniques. The results are presented through descriptive statistics, item-wise analyses, and visual representations. The chapter also explores the relationships between knowledge, attitudes, and practices, and examines the influence of demographic factors on these variables. One-way ANOVA results are presented to highlight any significant differences across hospital units. The chapter concludes with key findings and a summary of the results, providing a comprehensive overview of the current state of modern wound dressing practices among the studied nursing population.

3.1 Age Group

The age distribution of participants is summarized in Figure 1. Most nurses (61.6%) fell within the 31-40 years age group, indicating a workforce predominantly in their early to mid-career stage. The

younger cohort of 21-30 years represented 27.4% of the sample, while the more experienced group of 41-50 years accounted for 11.0%. This age distribution suggests a good mix of younger and more experienced nurses, with a concentration in the middle age bracket.

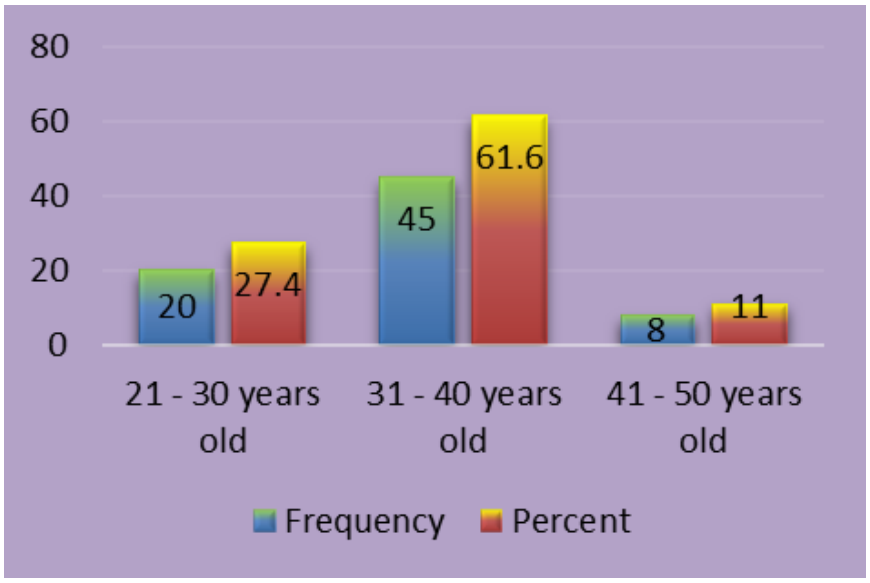

Fig. 1. Distribution of participants by age group

3.2 Gender

The gender distribution of the subjects is shown in Figure 2. Only 5 male nurses (6.8% of the nursing staff) were found in this study, while 68 female nurses (93.2%) were employed. The nursing field, which has traditionally been controlled by women, is experiencing a major gender imbalance. There aren't many male nurses, which could mean that different genders have different ideas about how to treat wounds.

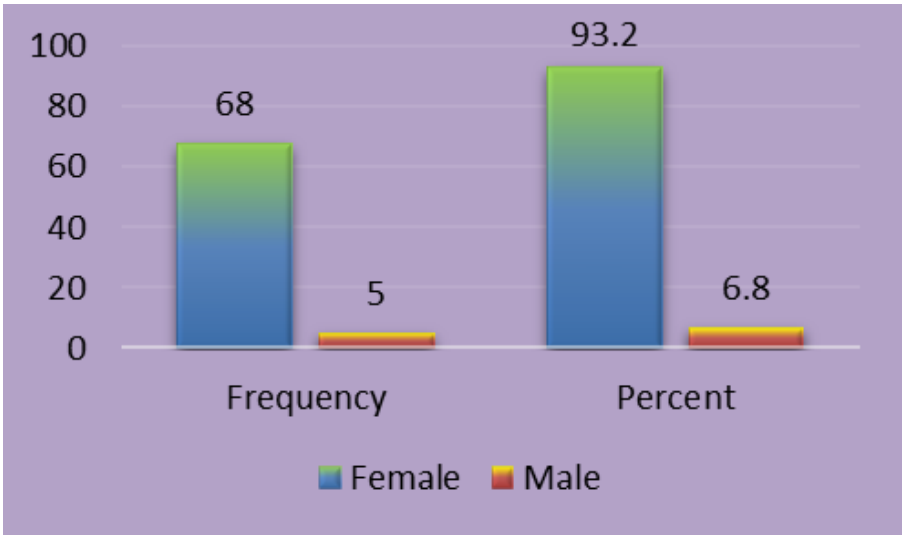

Fig. 2. Distribution of participants

3.3 Work Experience

The distribution of work experience among participants is presented in Figure 3. A substantial majority (64.4%) had 1-10 years of experience, representing early to mid-career professionals. The second largest group (31.5%) had 11-20 years of experience, while only a small fraction (4.1%) had over 20 years of experience. This distribution suggests a workforce with a good balance of newer perspectives and seasoned experience in nursing and wound care.

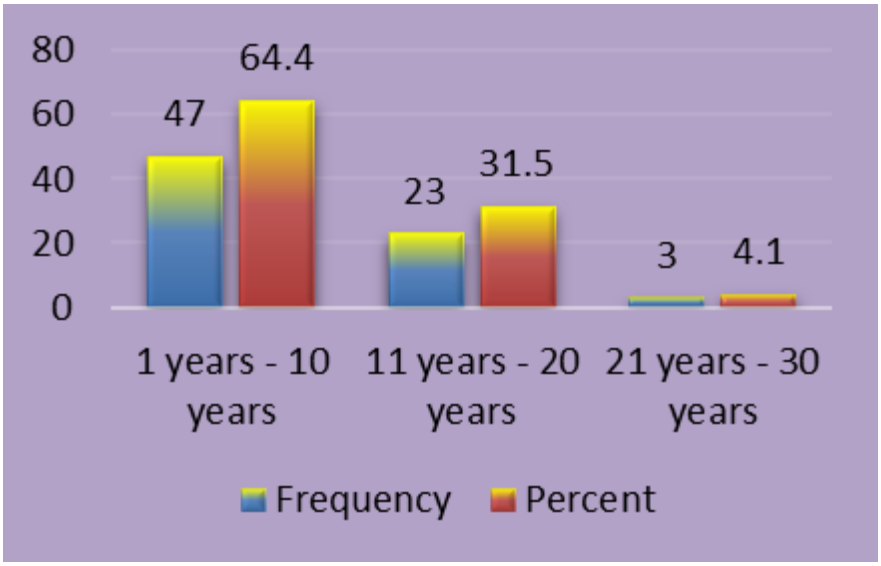

Fig. 3. Distribution of participants by work experience

3.4 Unit

The distribution of participants across different hospital units is detailed in Figure 4. The sample included nurses from four distinct units: Medical Ward 4A (20.5%), Multidisciplinary Transit Unit (28.8%), Multidisciplinary Ward 2A (26.0%), and Multidisciplinary Ward 4B (24.7%). This relatively even distribution across units ensures a balanced representation of nurses from various hospital settings, potentially capturing a wide range of wound care experiences and practices.

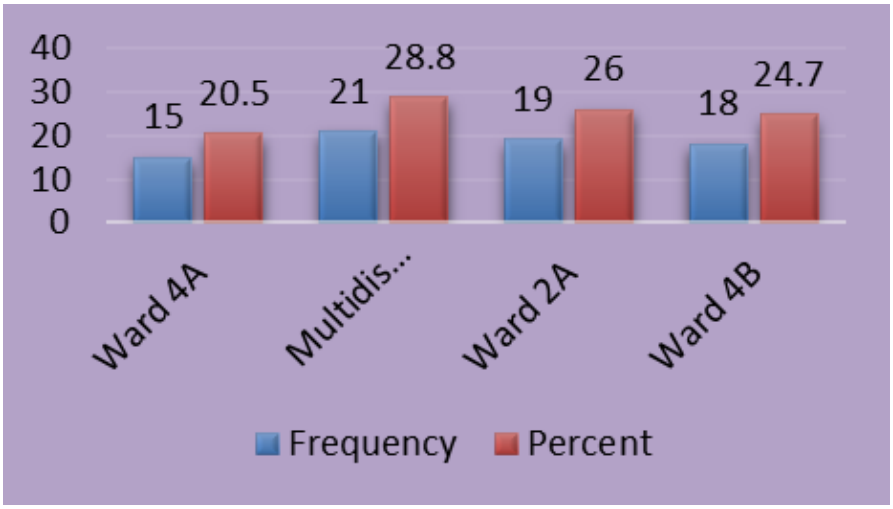

Fig. 4. Distribution of participants by hospital unit

3.5 Knowledge of Modern Wound Dressing

This section examines the participants' knowledge of modern wound dressing techniques. The analysis is based on responses to a series of knowledge-based questions. Table 1 presents the overall knowledge scores; the findings offer insights into the strengths and gaps in nurses' understanding of modern wound dressing practices. The mean knowledge score was 27.2329 out of a possible 32, with a standard deviation of 2.66417. This translates to an average correct response rate of approximately 85.1%, indicating a generally high level of knowledge about modern wound dressing among the nurses. The minimum score was 22 (68.75% correct), while the maximum was 32 (100% correct), suggesting that even the lowest-scoring participants had a reasonable grasp of the subject. The relatively small standard deviation implies a consistent level of knowledge across the sample, with most scores clustered around the mean.

Table 1
Descriptive statistics of overall knowledge scores

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Knowledge	73	22.00	32.00	27.2329	2.66417	7.098
Valid N (listwise)	73					

3.6 Item-wise Analysis of Knowledge Questions

Table 2 presents an item-wise analysis of the knowledge questions, revealing strengths and weaknesses in specific areas of modern wound dressing knowledge. The highest correct response rates were observed for items K1 (91.8%), K8 (90.4%), and K2 (89.0%). These items relate to the basic principle of moist wound environment, understanding of composite dressings, and the use of hydrocolloid for necrotic wounds, respectively. This suggests a strong grasp of fundamental concepts in modern wound dressing.

Conversely, the lowest correct response rates were for items K10 (24.7%), K9 (53.4%), and K15 (50.7%). These items pertain to the form of modern wound dressings, classification of gauze saline, and identification of foam dressings. The particularly low score on K10 indicates a significant misconception about the forms of modern wound dressings. Mid-range scores were observed for items such as K3 (57.5%) and K5 (65.8%), both related to the properties and applications of hydrogels. This suggests an area where knowledge could be improved. The mean values for individual items, all above 1.5 (where 2 represents a correct answer), further confirm the overall good knowledge level, with room for improvement in specific areas.

Table 2
Item-wise analysis of knowledge questions

Item	Knowledge Statement	Correct (%)	Incorrect (%)	Mean	Std. Deviation
K1	Modern wound dressing is based on the principle of creating and maintaining moist wound environment	91.8%	8.2%	1.9178	0.27656
K2	Hydrocolloid can be used to rehydrate necrotic wound and promote debridement	89.0%	11.0%	1.8904	0.31454
K3	Hydrogels cannot be used for highly exuding wound	57.5%	42.5%	1.5753	0.49771
K4	Thin hydrogels absorb exudates and debride wound healing	83.6%	16.4%	1.8356	0.37319
K5	Hydrogels are suitable for all stages of wound healing	65.8%	34.2%	1.6575	0.47782

K6	Alginate is produced from sodium and calcium	69.9%	30.1%	1.6986	0.46203
K7	Keltogel and sorban are types of alginate	72.6%	27.4%	1.7260	0.44908
K8	Composite is a combination of two or more modern wound dressing	90.4%	9.6%	1.9041	0.29648
K9	Gauze saline is a type of modern wound dressing	53.4%	46.6%	1.5342	0.50228
K10	Modern wound dressing occurs in form of milk	24.7%	75.3%	1.2466	0.43400
K11	Sorban is type of hydrocolloid	56.2%	43.8%	1.5616	0.49962
K12	Hydrocolloid can be used for hypergranulation	79.5%	20.5%	1.7945	0.40685
K13	Intrasite and granugels are types of hydrogel	86.3%	13.7%	1.8630	0.34621
K14	Alginates can be used for dry and necrotic wounds	67.1%	32.9%	1.6712	0.47302
K15	Allevyn is not a type of foam dressing	50.7%	49.3%	1.5068	0.50341
K16	Foam dressing are suitable for epithelising wounds	84.9%	15.1%	1.8493	0.36022

Note: Mean values closer to 2 indicate a higher percentage of correct responses, as 1 = Incorrect and 2 = Correct.

Table 3 summarizes the overall attitude scores of the participants. The mean attitude score was 14.7397 out of a possible 20, with a standard deviation of 1.86359. This indicates a generally positive attitude towards modern wound dressing among the nurses, with an average agreement rate of approximately 73.7%. The minimum score was 14 (70% agreement), while the maximum was 20 (100% agreement), suggesting that even the participants with the lowest scores still held predominantly positive attitudes. The relatively small standard deviation implies consistency in attitudes across the sample, with most scores clustered around the mean.

Table 3
Descriptive statistics of overall attitude scores

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Attitude	73	14.00	20.00	14.7397	1.86359	3.473
Valid N (listwise)	73					

3.7 Item-wise Analysis of Attitude Questions

Table 4 presents an item-wise analysis of the attitude questions, revealing nuanced perspectives on various aspects of modern wound dressing. Four items (A1, A6, A8, and A10) showed 100% agreement among all participants. These items relate to modern wound dressing being a vital component of wound care plans, facilitating wound healing, determining the quality of nursing wound care, and being a vital nursing skill for effective wound management. This unanimous agreement highlights the high value nurses place on modern wound dressing techniques.

Conversely, items A2, A3, A4, A5, A7, and A9 showed lower agreement rates, which is actually positive given the negative nature of these statements. For instance, only 16.4% agreed that modern wound dressing is the sole responsibility of physicians (A2), indicating that most nurses recognize their crucial role in this practice. Similarly, low agreement with statements about increased workload (A3, 11.0%), not being a required standard (A4, 12.3%), and being a waste of time (A9, 11.0%) further reinforces the positive attitudes towards modern wound dressing. The mean values for individual items, where higher values indicate more positive attitudes, range from 1.1096 to 2.0000. This further confirms the overall positive attitude, with room for improvement in specific areas such as interdisciplinary collaboration and workload perception.

Table 4
Item-wise analysis of attitude questions

Item	Attitude Statement	Agree (%)	Disagree (%)	Mean	Std. Deviation
A1	A vital component of a modern wound care plan	100%	0%	2.0000	0.00000
A2	The sole responsibility of the physicians	16.4%	83.6%	1.1644	0.37319
A3	Increase nurse's workload	11.0%	89.0%	1.1096	0.31454
A4	Not a required standard in wound care	12.3%	87.7%	1.1233	0.33104
A5	Not necessary for wound care decision-making	12.3%	87.7%	1.1233	0.33104
A6	Facilitates wound healing	100%	0%	2.0000	0.00000
A7	A very difficult procedure for nurses	11.0%	89.0%	1.1096	0.31454
A8	Help determine the quality of nursing wound care	100%	0%	2.0000	0.00000
A9	A sheer waste of nursing time	11.0%	89.0%	1.1096	0.31454
A10	A vital nursing skill required for effective management of wound	100%	0%	2.0000	0.00000

Note: Mean values are based on a scale where 1 = Disagree and 2 = Agree. Higher mean values indicate stronger agreement with the statement.

3.8 Practices in Modern Wound Dressing

Table 5 summarizes the overall practice scores of the participants, including sub-categories of preparation, application, and documentation. The mean overall practice score was 79.4932 out of a possible 81, with a standard deviation of 2.56105. This indicates an exceptionally high adherence to recommended practices, with an average implementation rate of approximately 98.1%. The minimum score was 69 (85.2% adherence), while the maximum was 81 (100% adherence), suggesting that even the lowest-scoring participants maintained good practices. The small standard deviation implies consistency in practices across the sample.

Breaking down the scores by sub-categories, preparation practices scored highest (mean 35.6027 out of 36), followed by application (mean 32.1507 out of 33), and documentation (mean 11.7397 out of 12). This suggests that while all areas of practice are strong, there might be slightly more room for improvement in documentation practices.

Table 5
Descriptive statistics of overall practice scores and sub-categories

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Practice	73	69.00	81.00	79.4932	2.56105	6.559
Practice - Preparation	73	31.00	36.00	35.6027	.96810	.937
Practice - Application	73	27.00	33.00	32.1507	1.49695	2.241
Practice - Documentation	73	8.00	12.00	11.7397	.83379	.695
Valid N (listwise)	73					

3.9 Item-wise Analysis of Practice Questions

Table 6 presents an item-wise analysis of the practice questions, revealing detailed insights into specific wound care procedures. Several items (P3, P4, P8, P9, P18, P23) showed 100% "Always" responses, indicating universal adherence to practices such as patient identification, procedure explanation, exposing only the wound site, hand washing, using sterile gloves, and covering the wound with sterile gauze.

The majority of other items had "Always" response rates above 90%, demonstrating high consistency in practice. For instance, 98.6% always prepare equipment (P2) and carefully remove gauze dressing (P15), while 97.3% always provide privacy (P6) and open sterile dressing sets at the bedside (P10). Areas with slightly lower "Always" rates, though still high, included using dry gauze to swab the wound (P22, 84.9%), wearing disposable gloves (P14, 89.0%), and cleaning from top to bottom (P20, 91.8%). These areas, while strong, might benefit from reinforcement in training. The mean values for individual items, all above 2.7 on a 3-point scale where 3 represents "Always", further confirm the overall excellent adherence to best practices in modern wound dressing.

Table 6
Item-wise analysis of practice questions

Item	Practice Statement	Always (%)	Sometimes (%)	Never (%)	Mean	Std. Deviation
P1	Review physician orders for dressing change procedures	91.8%	8.2%	0%	2.9178	.27656
P2	Prepare equipment	98.6%	1.4%	0%	2.9863	.11704
P3	Identify the patient	100%	0%	0%	3.0000	.00000
P4	Explain the procedure to the patient	100%	0%	0%	3.0000	.00000
P5	Instruct pt. not to touch area or sterile supplies	97.3%	1.4%	1.4%	2.9589	.26025
P6	Provide Privacy	97.3%	2.7%	0%	2.9726	.16437
P7	The patient's position comfortably	95.9%	4.1%	0%	2.9589	.19989
P8	Expose only wound site	100%	0%	0%	3.0000	.00000
P9	Wash hands	100%	0%	0%	3.0000	.00000
P10	Open sterile dressing sets on the trolley (Patient bedside)	97.3%	2.7%	0%	2.9726	.16437
P11	Open a bottle of antiseptic solution and pour it into a sterile basin	95.9%	2.7%	1.4%	2.9452	.28335
P12	Place the disposable bag within reach away from the work area	93.2%	2.7%	4.1%	2.8904	.42693
P13	Remove tape, pull parallel to the skin, and pull toward the dressing remove the remaining adhesive tape from the skin	95.9%	2.7%	1.4%	2.9452	.28335
P14	Wear disposable gloves	89.0%	2.7%	8.2%	2.8082	.56905
P15	With a gloved hand, carefully remove gauze dressing, one layer at a time, taking care not to dislodge drains or tubes, dehydrate with normal saline if necessary	98.6%	1.4%	0%	2.9863	.11704
P16	Dispose of soiled dressing in a disposable bag	95.9%	2.7%	1.4%	2.9452	.28335
P17	Remove gloves by pulling out the inside of them	94.5%	5.5%	0%	2.9452	.22915
P18	Put on sterile gloves	100%	0%	0%	3.0000	.00000
P19	Clean the wound with an antiseptic solution using a gauze swab	93.2%	4.1%	2.7%	2.9041	.37875
P20	Clean from top to bottom	91.8%	4.1%	4.1%	2.8767	.43923
P21	From center to outside in a circular motion (clean from least contaminated area to most contaminated, use a separate gauze swab for each stoke, applying antiseptic ointment if ordered)	98.6%	1.4%	0%	2.9863	.11704

P22	Use dry gauze to swab in same manner as in (19,20,21) to dry the wound	84.9%	5.5%	9.6%	2.7534	.61871
P23	Cover the wound with sterile gauze	100%	0%	0%	3.0000	.00000
P24	Inflammation signs such as (hotness, redness, swelling, tenderness)	94.5%	5.5%	0%	2.9452	.22915
P25	Infection signs- such as bad odor, pus	93.2%	6.8%	0%	2.9315	.25434
P26	Drain - Colour, amount, odor	94.5%	5.5%	0%	2.9452	.22915
P27	Record date & time	93.2%	5.5%	1.4%	2.9178	.32290

Note: Mean values are based on a scale where 1 = Never, 2 = Sometimes, and 3 = Always. Higher mean values indicate more consistent practice of the item

3.10 Relationships between Knowledge, Attitudes, and Practices

The correlation matrix in Table 7 presents the relationships between nurses' knowledge (total QK), attitudes (total QA), and practices (total QP) regarding modern wound dressing, utilizing both Pearson's r and Spearman's rho to capture both linear and non-linear correlations, respectively. The matrix reveals that there is no significant correlation between knowledge (QK) and attitude (QA) scores, as indicated by Pearson's r = 0.110 and Spearman's rho = 0.122, both of which lack statistical significance. This suggests that a nurse's knowledge about modern wound dressing techniques does not necessarily influence their attitude toward these practices. The weak, non-significant correlation implies that other factors may be contributing to attitudes, such as workplace culture, personal beliefs, or previous experiences, rather than their technical knowledge alone.

In contrast, a stronger and statistically significant relationship is observed between knowledge (QK) and practice (QP), with Pearson's r = 0.353 ($p < 0.01$) and Spearman's rho = 0.328 ($p < 0.01$). These moderate positive correlations indicate that higher knowledge levels are associated with better practice scores, reflecting that nurses who are more knowledgeable about modern wound dressing techniques are likely to apply this knowledge in their practice. The statistical significance of these values suggests that knowledge plays a substantial role in shaping practical application, reinforcing the importance of education and training in enhancing clinical practices related to wound care. The significant positive association, particularly for Pearson's r, indicates a linear relationship, implying that as knowledge increases, practical application tends to improve in a proportional manner.

Additionally, there is a statistically significant correlation between attitude (QA) and practice (QP) scores, though the association is weaker than the knowledge-practice relationship, with Pearson's r = 0.184 and Spearman's rho = 0.237 ($p < 0.05$). This suggests that while a positive attitude toward modern wound dressing moderately influences practical application, its impact is less direct or potent compared to knowledge. This weaker but significant association might imply that while attitude positively affects practice, it does so to a lesser extent than knowledge, possibly indicating that while attitudes are beneficial, they must be paired with adequate knowledge to fully enhance wound care practices. Thus, this matrix underscores the critical role of knowledge in effective practice, with attitude playing a supportive yet less influential role.

Table 7
Correlation matrix for knowledge, attitude, and practice scores

		total QK	total QA	total QP
Total QK	Pearson's r	-		
	Spearman's rho	-		
Total QA	Pearson's r	0.110	-	
	Spearman's rho	0.122	-	
Total QP	Pearson's r	0.353**	0.184	-
	Spearman's rho	0.328**	0.237*	-

Note. * < .05, ** p < .01, *** p < .001

3.11 Influence of Demographic Factors on KAP

Examining the influence of demographic factors on KAP scores is essential for tailoring wound care education and protocols to specific groups within the nursing staff. One-way ANOVA tests were employed to detect any significant differences in KAP scores across various hospital units. These tests help determine whether certain units might require additional support or if successful practices from high-performing units could be applied more broadly. The influence of demographic factors on Knowledge, Attitudes, and Practices was analyzed using one-way ANOVA, focusing on differences across hospital units.

The results from the One-Way ANOVA analysis, as displayed in Figure 5, provide insights into whether there are statistically significant differences in Knowledge (total QK), Attitude (total QA), and Practice (total QP) scores among nurses across different hospital units. The analysis uses both Welch's and Fisher's tests to account for potential differences in variances across groups. For knowledge scores (total QK), the Welch's F-statistic is 2.544 with a p-value of 0.072, and Fisher's F-statistic is 1.892 with a p-value of 0.139. Although the p-values suggest that there is no statistically significant difference in knowledge scores across the units at the traditional alpha level of 0.05, the Welch's p-value being close to 0.05 indicates a trend that might be worth further exploration. The lack of significant results for both attitude (total QA) and practice (total QP) scores, as indicated by p-values well above 0.05, suggests that there are no meaningful differences in these domains across the hospital units examined.

The group descriptive statistics offer a closer look at the average scores and variability within each unit. For knowledge (total QK), the Multidisciplinary Transit Unit had the highest mean score (12.00), indicating that nurses in this unit may have slightly better knowledge regarding modern wound dressing practices compared to the other units. However, the standard deviations (SD) and standard errors (SE) reveal considerable variability within units, particularly in Medical Ward 4A, which has the highest SD (3.42), indicating a wide range of knowledge levels among nurses in this unit. This variation could potentially explain why the ANOVA results did not reach statistical significance, as high variability within groups can obscure differences between groups.

Similarly, for attitude (total QA) and practice (total QP) scores, the descriptive statistics show relatively close mean scores across the units, with the Multidisciplinary Ward 4B showing a slightly higher attitude score (5.39) and the Multidisciplinary Transit Unit having the highest mean practice score (52.81). However, as the ANOVA results indicated, these differences are not statistically significant, meaning that, overall, the attitudes and practices regarding modern wound dressing are fairly consistent across the units studied.

One-Way ANOVA

		F	df1	df2	p
total QK	Welch's	2.544	3	35.0	0.072
	Fisher's	1.892	3	69	0.139
total QA	Welch's	0.611	3	36.6	0.612
	Fisher's	0.974	3	69	0.410
total QP	Welch's	0.280	3	34.1	0.840
	Fisher's	0.176	3	69	0.912

Group Descriptives

	Unit	N	Mean	SD	SE
total QK	Medical Ward 4A	15	11.00	3.42	0.884
	Multidisciplinary Transit Unit	21	12.00	1.82	0.396
	Multidisciplinary Ward 2A	19	11.63	2.85	0.654
	Multidisciplinary Ward 4B	18	10.11	2.37	0.559
total QA	Medical Ward 4A	15	4.47	1.55	0.401
	Multidisciplinary Transit Unit	21	4.57	1.80	0.394
	Multidisciplinary Ward 2A	19	4.53	1.31	0.300
	Multidisciplinary Ward 4B	18	5.39	2.55	0.600
total QP	Medical Ward 4A	15	52.53	3.16	0.816
	Multidisciplinary Transit Unit	21	52.81	1.60	0.349
	Multidisciplinary Ward 2A	19	52.26	2.38	0.545
	Multidisciplinary Ward 4B	18	52.33	3.22	0.758

Fig. 5. One-way ANOVA results and descriptive statistics for KAP scores across hospital units

4. Discussion

4.1 High Knowledge Levels with Identified Gaps

The study reveals a strong foundational knowledge among nurses in modern wound care techniques, particularly in core principles and standard practices. This finding is indicative of effective foundational training and professional awareness. However, notable gaps were identified in more specialized areas, such as the classification, application, and limitations of advanced wound dressings [11-13]. These deficiencies highlight the need for targeted educational initiatives to address complex and evolving aspects of wound care. By prioritizing specialized training modules and continuous professional development, healthcare institutions can ensure that nurses are fully equipped to meet the nuanced demands of contemporary wound management.

4.2 Positive Attitudes with Nuanced Variability

The study highlights nurses' overwhelmingly positive attitudes toward modern wound care, reflecting their recognition of its vital role in improving patient outcomes and upholding clinical standards. This broad positivity indicates a strong alignment with evidence-based practices and an

intrinsic motivation to deliver high-quality care. Nurses' favorable attitudes underscore their willingness to adopt and integrate modern techniques, demonstrating a clear commitment to advancing their professional practice.

However, nuanced variability in attitudes emerged, particularly concerning interdisciplinary collaboration and perceived workload implications. Some nurses expressed reservations about the challenges posed by teamwork dynamics and increased responsibilities associated with advanced wound care. These concerns may create latent barriers to the seamless application of modern techniques, potentially limiting their widespread adoption.

To address these issues, healthcare institutions should prioritize initiatives that promote interdisciplinary teamwork and role clarity, ensuring that nurses feel supported and valued within collaborative frameworks [14]. Streamlining workload management through effective staffing and resource allocation can further alleviate stress, enhancing nurses' capacity to embrace innovative practices. Strengthening nurses' sense of professional contribution within the healthcare team could translate into greater enthusiasm, engagement, and commitment to modern wound care.

4.3 Exceptional Practice Adherence

Adherence to recommended practices in modern wound care was exemplary, reflecting a high degree of commitment among nurses to translating theoretical knowledge into effective clinical action. Strengths were particularly evident in the preparation, execution, and monitoring of wound care protocols. Nevertheless, the study identifies a need for enhanced documentation practices. Comprehensive and consistent documentation is essential not only for legal and procedural compliance but also for facilitating communication, continuity of care, and quality improvement initiatives. Implementing streamlined documentation systems and reinforcing their significance through routine training would ensure that high standards of practice are uniformly maintained and consistently monitored [15].

4.4 Influence of Demographic and Unit Variability

Uniformity in KAP scores across hospital units suggests successful standardization of training and practice frameworks at the organizational level. However, subtle differences, such as higher knowledge scores in certain units, indicate opportunities to identify and scale best practices. These variations point to the potential benefits of targeted, unit-specific interventions, including cross-training, best-practice dissemination, and tailored mentorship. By leveraging these insights, healthcare organizations can ensure equitable access to training resources and consistent quality of care across all units, thereby reinforcing institutional excellence in wound care.

4.5 Implications for Policy and Practice

The findings of this study provide valuable guidance for shaping policies and improving practices in modern wound care. High levels of knowledge and adherence to recommended practices among nurses are encouraging indicators of the current standards in clinical settings. However, the identified gaps highlight the need for targeted strategies to address specialized areas of knowledge and systemic challenges. Policies should prioritize integrating advanced wound care topics, such as bioactive dressings and emerging technologies, into continuing professional development programs to ensure that nurses are equipped to handle complex wound cases effectively [16].

Additionally, fostering a collaborative healthcare culture is critical for optimizing wound care practices. Interdisciplinary initiatives that promote teamwork, role clarity, and mutual respect can address barriers to seamless collaboration and enhance the overall quality of care. Refining documentation protocols is another key area for improvement; streamlined systems and training can ensure consistency, improve communication, and support data-driven decision-making. Healthcare organizations can identify and replicate best practices across all teams by leveraging high-performing units as benchmarks. Addressing variability through tailored interventions and focusing on education, collaboration, and operational efficiency will help cultivate a culture of excellence. These efforts not only improve patient outcomes but also enhance nurses' professional growth and satisfaction, contributing to a stronger healthcare system.

4.6 Barriers to Adopting Modern Wound Care Techniques

The study identifies several barriers to the adoption of modern wound care techniques, including limited interdisciplinary collaboration, perceived workload increases, and gaps in advanced knowledge related to specialized dressing applications. These barriers underscore systemic and individual challenges that may hinder nurses' ability to fully embrace modern practices. Limited collaboration highlights the need for enhanced communication and teamwork strategies, particularly in settings where interdisciplinary dynamics are crucial for patient outcomes. Workload concerns point to the importance of optimizing staffing levels, streamlining resource allocation, and integrating advanced wound care into routine practices to reduce perceived burdens. Furthermore, gaps in specialized knowledge indicate the need for targeted training programs that go beyond foundational education, focusing on the classification, indications, and limitations of advanced dressings. Addressing these barriers through tailored interventions, implementing workload management policies, and investing in specialized training, could significantly enhance nurses' capacity to adopt and sustain modern wound care practices effectively.

5. Conclusion

This study underscores the robust foundational knowledge and positive attitudes of nurses toward modern wound care practices, reflecting a strong commitment to delivering high-quality patient care. The exceptional adherence to recommended practices demonstrates nurses' ability to translate theoretical knowledge into effective clinical action. However, the identification of gaps in specialized knowledge, nuanced variability in attitudes, and documentation practices highlights the need for targeted improvements to address these areas. The findings emphasize the importance of integrating advanced wound care topics into ongoing professional development programs. Specialized training initiatives, particularly focusing on the classification and application of bioactive and emerging dressing technologies, are critical to equipping nurses with the expertise required for complex wound management. Addressing these gaps will enable nurses to adapt to the evolving landscape of wound care with confidence and competence.

Healthcare institutions must also prioritize fostering an environment that supports interdisciplinary collaboration and role clarity. Addressing concerns about workload implications and teamwork dynamics through clear communication, adequate staffing, and streamlined resource allocation will enhance nurses' capacity to embrace innovative practices. Strengthening these collaborative frameworks can significantly boost engagement and commitment, driving the widespread adoption of modern wound care techniques. Finally, the study highlights the value of leveraging high-performing units as benchmarks to identify and replicate best practices across all

teams. Tailored interventions, such as cross-training and mentorship programs, can address unit-specific variability and promote equitable access to resources and expertise. By focusing on education, collaboration, and operational efficiency, healthcare organizations can ensure consistent excellence in wound care practices, ultimately improving patient outcomes and strengthening the healthcare system.

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