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Knowledge Gaps and Pressure-Injury Prevention Practices Among Nurses in Tertiary-Care Hospitals: A Multicenter Cross-Sectional Study.

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Abstract

Background: Pressure injuries (PIs) remain an important patient-safety concern, and nurses play a central role in their prevention. However, limitations in PI prevention knowledge and inconsistencies in preventive practices continue to be reported, particularly in resource-variable healthcare settings.

Objective: To assess nurses' knowledge and self-reported practices regarding PI prevention and examine the relationship between knowledge, preventive practices, and selected professional characteristics.

Methods: A multicenter cross-sectional study was conducted among 138 registered nurses from selected public and private healthcare facilities in Kasur and Lahore, Punjab, Pakistan. Data were collected using a structured self-administered questionnaire assessing demographic and professional characteristics, PI prevention knowledge, and self-reported preventive practices. Descriptive statistics, Spearman's correlation, one-way analysis of variance, and simple linear regression were used for analysis.

Results: Participants answered approximately 46% of the PI prevention knowledge items correctly, while the mean prevention-practice score was 3.49 ± 0.25 on a five-point scale. Knowledge showed a very weak, non-significant correlation with preventive practice ($\rho = 0.051$, $p = 0.551$). Knowledge and practice did not differ significantly according to nursing experience, previous PI prevention training, training recency, frequency of caring for at-risk patients, or guideline availability. Knowledge, age, previous training, and guideline availability were also not significant individual predictors of preventive practice.

Conclusion: Nurses demonstrated limitations in overall PI prevention knowledge despite reporting moderate-to-frequent preventive practices. Knowledge alone was not associated with self-reported practice, suggesting that PI prevention may also depend on educational, clinical, and organizational factors. Strengthening competency-based education alongside effective implementation of evidence-based protocols and supportive clinical systems may improve PI prevention.

Keywords: pressure injury; pressure injury prevention; nurses; knowledge; preventive practices; patient safety; Pakistan

Introduction

Pressure injuries (PIs), formerly known as pressure ulcers (PUs) and bedsores, continue to be a significant patient safety and quality of care issue in healthcare facilities all over the world (Mervis & Phillips, 2019). Displays features of limited damage to the skin and/or underlying soft tissue, typically over a bony prominence or related to a medical device. Their occurrence is more likely to be seen in patients with poor mobility, prolonged hospitalization, critical illness, loss of sensory

perception, poor nutrition, elderly or in patients who have several comorbid conditions (Jaul et al., 2018). Pressure injuries can result in a lot of pain, discomfort, they can lead to a risk of infection and other complications, they can slow down a patient's recovery and cause a longer hospital stay, lower a patient's quality of life, and place a greater financial burden on health care systems (Peterson et al., 2025). Pressure injuries are frequent problems for hospitalized patients despite preventive measures undertaken. The pooled prevalence of pressure injuries in adults when hospitalized is estimated at 12.8% and the prevalence of HAPIs at 8.4% (Li et al., 2020), indicating the ongoing burden of this avoidable clinical issue. Prevention is important when looking at ways to reduce the burden of pressure injuries, as many of the risk factors which can be impacting on a patient can be identified and managed with nursing interventions (Peterson et al., 2025). Nurses have a unique role in this area as they can be expected to have ongoing contact with patients in hospital and due to the nature of their role they can assess patients, recognize changes in skin, take action to prevent changes and measure consequences (Patrician et al., 2024). Key elements of pressure injury prevention include systematic risk assessment and reassessment, regular skin monitoring, adequate repositioning and mobilization, moisture management, minimizing friction and shear, heel offloading, proper support surface use, nutrition assessment, monitoring of medical equipment, documentation and education of patient and caregiver (Pott et al., 2023). Nurses need to be knowledgeable and evidence-based, and to translate that knowledge into clinical practice for successful implementation of these measures (Al-Busaidi et al., 2019).

Yet, there has been some significant gaps in the knowledge of the role of the nurse in prevention of pressure injuries in international research. The updated systematic review and meta-analysis results, using the Pressure Ulcer Knowledge Assessment Tool, found nurses overall had pooled knowledge scores of around 51.5% (Wu et al., 2022). Especially significant gaps were identified in the knowledge domain of preventive interventions aimed at reducing pressure and shear, suggesting that knowledge gaps might be in direct link with bedside nursing care (Wu et al., 2022). Likewise, a cross-country examination of attitudes and knowledge of PI prevention among nurses and nursing students found average knowledge scores overall, despite a positive attitude to prevention (Saleh et al., 2026). These findings are a cause for concern as lack of knowledge about risk factors, pressure-injury classification, pressure area repositioning, support surfaces, nutrition, moisture management and other pressure-injury prevention measures can lead to inefficient or inconsistent implementation of pressure-injury nursing interventions (Wu et al., 2023). Even so, sufficient knowledge is not always translated into proper clinical practice (Asiri et al., 2025). However, for the prevention of pressure injuries, nurses must take what they have learned and consistently put it into practice as they care for their patients. Professional experience, education, prior training, workload, staffing, equipment, institutional policies, and organizational support are factors that could impact implementation of preventive practices. Different relationships between knowledge and attitudes and whether this affects the level of pressure-injury prevention practices has been reported by different studies, and a recent systematic review and meta-analysis of registered nurses revealed significant variation in the findings from this context (Asiri et al., 2025). Therefore, the assessment of knowledge without concurrent evaluation of actual or self-reported preventive-care practices may result in an incomplete assessment about PIP among nurses. This issue is further illustrated with evidence from Pakistan. In response to the issues noted, a cross sectional study was conducted on the Knowledge, Attitude and Practices of registered nurses towards pressure ulcer prevention in a Tertiary care Hospital in Faisalabad (Inayat et al., 2025), and the findings showed differences between the various components of knowledge related to pressure ulcer prevention and related practices. The study also that found that there was a positive correlation between knowledge and preventive practices with a p value of less than 0.0001, highlighting the importance of enhancing nurse knowledge to facilitate the provision of preventive care (Inayat et al., 2025). But, healthcare provision in Pakistan comprises

of institutions of varying types of organization, resources, population of patients, educational and clinical care. Hospital based evidence may then not consistently reflect nurses in other public and private healthcare settings. Of importance here is that having an overall knowledge score is not necessarily an indicator of specific deficiencies. A nurse might score well on some aspects of the knowledge questions and not as well on others, perhaps issues with staging pressure injuries, and reassessment and repositioning or pressure redistribution, or offloading the heels, nutrition, moisture management, or medical device injuries (Dalvand et al., 2018). The identification of gaps in knowledge is thus useful as it can indicate the areas of learning that item-specific knowledge gaps may need to be reinforced. Again, analysis of individual preventive practices can help to identify activities in the clinic that occur with regularity and those that might need to be more extensively focused on. This highlights the need to focus on specific educational gaps to foster professional development in pressure-injury management and prevention that can, in turn, enhance nurses' knowledge and practices to manage and prevent these injuries (Ding et al., 2024). Evidence looking at nurses' specific knowledge gaps and applying the preventive principles for pressure injuries in various healthcare settings of Kasur and Lahore, Province of Punjab in Pakistan, is still limited. The involvement of nurses from Bhullay Shah Hospital, THQ Hospital Kasur and in the private healthcare setup involved in the project, will give an opportunity to study the knowledge and practices related to prevention across different clinical settings, both public and private. Learn about these patterns and the education can be targeted to areas that need nursing care as well as continuing professional development, reinforcement of clinical protocols, and enhancements in preventive nursing care.

Hence, the main objective of the current multicenter cross-sectional study was to determine the knowledge level of the nurse about pressure injury prevention, knowledge gaps, their practice of pressure injury prevention and to explore the association between the knowledge and practice of the nurse in the selected healthcare settings in Kasur and Lahore, Punjab, Pakistan.

Methodology

Study Design

Therefore, a multicenter cross-sectional descriptive-analytical study was carried out to determine knowledge gaps and pressure injury prevention practice among nurses in selected public and private healthcare facilities of Kasur and Lahore in Punjab, Pakistan. Since it would be possible to observe the nurses' knowledge and reported practice with PIP at one time, a cross-sectional design was deemed suitable. An analytical aspect was also conducted to investigate the correlation between the knowledge and (nurse's) reported preventive practices.

Study Setting

The study was performed at Bhullay Shah Hospital, Kasur, Tehsil Headquarters (THQ) Hospital, Kasur and selected private health care centers where they participated in Lahore, Punjab, Pakistan. Selection of these healthcare settings was to ensure representation of nurses operating in a variety of public and private clinical settings. They included healthcare facilities from Kasur and Lahore, thereby gaining access to the nurses who had a diverse clinical experience and varied professional background. All researchers conducted the study independently and received administrative consent from the healthcare facilities that participated in the study.

Objectives

1. To assess nurses’ knowledge regarding pressure-injury prevention in tertiary-care hospitals.
2. To identify specific gaps in nurses’ knowledge regarding pressure-injury prevention.
3. To assess pressure-injury prevention practices among nurses in tertiary-care hospitals.

4. To examine the relationship between nurses' knowledge and pressure-injury prevention practices in tertiary-care hospitals.

Study Duration

Data collection was done in May 2026. During this time the participant recruitment process, questionnaire distribution, and completion and collection of questionnaires concluded.

Study Population

Registered Nurses (RNs) employed in Bhullay Shah Hospital and THQ Hospital of Kasur and selected participating private healthcare settings of Lahore were chosen as the target population. The nurses that were in various clinical areas and faced-to-face with patients were deemed fit to include in the study as pressure-injury risk assessment and prevention were part of nursing care and routine daily activities.

Sample Size

138 nurses were involved in the study. The final sample comprised eligible respondents who were nurses from the selected healthcare settings who participated voluntarily and completed the study questionnaire that were available during the data collection period.

Sampling Technique

The research used convenience sampling technique in recruiting the respondents. Data Collection Period was the time during which registered nurses, who are eligible for the selection from Bhullay Shah Hospital, THQ Hospital Kasur and selected Private Healthcare setups in Lahore were approached, consulted and asked to contribute. Through the use of a voluntary response sample, a sufficient sample of 138 was achieved of the nurses who met the inclusion criteria and were willing to participate.

Eligibility Criteria

The population consisted of registered nurses working in one of the healthcare settings of Kasur or Lahore who were (18-50) years old, directly engaged in providing care to the patients, available during the data collection period and willing to participate in the study. Nurses attending nursing schools, nursing interns, nurses who took vacation for the duration of the study and participants with significantly incomplete questionnaires were excluded from the study.

Study Instrument

Structured, self-administered Pressure Injury Prevention Knowledge and Practice Questionnaire was used to collect data. The questionnaire adopted in the present study was based on well-validated surveys and questionnaires concerning pressure injury knowledge and pressure injury prevention practices, respectively, (Manderlier et al., 2017) developed the Pressure Ulcer Knowledge Assessment Tool (PUKAT 2.0) (2017), and (Moya-Suárez et al., 2017) developed the Questionnaire to Evaluate Nurses' Adherence to Recommendations for Preventing Pressure Ulcers (QARPPU).

The PUKAT 2.0 instrument has been previously designed and psychometrically validated for use in measuring knowledge about pressure-ulcer prevention. The original instrument consists of 25 multiple choice questions in 6 areas: etiology, classification and observation, risk assessment, nutrition, prevention, and patients' population (Manderlier et al., 2017). QARPPU was designed and psychometrically tested for measuring pressure ulcer prevention recommendation adherence by nurses. The original QARPPU has four factors with 18 items and showed psychometric qualities during its development process (Moya-Suárez et al., 2017).

For the present study, the questionnaire sections were designed to present simplified format which could be readily completed by nurses working in the selected clinical settings. In Section A, Demographic and Professional Characteristics, you are asked about yourself. Demographic and professional data were collected from the participants in Section A. Variables were: age, gender, highest nursing qualification, current clinical department/unit, total nursing experience in years,

experience in the current clinical unit, previous education or training on pressure-injury prevention, frequency of caring for patients with pressure-injury risk and availability of a pressure-injury prevention guideline or protocol in the clinical unit. Age was categorized into 18–30 years, 31–40 years, 41–50 years, 51–60 years, and above 60 years.

Section B: Knowledge about preventing pressure injuries (RHPK-P)

Section B displayed 25 statements that measured nurses' awareness of the prevention of pressure injuries. The content in this section is based on the learning areas outlined in PUKAT 2.0 (Manderlier et al., 2017). The questions focused on important considerations for prevention of pressure injuries such as pressure/sharing, friction, moisture, nutrition, mobility/sensory impairment, identification/staging of pressure injuries, risk assessment/reassessment, repositioning, pressure redistributing support surfaces, heel offloading, medical device-related pressure injuries, and skin protection and pressure prevention strategies for patients who are in prolonged sitting or immobility.

Each knowledge statement was presented in three different formats for answering, which were then True, False, and I Do Not Know. A score of one point was given for a correct answer and a score of zero was given for an incorrect answer or the answer "I Do Not Know." The range for the total possible knowledge score was 0 to 25, with higher scores representing a higher level of knowledge of pressure-injury prevention. Along with the overall score, the percentage of those responding correctly on each item was determined. Percentages of correct responses to every item was computed and items that had lower percentages of correct responses were identified as those representing more gaps in knowledge and were selected to reflect knowledge gaps among participating nurses.

Preventing Pressure Injuries in Section C

The 22 statements of Section C evaluated the self-reported practices that nurses use when preventing a pressure injury. The content has been created taking into account the following preventive-practice areas included in QARPPU (Moya-Suárez et al., 2017). The items evaluated included clinical practices for pressure injury risk assessment and reassessment, documentation, skin inspection, examination of skin being covered by medical devices, moisture and skin management, avoidance of inappropriate skin massage over persistently reddened skin, maintenance of clean and appropriate bed linen, individualized repositioning, positioning, reducing friction and shear, using pressure redistributing support surfaces, heel offloading, taking off pressure for seated individuals, evaluation and referral for nutrition, educating patients and families, monitoring medical devices, implementing early preventive interventions, and documenting frequency of preventive nursing interventions. This section was regarded as a research-derived practice questionnaire based on the QARPPU instead of administration of the QARPPU instrument as the items were modified and expanded for the current study.

Validity and Reliability

The questionnaire was checked with experts who had the necessary background with nursing education, clinical practice, academic nursing, and research methodology before the main data collection. The experts rated the questionnaire with regard to relevance, clarity, comprehensiveness, suitability for the target population, consistency with the aim of the study, and simplicity of completion. Before finalizing the questionnaire, necessary modifications were made according to their recommendations.

A pilot study was also carried out among a group of nurses who are similar to the target population to assess how clear, feasible, comprehensible and how much time it takes to answer the questionnaire. Nurses who participated in the pilot study were excluded from the sample. Cronbach's alpha was used to determine internal consistency of the 22-item long practice section, which was also set at 0.70 and above for acceptability. Internal consistency for the knowledge

section was calculated using Kuder–Richardson Formula 20 (KR-20) that was employed in view of the dichotomously scored knowledge items.

Data Collection Procedure

Administrative approval was taken from the management of Bhullay Shah Hospital/THQ Hospital Kasur and the related private health care system in Lahore before implementing data collection. Based on permission, qualified nurses were approached in their respective clinical areas. The purpose of the study, voluntary participation, confidentiality of responses and how to fill in the questionnaire were explained to the researchers. All nurses who agreed to take part were given the self-administered questionnaire to be completed independently based on their knowledge and current practice in clinical work. There was enough time for the questionnaire to be completed. The completed questionnaires were then picked up by the researchers and data were entered after ensuring completeness. Names of participants and other direct personal identifiers were not used on questionnaires.

Data Analysis

The data collected were coded, entered, cleaned and analyzed using the Statistical Package for the Social Sciences (SPSS). Categorical demographic and professional attributes were presented as frequencies and percentages. When the distribution of continuous variables and total knowledge and practice scores was approximately normally distributed, means and standard deviations were used for summary. When distributions were significantly non-normal, the data were summarized using medians and interquartile ranges.

The number and percentage of participants answering correctly each of the 25 knowledge questions was computed to determine the knowledge gaps. Lower percentages of correct responses were seen as areas where there were higher levels of lack of knowledge. For each of the participants, an overall knowledge score with the total number of correct reactants was also calculated.

Frequencies and percentages were determined for responses to each practice statement for pressure-injury prevention practices. Responses were summed across the 22 items to get a total practice score, which is higher the more often participants reported practicing pressure-injury prevention activities.

For data and information that were suited for parametric analysis, the relationship between total knowledge score and practice score of nurses was analyzed by Pearson's correlation coefficient. Spearman's rank correlation coefficient was employed if the scores were not normally distributed and/or assumptions for Pearson's correlation were not met. Differences in knowledge and practice scores for fish trader and selected demographic and professional characteristics were also analyzed by using appropriate statistical tests. All statistical tests used were two tails and p-values < 0.05 were regarded as statistically significant.

Ethical Considerations

The research was done on an independent basis for academic research. Before recruitment, administrative approval was taken from Bhullay Shah Hospital, THQ hospital Kasur and private health-care setups where the participants were recruited in Lahore. Entry to the study was voluntary with the intention and method of the study presented to the eligible nurse prior to the administration of the questionnaire. Participants were informed of consent prior to participating in the study. Participants were told they could opt out of involvement in the study or, if they did, face no repercussions. No names or other directly identifying information were collected. Confidentiality was respected and electronic and completed questionnaires were used strictly for academic and research purposes. Ethical clearance from the appropriate institutional research or ethics committee was obtained if required by the Educational Institution prior to starting the participant recruitment process.

Results

Table 1: Sociodemographic and work-related characteristics of participants (n=138)

Variable	Categories	Frequency	Percentage
Age (years)	18–30	70	50.7
	31–40	49	35.5
	41–50	18	13.0
	≥51	1	0.7
Gender	Male	78	56.5
	Female	60	43.5
Highest nursing qualification	BSN	31	22.5
	Diploma	24	17.4
	MSN/MSc	42	30.4
	Post-RN	41	29.7
Clinical department	Emergency	23	16.7
	ICU	21	15.2
	Medical ward	20	14.5
	Neurology	30	21.7
	Orthopedics	16	11.6
	Surgical ward	28	20.3
Total nursing experience	<1 year	70	50.7
	1–5 years	50	36.2
	6–10 years	18	13.0
Previous PI prevention training	Yes	54	39.1
	No	84	60.9
Time since last PI training	Within 1 year	37	26.8
	1–2 years ago	43	31.2
	3–5 years ago	52	37.7
	>5 years ago,	6	4.3
Frequency caring for PI-risk patients	None	2	1.4
	Daily	32	23.2
	Several times/weeks	45	32.6
	Several times/months	49	35.5
	Rarely	10	7.2
Availability of PI prevention guideline	Yes	81	58.7
	No	47	34.1
	Do not know	10	7.2

Participant Characteristics

A total of 138 nurses participated in the study. As presented in Table 1, approximately half of the participants were aged 18–30 years (50.7%), followed by those aged 31–40 years (35.5%) and 41–50 years (13.0%). Only one participant (0.7%) was aged 51 years or older. Male nurses represented 56.5% of the sample, while females accounted for 43.5%. The participants represented diverse educational backgrounds. MSN/MSc-qualified nurses constituted the largest group (30.4%), closely followed by post-RN nurses (29.7%), while 22.5% held a BSN and 17.4% held a nursing diploma. Participants were distributed across six clinical departments, with the largest proportions working in neurology (21.7%) and surgical wards (20.3%), followed by emergency (16.7%), ICU (15.2%), medical wards (14.5%), and orthopedics (11.6%).

Regarding professional experience, 50.7% of the nurses had less than one year of experience, 36.2% had 1–5 years, and 13.0% had 6–10 years of nursing experience. More than half of the participants (60.9%) reported that they had not previously received pressure-injury (PI) prevention training, whereas 39.1% reported previous training. With respect to exposure to patients at risk of pressure injury, 35.5% cared for such patients several times per month, 32.6% several times per week, and 23.2% daily. Only 7.2% reported rarely caring for at-risk patients. Furthermore, 58.7% reported that a PI prevention guideline or protocol was available in their clinical unit, whereas 34.1% reported that no such guideline was available and 7.2% were unaware of whether a guideline existed.

Table 2: Descriptive statistics for total PI knowledge and total prevention practice (n=138)

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Total_Knowldge	138	0.23	0.69	0.4599	0.08828
Total Prevention	138	2.91	4.09	3.4895	0.24813

Pressure-Injury Prevention Knowledge and Practices

As shown in Table 2, the mean total PI prevention knowledge score was 0.4599 (SD = 0.0883), with observed scores ranging from 0.23 to 0.69. As the knowledge score was expressed as the proportion of correctly answered items, participants answered approximately 46.0% of the knowledge items correctly on average. The relatively restricted observed range, with no participant scoring above 0.69, indicates that substantial room for improvement in PI prevention knowledge remained within the sample. The mean prevention-practice score was 3.4895 (SD = 0.2481), with scores ranging from 2.91 to 4.09 on the 1–5 response scale. Thus, on average, nurses reported performing PI prevention activities at a frequency between “sometimes” and “often.” The relatively small standard deviation indicates that self-reported practice scores were fairly concentrated around the sample mean.

Table 3: Spearman’s correlation between total PI knowledge and total prevention practice (n=138)

Variables	Spearman’s rho	p-value
Total_Knowldge × Total Prevention	0.051	0.551

Relationship Between PI Prevention Knowledge and Prevention Practices

Spearman's rank-order correlation was conducted to examine the relationship between nurses' PI prevention knowledge and their self-reported prevention practices. As presented in Table 3, there was a very weak positive correlation between total knowledge and prevention-practice scores ($\rho = 0.051$). However, this relationship was not statistically significant ($p = 0.551$). These findings indicate that nurses with higher PI prevention knowledge scores did not necessarily report more frequent implementation of PI prevention practices. Therefore, within this sample, there was no statistically significant evidence of an association between overall knowledge and self-reported preventive practice.

Table 4: One-way ANOVA: Comparison of total PI knowledge and prevention practice across work-related subgroups

Independent variable	Outcome	F	df	p-value
Nursing experience	Total Knowledge	0.069	2,135	0.934
	Total Prevention	0.496	2,135	0.610
Previous PI training	Total Knowledge	0.536	1,136	0.465
	Total Prevention	1.602	1,136	0.208
Time since last PI training	Total Knowledge	2.361	3,134	0.074
	Total Prevention	0.157	3,134	0.925
Frequency of caring for at-risk patients	Total Knowledge	0.601	4,133	0.663
	Total Prevention	1.754	4,133	0.142
Availability of PI guideline	Total Knowledge	2.202	2,135	0.115
	Total Prevention	0.022	2,135	0.978

Differences in Knowledge and Prevention Practices Across Professional Characteristics

One-way ANOVA showed no statistically significant differences in PI prevention knowledge or prevention-practice scores across the examined work-related characteristics (Table 4). Neither nursing experience nor previous PI prevention training was significantly associated with knowledge ($p = 0.934$ and 0.465, respectively) or practice ($p = 0.610$ and 0.208, respectively). Similarly, no significant differences were observed according to training recency, frequency of caring for at-risk patients, or availability of PI prevention guidelines (all $p > 0.05$). The largest between-group variation was observed for knowledge according to time since last PI training, $F(3, 134) = 2.361$, $p = 0.074$; however, this did not reach statistical significance. Overall, none of the examined professional characteristics were significantly associated with differences in PI prevention knowledge or practice.

Table 5: Simple linear regression models predicting total PI prevention practice

Predictor	B	SE	Beta	t	p	R^2
Total_Knowldge	0.220	0.240	0.078	0.917	0.361	0.006

Predictor	B	SE	Beta	t	p	R^2
Age	−0.045	0.029	−0.132	−1.557	0.122	0.018
Previous PI training	−0.055	0.043	−0.108	−1.266	0.208	0.012
PI guideline availability	0.007	0.034	0.018	0.211	0.833	0.000

Predictors of Pressure-Injury Prevention Practices

Simple linear regression analyses examined the individual associations of PI prevention knowledge, age, previous PI prevention training, and guideline availability with prevention-practice scores (Table 5). None of the examined predictors were statistically significant. Knowledge showed a weak positive association with prevention practice ($\beta = 0.078$, $p = 0.361$), whereas age ($\beta = -0.132$, $p = 0.122$) and previous PI training ($\beta = -0.108$, $p = 0.208$) showed small, non-significant negative associations. Guideline availability showed virtually no association with prevention practice ($\beta = 0.018$, $p = 0.833$). The individual models explained only 0.0–1.8% of the variance in prevention-practice scores, indicating limited predictive contribution from these factors.

Discussion

This multicenter study examined nurses' knowledge and self-reported practices regarding pressure-injury (PI) prevention in selected healthcare settings in Kasur and Lahore, Pakistan. Overall, nurses answered approximately 46% of the knowledge items correctly, while the mean prevention-practice score was 3.49 out of 5. Despite this difference, knowledge was not significantly associated with self-reported preventive practice. Professional characteristics, including nursing experience, previous PI training, training recency, frequency of caring for at-risk patients, and guideline availability, also showed no significant differences in knowledge or practice. These findings highlight limitations in PI prevention knowledge and suggest that preventive practice may depend on factors beyond knowledge alone.

The overall knowledge level indicates considerable scope for strengthening nurses' understanding of PI prevention. This finding is consistent with international evidence showing persistent knowledge limitations among nurses. (Griffiths et al., 2016), in an updated systematic review and meta-analysis using the Pressure Ulcer Knowledge Assessment Tool (PUKAT), reported a pooled knowledge score of 51.5%, with particularly important deficiencies in measures related to pressure and shear. Similar knowledge limitations have been reported in previous meta-analytic and multicenter evidence (Dalvand et al., 2018). More recent systematic evidence also suggests that insufficient PI prevention knowledge remains an important issue among nurses (Saleh et al., 2026). Thus, the current findings reflect a broader challenge in PI prevention rather than one restricted to the participating healthcare facilities. However, direct numerical comparisons should be interpreted cautiously because the present questionnaire was informed by PUKAT 2.0 but was modified for this study.

The characteristics of the participants may provide some context for the observed knowledge level. Approximately half had less than one year of nursing experience, and most had not previously received PI prevention training. Nevertheless, neither experience nor previous training was significantly associated with knowledge. This differs from some previous studies reporting better PI-related knowledge among nurses with greater professional experience, educational preparation, or additional wound-care training (Saleh et al., 2026). Such differences may reflect

variations in healthcare settings, educational backgrounds, measurement approaches, and the nature and quality of previous training.

Despite limitations in knowledge, participants reported performing PI prevention practices with moderate-to-frequent regularity. Previous research has similarly demonstrated considerable variation in nurses' preventive practices. (Ghorbani Vajargah et al., 2023), in a systematic review involving 6,501 nurses, found that approximately half demonstrated desirable PI prevention practices. The difference between knowledge and reported practice in the present study may reflect the influence of established ward routines, teamwork, supervision, institutional expectations, and available resources. Nurses may therefore perform routine preventive interventions even when their formal knowledge is incomplete. However, because practice was self-reported, the possibility of recall and social-desirability bias should also be considered.

An important finding was the absence of a significant relationship between PI prevention knowledge and self-reported practice ($\rho = 0.051$, $p = 0.551$). This does not suggest that knowledge is unimportant; rather, it demonstrates that knowledge alone may not ensure its translation into bedside practice. (Asiri et al., 2025) similarly reported considerable variation in the relationship between nurses' PI prevention knowledge, attitudes, and practices. Preventive behavior may also be shaped by workload, staffing, available resources, organizational support, clinical policies, and the working environment (Ghorbani Vajargah et al., 2023; Wu et al., 2022). Therefore, strengthening knowledge without addressing barriers within the clinical environment may have limited influence on actual preventive care.

The current finding differs from recent evidence from Pakistan. Inayat et al. (2025) reported a significant relationship between nurses' knowledge and pressure-ulcer prevention practices in a tertiary-care hospital in Faisalabad (Inayat et al., 2025). Differences in study settings, participant characteristics, sampling, and measurement approaches may contribute to the contrasting findings. The present study involved nurses from different public and private healthcare settings in Kasur and Lahore, whereas the Faisalabad study was conducted within a single tertiary-care setting. This variation suggests that the relationship between knowledge and preventive practice may differ across healthcare environments and requires further multicenter investigation in Pakistan.

No significant differences in knowledge or practice were found according to nursing experience, previous training, training recency, frequency of caring for at-risk patients, or guideline availability. Although previous literature has identified training and professional experience as potentially important factors (Ghorbani Vajargah et al., 2023; Saleh et al., 2026), their effects may depend on the quality and context of exposure. For example, previous training does not necessarily indicate that education was comprehensive, evidence-based, competency-focused, or regularly reinforced. Structured educational interventions have been shown to improve nurses' PI-related knowledge and practice (Tayyib & Asiri, 2026). These findings therefore support greater attention to the quality and effectiveness of training rather than training attendance alone.

Similarly, guideline availability was not significantly associated with knowledge or practice. Simply having a PI prevention guideline within a clinical unit may not ensure its implementation. Effective use may depend on staff awareness, accessibility, leadership support, adequate resources, monitoring, and integration into routine care. Previous evidence has identified organizational resources, multidisciplinary involvement, environmental context, and implementation support as important influences on PI prevention (Cordina et al., 2025; Wan et al., 2023). Future studies should therefore examine actual guideline implementation and adherence rather than availability alone.

Practical Implications

The findings highlight the need for targeted, competency-based education to strengthen nurses' knowledge of pressure-injury prevention. However, the weak knowledge–practice relationship suggests that education alone may be insufficient. Healthcare facilities should combine regular training with accessible evidence-based protocols, adequate preventive resources, competency assessment, and routine audit and feedback. Greater emphasis should be placed on the effective implementation and reinforcement of training and guidelines rather than their mere availability.

Strengths and Limitations

This study has several strengths, including its multicenter design, inclusion of nurses from public and private healthcare settings and different clinical departments, and simultaneous assessment of PI prevention knowledge and self-reported practices. These features provided a broader understanding of PI prevention across varied clinical settings.

Several limitations should be considered. The cross-sectional design precludes causal inference, while convenience sampling and the relatively small sample may limit generalizability and statistical power. Self-reported practices may also be affected by recall and social-desirability bias. In addition, the questionnaire was adapted from established instruments, which limits direct comparison with studies using the original PUKAT 2.0 or QARPPU. Important organizational factors, including workload, staffing, resources, and leadership support, were not assessed. Future studies should use larger, more representative samples and incorporate objective measures of clinical practice and organizational factors.

Conclusion

Statistically significant findings in the present study indicated low overall knowledge of PI prevention by the nurses and moderate to frequent regularity with self-reported practices. There were no relationships between knowledge and prevention-practice scores, or between the professional characteristics examined and prevention-practice or knowledge scores. These results indicate that the issue of prevention of PI cannot be reduced to a knowledge issue only. While improving the evidence-based knowledge of nurses is a necessary part of the care, a strategy to effectively implement prevention is likely to need a wider approach that brings together Continuing Education in addition to competency development, easy-to-understand, practice-focused directives, organizational support, sufficient resources and monitoring of prevention activity. Combination of multilevel approaches that focus not only on individual knowledge, but on the clinical context might thus be a more fitting way to support strengthening of PI prevention in a Pakistani healthcare context.

Reference

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