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CRITICAL CARE NURSES AND PRESSURE INJURY PREVENTION: KNOWLEDGE, CHALLENGES, AND PERCEIVED BARRIERS

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ABSTRACT

Background: *Pressure injuries are a major patient safety issue in critical care settings, where immobility, complex conditions, and high workload increase risk. Nurses play a key role in prevention; however, knowledge gaps and workplace barriers may limit effective practice, especially in resource-limited settings such as South Punjab, Pakistan.*

Objective: *To assess critical care nurses' knowledge, perceived barriers, and the relationship between knowledge and barriers regarding pressure injury prevention.*

Methods: *A descriptive cross-sectional study was conducted among 100 registered nurses working in ICUs and CCUs of tertiary care hospitals in South Punjab. Data were collected using a structured questionnaire including the pressure injuries Knowledge Assessment Tool (PUKAT) and an 11-item perceived barriers scale. Data were analyzed using SPSS version 27 with descriptive statistics, chi-square tests, and Pearson correlation analysis.*

Results: *The mean age was 28.61 ± 6.60 years, and 55% were female. Overall, 63% of nurses had satisfactory knowledge, while 37% had inadequate knowledge. The mean knowledge score was 15.13 ± 4.87. Educational level was significantly associated with knowledge ($p = 0.044$). Major barriers included lack of written protocols, overcrowding, and inadequate staffing. A significant negative correlation was found between knowledge and perceived barriers ($r \approx -0.72$, $p < 0.05$).*

Conclusion: *Critical care nurses demonstrated moderate knowledge with significant organizational barriers. Strengthening continuous education, implementing standardized pressure injury prevention protocols, improving staffing and resource allocation, and enhancing institutional support are essential to improve preventive practices and patient safety in critical care settings.*

Keywords: *Pressure injuries, critical care nurses, pressure injury prevention, perceived barriers, patient safety*

1 | INTRODUCTION

Pressure injuries (PIs), previously known as pressure injuriess, are localized damage to the skin and underlying tissue caused by prolonged pressure, friction, or shear forces, particularly over bony prominences. These injuries are common among critically ill and immobilized patients due to reduced mobility, impaired perfusion, and multiple clinical risk factors [9,21]. Critically ill patients in intensive care units (ICUs) are especially vulnerable because of mechanical ventilation, hemodynamic instability, prolonged bed rest, and complex therapeutic interventions [11,15]. Pressure injuries remain a major patient safety issue globally, contributing to increased morbidity, prolonged hospital stay, higher healthcare costs, and increased mortality rates [18].

The burden of pressure injuries is increasing in healthcare settings worldwide, despite advancements in preventive strategies and clinical guidelines. Prevention of pressure injuries is recognized as a key indicator of nursing care quality and patient safety. Nurses, particularly critical care nurses, are primarily responsible for early identification of at-risk patients and implementation of preventive measures such as repositioning, skin assessment, use of pressure-relieving devices, and nutritional support [11,16]. Evidence suggests that effective prevention strongly depends on nurses' knowledge, clinical competence, and adherence to evidence-based guidelines [9,12]. However, pressure injuries continue to be reported at high rates in acute and critical care settings, indicating gaps in prevention practices [15,17].

International literature highlights significant deficiencies in nurses' knowledge and practices regarding pressure injury prevention. A systematic review reported variations in nurses' knowledge and attitudes toward prevention strategies across different healthcare systems [9]. Similarly, studies have identified inadequate understanding of risk assessment tools and preventive interventions among nurses working in clinical settings [12]. In critical care environments, barriers such as heavy workload, insufficient staffing, lack of resources, and limited training opportunities significantly affect the implementation of effective preventive care [10,18].

In addition to systemic barriers, nurses in critical care settings face multiple occupational challenges that may negatively influence patient care outcomes. Studies conducted in Pakistan have reported that ICU nurses frequently experience sleep deprivation, occupational stress, and poor working conditions, which reduce work performance and clinical efficiency [3,4]. Furthermore, inadequate nurse-to-patient ratios and high workload intensity have been associated with reduced patient safety and compromised quality of care [7]. Occupational hazards and limited organizational support further restrict nurses' ability to consistently apply evidence-based preventive practices [5].

Knowledge and competency in nursing practice play a vital role in preventing hospital-acquired complications, including pressure injuries. Studies conducted in South Punjab revealed gaps in nurses' theoretical and practical knowledge, indicating a persistent theory-practice gap in clinical settings [6]. Similarly, research focusing on ICU nurses' infection control practices and CLABSI prevention highlighted that nurses' knowledge and adherence to guidelines significantly influence patient outcomes and healthcare quality [2,8]. These findings emphasize the importance of continuous education, training, and institutional support to improve nursing practice.

Pressure injury prevention is also influenced by organizational, environmental, and workplace factors. International studies have identified workload, lack of equipment, staffing shortages, and insufficient training as major barriers to effective prevention [10,13,18]. Gwag and Kim [13] further reported that occupational stress and workload negatively impact nurses' ability to ensure patient safety and implement preventive care. Similarly, studies have shown that structured preventive strategies such as care bundles and evidence-based protocols can improve outcomes when supported by adequate staffing and leadership [22].

Evidence-based nursing practice is essential for improving patient safety and reducing preventable complications in critical care settings.

Ominyi et al. [19] emphasized that the use of evidence in nursing practice depends on organizational support, clinical culture, and access to educational resources. Likewise, implementation studies have shown that structured interventions, simulation-based training, and quality improvement programs can significantly reduce pressure injury incidence when properly implemented in clinical settings [11,14,17].

Although global evidence on pressure injury prevention is increasing, limited research has focused specifically on critical care nurses' knowledge and perceived barriers in Pakistan. Existing studies in Pakistan have primarily focused on occupational stress, infection control, nurse-to-patient ratio, and clinical competency rather than pressure injury prevention [2–8]. Therefore, there remains a significant research gap regarding nurses' preparedness, knowledge level, and barriers affecting pressure injury prevention practices in critical care settings.

Understanding critical care nurses' knowledge and perceived barriers regarding pressure injury prevention is essential for improving patient safety, enhancing nursing practice, and guiding healthcare policy development. Identifying these barriers will support healthcare administrators and policymakers in designing targeted educational programs, improving resource allocation, and strengthening institutional strategies to reduce pressure injury incidence in critical care units.

1.1 | Knowledge, Challenges, and Pressure Injury Prevention in Critical Care Nursing

Pressure injury prevention is a complex nursing responsibility requiring adequate knowledge, clinical judgment, and adherence to evidence-based practices. Critically ill patients are at high risk due to immobility, reduced sensory perception, use of medical devices, and poor tissue perfusion [11,13]. Therefore, critical care nurses must be competent in risk assessment, early identification, and implementation of preventive strategies.

International studies have shown that nurses' knowledge and attitudes significantly influence pressure injury prevention practices [9,12]. Inadequate training and limited awareness of guidelines contribute to inconsistent preventive care delivery [9]. Additionally, Kadhim [24] found that nurses' knowledge and attitudes toward pressure injury prevention are influenced by demographic and professional characteristics such as experience and education level.

Workplace barriers also play a significant role in limiting effective pressure injury prevention. Studies have identified staffing shortages, heavy workload, inadequate resources, and lack of training as major challenges in clinical settings [10,18,23]. Gwag and Kim [13] further highlighted that workload and occupational stress reduce nurses' compliance with patient safety practices, including pressure injury prevention.

Organizational support is also critical for improving nursing performance. Studies from Pakistan show that ICU nurses frequently experience fatigue, sleep deprivation, and stress due to demanding working conditions [3,4]. These factors negatively impact nurses' ability to deliver consistent, high-quality preventive care [7]. Furthermore, evidence-based practice is essential in improving patient outcomes in critical care settings. Research shows that organizational culture, leadership support, and access to resources strongly influence the use of evidence in nursing practice [19]. Structured interventions such as care bundles have been shown to improve pressure injury prevention when supported by adequate staffing and teamwork [22].

1.2 | Bridging International Evidence With the Pakistani Critical Care Context

Globally, pressure injury prevention has become a priority for healthcare systems due to its impact on patient safety and healthcare costs [15–18]. Numerous interventions, including educational programs, simulation training, and quality improvement initiatives, have been shown to reduce pressure injury incidence in hospital settings [11,14,17]. However, the success of these interventions depends on adequate staffing, training, and institutional support.

In Pakistan, critical care nursing faces several challenges, including limited resources, inadequate staffing, heavy workloads, and insufficient professional development

opportunities [3,5,7]. Most local studies have focused on infection control, occupational stress, and nursing competency rather than pressure injury prevention [2–8]. This highlights a clear gap in the literature regarding nurses' knowledge and barriers in this specific area.

Hospitals in Pakistan, particularly in South Punjab and tertiary care centers, continue to face increasing patient loads and resource limitations. Critical care nurses in these settings work under stressful conditions, which may compromise adherence to evidence-based preventive practices and increase the risk of pressure injuries.

Therefore, exploring critical care nurses' knowledge and perceived barriers is essential to improve clinical practice, patient outcomes, and healthcare quality in Pakistan. Findings from this study may help in developing targeted interventions, improving training programs, and strengthening institutional policies for pressure injury prevention.

1.3 | Aim and Objectives

The aim of this study was to assess critical care nurses' knowledge, challenges, and perceived barriers regarding pressure injury prevention in tertiary care hospitals. The specific objectives were to: (1) assess nurses' knowledge regarding pressure injury prevention; (2) identify perceived barriers to pressure injury prevention; (3) explore workplace and organizational challenges in critical care settings; and (4) examine the association between demographic variables and nurses' knowledge.

2 | METHODS

2.1 | Study Design

A descriptive cross-sectional study was conducted to assess critical care nurses' knowledge, challenges, and perceived barriers regarding pressure injury prevention in tertiary care hospitals in South Punjab, Pakistan. The study followed the STROBE guidelines for reporting observational studies.

2.2 | Study Context

Critical care units in South Punjab are high-acuity settings with critically ill, immobile patients at high risk of pressure injuries. Nurses in these settings face heavy workloads, staffing shortages, limited resources, and time constraints, which may affect adherence to pressure injury prevention practices.

2.3 | Participants and Sampling

Registered nurses working in ICUs, CCUs, and related critical care units were included. Nurses in managerial roles and those with less than six months of experience were excluded. A purposive sampling technique was used, and 100 nurses were included in the final analysis after informed consent.

2.4 | Measures

Socio-demographic data included age, gender, education, and clinical experience. Nurses' knowledge was assessed using the **pressure injuries Knowledge Assessment Tool (PUKAT)** (26 items; ≥60% considered satisfactory). Perceived barriers were measured using an **11-item Likert scale** developed from literature [25], assessing workload, staffing, resources, and training issues.

2.5 | Data Collection Procedure

Data were collected using a self-administered questionnaire distributed in critical care units. Participation was voluntary, and confidentiality and anonymity were ensured.

2.6 | Data Analysis

Data were analyzed using SPSS version 27. Descriptive statistics, chi-square tests, and Pearson correlation were used. A p-value < 0.05 was considered statistically significant.

2.7 | Ethical Considerations

Ethical approval was obtained, and written informed consent was taken from all participants. The study adhered to the Declaration of Helsinki.

2.8 | Hypotheses

Based on the objectives of the study, the following hypotheses were formulated:

H1: Critical care nurses demonstrate inadequate knowledge regarding pressure injury prevention.

H2: Critical care nurses report significant perceived barriers to pressure injury prevention

practice.

H3: There is a significant relationship between nurses' knowledge and perceived barriers regarding pressure injury prevention.

H4: There is a significant association between nurses' demographic characteristics and their knowledge regarding pressure injury prevention.

3 | RESULTS

A total of 113 eligible participants were identified, of whom 107 were invited to participate. Seven nurses declined participation, and 100 completed questionnaires were included in the final analysis. The response rate was acceptable for cross-sectional survey research.

3.1 | Socio-demographic characteristics

Table 1 presents the socio-demographic profile of the participants. The mean age of respondents was 28.61 ± 6.60 years. Nearly half of the nurses were aged 18–27 years (49%), followed by 28–37 years (47%). The sample comprised slightly more females (55%) than males (45%). Most participants were unmarried (56%). Regarding education, the majority held a nursing college degree (74%), followed by institute-level qualifications (19%). In terms of experience, 43% had 1–5 years of critical care experience, while 39% had ≤1 year of experience.

Table 1 | Socio-demographic characteristics of critical care nurses (n = 100)

Variable	Category	Frequency (%)
Gender	Male	45 (45.0)
	Female	55 (55.0)
Age (years)	18–27	49 (49.0)
	28–37	47 (47.0)
	38–47	2 (2.0)
	≥48	2 (2.0)
	Mean ± SD	28.61 ± 6.60
Education	Nursing school	2 (2.0)
	Institute	19 (19.0)
	College	74 (74.0)
	Master/PhD	5 (5.0)
Marital status	Single	56 (56.0)
	Married	40 (40.0)
	Divorced	2 (2.0)
	Widow	2 (2.0)
Experience in CCU	≤1 year	39 (39.0)
	1–5 years	43 (43.0)
	6–10 years	8 (8.0)
	11–15 years	9 (9.0)
	16–20 years	1 (1.0)

3.2 | Knowledge level of critical care nurses

Figure 1 illustrates the distribution of knowledge levels regarding pressure injury prevention among critical care nurses. The findings show that the majority of participants demonstrated a satisfactory level of knowledge. Specifically, approximately two-thirds of the nurses (63%) achieved satisfactory knowledge scores, while 37% were categorized as having unsatisfactory knowledge based on the ≥60% cutoff of the pressure injuries Knowledge Assessment Tool (PUKAT).

This indicates that although a relatively good proportion of nurses possess adequate theoretical understanding of pressure injury prevention, a considerable gap still exists among nearly one-

third of critical care nurses. This gap may negatively influence adherence to evidence-based preventive practices in high-risk critical care environments, where patients are highly vulnerable to pressure injuries due to immobility, hemodynamic instability, and prolonged hospitalization.

Figure 1: Knowledge Level of Critical Care Nurses

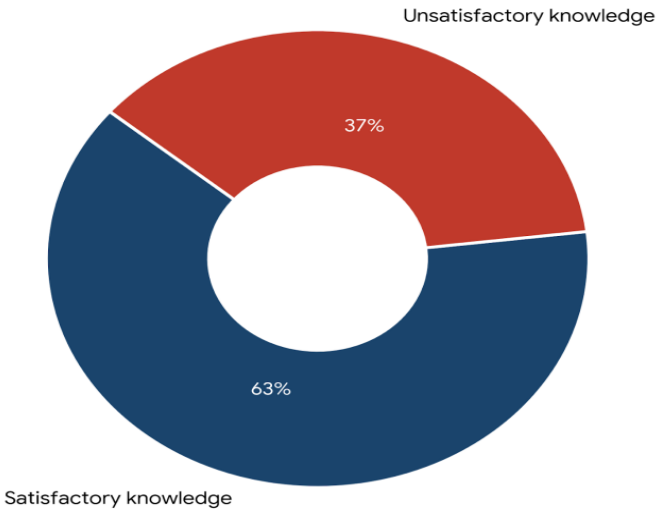

Figure 1 | Knowledge level of critical care nurses regarding pressure injury prevention

3.3 | Knowledge scores and association with demographic variables

The mean knowledge score was 15.13 ± 4.87, indicating an overall satisfactory level (≥60% cut-off). A statistically significant association was observed between educational level and knowledge ($p = 0.044$). Age showed a borderline significant association, while gender, marital status, and experience were not significantly associated with knowledge levels ($p > 0.05$).

Table 2 | Association between demographic variables and knowledge level (n = 100)

Variable	Category	Satisfactory n (%)	Unsatisfactory n (%)	χ^2	p-value
Age	18–27	38 (38.0)	19 (19.0)	0.534	0.099
	28–37	15 (15.0)	16 (16.0)		
	38–47	7 (7.0)	0		
	≥48	3 (3.0)	2 (2.0)		
Gender	Male	30 (30.0)	15 (15.0)	0.069	0.492
	Female	33 (33.0)	22 (22.0)		
Education	Nursing school	1 (1.0)	1 (1.0)	0.798	0.044*
	Diploma	9 (9.0)	10 (10.0)		
	College	50 (50.0)	24 (24.0)		
	Master/PhD	3 (3.0)	2 (2.0)		
Marital status	Single	32 (32.0)	17 (17.0)	0.436	0.933
	Married	29 (29.0)	18 (18.0)		
	Divorced/Widow	2 (2.0)	2 (2.0)		
Experience	≤1	25 (25.0)	14 (14.0)	0.336	0.963

	1–5	24 (24.0)	19 (19.0)		
	6–10	5 (5.0)	3 (3.0)		
	11–15	8 (8.0)	1 (1.0)		
	16–20	1 (1.0)	0		

*Significant at $p < 0.05$

3.4 | Perceived barriers to pressure injury prevention

The overall perceived barrier score was 34.74 ± 4.02, indicating a moderate-to-high level of perceived barriers among critical care nurses. The most frequently reported barriers were lack of written standards (3.43 ± 1.26), overcrowding in wards (3.33 ± 1.11), and inadequate manpower (3.30 ± 0.98). Lack of pressure redistribution devices (3.26 ± 1.05) and poor knowledge of assessment tools (3.14 ± 1.08) were also commonly reported.

Table 3 | Perceived barriers toward pressure injury prevention (n = 100)

Barrier	Mean ± SD
Inadequate manpower	3.30 ± 0.98
Overcrowding in wards	3.33 ± 1.11
Lack of adequate linens	3.18 ± 0.99
Lack of written standards	3.43 ± 1.26
Lack of disposable materials	2.81 ± 0.97
Lack of access to literature	3.09 ± 1.01
Inadequate knowledge of evidence-based practice	3.06 ± 1.04
Poor knowledge of assessment tools	3.14 ± 1.08
Lack of decision-making autonomy	2.98 ± 1.01
No pressure redistribution appliances	3.26 ± 1.05
Lack of management support	3.16 ± 1.06
Total score	**34.74 ± 4.02**

3.5 | Relationship between knowledge and perceived barriers

A statistically significant relationship was found between nurses' knowledge scores and perceived barriers (Pearson correlation test, $p < 0.05$), indicating that nurses with lower knowledge reported higher perceived barriers to pressure injury prevention in critical care settings.

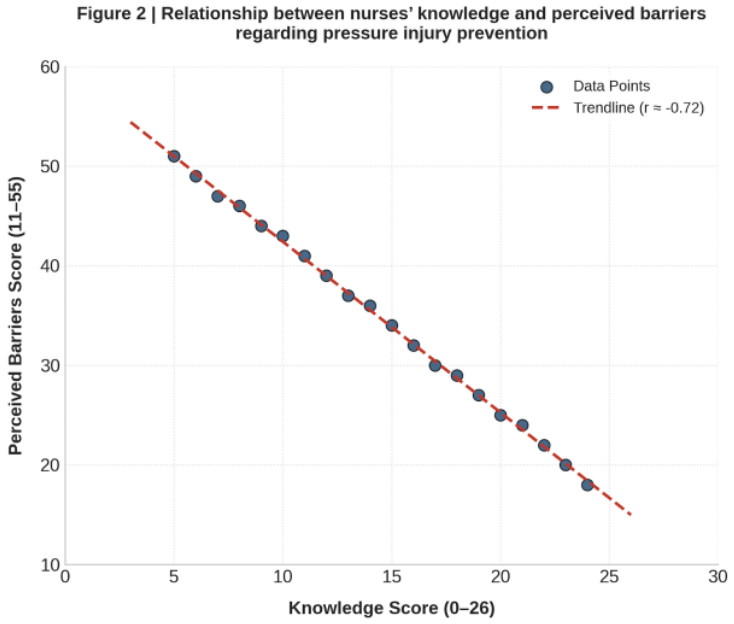

Figure 2 | Relationship between nurses' knowledge and perceived barriers regarding pressure injury prevention: *Pearson correlation analysis indicates a moderate to strong negative relationship between nurses' knowledge scores and perceived barriers ($r \approx -0.72$, $p < 0.05$). This suggests that as knowledge regarding pressure injury prevention increases, perceived barriers decrease significantly among critical care nurses.*

4 | DISCUSSION

The present study assessed critical care nurses' knowledge, challenges, and perceived barriers regarding pressure injury prevention in tertiary care hospitals of South Punjab, Pakistan. A total of 100 critical care nurses participated, with most being young adults, predominantly female, and holding undergraduate nursing qualifications. A considerable proportion had limited experience in critical care settings, highlighting a relatively early-career nursing workforce in high-acuity units. These demographic characteristics may influence both clinical competence and adherence to evidence-based pressure injury prevention practices.

The findings revealed that approximately two-thirds of critical care nurses demonstrated satisfactory knowledge regarding pressure injury prevention, while one-third had inadequate knowledge. This indicates a moderate level of preparedness among nurses; however, a substantial knowledge gap still exists in critical care environments where patients are at high risk of developing pressure injuries. Similar findings have been reported in international studies, where nurses demonstrated variable knowledge levels regarding pressure injury prevention, particularly in risk assessment and preventive interventions [9,12]. Studies from Pakistan also highlight gaps in theoretical and practical nursing knowledge, suggesting a persistent theory–practice gap in clinical care [6].

The current study also identified significant perceived barriers to pressure injury prevention. The most commonly reported barriers included lack of written protocols, overcrowding in wards, inadequate manpower, limited availability of pressure redistribution devices, and insufficient institutional support. These findings are consistent with previous research showing that workload, staffing shortages, and lack of resources are major obstacles to effective pressure injury prevention in critical care settings [10,18,23]. Gwag and Kim [13] further emphasized that workload and occupational stress negatively affect patient safety practices, including pressure injury prevention compliance.

The significant association between nurses' knowledge and demographic variables, particularly educational level, indicates that higher academic preparation may enhance awareness and understanding of pressure injury prevention practices. Similar findings have been reported by Kadhim [24], who found that nurses' knowledge and attitudes are significantly influenced by educational and professional characteristics. However, no significant association was found between knowledge and experience, suggesting that clinical exposure alone may not be sufficient to ensure adequate preventive knowledge without structured training programs.

The correlation analysis demonstrated a significant negative relationship between nurses' knowledge and perceived barriers. This indicates that nurses with lower knowledge levels reported higher perceived barriers, suggesting that inadequate knowledge may intensify the perception of environmental and organizational constraints. This finding is consistent with Ominyi et al. [19], who highlighted that evidence-based practice implementation is strongly influenced by nurses' knowledge, organizational support, and access to resources. Similarly, Roberts et al. [22] reported that structured care bundles can improve pressure injury prevention outcomes when nurses are adequately trained and supported.

Overall, the findings suggest that pressure injury prevention in critical care settings is influenced by an interaction of individual knowledge, organizational support, and workplace constraints. Improving nurses' education, strengthening institutional policies, and addressing systemic barriers are essential to enhance patient safety and reduce hospital-acquired pressure injuries.

5 | CONCLUSION

This study concluded that critical care nurses in South Punjab possess moderate knowledge regarding pressure injury prevention; however, a significant proportion still demonstrate inadequate understanding. Multiple organizational and workplace barriers, including staffing shortages, lack of protocols, overcrowding, and limited resources, significantly hinder effective preventive practices. Furthermore, a significant relationship was observed between nurses' knowledge and perceived barriers, indicating that improved knowledge may reduce perceived obstacles in clinical practice. These findings support implementation of structured educational interventions, standardized pressure injury prevention protocols, and staffing optimization in critical care units to improve patient safety outcomes.

5.1 | LIMITATIONS

- The study used a cross-sectional design, which limits causal interpretation of relationships between variables.
- Data were self-reported, which may introduce response and social desirability bias.
- The study was conducted in selected tertiary care hospitals of South Punjab; therefore, findings may not be generalizable to all healthcare settings in Pakistan.
- The relatively small sample size may limit broader statistical generalization.

5.2 | RECOMMENDATIONS

i. **Educational Interventions:** Regular training programs and workshops on pressure injury prevention should be implemented for critical care nurses.

ii. **Policy Development:** Hospitals should develop and strictly implement standardized pressure injury prevention protocols and guidelines.

iii. **Resource Allocation:** Adequate staffing, pressure-relieving devices, and clinical resources should be ensured in critical care units.

iv. **Continuous Professional Development:** Simulation-based and evidence-based learning strategies should be introduced to improve clinical competency.

v. **Future Research:** Larger multi-center and longitudinal studies are recommended to explore long-term outcomes and intervention effectiveness in pressure injury prevention.

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