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Health Literacy as a Key Determinant of Patient Safety among Nurses in Pakistan

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Background and objective: Patient safety remains a critical concern in low- and middle-income countries such as Pakistan. Nurses' health literacy may contribute to improved patient safety through better clinical decision-making; however, factors such as heavy workload and limited training may compromise both health literacy and safety practices. This study aimed to examine the relationship between health literacy and patient safety culture among nurses in a single hospital in Pakistan.

Materials and Methods: This cross-sectional study was conducted in 2026 in one hospital in Pakistan. A total of 150 nurses participated. Data were collected using the Health Literacy Questionnaire (HLQ) and the Hospital Survey on Patient Safety Culture (HSOPSC).

Results: Participants demonstrated moderate levels of health literacy (mean = 3.13) and patient safety culture (mean = 3.27). A moderate positive correlation was observed between health literacy and patient safety culture ($r = 0.42$, $p < 0.01$). However, these findings should be interpreted cautiously due to the cross-sectional design, which limits causal inference, and the single-center sampling, which restricts generalizability. Therefore, the results should be considered preliminary.

Conclusion: This study provides preliminary evidence of an association between nurses' health literacy and patient safety culture in a limited hospital setting. However, the observed relationship cannot be interpreted causally. Further large-scale, multi-center, and longitudinal studies are required to confirm these findings and explore additional contextual and organizational factors influencing patient safety.

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Introduction

Health literacy, defined as the ability to access, understand, evaluate, and use health information to make informed health decisions, is increasingly recognized as a key component of high-quality healthcare. In nursing practice, it plays a crucial role in supporting communication, clinical decision-making, and patient education, all of which contribute to safe and effective care delivery (1–2). Patient safety culture, defined as the shared values, beliefs, and practices regarding safety within healthcare organizations, is a fundamental determinant of healthcare quality and patient outcomes(3).

Nurses play a central role in ensuring patient safety due to their continuous involvement in medication administration, patient monitoring, documentation, care coordination, and patient education. Evidence indicates that nurses with higher levels of health literacy demonstrate improved ability to interpret clinical guidelines, communicate effectively, and reduce clinical errors during care delivery (3–5). Furthermore, previous studies have shown that health literacy competencies among healthcare professionals are associated with improved patient-centered care and clinical outcomes (4,5).

The relationship between health literacy and patient safety has received increasing international attention. Limited health literacy has been associated with medication errors, misunderstanding of discharge instructions, delayed care-seeking behavior, poor treatment adherence, and communication failures during care transitions (6,7). These findings highlight that health literacy is not only an educational concern but also a critical patient safety issue.

Despite this growing evidence, most existing research has focused on patients or high-income healthcare systems, with limited attention to nurses' individual competencies in low- and middle-income countries. As a result, the role of nurses' health literacy in shaping patient safety culture remains insufficiently explored in resource-constrained settings (8).

Patient safety remains a significant challenge in Pakistan, where healthcare systems face multiple structural and organizational constraints. Previous studies have reported low rates of error reporting, weak non-punitive responses to errors, and suboptimal patient safety culture in hospital settings. These challenges are further exacerbated by high patient-to-nurse

ratios, limited continuing professional development opportunities, and workforce shortages. Such systemic issues may negatively influence both nurses' health literacy and patient safety performance (9,10).

In addition, contextual factors specific to Pakistan, including linguistic diversity, varying educational levels among patients, and hierarchical workplace culture, may further complicate effective communication and health literacy practices in clinical settings. These factors highlight the importance of examining this relationship within the Pakistani healthcare context rather than generalizing findings from high-income countries.

Due to practical constraints such as limited resources and feasibility considerations, this study was conducted in a single tertiary-care private university-affiliated hospital in Pakistan. While this design allows for an in-depth assessment within a controlled environment, it may limit the generalizability of the findings to other healthcare settings.

Moreover, potential confounding variables such as age, years of clinical experience, level of education, and prior training may influence both health literacy and patient safety culture. Although these variables were considered during data collection, their effects were not fully controlled using multivariable statistical methods, which should be acknowledged when interpreting the findings.

Therefore, this study aimed to examine the relationship between health literacy and patient safety culture among nurses in Pakistan. Given the limited evidence in low- and middle-income countries and the contextual challenges of the Pakistani healthcare system, including workload, staffing shortages, and resource limitations, this study provides preliminary and exploratory evidence. However, the findings should be interpreted with caution, and causal inferences cannot be made. Further multi-center and longitudinal studies are required to validate and extend these findings.

The present study addresses the following research question: What is the relationship between health literacy and patient safety culture among nurses in a hospital in Pakistan in 2026? Based on the literature, the following hypotheses were formulated: H1: There is a

significant positive relationship between nurses' health literacy and patient safety culture. H0: There is no significant relationship between nurses' health literacy and patient safety culture.

Materials and Methods

In this descriptive–correlational study conducted in Pakistan from January to February 2026, a total of 150 nurses were randomly selected. This study used a cross-sectional design, which was chosen due to its feasibility, low cost, and suitability for examining relationships between variables at a single point in time. However, cross-sectional studies are not able to determine causal relationships; therefore, the findings should be interpreted only as associations rather than causation.

This study was conducted in a large tertiary-care private university-affiliated hospital in Pakistan. The hospital provides a wide range of inpatient and outpatient services and serves a diverse population of patients from both urban and rural areas. Nurses in this hospital work under relatively high patient-to-nurse ratios, which may affect workload management and the quality of care. Although general patient safety policies and routine training programs are in place in the hospital, structured programs specifically aimed at improving nurses' health literacy are limited.

The sample size was determined based on statistical formulas for correlational studies, considering a 95% confidence level, 80% statistical power, and expected correlation coefficients reported in previous studies. According to Cohen (1992), an appropriate sample size is essential to ensure sufficient statistical power and to reduce the risk of Type II error in correlational research. The final sample size (n = 150) was considered adequate to detect a moderate effect size. However, the absence of an a priori power analysis is acknowledged as a limitation, as it may reduce the study's ability to detect smaller effect sizes.

$$n = \left(\frac{z_{1-\frac{\alpha}{2}} + z_{1-\beta}}{0.5 \ln(\frac{1+r}{1-r})} \right)^2 + 3$$

Inclusion criteria were having a valid nursing qualification, a minimum of one year of clinical work experience, and willingness to participate in the study. Nurses who returned incomplete questionnaires were excluded from the study.

The data collection tools consisted of a demographic questionnaire and two standardized instruments, the Health Literacy Questionnaire (HLQ) and the Hospital Survey on Patient Safety Culture (HSOPSC). The demographic questionnaire included variables such as age, gender, educational level, work department, and work experience. Health literacy was assessed using the Health Literacy Questionnaire (HLQ), a standardized 44-item instrument comprising nine dimensions of health literacy. This tool covers domains such as understanding health information, managing personal health, appraising the reliability of information, and engaging with healthcare providers. Responses are recorded on 4- and 5-point Likert scales ranging from “strongly disagree” to “strongly agree” (11). Patient safety culture was measured using the Hospital Survey on Patient Safety Culture (HSOPSC), developed by the Agency for Healthcare Research and Quality (AHRQ). This instrument includes 42–45 items and assesses multiple dimensions such as teamwork, open communication, staffing, error reporting, and safety management. Responses are rated on a 5-point Likert scale ranging from “strongly disagree” to “strongly agree” (12).

Although both instruments have been widely used and validated in international studies, limited evidence exists regarding full validation within the Pakistani nursing context. Therefore, face and content validity were evaluated by a panel of 12 experts in medical and nursing sciences, and necessary modifications were made based on their feedback. In addition, a pilot study was conducted among 20 nurses to assess clarity and cultural appropriateness of the instruments. Internal consistency reliability was assessed using Cronbach’s alpha, which was 0.91 for the HLQ and 0.94 for the HSOPSC, indicating excellent reliability in this study.

Data were collected from eligible nurses working in the selected hospital. Participants were recruited using a convenience sampling approach and were informed about the purpose of the study. After obtaining informed consent, the questionnaires were distributed in person

during work shifts at times that did not interfere with patient care. Participants completed the questionnaires independently and returned them in sealed envelopes to ensure anonymity. No identifying information was collected. To minimize response bias, participants were assured that their responses would remain confidential and would be used only for research purposes. Clear written and verbal instructions were provided before completing the questionnaires. The researchers were not present during completion to reduce social desirability bias and to encourage honest responses.

Data were analyzed using SPSS Ver/26. Descriptive statistics, including mean, standard deviation, frequency, and percentage, were used to summarize the demographic characteristics of participants and study variables. The normality of continuous variables was assessed using the Kolmogorov–Smirnov test. For inferential analysis, Pearson's correlation coefficient was used to examine the relationship between health literacy and patient safety culture, as both variables were continuous and normally distributed. The assumptions of Pearson's correlation, including linearity, normality, and homoscedasticity, were checked prior to analysis. A significance level of $p < 0.05$ was considered statistically significant. Since only one primary analysis was conducted to examine the relationship between the two main variables, no correction for multiple comparisons was required. The choice of Pearson's correlation was based on the study objective of assessing the strength and direction of the linear relationship between two continuous variables in a cross-sectional design. Potential confounding variables, including demographic and professional characteristics such as age, gender, years of clinical experience, and educational level, were collected using a structured demographic questionnaire. However, due to the primary focus on examining the bivariate relationship between health literacy and patient safety culture, these variables were not controlled for using multivariable statistical methods such as regression analysis. This should be considered a limitation of the study, as the observed association may be influenced by unmeasured or uncontrolled confounders.

Ethical approval for this study was obtained from the relevant institutional ethics committee prior to data collection. Permission to conduct the study was also granted by the hospital administration. All procedures were conducted in accordance with the principles of the

Declaration of Helsinki. Participation in the study was entirely voluntary. Written informed consent was obtained from all participants after providing them with full information about the purpose of the study, procedures, potential risks, and benefits. Participants were informed that they had the right to refuse participation or withdraw from the study at any time without any consequences. To protect participants' rights and confidentiality, no identifying information was collected, and all responses were kept strictly anonymous. Data were stored securely and accessed only by the research team. The study posed minimal risk to participants, and all efforts were made to ensure their privacy, dignity, and psychological comfort throughout the research process.

Results

A total of 150 nurses participated in this study. The mean age of participants was 39.67 ± 7.59 years, indicating a relatively experienced nursing workforce. Most participants were female (60%) and held a bachelor's degree in nursing (90%), while 10% had a master's degree. Nurses were recruited from multiple clinical departments, including critical care units (33.3%), surgery (30%), emergency departments (23.3%), and pediatric wards (13.3%), providing representation from diverse clinical settings within the hospital. Regarding professional experience, 40% of participants had 1–5 years of work experience, 26.7% had 6–10 years, and 33.3% had more than 10 years of clinical experience. These findings suggest variability in both educational and professional backgrounds among participants, which may influence perceptions of health literacy and patient safety culture **(Table 1).**

Table 1. Demographic Characteristics of Participating Nurses

Variables	Groups	Frequency	Percent
Gender	Male	60	40
	Female	90	60
Educational level	Bachelor	135	90
	Master	15	10
Work department	Critical care	50	33.3
	Emergency	35	23.3
	Surgery	45	30
	Pediatric	20	13.3
Work experience	1-5 years	60	40
	6-10 years	40	26.7
	>10 years	50	33.3

Table 2 shows the descriptive statistics of nurses' health literacy dimensions. The mean scores across HLQ dimensions ranged from 2.88 to 3.42, indicating an overall moderate level of health literacy. The highest mean scores were observed for Provider Support (3.42 ± 0.71) and Social Support (3.37 ± 0.74), whereas the lowest mean score was reported for System Navigation (2.88 ± 0.59). The total health literacy score was 3.13 ± 0.54.

Table 2. Descriptive Statistics of Health Literacy Questionnaire Dimensions

HLQ Dimension	Mean	SD	Min	Max
Provider Support	3.42	0.71	1.80	4.90
Health Management Information	3.28	0.76	1.60	4.80
Active Self-Management	3.11	0.69	1.70	4.70
Social Support	3.37	0.74	1.50	4.85
Information Appraisal	2.94	0.63	1.40	4.60
Provider Engagement	3.21	0.68	1.90	4.75
System Navigation	2.88	0.59	1.30	4.50
Information Seeking	2.96	0.66	1.50	4.65
Understanding Information	3.05	0.72	1.60	4.80
Total Score	**3.13**	**0.54**	**1.85**	**4.67**

Table 3 presents the descriptive statistics of patient safety culture dimensions. Nurses reported the highest mean scores in Intra-Unit Teamwork (3.60 ± 0.62) and Supervisor Support (3.50 ± 0.65). In contrast, the lowest scores were observed for Staffing (2.75 ± 0.73) and No Punitive Response to Error (2.88 ± 0.70), indicating weaker perceptions in these dimensions.

Table 3. Descriptive Statistics of Hospital Survey on Patient Safety Culture Dimensions

HSOPSC Dimension	Mean	SD	Min	Max
Open Communication	3.45	0.68	1.80	5.00
Error Feedback	3.32	0.70	1.60	4.90
Event Reporting	2.95	0.72	1.20	4.80
Supervisor Support	3.50	0.65	2.00	5.00
Continuous Learning	3.38	0.67	1.70	4.90
Intra-unit Teamwork	3.60	0.62	2.00	5.00
Inter-unit Teamwork	3.22	0.69	1.50	4.80
Staffing	2.75	0.73	1.20	4.50
No punitive Response	2.88	0.70	1.30	4.60
Management Support	3.40	0.66	1.80	5.00
Safety Perception	3.33	0.68	1.70	4.90
Handoffs & Transitions	3.10	0.72	1.50	4.80

A Pearson correlation analysis was conducted to examine the relationship between nurses' health literacy and patient safety culture. The findings demonstrated a positive and

statistically significant correlation between HLQ total score and HSOPSC total score ($r = 0.42$, $p < 0.01$), indicating that nurses with higher health literacy tended to report more positive perceptions of patient safety culture. However, this association should be interpreted cautiously, as the cross-sectional design of the study does not allow causal inferences to be made. Therefore, it cannot be concluded that higher health literacy directly improves patient safety culture. Other factors, such as clinical experience, workload, organizational support, and professional training, may also have contributed to the observed relationship.

Discussion

The present study investigated the relationship between health literacy and patient safety culture among nurses in Pakistan. The findings revealed that nurses had moderate levels of both health literacy and patient safety culture. In addition, a significant positive correlation was found between health literacy and patient safety culture, indicating that nurses with higher health literacy tended to report more positive perceptions of patient safety (13,14).

The moderate level of health literacy observed in the present study is consistent with the findings of Cocchieri et al. (13), who reported that although nurses' health literacy was associated with improved nursing care quality, gaps still existed in advanced competencies such as critical appraisal of health information. This suggests that while nurses may possess acceptable baseline literacy, it does not necessarily translate into fully optimized clinical decision-making. Similarly, McCaskill et al. (14) demonstrated that targeted health literacy interventions can improve patients' health literacy outcomes, indirectly highlighting that nurses' own health literacy is a modifiable factor. Taken together, these studies support the present findings by emphasizing that health literacy among nurses is moderate and improvable rather than optimal. In contrast, findings from Tavousi et al. (15) provide a broader methodological perspective, showing that variability in health literacy levels across studies may partly depend on measurement tools and conceptual definitions used. This may explain why health literacy levels in the present study appear moderate, as differences in instruments and evaluation frameworks can influence reported scores. In the context of

Pakistan, additional structural factors such as workload and limited continuing education opportunities may further constrain the development of advanced health literacy skills.

Similarly, nurses in the present study reported a moderate level of patient safety culture. Higher scores in teamwork and supervisor support suggest relatively strong interpersonal collaboration in hospital settings. This finding is consistent with Halinen et al. (17), who identified teamwork as a key protective factor in reducing patient safety incidents in clinical environments. However, their study also emphasized that systemic weaknesses such as communication failures and organizational pressure contribute significantly to safety incidents, which aligns with the lower scores observed in staffing and non-punitive response to error in the present study. Moreover, Rochefort et al. (16) demonstrated that inadequate nurse staffing is significantly associated with adverse patient outcomes, including increased mortality rates. This provides strong empirical support for the current finding that staffing is one of the weakest dimensions of patient safety culture. The convergence of these findings suggests that structural workforce limitations remain a critical barrier to establishing a strong safety culture.

Overall, the present study extends previous research by demonstrating that health literacy is not only independently important but is also positively associated with patient safety culture in the Pakistani nursing context, an area that has been relatively underexplored. This highlights the need for integrated strategies that address both educational development and organizational factors to improve patient safety outcomes.

One of the most important findings of this study was a statistically significant but moderate positive association between health literacy and patient safety culture ($r = 0.42$). Although statistically significant, the effect size was modest. Health literacy explained approximately 17.64% of the variance in patient safety culture, indicating that a substantial proportion of variability was influenced by factors other than health literacy. Variables such as workload, staffing adequacy, leadership support, organizational climate, and professional experience may also contribute significantly to patient safety culture and may act as confounding or mediating factors. Therefore, these findings should be interpreted cautiously, and health literacy should not be considered the sole determinant of patient safety outcomes.

Nevertheless, the observed relationship supports previous evidence suggesting that communication competence, comprehension of clinical information, and effective decision-making are important components of safe clinical practice (18). Nurses with stronger health literacy may be better able to understand safety protocols, interpret written instructions, communicate effectively with colleagues and patients, and identify potential risks before adverse events occur.

The observed relationship may also be explained by the broader role of health literacy in strengthening professional confidence and engagement. Nurses who are able to critically appraise and apply health information may participate more actively in safety initiatives, teamwork processes, and quality improvement efforts. Therefore, health literacy should be considered not only an individual competency but also an important contributor to organizational safety culture (19).

These findings have important practical implications for nursing managers and policymakers. Integrating health literacy training into undergraduate curricula, orientation programs, and continuing professional development may improve communication quality and patient safety outcomes (20). Strategies such as teach-back communication, simplified educational materials, and supportive error-reporting systems may also be beneficial (21).

No statistically significant associations were observed between certain demographic variables (such as age, years of experience, and educational level) and the main study variables. This suggests that patient safety culture and health literacy may be more strongly influenced by organizational and systemic factors rather than individual demographic characteristics alone. In addition, the relatively homogeneous sample and limited variability in some demographic variables may have reduced the ability to detect statistically significant differences. These findings indicate that demographic factors alone may not be sufficient predictors of health literacy or patient safety culture among nurses in this setting.

The cultural context in Pakistan may significantly influence both health literacy and patient safety culture. Hierarchical workplace structures and strong respect for authority can restrict open communication, hinder error reporting, and limit teamwork between nurses and senior staff. Language diversity and differences in patients' educational levels may also create

communication barriers, affecting effective health information exchange and the application of health literacy in practice. Additionally, cultural norms that discourage questioning authority may reduce nurses' engagement in safety discussions. However, collectivist values, strong interpersonal relationships, and teamwork-oriented attitudes may support collaboration and positive safety behaviors. Overall, these cultural factors may partly explain the moderate level of patient safety culture and suggest that the relationship between health literacy and patient safety is context-dependent and may vary across settings.

The findings align with previous studies emphasizing the importance of health literacy and patient safety culture in nursing practice. Prior research has shown that nurses generally have moderate health literacy, which is associated with improved communication, better clinical decision-making, and enhanced patient safety outcomes. However, most existing studies have focused on patients or general healthcare providers rather than nurses' health literacy as a distinct professional competency linked to patient safety culture. Evidence also indicates that patient safety culture is influenced by organizational factors such as leadership, teamwork, and staffing levels. This study extends the literature by examining this relationship in a resource-limited setting like Pakistan, providing context-specific evidence from a low- and middle-income country. It highlights that health literacy interacts with broader organizational and cultural factors in shaping patient safety culture. Overall, the study underscores the importance of addressing both individual competencies and system-level influences to improve patient safety.

Study Limitations and Strengths: This study has several limitations. Its cross-sectional design does not allow causal inferences. Conducting the study in a single teaching hospital in Lahore limits the generalizability of the findings. The use of self-reported questionnaires may introduce response bias. In addition, the relatively small sample size may have reduced statistical power. Future research should include larger, multi-center samples and use longitudinal or interventional designs. The use of objective measures and mixed-method approaches is also recommended to provide a more comprehensive understanding of the topic.

The findings indicate that the moderate level of health literacy and its positive relationship with patient safety culture suggest that improving nurses' health literacy may enhance patient safety practices in Pakistan. In a resource-limited healthcare system with high workload and limited training opportunities, short and practical in-service training programs focusing on communication skills, clinical guideline interpretation, and safe documentation may be effective. Strengthening supportive supervision, adopting a non-punitive approach to error reporting, and implementing regular feedback sessions and peer support can further improve safety culture. Additionally, promoting open communication between nurses and senior staff is important in the hierarchical structure of Pakistani healthcare settings. Overall, the study emphasizes the need for low-cost, practical, and context-sensitive interventions rather than large-scale structural reforms.

Conclusion

This study demonstrated that nurses' health literacy was at a moderate level and was positively associated with patient safety culture in a single teaching hospital in Pakistan. These findings highlight the potential importance of nurses' ability to access, understand, and apply health information in shaping patient safety culture. However, the results should be interpreted with caution, as causal inferences cannot be made due to the cross-sectional design, and the findings are context-specific to the study setting. Therefore, they may not be generalizable to other healthcare environments with different organizational structures and resource levels. Future longitudinal and multi-center research is required to further investigate and validate this relationship across diverse settings.

Healthcare policymakers, nursing educators, and hospital administrators are encouraged to consider the potential role of nurses' health literacy in strengthening patient safety culture within clinical settings. However, given the methodological and contextual limitations of this study, these findings should be interpreted cautiously. Further research in diverse healthcare environments in Pakistan is needed to better understand this relationship. Future studies should focus on developing and evaluating culturally appropriate interventions aimed at improving nurses' health literacy and enhancing patient safety practices. Such efforts may

contribute to improving healthcare quality; however, evidence from larger, multi-center, and longitudinal studies is required before implementing broad policy changes.

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