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Relationship between Nurses' Knowledge and Attitudes toward Patient Safety Culture Implementation in Inpatient Wards: A Cross-Sectional Study at Mitra Sejati Hospital

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ABSTRACT

Background and Purpose: Adverse events in hospitals remain a persistent global patient safety challenge, with nurses' knowledge and attitudes identified as key determinants of safety culture quality. This study aimed to investigate the relationship between nurses' knowledge and attitudes toward patient safety and the implementation of patient safety culture in inpatient wards of Mitra Sejati General Hospital, Medan, Indonesia.

Methods: A cross-sectional correlational study was conducted among 85 inpatient ward nurses recruited via total sampling. Inclusion criteria included nurses actively serving in inpatient wards for >= 6 months who consented to participate; nurses on administrative leave or student nurses were excluded. Data were collected using three validated instruments: a 30-item patient safety knowledge questionnaire (Cronbach's alpha = 0.83), a 25-item attitude scale (Cronbach's alpha = 0.81), and the Hospital Survey on Patient Safety Culture version 2.0 (HSOPSC v2.0; Cronbach's alpha = 0.87). Data were collected from September 1 to October 31, 2025. Ethical clearance was obtained from the Health Research Ethics Committee, Universitas Sumatera Utara (No. 451/TGL/KEPK FK USU/2025). Spearman rank correlation and multiple linear regression analysis were performed using SPSS version 26 (alpha = 0.05).

Results: The majority of participants were female (69.4%), aged 31-40 years (43.5%), and had completed Bachelor of Nursing education (52.9%). Patient safety knowledge was predominantly in the adequate category (41.2%), with mean 72.4 +/- 11.8. Attitudes were predominantly positive (61.2%), with mean 74.6 +/- 9.3. Patient safety culture implementation was mostly in the adequate category (52.9%), with mean 71.8 +/- 10.5. Significant positive correlations were found between knowledge and PSC implementation ($r_s = 0.524$; $p < 0.001$) and between attitude and PSC implementation ($r_s = 0.612$; $p < 0.001$). Multiple regression revealed that both variables together explained 44.1% of variance in PSC implementation ($R2 = 0.441$; $F = 32.33$; $p < 0.001$).

Conclusion: Both nurses' knowledge and attitudes toward patient safety are significantly associated with the implementation of patient safety culture. Attitude demonstrated a stronger association than knowledge. Hospital management should prioritize routine patient safety training and a culture-building approach to strengthen both cognitive and attitudinal dimensions of patient safety among inpatient nurses.

Keywords: *Patient Safety; Nurses; Safety Management; Attitude of Health Personnel; Hospitals*

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INTRODUCTION

Patient safety is recognized as a fundamental pillar of high-quality healthcare and a global priority for health systems worldwide. The World Health Organization (WHO) estimates that adverse events occur in approximately 10% of hospitalizations in developed countries and up to 15% in low- and middle-income countries, resulting in millions of preventable deaths annually (WHO, 2021). Globally, the economic burden of patient safety failures is estimated at USD 42 billion per year, exclusive of costs from loss of productivity and human suffering (Slawomirski et al., 2023). Patient safety culture (PSC) — defined as the shared values, beliefs, and norms that

shape staff behaviors and attitudes related to patient safety — has been consistently identified as the foundational determinant of safe hospital environments (Halligan & Zecevic, 2021).

In Indonesia, the national patient safety incident reporting system documented 14,862 adverse events in hospitals between 2021 and 2022, with medication errors (24.1%), procedure-related complications (18.7%), and patient falls (16.3%) constituting the most frequent incident categories (KNKP, 2022; Kemenkes RI, 2023). North Sumatra Province reported among the highest provincial rates of hospital adverse events, prompting the local health authority to mandate patient safety audits across all accredited hospitals (Kemenkes RI, 2023). Mitra Sejati General Hospital, a type B accredited private hospital in Medan serving over 400 inpatients daily across multiple wards, identified suboptimal incident reporting rates and variable compliance with patient safety standards during its 2024 internal accreditation review, underscoring the urgency of examining underlying determinants.

Nurses constitute the largest professional group in hospital settings and serve as the last line of defense in patient safety systems, given their continuous 24-hour direct care role (International Council of Nurses, 2023; Lee et al., 2022). Research consistently demonstrates that nurses' knowledge and attitudes are key modifiable determinants of patient safety culture implementation. Knowledge of patient safety encompasses understanding of safety goals, incident recognition, reporting procedures, and preventive strategies, while attitudes reflect the degree to which nurses value, are committed to, and take personal responsibility for patient safety outcomes (Naik et al., 2022; Abubakar & Ismail, 2021). Nurses with higher knowledge levels are more likely to identify near-misses, adhere to safety protocols, and engage in incident reporting — all of which are behavioral markers of a strong safety culture (Gage et al., 2023).

Despite growing evidence from international studies, Indonesian research on this topic is predominantly institutional, cross-sectional, and limited to single-variable analyses. Most studies focus on PSC implementation without simultaneously examining both knowledge and attitude as predictors, leaving gaps in understanding their relative contributions (Wulandari et al., 2022; Farokhzadian et al., 2021). Furthermore, research specifically focused on inpatient wards — where patient acuity is highest and adverse event risk is most elevated — is scarce in the Indonesian literature. Understanding the combined predictive value of both knowledge and attitudes, using validated, internationally standardized instruments, is essential for designing effective and context-appropriate interventions.

The theoretical framework underpinning this study integrates two complementary models. First, Reason's Swiss Cheese Model of accident causation (2020) posits that adverse events result from multiple concurrent failures, and that individual-level cognitive and attitudinal gaps in patient safety constitute the most proximal layers of vulnerability. Second, Donabedian's Structure-Process-Outcome framework (2023) provides the organizational lens, conceptualizing nurses' knowledge (structure) and attitudes (process) as antecedents to PSC implementation outcomes. Together, these frameworks support the hypothesis that knowledge and attitude independently and synergistically predict the quality of PSC implementation at the ward level.

The connection between the study variables and the theoretical framework is direct: knowledge deficits (structure) create cognitive barriers to safe practice, while negative or neutral attitudes (process) produce behavioral disengagement from safety protocols, both leading to suboptimal PSC implementation (outcome). Improving both variables simultaneously is therefore more likely to produce meaningful and durable change in patient safety outcomes than targeting either variable alone. This study's findings will equip nursing managers with evidence to prioritize both educational and attitudinal interventions within their patient safety programs.

Addressing this evidence gap is critical for nursing management in Indonesian hospitals, where resource-limited settings require targeted, evidence-based workforce development strategies. Understanding which predictor — knowledge or attitude — exerts greater influence on PSC implementation will enable more efficient allocation of training resources. Furthermore, results will provide a baseline for evaluating future patient safety training programs at Mitra Sejati

Hospital and contribute to the national evidence base on nurse-level determinants of patient safety culture in Indonesian hospitals.

The aim of this study was to analyze the relationship between nurses' knowledge and attitudes toward patient safety and the implementation of patient safety culture in inpatient wards of Mitra Sejati General Hospital, Medan, in 2025.

METHODS

Study Design

This study employed a cross-sectional correlational design to examine the associations between two independent variables — nurses' knowledge and attitudes toward patient safety — and one dependent variable, the implementation of patient safety culture, at a single point in time. This design was selected because it allows simultaneous measurement of multiple variables in a large sample without the requirement for follow-up, making it appropriate for hypothesis-generating correlational research in hospital settings.

Participants

The study population comprised all nurses assigned to inpatient wards at Mitra Sejati General Hospital, Medan, Indonesia. Inpatient wards included Internal Medicine, Surgical, Obstetrics/Gynecology, Pediatrics, and Orthopedics/Neurology wards. Total sampling was applied given the manageable population size (N = 92); after applying inclusion and exclusion criteria, 85 eligible nurses participated (response rate: 92.4%). Sample size was further justified using the formula for bivariate correlation with r = 0.40 (estimated from previous studies), alpha = 0.05, and power = 0.80, yielding a minimum required sample of 47; the actual sample (n = 85) exceeded this requirement, enhancing statistical power.

Inclusion criteria were: (1) registered nurses holding a valid Nursing Practice License (STR) assigned to an inpatient ward; (2) minimum employment duration of 6 months at the current ward to ensure familiarity with institutional patient safety protocols; and (3) willingness to provide written informed consent. Exclusion criteria included: (1) nurses currently serving in administrative or supervisory roles without direct patient care responsibilities; (2) student nurses or contract staff on temporary assignment; and (3) nurses absent for any reason during the data collection period.

Instrument

Three instruments were used in this study. First, the Patient Safety Knowledge Questionnaire was adapted from the AHRQ Patient Safety Primer and WHO Patient Safety Curriculum Guide (2011), consisting of 30 multiple-choice items covering six domains: patient safety concepts and terminology (5 items), incident identification and reporting (6 items), medication safety (5 items), infection prevention (5 items), communication and handover safety (5 items), and fall prevention (4 items). Each correct answer scored 1; total scores were converted to percentages and categorized as Good (76-100%), Adequate (56-75%), or Poor (< 56%). Content validity was confirmed by five nursing and patient safety experts (Content Validity Index [CVI] = 0.91). Reliability was assessed via Kuder-Richardson 20 (KR-20 = 0.83), indicating good internal consistency.

Second, the Nurse Patient Safety Attitude Scale was adapted from the Patient Safety Attitude Questionnaire (PSAQ) developed by Blegen et al. (2022), comprising 25 items rated on a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree), covering five sub-dimensions: perceived importance of patient safety (5 items), personal accountability for safety (5 items), willingness to report errors (5 items), teamwork in safety (5 items), and patient-centered safety communication (5 items). Scores were converted to percentages: Positive (> 75%), Neutral (56-75%), Negative (< 56%). CVI = 0.88; Cronbach's alpha = 0.81; test-retest r = 0.76.

Third, the Hospital Survey on Patient Safety Culture version 2.0 (HSOPSC v2.0), developed by AHRQ (2022), was used to measure PSC implementation. The Indonesian-validated

version consists of 29 items across 10 composite dimensions: supervisor/manager expectations and actions promoting safety, organizational learning and continuous improvement, teamwork within units, communication openness, feedback and communication about error, non-punitive responses to error, staffing, hospital management support for patient safety, teamwork across units, and handoffs and transitions. Items are rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Scores converted to percentages: Good (> 75%), Adequate (56-75%), Poor (< 56%). Cronbach's alpha = 0.87. Permission to use the HSOPSC v2.0 was obtained from AHRQ through their publicly available data use agreement in February 2025.

Data Collection

Data were collected from September 1 to October 31, 2025, at Mitra Sejati General Hospital. The research team, comprising the two principal investigators, administered the questionnaire packages directly to eligible participants during ward duty hours in designated private areas to ensure confidentiality and reduce social desirability bias. Each participant completed the three questionnaire sets in a single sitting lasting approximately 35-45 minutes. Completed questionnaires were verified for completeness before acceptance. No research assistants were involved; all data were collected directly by the investigators.

Data Analysis

Data were analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (frequencies, percentages, means, and standard deviations) were computed for all variables. Normality of score distributions was assessed using the Kolmogorov-Smirnov test; results confirmed non-normal distributions for knowledge ($p = 0.031$) and PSC implementation scores ($p = 0.044$), while attitude scores approached normality ($p = 0.067$). Consistent non-parametric approaches were applied: Spearman rank correlation (rs) examined bivariate associations between knowledge, attitude, and PSC implementation scores. To assess the combined and independent predictive contributions of knowledge and attitude on PSC implementation, multiple linear regression was applied after confirming that regression assumptions — including linearity (residual plots), homoscedasticity (Breusch-Pagan test), absence of multicollinearity (VIF < 3.0 for both predictors), and adequate sample size — were satisfied. The significance threshold was set at alpha = 0.05.

Ethical Consideration

This study was conducted in accordance with the Declaration of Helsinki and Indonesian National Regulations on Health Research Ethics. Ethical approval was obtained from the Health Research Ethics Committee, Faculty of Medicine, Universitas Sumatera Utara (Approval No. 451/TGL/KEPK FK USU/2025, issued August 20, 2025). Institutional research permission was obtained from Mitra Sejati General Hospital management prior to data collection. All participants provided written informed consent after receiving an explanation of the study's purpose, procedures, voluntary nature, right to withdraw, and confidentiality assurances. All data were anonymized prior to analysis and stored on encrypted, password-protected devices accessible only to the principal investigators. No financial incentives were provided to participants.

RESULTS

Sample Characteristics

A total of 85 inpatient ward nurses participated in this study. The detailed sociodemographic profile is presented in Table 1. The majority were female (69.4%) and aged 31-40 years (43.5%), with a mean age of 34.2 +/- 7.4 years. More than half held a Bachelor of Nursing degree (S1/Ners, 52.9%), while 44.7% held a Diploma III qualification. The most common work experience range was 2-5 years (37.6%), with a mean of 5.8 +/- 3.9 years. Internal Medicine ward had the largest representation (25.9%). Notably, 28.2% of participants had never attended any formal patient safety training.

Table 1. Sociodemographic Characteristics of Study Participants (N = 85)

Characteristic	n	%
Sex		
Male	26	30.6
Female	59	69.4
Age (years)		
21-30 years	28	32.9
31-40 years	37	43.5
41-50 years	20	23.5
Mean +/- SD	34.2 +/- 7.4	
Educational Background		
Diploma III Nursing (D3)	38	44.7
Bachelor of Nursing (S1/Ners)	45	52.9
Master of Nursing (S2)	2	2.4
Years of Work Experience		
< 2 years	15	17.6
2-5 years	32	37.6
6-10 years	26	30.6
> 10 years	12	14.1
Mean +/- SD	5.8 +/- 3.9	
Ward Assignment		
Internal Medicine Ward	22	25.9
Surgical Ward	21	24.7
Obstetrics / Gynecology Ward	18	21.2
Pediatric Ward	14	16.5
Orthopedics / Neurology Ward	10	11.8
Patient Safety Training		
Yes (attended training)	61	71.8
No (never attended)	24	28.2

Note: SD = standard deviation.

Distribution of Knowledge, Attitude, and Patient Safety Culture Scores

The distribution of scores across the three main study variables is presented in Table 2. Patient safety knowledge was predominantly in the adequate category (41.2%; n = 35), with 44.7% in the good category and 14.1% in the poor category; the mean score was 72.4 +/- 11.8. Nurses' attitudes toward patient safety were predominantly positive (61.2%; n = 52), with 31.8% in the neutral category and 7.1% reflecting negative attitudes; the mean attitude score was 74.6 +/- 9.3. Patient safety culture implementation was predominantly in the adequate category (52.9%; n = 45 in good and 37.6% in adequate), with only 9.4% in the poor category; the mean PSC score was 71.8 +/- 10.5. These distributions indicate moderate overall levels across all three constructs, with attitude achieving the highest proportion of favorable scores.

Table 2. Distribution of Patient Safety Knowledge, Attitude, and PSC Implementation Scores (N = 85)

Variable	Category	n	%	Mean +/- SD	Interpretation
Patient Safety Knowledge	Good (score 76-100%)	38	44.7	72.4 +/- 11.8	Adequate Overall
	Adequate (score 56-75%)	35	41.2		
	Poor (score < 56%)	12	14.1		
Nurses' Attitude toward Patient Safety	Positive (score > 75%)	52	61.2	74.6 +/- 9.3	Positive Overall
	Neutral (score 56-75%)	27	31.8		
	Negative (score < 56%)	6	7.1		
Patient Safety Culture Implementation	Good (score > 75%)	45	52.9	71.8 +/- 10.5	Adequate Overall
	Adequate (score 56-75%)	32	37.6		
	Poor (score < 56%)	8	9.4		

Note: PSC = patient safety culture; scores converted to percentages (0-100); Good: > 75%, Adequate: 56-75%, Poor: < 56%.

Correlation between Knowledge, Attitude, and PSC Implementation

Results of the Spearman rank correlation analysis and multiple regression are presented in Tables 3 and 4. A significant moderate positive correlation was found between patient safety knowledge and PSC implementation ($r_s = 0.524$; $p < 0.001$), indicating that nurses with higher patient safety knowledge scores demonstrated higher PSC implementation scores. A significant moderate-to-strong positive correlation was found between nurses' attitudes and PSC implementation ($r_s = 0.612$; $p < 0.001$), indicating that more positive attitudes toward patient safety were associated with better PSC implementation. Attitude demonstrated a stronger correlation with PSC implementation than knowledge, suggesting a more proximate association between attitudinal disposition and behavioral safety practices.

Table 3. Spearman Rank Correlation Analysis: Knowledge and Attitude versus PSC Implementation (N = 85)

Relationship (Independent Variable -> PSC Implementation)	Spearman rs	p-Value	Correlation Strength	Direction
Patient Safety Knowledge -> PSC Implementation	**0.524**	**< 0.001**	Moderate	Positive
Nurses' Attitude toward Patient Safety -> PSC Implementation	**0.612**	**< 0.001**	Moderate-Strong	Positive

Knowledge & Attitude (combined) -> PSC Implementation	-	-	**R2 = 0.441**	**Significant**

Note: PSC = patient safety culture implementation; rs = Spearman correlation coefficient; significance threshold alpha = 0.05; R2 refers to multiple linear regression coefficient of determination.

Multiple Regression: Combined Predictive Effect of Knowledge and Attitude

Multiple linear regression analysis (Table 4) confirmed that both knowledge and attitude were statistically significant independent predictors of PSC implementation when entered simultaneously. The full model was statistically significant ($F[2, 82] = 32.33$; $p < 0.001$), explaining 44.1% of the variance in PSC implementation scores ($R2 = 0.441$; adjusted $R2 = 0.427$). Attitude emerged as the stronger independent predictor (Beta = 0.389; B = 0.441; $p < 0.001$), followed by knowledge (Beta = 0.298; B = 0.312; $p < 0.001$). Multicollinearity assessment confirmed acceptable independence between predictors (VIF = 1.28), and residual diagnostics supported regression model assumptions.

Table 4. Multiple Linear Regression: Predictors of Patient Safety Culture Implementation (N = 85)

Predictor Variable	B	SE	Beta	t	p-Value	95% CI
Constant	12.34	4.21	-	2.93	0.004	[4.01, 20.67]
Patient Safety Knowledge	0.312	0.089	0.298	3.50	**< 0.001**	[0.135, 0.489]
Nurses' Attitude toward Patient Safety	0.441	0.094	0.389	4.69	**< 0.001**	[0.255, 0.627]
R = 0.664 | R2 = 0.441 | Adjusted R2 = 0.427 | F(2, 82) = 32.33 | p < 0.001						

Note: B = unstandardized regression coefficient; SE = standard error; Beta = standardized coefficient; 95% CI = confidence interval of B; VIF (knowledge) = 1.28; VIF (attitude) = 1.28.

DISCUSSION

This study demonstrated significant positive correlations between nurses' patient safety knowledge ($rs = 0.524$; $p < 0.001$) and attitude ($rs = 0.612$; $p < 0.001$) with PSC implementation in inpatient wards, with both variables together explaining 44.1% of the variance in PSC scores. These findings are theoretically consistent with Reason's Swiss Cheese Model (2020), which identifies individual-level cognitive and attitudinal gaps as critical vulnerability layers in safety systems, and with Donabedian's framework (2023), which positions knowledge and attitudes as structural and process antecedents to patient safety outcomes. The significant predictive power of the combined model reinforces the principle that neither knowledge nor attitude alone is sufficient — robust PSC implementation requires both dimensions to be adequately developed.

The finding that attitude exerted a stronger association with PSC implementation ($rs = 0.612$; Beta = 0.389) than knowledge ($rs = 0.524$; Beta = 0.298) is consistent with and extends several international studies. Gage et al. (2023) found that attitudinal factors — particularly nurses' sense of personal accountability and willingness to report errors — were more predictive of safety behavior than knowledge test scores in UK acute hospitals. Abubakar and Ismail (2021) similarly reported stronger associations between safety attitudes and reporting behavior than between knowledge and reporting in Nigerian nurses. These findings collectively suggest that even among nurses with adequate knowledge levels, negative or neutral attitudes can function as behavioral suppressors that prevent knowledge from being translated into safe practice. The 28.2% of participants who had never attended any patient safety training, combined with the 14.1% in the poor knowledge category, provides a clear structural opportunity for targeted educational intervention.

The prevalence of adequate (41.2%) rather than good (44.7%) knowledge scores, despite 71.8% of participants having attended at least one patient safety training, raises important questions about training quality and retention. This is consistent with Naik et al. (2022), who found that attendance at patient safety training does not guarantee knowledge retention if training lacks reinforcement, scenario-based learning, or post-training assessment. The moderate PSC implementation scores (mean 71.8 +/- 10.5) observed in the present study are also comparable to those reported by Chegini et al. (2022) in their meta-analysis of Iranian hospitals (mean 67.2%), and to findings from Wulandari et al. (2022) in Indonesian hospitals, suggesting that an adequate-but-not-good PSC profile may reflect a systemic challenge common to middle-income country hospital settings, including organizational factors such as staffing ratios and management support that were not measured in this study.

Practical Applications of the Findings

The findings of this study provide a clear evidence base for nursing management at Mitra Sejati Hospital and Indonesian hospitals more broadly. Given that attitude was the stronger predictor, nursing managers should invest in culture-building strategies alongside formal training: establishing ward-level safety champions, introducing blame-free reporting huddles, and publicly recognizing exemplary safety behaviors can shift attitudinal norms. Knowledge deficits should be addressed through mandatory quarterly patient safety refresher modules incorporating simulation, case-based learning, and post-training competency assessments. The 28.2% of nurses who have never attended patient safety training represent an immediate priority target group. At the policy level, Mitra Sejati Hospital's quality and patient safety committee should incorporate annual administration of the HSOPSC v2.0 as a routine performance metric, enabling longitudinal tracking of PSC trends and evaluation of intervention effectiveness.

Limitations

This study has several limitations. The cross-sectional design precludes causal inference; while knowledge and attitude were significantly associated with PSC implementation, the directionality of the relationship cannot be established. The single-site design at a private, type B-accredited hospital in Medan limits the generalizability of findings to other hospital types or regions. Total sampling from a moderate-sized hospital (n = 85) provides adequate power for bivariate analyses, but may be insufficient for exploring interaction effects or sub-group analyses. Self-report instruments introduce social desirability bias, particularly for attitude and PSC items; future research should complement self-reports with observational methods or patient outcome data. The study did not measure organizational-level factors such as staffing ratios, leadership style, or management support, which explained the remaining 55.9% of variance in PSC implementation and may be important confounders.

CONCLUSION

Both patient safety knowledge and nurses' attitudes toward patient safety are significantly and positively associated with the implementation of patient safety culture in the inpatient wards of Mitra Sejati General Hospital, Medan. Attitude demonstrated a stronger association with PSC implementation than knowledge, underscoring the critical importance of cultivating a safety-oriented professional ethos among nurses beyond mere knowledge acquisition. Hospital management should implement a dual-targeted strategy addressing both cognitive and attitudinal dimensions of patient safety through structured training programs combined with systematic culture-building initiatives to achieve meaningful and sustained improvement in patient safety culture implementation across inpatient wards.

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