Original Article

Patient Safety Culture, Missed Nursing Care, and Adverse Events in University Hospitals: A Cross-Sectional Study

Abstract

Background: Patient safety culture, which reflects fundamental assumptions and actions related to patient safety, remains unchanged after accreditation. Missed nursing care is prevalent in university hospitals and affects the occurrence of adverse events. This study aims to determine the effect of patient safety culture on missed nursing care and adverse events as perceived by nurses at university hospitals. **Materials and Methods:** This cross-sectional study was conducted using an online survey at six university hospitals in Indonesia from September to November 2021. The survey included the Safety Attitude Questionnaire (SAQ), the missed nursing care instrument by the international RN4Cast consortium, and the adverse event instrument by the International Hospital Outcomes Research Consortium. A total of 330 nurses completed the survey. **Results:** A total of 330 nurses participated in this study, resulting in an 89% response rate. The findings show a significant correlation between safety culture and missed nursing care ($r = 0.153$; $p < 0.001$) and between safety culture and adverse events ($r = 0.001$ $p < 0.001$). The positive coefficient value indicates that a better safety culture was associated with reduced missed nursing care. Additionally, there was a significant relationship between missed nursing care and adverse events ($r = 0.146$, $p < 0.001$), indicating that a higher incidence of missed nursing care leads to more adverse events. **Conclusions:** This study indicates that modification on patient safety culture correlates with changes in missed nursing care and adverse events as quality of nursing services.

Keywords: *Adverse effects, nursing, nursing care, patient safety*

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Introduction

Nurses interact with patients more frequently and for a longer duration than any other health care professional, reaching 86.14% of patient interactions.[1] In hospitals, almost three-quarters (73.4%) of nurses report missing at least one activity by the end of their shifts, with an average of 2.7 out of 12 care activities being missed.[2] Missed nursing care includes nurse–patient communication, updating nursing care plans, or providing health education.[2,3] If this condition is not effectively managed, it can impact the quality of patient care. Missed nursing care occurs when nursing care is delayed, incomplete, or not provided at all.[4] Several studies indicate that delayed or absent nursing activities (missed nursing care) affect unanticipated events, such as medication errors, urinary tract infections, patient falls, pressure injuries, critical incidents, low quality of service, and hospital readmission.[5] A better patient safety culture in hospitals improves the incident reporting system, thus preventing the recurrence of incidents.[6] Several studies explain that missed nursing care is influenced by the nursing work environment and safety culture.[7,8] This leads to urgent assessment on patient safety culture in hospitals.

Patient safety culture refers to the norms, values, and fundamental assumptions and actions related to patient safety within organizations, which guides the behavior of health professionals.[9] Studies comparing hospital safety cultures show that hospitals with low safety cultures are more likely to experience high rates of adverse events, patient harm, severity-adjusted mortality, pressure ulcers, and falls.[10-12] Consequently, hospitals must report their patient safety culture in accreditation documents as it significantly impacts hospital quality indicators such as adverse events and length of stay (LOS). Multiple studies in

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university hospitals found that health workers often receive punitive responses when they make errors, resulting in low incident report rates.[13-15] Several university hospitals in Indonesia play a role in developing healthcare services based on evidence-based methods and practices.[16] Given that patient safety culture in university hospitals is rarely examined, it is important to assess their safety culture.

In addition, missed nursing tasks significantly threaten the quality of care and safety, with university hospital nurses reporting the highest rate of missed nursing care.[17-19] Moreover, university hospitals may experience adverse events, including falls, infections, medication errors, and patient or family complaints.[20,21] Studies show that improving safety culture score reduces adverse events and minimizes missed nursing care.[7,8,22-25] However, no study has assessed how safety culture, missed nursing care, and adverse events interact in university hospitals. University hospitals should be the leaders in patient safety culture and quality improvement due to their academic atmosphere.

The aim of this study is to examine the correlation between patient safety culture, missed nursing care, and adverse events as perceived by nurses at university hospitals. Understanding the correlation between these three aspects and how they affect each other is critical for developing hospital quality improvement programs and reducing adverse events.

Materials and Methods

This study employed an observational correlational survey with a cross-sectional data collection technique conducted from September to November 2021. The design aimed to capture patient safety culture, missed nursing care, and adverse events at one point of time. However, the cross-sectional design also allowed for the collection of data on these variables from the past until the current time. This study was conducted at six university hospitals, including Universitas Brawijaya Hospital, Airlangga University Hospital, Gajah Mada University Academic Hospital, Diponegoro National Hospital, University of North Sumatra Hospital, and Hasanuddin University Hospital. The sample population included all inpatient nurses at these university hospitals, obtained using consecutive sampling. The eligibility criteria included inpatient nurses who were willing to respond and had at least 1 year of experience.[9] The sample consisted of 330 respondents of varying age groups, gender, qualifications, and work experience. The intended sample size was calculated using a formula for estimating sample size in a cross-sectional study, with a d-value of 0.05, Z (1-α/2) =1.96, and an expected proportion (p) of 0.3, resulting in a minimum sample size of 323 nurses.

In this study, data were collected using an online questionnaire. The researchers distributed the questionnaire link via the Google Form application to the respondents' representatives, who then shared the online questionnaire link with the target community of nurses. Respondents used the provided link to complete the online questionnaire. After the data were collected, each respondent was assigned a designation. The Google Form questionnaire included questions on demographic factors (age, gender, qualification, work experience, marital status, employment status, and shift pattern), the Safety Attitude Questionnaire (SAQ), the Missed Nursing Care instrument, and the instrument for adverse events. All surveys were completed by nurses working in the inpatient unit. The SAQ was used to assess patient safety culture. The SAQ had been translated into Indonesian using a backward translation technique, resulting in SAQ-INA.[9] This SAQ-INA consists of 36 questions divided into six domains: teamwork climate, safety climate, job satisfaction, stress awareness, perceptions of hospital/room administrators, and working conditions. The SAQ employs a 5-point Likert scale to capture respondents' assessments of the conditions described in the provided statements.[25] The Missed Nursing Care instrument evaluated 12 required nurse activities per shift, separated into two missed care domains: clinical and planning/communication.[2] The clinical domain includes monitoring, skin care, oral hygiene, pain management, treatments and procedures, and the timely administration of medications. The planning/communication domain includes reassuring/communicating with the patient, instructing/advising the patient/family, documentation, preparing the patient/family for discharge, developing/updating a care plan, and coordinating care. Responses were measured on a 5-point Likert scale ranging from 1 (never) to 5 (always). The score was then calculated by summing the total score for each item. The instrument for adverse events was measured by nurses' reports on the frequency of four types of negative patient incidents during their shift over the past year, including patient falls, nosocomial infections, medication errors, and patient complaints.[26] The nurses were asked, "Over the past year, how often would you say each of the following incidents has occurred involving you or your patient?" Response options range from 1 (never) to 4 (often), and a total score was derived by summing the frequency score of the four incidents. All three instruments were combined sequentially into one Google Form without section titles, allowing respondents to naturally answer the survey without knowing the specific aspect being measured. At the beginning of the survey, the researchers provided a brief statement assuring respondents that their responses would be anonymous and not accessible by hospital managers, ensuring that nurses would not face punishment for providing negative feedback regarding the hospital they work in.

Data were analyzed using Smart PLS Version 3.2.9 (SmartPLS GmbH) to assess further not only the correlation between three aspects but also how these three aspects interact with each other. This statistical analysis included the outer test model to evaluate the validity and reliability of the indicators.

An indicator was regarded as valid if it has a loading factor of ≥0.60. Indicators were considered reliable if they have a composite reliability of >0.60. The missed nursing care variables, derived from 12 factors, were all valid as were the unexpected event variables from four factors. Among the five factors of patient safety culture, four were valid and one was invalid. A variable was considered reliable if the composite reliability and Cronbach's alpha value were both >0.70. Inner test model, or hypothesis testing, was done after ensuring that all the data were valid and reliable ($p < 0.50$).

Ethical considerations

The study was approved by the Ethics Committee for Health Research, Faculty of Medicine, Universitas Brawijaya, and the Ethics Committee of Airlangga University Hospital (Approvals No. 277/EC/KEPK/10/2021 and No. 194/KEP/2021). All participants in this study had provided informed consent. The informed consent was displayed at the beginning of the Google Form survey; if nurses proceeded to complete and submit the survey, it was assumed that they consented to participate in the study. As required by the Personal Data Protection in Electronic Systems (PDP Regulation), the entire survey procedure utilized pseudonymity, and all personal data were kept strictly confidential.

Results

A total of 330 nurse respondents participated in this study, resulting in an 89% response rate (n = 371). The flow chart in Figure 1 illustrates the distribution of respondents from each hospital. The questionnaire was initially distributed to 440 nurses, and only 371 nurses were eligible to participate in this study. Table 1 shows that the majority of the respondents were female nurses 271 (82.12%) aged 26–30 years 145 (43.94%) and married (n = 208; 63,03%). Most of the nurses held a bachelor's degree (n = 211; 63.94%) and were contract employees (n = 185; 56.06%). The majority had worked for 1–5 years (n = 196; 59.39%) and worked in a shift pattern (n = 304; 92.12%). These characteristics are typical for nurses working in inpatient units in Indonesia.

Table 2 reveals that the patient safety culture domains with the highest mean values are job satisfaction and teamwork climate, with a score of mean (SD) 78.24 (13.28). This reflects that nurses reported a positive patient safety culture on job satisfaction and teamwork climate. The missed nursing care variable showed a score of mean (SD) 53.18 (5.26), and the mean value of the adverse events was mean (SD) 13.11 (2.37). The findings illustrate that most nurses in this study had positive attitudes on safety in terms of teamwork and job satisfaction (mean >75). However, they perceived safety climate, stress recognition, perception of management, and working conditions poorly (mean <75). Both missed nursing care and adverse events in this study were found to occur frequently in Indonesian university hospitals. The data of patient safety culture, missed nursing care, and adverse events were quite

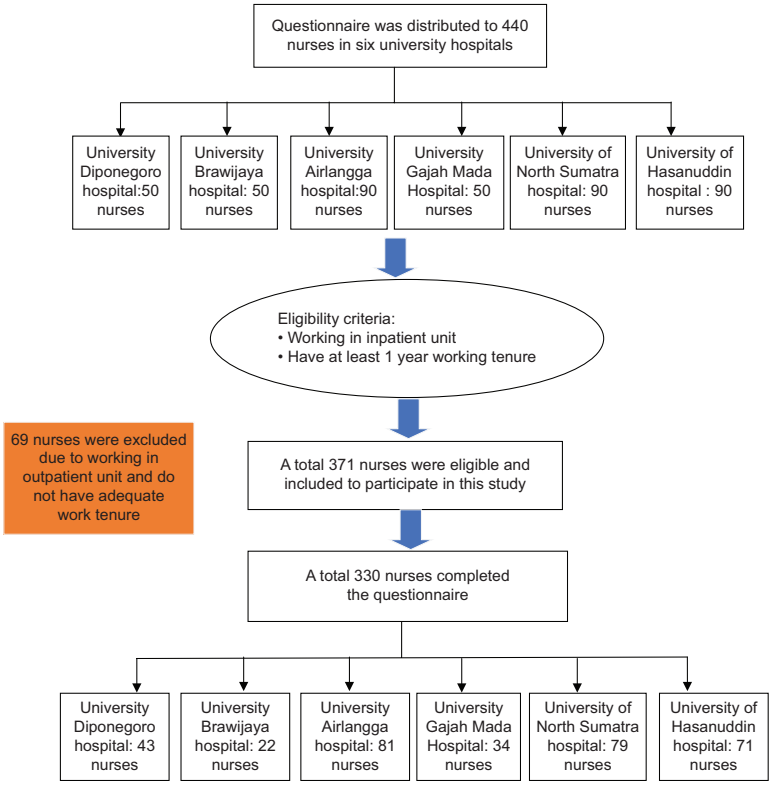

Figure 1: Data collection process in six university hospitals

Table 1: Sociodemographic characteristics of respondents (*n*=330)

Demographic Factors	Categories	*n* (%)
Sex	Male	59 (17.82)
	Female	271 (82.12)
Age	21-25 years old	35 (10.60)
	26-30 years old	145 (43.94)
	31-35 years old	112 (33.94)
	36-40 years old	27 (8.18)
	>41 years old	11 (3.34)
Marital Status	Single	122 (37.97)
	Married	208 (63.03)
Educational Level	Nursing diploma	110 (33.33)
	Bachelor	211 (63.94)
	Master	9 (2.73)
Work experience	<1 year	13 (3.94)
	1-5 years	196 (59.39)
	6-10 years	110 (33.33)
	>10 years	11 (3.34)
Employment status	Contract employees	185 (56.06)
	Permanent employee	145 (43.94)
Service pattern	Non-Shift	26 (7.88)
	Shift	304 (92.12)

Table 2: An overview of patient safety culture in university hospitals

Domain of patient safety culture	Mean (SD*)	95% CI**	
Teamwork Climate	76.72 (8.99)	75.74	75.74
Safety Climate	71.57 (9.35)	70.56	70.56
Job satisfaction	78.24 (13.28)	76.80	76.80
Stress recognition	51.33 (17.78)	49.40	49.40
Perceptions of Ward Management	62.32 (10.12)	61.22	61.22
Perceptions of Hospital Management	61.02 (10.44)	59.88	59.88
working conditions	65.15 (14.75)	63.55	63.55
Missed Nursing Care score	53.18 (5.26)	52.62	52.62
Adverse Event Score	13.11 (2.37)	12.85	12.85

*Standart Deviation. **Confidence Interval

similar with Indonesian benchmarking data in previous studies.[4,9]

Figure 2 shows a significant weak correlation between safety culture and missed nursing care (r = 0.153; $p < 0.001$) and between safety culture and adverse events (r = 0.001; $p < 0.001$). The positive coefficient value indicated that a better safety culture was associated with improved behaviors of missed nursing care. Additionally, there was a significant relationship between missed nursing care and adverse events (r = 0.146, $p < 0.001$), indicating that higher rates of missed nursing care were linked to an upward trend of adverse events. The figure also explains that safety culture might not directly affect the adverse events, but safety culture affected missed nursing care as a mediator that leads to occurrence of adverse events.

Discussion

Our study found that safety culture correlates with adverse events through missed nursing care as a mediating factor. Although studies show a direct connection between safety culture and adverse events,[10-12] our findings suggest that safety culture only correlates with adverse events through missed nursing care. This aligns with studies showing that patient safety culture explains variations in missed nursing care and quality of care concern.[7] Additionally, other studies explain the significant impact of safety culture and missed nursing care[8,27] and how missed nursing care influence adverse events. To our knowledge, this study is the first to provide a detailed explanation of how patient safety culture, missed nursing care, and adverse events correlate with each other. Our study highlights the role of safety culture as an input, missed nursing care as a process, and adverse events as an outcome of safety procedure in hospital settings.

Patient safety is a top priority in nursing, and missed nursing care poses a significant risk to patient safety. This study found that patient safety culture influences missed nursing care behavior. Missed nursing care can lead to poor quality of patient care, decreased patient satisfaction, reduced nurse job satisfaction, increased patient adverse effects, and prolonged hospital stays and readmissions.[3,28] Safety culture domains, such as teamwork climate, job satisfaction, and working condition, are intercorrelated with missed nursing care.[8] Safety culture serves as the input component in health services. Other external factors such as inadequate staffing, environmental factors, and a lack of personal and professional accountability have been identified as the primary contributors to missed nursing care.[3,29-31] Implementing evidence-based staffing practice is challenging, especially when the number of nurses per shift is low due to high turnover rates.[32] Additionally, understaffing often results in a lack of time to complete the task, which negatively affects patient outcome.[29]

A positive patient safety culture is a crucial prerequisite for achieving optimal patient outcomes.[9] Key predictors of patient and hospital safety in general are open communication, adequate staffing, frequency of reported incidents, and length of stay in the unit and hospital.[33] In a positive safety culture, nurses have a better perception of their team, so they can openly discuss the errors and prevent their reoccurrence.[9] High patient safety care is also associated with lower incidences of missed care nursing and adverse events.[7] Other studies found that organizational learning, teamwork, and open communication are strongly correlated with missed nursing care.[8,34] In addition, missed nursing care is associated with increased mortality rates and adverse events.[3,29] Nurses play a positive role in providing new information about missed nursing care and patient safety in order to help predict errors and adverse events.[33]

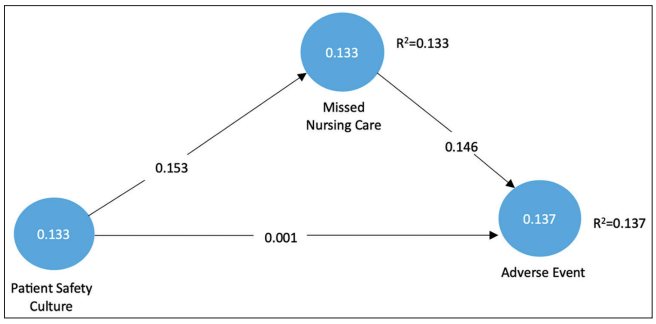

Figure 2: The results of path coefficient analysis of missed nursing care, patient safety culture, and adverse events

While previous study shows that various domains of safety culture, such as teamwork, job satisfaction, working environment, and management perception, affect missed nursing care,[7] our study further emphasizes the importance of staffing. Communication with patients, fundamental care, and patient experience during treatment are significantly correlated with nursing staff adequacy.[35] Patient safety, the quality of nursing care, and nurse job satisfaction will be negatively impacted by a shortage of staff and higher rates of missed nursing care.[36] Personal accountability also plays an essential role in missed nursing care. Increasing nurse and ward accountability can contribute to a culture of hospital safety and reduce adverse outcomes for patients, nurses, and the organization.[37] In addition, the work environment within a unit influences missed nursing care. This indicates that missed nursing care is an outcome influenced by the nurse's work environment and patient safety culture.[31]

Unlike the other study that directly links safety culture to adverse events,[7] our study found that safety culture only correlates with adverse events through the intermediary of missed nursing care. This highlights the importance of preventing adverse events. Hospital management should focus not only on improving the safety culture among nurses but also on preventing missed nursing care. Missed nursing care can be managed by implementing interventions that support a positive nursing work environment and a culture of patient safety.[8] Therefore, it is essential to increase staff awareness of patient safety and nursing care ratios in order to identify patient safety culture's strengths and areas for improvement.[38] Strategies to enhance safety culture in care settings include the exchange of experiences and collegial learning, integration of staff perceptions, external facilitation, staff training, and structured multistep procedures of the intervention process.[39] Teamwork training using the TeamSTEPPS method, which emphasizes building better teamwork and effective communication, provides a positive impact on reducing missed nursing care and clinical errors.[40,41]

The main issues related to adverse events experienced by nurses include an organizational climate that is intolerant of individual errors and the causes and concealment of adverse events.[4] An organizational climate that fosters psychological safety encourages individuals to speak up about their concerns; therefore, adverse events can be prevented.[42] Factors influencing the reduction of adverse events include staffing, hospital transfers and transitions, frequency of incident reporting, nonpunitive responses to errors, supervisory expectations and actions promoting safety, open communication, continuous improvement organizational learning, teamwork within units, and hospital support on patient safety.[24] Intervention strategies to improve patient safety culture and reduce adverse events are educational programs, simulation programs, and team strategies.[43] Our findings show that patient safety culture does not directly affect the occurrence of adverse events; however, it strongly affects missed nursing care, which eventually increases adverse events. This highlights the importance of managing nursing resources to maintain high-quality nursing care.

Although this study provides extensive data regarding patient safety culture, missed nursing care, and adverse events in university hospitals in Indonesia, the data are only limited to the nurses. Including data from other health professionals such as doctors, midwives, nutritionists, and other health workers could provide a more comprehensive understanding in future research. Since nurses represent the largest proportion of the healthcare workforce in the hospital, their perception adequately represents hospitals' conditions regarding patient safety culture, missed nursing care, and adverse events.

Conclusion

Our study findings provide valuable insights for academic or educational hospital administration regarding the correlation between patient safety culture and the quality of nursing services, specifically missed nursing care and adverse events. It is crucial for nurses to understand how to manage nursing resources and maintain a culture of patient safety. The findings of the study highlight the importance of enhancing patient safety culture through supervisory activities and open communication. Consequently, this approach can improve service quality by reducing the incidence of missed nursing care incidents and preventing adverse events.

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Conflicts of interest

Nothing to declare.

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