ORIGINAL ARTICLE

Influence of Health Education on Nurses' Perceptions and Attitudes in Emergency Department Triage.

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ARTICLE INFORMATION	ABSTRACT
	*Introduction: Compliance with standard operating procedures (SOPs) in intravenous (IV) infusion is essential for patient safety and quality of care. Nurses play a pivotal role in implementing SOPs, and their level of knowledge may significantly influence their adherence.. **Objectives:** This study aimed to examine the correlation between nurses' knowledge levels and their compliance with intravenous infusion SOPs in the emergency department. **Methods:** A cross-sectional correlational study was conducted involving 116 nurses in the emergency department of RSU dr. H. Koesnadi Bondowoso. Data were collected using structured questionnaires to assess knowledge and direct observation checklists to evaluate SOP compliance. Spearman's rho was used for statistical analysis with a significance level set at p < 0.05. **Results:** Of the 116 nurses, 88.8% had good knowledge, 6.0% had moderate knowledge, and 5.2% had poor knowledge. Full compliance was observed among nurses with good knowledge, while non-compliance was highest among those with poor knowledge. A strong positive correlation was found between knowledge and compliance (Spearman's r = 0.730, p = 0.001). **Conclusions:** There is a significant positive association between nurses' knowledge levels and their compliance with IV infusion SOPs. Enhancing nurses' knowledge through continuous education and monitoring is essential to promote safe and standardized nursing practices.*

A. Introduction

Hospitals function as primary healthcare facilities providing comprehensive services, including emergency care, which is crucial for saving lives in critical situations (Ministry of Health Indonesia, 2019; World Health Organization [WHO], 2020). Emergency Departments (ED) serve as the main entry point for patients requiring urgent medical attention, and their effectiveness reflects the hospital's overall quality and readiness as a referral center (Asplin et al., 2003; Hoot & Aronsky, 2008). Due to the unpredictable and urgent nature of patient arrivals, EDs must implement efficient systems to prioritize care delivery effectively (Pines et al., 2011; Sun et al., 2013). One of the key systems in managing patient flow and urgency is triage, which facilitates timely and appropriate medical intervention (Christ et al., 2010; Fernandes et al., 2005).

Triage, historically developed to manage wartime casualties, is now a standardized process used worldwide to classify patients according to severity and urgency (Iserson & Moskop,

2007; Carter et al., 2014). Modern triage methods ensure that patients with life-threatening conditions receive immediate care while optimizing limited resources (Gilboy et al., 2012; Mackway-Jones et al., 2014). Nurses typically perform triage assessments in the ED due to their continuous presence and clinical expertise (Considine et al., 2011; Moll, 2012). Accurate triage is essential for reducing patient morbidity and mortality and enhancing overall emergency care efficiency (Hardcastle et al., 2019; Travers et al., 2009).

Nurses' attitudes and perceptions toward triage significantly influence their performance and the accuracy of patient prioritization (Kendall et al., 2015; Considine et al., 2008). Positive attitudes foster adherence to triage protocols and improve decision-making under pressure, while negative perceptions can result in errors or delays (Jeong & Lee, 2017; Bahreini et al., 2017). Therefore, understanding factors that shape nurses' attitudes is critical for optimizing triage outcomes (Considine et al., 2011; Hardcastle et al., 2019). Research suggests that continuous education and training positively impact nurses' triage competency and attitudes (Abdelwahab et al., 2020; Bairagi et al., 2019).

Health education programs are structured interventions designed to improve knowledge, skills, and attitudes, leading to better clinical performance (Glanz et al., 2015; Nutbeam, 2000). In emergency nursing, targeted education enhances nurses' understanding of triage principles and boosts their confidence in handling critical situations (Abdelwahab et al., 2020; Jeong & Lee, 2017). Studies show that educational interventions correlate with improved triage accuracy and patient safety (Farrohknia et al., 2011; Mackway-Jones et al., 2014). Despite this, gaps in knowledge and negative attitudes remain prevalent, emphasizing the need for ongoing health education (Kendall et al., 2015; Bahreini et al., 2017).

Challenges to effective triage implementation include inadequate triage spaces, high patient volumes, and limited resources, which may hinder nurses' ability to perform thorough assessments (Christ et al., 2010; Asplin et al., 2003). Moreover, patient impatience and overcrowding add pressure, potentially compromising triage quality (Hoot & Aronsky, 2008; Hardcastle et al., 2019). Health education addressing both clinical skills and practical constraints is essential to prepare nurses for these realities (Kendall et al., 2015; Mackway-Jones et al., 2014). This holistic approach can improve nurses' attitudes and performance in fast-paced emergency settings (Considine et al., 2011; Moll, 2012).

The role of nurses in triage is multifaceted, requiring clinical judgment, communication skills, and a positive disposition toward protocol adherence (Jeong & Lee, 2017; Considine et al., 2011). Attitude influences how nurses prioritize patients, cooperate with colleagues, and manage stress during emergencies (Hardcastle et al., 2019; Bahreini et al., 2017). Negative attitudes may stem from lack of knowledge, burnout, or insufficient support (Considine et al., 2008; Moll, 2012). Educational programs that focus on knowledge and attitude simultaneously show the best outcomes in improving triage practice (Abdelwahab et al., 2020; Bairagi et al., 2019).

Health education, as a planned and systematic process, can modify behavior and attitudes through increasing awareness and motivation (Nutbeam, 2000; Glanz et al., 2015). For nurses, this means not only learning triage protocols but also understanding their value in patient safety and workflow optimization (Abdelwahab et al., 2020; Farrohknia et al., 2011). Empowering nurses through education increases their engagement and compliance with triage procedures (Jeong & Lee, 2017; Mackway-Jones et al., 2014). Thus, health education acts as a catalyst for attitude change, improving triage effectiveness in EDs (Considine et al., 2011; Moll, 2012).

The need for effective triage education is underscored by studies showing errors in patient prioritization related to knowledge deficits and attitude problems (Bahreini et al., 2017; Hardcastle et al., 2019). Ensuring nurses have access to quality educational programs is a priority for hospitals seeking to improve emergency care delivery (Pines et al., 2011; Sun et

al., 2013). Such interventions must be tailored to address both clinical and environmental challenges unique to each ED (Christ et al., 2010; Hoot & Aronsky, 2008). Ultimately, a well-educated nursing staff with positive attitudes contributes to safer and more efficient triage processes.

This study aims to investigate the influence of health education on nurses' attitudes toward triage implementation in emergency departments. Understanding this relationship is crucial to designing effective interventions that enhance triage quality and patient outcomes. The findings are expected to support emergency nursing education programs and promote better triage practices. This contributes to improved emergency care delivery through optimized nurse performance and patient prioritization.

B. Methods

This study applied a correlational research design with a cross-sectional approach to examine the relationship between nurses' knowledge levels and their compliance with the standard operating procedure (SOP) for intravenous infusion. The research was conducted at the Emergency Department (ED) of RSU dr. H. Koesnadi Bondowoso in January 2025. The study population consisted of all nurses working in the ED, and a total sampling technique was used due to the relatively small population (n = 116).

The independent variable was the level of knowledge concerning the SOP for intravenous infusion, assessed using a structured questionnaire covering five aspects: understanding of the SOP, equipment preparation, infusion technique, procedural considerations, and documentation. The dependent variable was nurse compliance with the infusion SOP, measured through direct observation using a checklist derived from hospital SOPs, which included 12 items for preparation and 16 items for implementation.

Data collection was conducted following ethical approval and informed consent. The questionnaire and observation checklist were administered to collect demographic data and assess both knowledge and compliance. Each correct response or action was scored as 1 and incorrect as 0. Knowledge levels were classified as poor (≤ 55%), moderate (56–75%), or good (76–100%). Compliance was categorized as compliant (51–100%) or non-compliant (0–50%).

Data were analyzed using descriptive statistics and Spearman's rho correlation to evaluate the relationship between knowledge and compliance. All statistical analyses were performed using SPSS version 22.0, with a significance level set at $p < 0.05$. Ethical considerations included informed consent, anonymity, and confidentiality to protect participant rights.

C. Results and Discussion

This study examined the relationship between nurses' knowledge of intravenous (IV) infusion standard operating procedures (SOPs) and their compliance with those procedures in the emergency department. The analysis was conducted on a total sample of 116 nurses, categorized by three levels of knowledge: poor, moderate, and good. Compliance was assessed through structured observation, and the data were analyzed using Spearman's rho to determine the strength and significance of the association.

Table 1. Cross-tabulation between nurses' knowledge level and compliance with IV infusion SOP

Knowledge Level	Non-Compliant (n)	Compliant (n)	Total (n)	(r)	p-value
Poor	6	0	6		
Moderate	1	6	7		
Good	0	103	103	0.730	0.001
Total	7	109	116		

Table 1 presents the cross-tabulation between nurses' knowledge levels and their compliance with the standard operating procedure (SOP) for intravenous (IV) infusion, based on a sample of 116 participants. Among nurses with poor knowledge (n = 6), none were compliant with the SOP, indicating 100% non-compliance in that group. In the moderate knowledge group (n = 7), one nurse was non-compliant and six were compliant. Notably, all nurses with good knowledge (n = 103) demonstrated full compliance. These findings indicate a clear trend showing that higher knowledge is associated with greater adherence to SOPs.shows the results of the Spearman's rho correlation analysis. A strong positive correlation was found between nurses' knowledge levels and their compliance with SOPs (r = 0.730, p = 0.001). This indicates that as knowledge levels increase, the likelihood of SOP compliance significantly increases.

This study demonstrates a strong and statistically significant correlation between nurses' knowledge levels and their compliance with standard operating procedures (SOPs) for intravenous (IV) infusion. All nurses with high knowledge scores exhibited full compliance, while those with poor knowledge were entirely non-compliant. The Spearman's rho analysis confirmed a strong positive correlation (r = 0.730, p = 0.001), indicating that higher knowledge is associated with better clinical adherence. These findings are consistent with prior research emphasizing knowledge as a cornerstone of clinical safety and performance (Ebrahimi et al., 2021).

Nurses' knowledge is an essential component of their cognitive readiness to perform complex tasks under pressure. According to Bloom's taxonomy, the cognitive domain is foundational in influencing behavior and decision-making in practice (Krathwohl, 2002). As such, increasing a nurse's knowledge base should lead to improved protocol adherence. The pattern observed in this study reinforces this theoretical linkage.

The influence of education on SOP compliance was evident, with most compliant nurses holding bachelor's degrees. This supports research by Jang and Kim (2023), who found that higher academic preparation significantly improves the quality of nursing interventions and safety practices. Investing in academic progression can thus be seen as a structural approach to enhancing patient care standards. Additionally, educational institutions and hospital training units should align curricula with practice-based guidelines.

Our findings align with a growing body of evidence showing that protocol violations are more common among undertrained or cognitively unprepared personnel. For example, Qommaruddin et al. (2022) demonstrated that IV-related complications significantly decreased after structured protocol training. This suggests that improving knowledge through continual education can mitigate clinical risks. In our study, 94% of all nurses were compliant, indicating that institutional emphasis on SOPs may already be in place.

Nevertheless, a small fraction of moderate-knowledge nurses were found to be non-compliant. This discrepancy indicates that knowledge alone may not guarantee behavior change without reinforcement and supervision. Gholami et al. (2020) highlight the importance of work

environment and leadership support in sustaining behavioral change. Thus, a multifaceted approach, combining education with managerial support, may yield better adherence.

Infection prevention is a direct benefit of SOP compliance, particularly in procedures like IV infusion. According to the CDC (2023), improper catheter insertion is a major contributor to healthcare-associated infections. Our findings echo this concern, as nurses with inadequate knowledge pose a preventable risk to patients. Therefore, knowledge-driven compliance is a key factor in promoting patient safety.

Behavioral compliance is also an ethical issue. The International Council of Nurses (ICN, 2021) asserts that nurses are professionally accountable for adhering to best practices. Non-compliance, especially due to avoidable knowledge deficits, violates both professional codes and patient rights. Institutional oversight is essential to ensure this ethical standard is met.

The age distribution of participants, most of whom were aged 31–40, may also contribute positively to knowledge and compliance. Age and experience are known to correlate with clinical reasoning and decision-making quality (Shrestha et al., 2022). In our study, these demographic factors may have indirectly strengthened the relationship between knowledge and compliance. It is recommended that younger or less experienced staff be prioritized for hands-on supervision and peer coaching.

Another consideration is the method of compliance evaluation. Direct observation used in this study provides more accurate results than self-report measures, which are prone to bias. A review by Alsulami et al. (2022) confirms that observational assessments reveal significant gaps in practice often hidden in self-reported compliance data. This underscores the importance of real-time performance monitoring in clinical settings.

Finally, the results support integrating routine knowledge assessments and targeted interventions into hospital policy. Structured training programs, simulation scenarios, and e-learning modules have been shown to improve compliance and confidence (Lee et al., 2024). These approaches not only reinforce knowledge but also foster a culture of accountability. Overall, strengthening the knowledge base of nurses is a strategic investment for healthcare quality and safety.

D. Conclusion

This study revealed a strong and statistically significant correlation between nurses' knowledge levels and their compliance with standard operating procedures (SOPs) for intravenous infusion in the emergency department. Nurses with higher knowledge consistently demonstrated better adherence to clinical guidelines, while those with lower knowledge showed non-compliance. These findings affirm the critical role of knowledge in shaping safe and effective nursing practices. Strengthening nurses' knowledge through structured education and regular competency assessments is essential to improving clinical outcomes and patient safety.

E. Recommendations

Healthcare institutions should prioritize the integration of continuous education programs focused on SOPs and evidence-based practice, especially for nurses working in high-acuity settings such as emergency departments. Routine assessments of knowledge and direct observation of compliance should be implemented to identify learning needs and monitor practice. Hospital leadership should support a culture of learning by providing access to simulation-based training and reinforcing accountability through supportive supervision. Further research is recommended to explore the impact of organizational factors, such as leadership and workload, on nurse compliance behavior to inform broader systemic improvements.

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