I-PASS Training Significantly Improves Nurses' Handoff and Information Exchange Quality in Hospital Settings

Dewi Allo[1], Sella Dwi Astia Ningrum[1], Evra Yusandra Arifin[1]
[1]Department of Nursing, STIK Sint Carolus Jakarta, Indonesia
Correspondence: **Dewi Allo**: Jl. Salemba Raya 41, Jakarta Pusat 10440, Indonesia; deal_79@yahoo.com

ABSTRACT
Patient safety culture requires effective communication during handoffs to prevent errors and adverse events. Ineffective information transfer increases the risk of complications and mortality. This styudi aimed to analyze the effectiveness of I-PASS training on the quality of handoffs and information exchange among nurses at Hospital X, West Jakarta. A quantitative pre-experimental design was conducted from February–March 2026 involving 56 nurses meeting inclusion criteria. Data were collected using questionnaires and analyzed through bivariate and multivariate tests. Most respondents were aged 26–35 years (66.1%), female (75%), PK level 2 (85.7%), and D3 Nursing graduates (60.7%). After I-PASS training, 80.4% showed good training outcomes, and 57.1% demonstrated good handoff and information-exchange quality. Age was significantly associated with communication quality ($p = 0.032$). There was a significant improvement before and after training ($p = 0.000$). Multivariate analysis showed age ($p = 0.019$) and I-PASS training ($p = 0.029$) significantly influenced handoff quality, with $R^2 = 0.112$. In conclusion**,** I-PASS training effectively improved nurses' handoff and information-exchange quality. Hospitals should adopt structured and sustainable I-PASS training within standard operating procedures to ensure consistent implementation.
Keywords: I-PASS training; handoff quality; information exchange; nurses

INTRODUCTION
Patient safety has become a global priority in healthcare systems, with adverse events reaching 134 million cases and contributing to 2.6 million deaths annually in developing countries [1]. Global initiatives such as the Global Patient Safety Action Plan 2021–2030 emphasize strengthening patient safety culture as a foundational strategy for improving healthcare quality [2]. Patient safety culture reflects shared values, beliefs, and norms that shape healthcare professionals' behaviors in safeguarding patients. Despite its importance, the implementation of patient safety culture remains suboptimal across many countries [3,4].

In Indonesia, several challenges persist, including low reporting rates of patient safety incidents in hospitals [5]. Nurses, as frontline healthcare providers who interact most frequently with patients, play a pivotal role in ensuring effective handoff communication. However, limited knowledge and insufficient training in structured communication continue to hinder optimal handoffs and information exchange [6]. Interpersonal communication competence is an essential component of professional nursing practice and is central to patient safety [7].

One critical dimension of patient safety culture is handoffs and information exchange, which ensures continuity of care. Evidence consistently shows that this dimension often receives low scores and is associated with high risk for medical errors [8,9]. Ineffective handoff communication may lead to loss of essential information, diagnostic inaccuracies, treatment delays, and increased mortality risk [10,11]. Approximately 67% of communication-related errors in healthcare occur during handoffs when responsibility shifts between providers [12]. Data from [13] indicate that the handoffs and transitions domain scored 65%, with communication time rated adequate (73%). However, significant information loss still occurred during inter-unit transfers (58%) and shift changes (64%), suggesting that although time allocation is sufficient, the completeness and consistency of information remain inadequate.

Various interventions have been developed to improve handoff quality, including structured communication methods such as I-PASS. This method has demonstrated effectiveness in enhancing information completeness, communication efficiency, and reducing medical errors and adverse events [14]. Compared to other approaches such as SBAR, I-PASS shows more consistent effectiveness in improving handoffs and information exchange quality [15,16]. Nevertheless, research on I-PASS training implementation among nurses in Indonesia remains limited, highlighting the need for further investigation.

This study is grounded in Imogene King's Conceptual System and Goal Attainment Theory, which emphasizes interaction, communication, and transaction within nurse–patient interpersonal relationships [17]. In the context of handoffs, effective communication represents a transaction that determines the success of nursing care goals and patient safety.

At Hospital X in West Jakarta, the 2024 patient safety culture survey revealed that the handoffs and information exchange dimension had the lowest score (37.2%), indicating suboptimal handoff processes and a high risk of information loss during care transitions. This gap between expected communication standards and actual practice underscores the need for systematic training interventions.

Based on this context, the novelty of this study lies in examining the effectiveness of I-PASS training specifically among nurses; key personnel in handoffs and information exchange processes. Therefore, the objective of this study is to analyze the effectiveness of I-PASS training on the quality of handoffs and information exchange among nurses at Hospital X, West Jakarta.

METHODS
The study was conducted in 2026 at Hospital X, West Jakarta, involving clinical units including inpatient wards, the intensive care unit (ICU), and the emergency department (ED). A quantitative pre-experimental design with a one-group pretest–posttest structure was employed to assess changes in handoffs and information-exchange quality before and after the I-PASS training intervention, without a control group [18].

The study population consisted of 60 nurses working in inpatient wards, ICU, and ED. A total of 56 nurses were recruited using purposive sampling. Inclusion criteria were: (1) nurses assigned to inpatient wards, ICU, or ED; (2) willingness to participate; (3) professional level PK II or PK III; and (4) direct involvement in handoffs and information-exchange processes. Exclusion criteria included nurses who were on leave, sick, or attending academic training during data collection, as well as head nurses and research assistants.

The independent variable was the I-PASS structured communication training. The intervention consisted of a two-day training program involving theoretical instruction and simulation-based practice. Following the training, nurses applied the I-PASS method independently for two

weeks in their respective units at Hospital X, ensuring real-world implementation within routine handoff activities. The dependent variable was the quality of handoffs and information exchange. Measurement instruments included: 1) I-PASS Knowledge Test (20 items) assessing nurses' understanding of the structured communication method; 2) handoffs and Information Exchange Questionnaire (28 items) adapted from the HSOPSC (AHRQ, 2024). All instruments demonstrated acceptable validity ($r > 0.361$; $p < 0.05$) and high reliability (Cronbach's Alpha = 0.932).

Data analysis comprised: 1) descriptive analysis to describe respondent characteristics; 2) bivariate analysis using Pearson correlation and paired t-tests to examine relationships and pre–post differences; and multivariate analysis using ordinal logistic regression with backward elimination. Variables with $p < 0.250$ in the initial model were retained for further modeling.

RESULTS

Table 1 shows that most nurses were aged 26–35 years (66.1%). The majority were female (75%). Most nurses held PK Level 2 (85.7%), and the predominant educational background was Diploma in Nursing (60.7%). Table 2 indicates that before training, most nurses demonstrated fair I-PASS knowledge (55.4%). After the intervention, the proportion of nurses with good knowledge increased substantially to 80.4%, showing a marked improvement in training outcomes. Table 3 shows that prior to the intervention, most nurses were in the fair category (55.4%). After training, the proportion of nurses achieving good handoff and information-exchange quality increased to 57.1%, indicating that the I-PASS method improved communication consistency and information completeness.

Table 4 shows that among the tested characteristics, only age demonstrated a significant relationship with handoff and information-exchange quality ($p = 0.032$). Other variables showed no significant association. Table 5 demonstrates a significant difference in handoff and information-exchange quality before and after the I-PASS training. The mean improvement was 0.955, with a t-value of 15.109 and $p = 0.000$, confirming a statistically significant enhancement following the intervention.

Table 6 shows that in the final regression model, age ($p = 0.019$) and I-PASS training ($p = 0.029$) were the most significant predictors of handoff and information-exchange quality. The R Square value of 0.112 indicates that these variables explain 11.2% of the variance, while the remaining variance is influenced by other factors outside the model.

DISCUSSION

This study shows that the majority of nurses were aged 26–35 years (66.1%), reflecting the dominance of productive age groups in hospital services, consistent with findings [19,20]. Productive age supports cognitive maturity, work engagement, adaptability, and optimal performance. Most nurses were also female (75%), aligning with global characteristics of the nursing profession [21]. Women tend to possess strong empathy and interpersonal competence, although they are more vulnerable to emotional fatigue [20].

Most nurses held PK Level II (85.7%), indicating the dominance of intermediate clinical competence with the ability to practice independently and make clinical decisions. This reflects nurses' readiness to optimize interventions and contribute to evidence-based practice. Additionally, most respondents were graduates of Diploma in Nursing (D3) programs (60.7%), reflecting the dominance of vocational education in Indonesian nursing services [22].

From Imogene King's perspective, age, PK level, and education are components of the personal system that influence individual perceptions and responses within interactions. Productive age supports cognitive maturity and communication readiness, while in the interpersonal system, effective communication during handoff reflects the quality of interaction and transaction among nurses to ensure continuity of care.

The study results show an increase in nurses' knowledge after I-PASS training, from the fair category (55.4%) to the good category (80.4%), consistent with findings [23] that emphasize the effectiveness of training in

Table 1. Distribution of nurses' characteristics (age, sex, pk level, education) at Hospital X, West Jakarta

Characteristics	Frequency	Percentage
Age		
<25 years	7	12.5
26–35 years	37	66.1
36–45 years	12	21.4
Sex		
Male	14	25.0
Female	42	75.0
PK Level		
PK 2	48	85.7
PK 3	8	14.3
Education		
Diploma (D3)	34	60.7
Bachelor	22	39.3

Table 2. Distribution of I-PASS training outcomes before and after training at Hospital X, West Jakarta

Outcome	Before training		After training	
	Frequency	Perentage	Frequency	Perentage
Poor	6	10.7	0	0.0
Fair	31	55.4	11	19.6
Good	19	33.9	45	80.4

Table 3. Distribution of handoffs and information-exchange quality before and after I-PASS Training

Quality	Before training		After training	
	Frequency	Perentage	Frequency	Perentage
Poor	3	5.4	0	0.0
Fair	31	55.4	24	42.9
Good	22	33.9	32	57.1

Table 4. Influence of nurses' characteristics on handoffs and information-exchange quality

Variable	p-value
Age	0.032*
Sex	0.879
PK Level	0.117
Education	0.825

Table 5. Differences in handoffs and information-exchange quality before and after I-PASS Training

Mean	SD	t	p-value
0.955	0.666	15.109	0.000

Table 6. Backward linear regression analysis of nurses' characteristics and I-PASS training on handoffs and information-exchange quality

Step	Variable	B Value	p-value	R square
Step 1	Constant	2.001	0.000	0.112
	Age	0.212	0.020	
	PK level	–0.272	0.062	
	I-PASS training	0.223	0.063	
Step 2	Constant	1.989	0.000	
	Age	0.211	0.019	
	PK level	–0.271	0.060	
	I-PASS training	0.221	0.029	

improving nurses' cognitive capacity. Continuous training has been shown to enhance nurses' knowledge and competence in clinical practice [24,25], influencing professional attitudes and behaviors [26].

Although general improvement occurred, item-level analysis revealed variations in understanding, particularly regarding the purpose of handoff, patient summary, synthesis by receiver, and situation awareness, indicating limitations in applied and analytical abilities. This suggests that some nurses have not fully mastered aspects of responsibility transfer, information validation, and anticipatory planning in clinical communication. Overall, the I-PASS training effectively improved nurses' knowledge, but strengthening case-based learning and clinical reasoning is needed to optimize implementation in clinical practice.

I-PASS training improved the quality of handoffs and information exchange from the fair category (55.4%) to the good category (57.1%). This aligns with [27], which indicates the effectiveness of interventions in improving clinical communication. These findings also correspond with previous studies showing that I-PASS implementation enhances handoff quality and patient safety through more structured communication [28].

Conceptually, handoffs and information exchange involve the transfer of responsibility and clinical information that must be accurate, concise, and systematic to ensure continuity of patient care [29]. The improvement in quality after training indicates enhanced nurse competence in cognitive aspects, communication skills, and professional behavior [28]. From Imogene King's theoretical perspective, this reflects the success of the interpersonal system through effective communication that produces optimal transactions in achieving patient safety [17].

However, several aspects remain suboptimal, particularly in patient summary, synthesis by receiver, and consistency in using the I-PASS structure, indicating that communication is not yet fully action-oriented or reflective of closed-loop communication. Additionally, attention, workload, and adherence to privacy principles influence handoff effectiveness in clinical practice. The relatively high frequency of handoff implementation has not been fully accompanied by optimal quality, as shown by variations in moderate and low categories. This indicates the need for strengthened implementation through monitoring, evaluation, and habituation of structured I-PASS-based communication. Overall, I-PASS training effectively improved handoffs and information-exchange quality, but optimal implementation requires increased consistency, two-way communication, and adherence to patient-safety standards.

Bivariate analysis results show that only age had a significant relationship with handoffs and information-exchange quality. This finding indicates that differences in nurses' age may be associated with variations in the quality of handoff and information exchange in nursing practice. Thus, age can be considered an individual characteristic that supports communication effectiveness, accuracy of information delivery, and continuity of patient care during handoff. This aligns with previous findings showing that age is an individual factor influencing clinical communication effectiveness among nurses, particularly in delivering, receiving, and clarifying information during handoff [19,20]. More mature age supports improved communication quality due to enhanced critical thinking, emotional maturity, and broader clinical experience [19,20].

Bivariate analysis of differences in handoff and information-exchange quality shows a significant difference before and after I-PASS training, with a mean increase of 0.95 and $p = 0.000$, confirming the intervention's effectiveness in improving nurses' clinical communication quality. This finding aligns with studies showing increased adherence to I-PASS use from 41.6% to 70.5% after intervention [30]. Other studies also reported improvements in handoff quality from 49% to 83% with high significance [31], and reductions in communication errors by up to 56% through I-PASS implementation [32].

I-PASS is a structured communication method proven effective in improving handoffs and information-exchange quality and patient safety [33]. I-PASS training enhances nurses' competence in communication, time efficiency, and information accuracy during patient handoff [34]. Additionally, I-PASS implementation contributes to strengthening patient-safety culture, including teamwork and feedback communication [35].

From Imogene King's theoretical perspective, improved handoff quality reflects the success of the interpersonal system through effective communication that produces optimal transactions in achieving patient-safety goals [17]. Thus, I-PASS training significantly improves handoffs and information-exchange quality and supports evidence-based practice in nursing services.

Backward linear regression analysis shows that age ($p = 0.019$) and I-PASS training ($p = 0.029$) are significant factors influencing handoffs and information-exchange quality, contributing 11.2% ($R^2 = 0.112$), while the remaining variance is influenced by other factors outside the model [36]. This finding confirms that age and training are key determinants in improving nurses' clinical communication quality.

This finding aligns with research [37] showing that nurses' age contributes to improved handoff communication quality in hospitals. The age range of 25–35 years reflects maturity, work engagement, and optimal critical-thinking ability, supporting more systematic, accurate, and responsible handoff communication in clinical practice.

The results of this study are consistent with studies [38,39] showing that the I-PASS method is the most influential factor in improving handoffs and information-exchange quality. Standardized communication through I-PASS enhances clarity, completeness, and accuracy of clinical information, and strengthens patient safety through more effective and systematic care transitions [40]. However, the low R^2 value indicates that handoff and information-exchange quality is also influenced by other factors such as communication competence, workload, teamwork, patient-safety culture, and work environment [12,33]. Additionally, successful I-PASS implementation requires continuous reinforcement through monitoring, audits, and feedback.

From Imogene King's theoretical perspective, these findings reflect the interaction between the personal system (age) and the social system (I-PASS training), which strengthens effective interpersonal communication among nurses, supporting patient safety through improved handoffs and information-exchange quality [17]. Overall, this study confirms that I-PASS training is an effective intervention for improving handoff communication quality in hospitals. However, optimal results require additional strategies such as case-based simulation, strengthened adherence to communication structure, and continuous evaluation to ensure consistent implementation in clinical practice.

This study has limitations, including a pre-experimental design without control groups and randomization, which may introduce selection bias, and a sample limited to one hospital, restricting generalizability. Additionally, variations in respondents' understanding of applied I-PASS communication, uneven handoff implementation, and the absence of external factors such as workload, teamwork, organizational culture, and system support limit the findings. The knowledge instrument also lacked expert validation, affecting content validity.

This study reinforces that I-PASS training and knowledge play important roles in improving handoffs and information-exchange quality and support Imogene King's theory regarding interactions among personal, interpersonal, and social systems in nursing. Practically, I-PASS training effectively improves handoff communication quality and can be implemented as a continuous program to support patient safety and service quality.

CONCLUSION

This study concludes that the I-PASS training method is effective in improving the quality of handoffs and information exchange among nurses at Hospital X, West Jakarta. The improvement is reflected in the increased knowledge of nurses after the training and the enhanced clarity,

accuracy, and consistency of communication during handoff processes. The analysis further demonstrates that I-PASS training significantly influences handoff communication quality, indicating that this structured method can strengthen the precision, completeness, and continuity of information transfer among nurses.

These findings underscore the importance of implementing I-PASS training as a continuous program supported by supervision, audits, and feedback to ensure consistent handoff practices and reinforce patient safety. Based on the results, hospitals are advised to integrate I-PASS training into standard operating procedures for patient handover. Nursing education institutions should also incorporate I-PASS-based handoff communication training through simulation and clinical practice to strengthen students' competencies in structured communication.

Ethical consideration, competing interest and source of funding

-The study adhered to ethical principles of autonomy, confidentiality, and beneficence. All participants provided informed consent prior to data collection. Ethical approval was obtained from the institutional review board, and participation was voluntary with the option to withdraw at any stage.
-The author declares that there is no conflict of interest in this study and affirms that all research procedures were conducted objectively without any external influence.
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