



Effect of Health Service Quality Education on Phlebitis Prevention Practices among Nurses in Community Health Centers: A Quasi-Experimental Study

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ABSTRACT

Phlebitis is one of the most common complications associated with intravenous (IV) catheter insertion and is characterized by inflammation of the vein wall, causing pain, redness, and discomfort. This study aimed to analyze the effect of health service quality education on phlebitis prevention practices among healthcare workers at selected inpatient Community Health Centers (Puskesmas) in Makassar City. This study employed a quasi-experimental design using a one-group pretest-posttest approach. The study was conducted from January to March 2025 at Bara-Baraya Community Health Center, Mamajang Kassi-Kassi Community Health Center, and Patingalloang Community Health Center in Makassar City. A total of 50 healthcare workers were selected using purposive sampling based on predetermined inclusion criteria. Data were collected using validated questionnaires and observation sheets before and after the educational intervention. Instrument validity and reliability tests were conducted prior to data collection, and all instruments were declared valid and reliable. Data were analyzed using descriptive statistics and the Wilcoxon Signed Rank Test with a significance level of $\alpha = 0.05$. The results showed that 37 respondents experienced an increase in posttest scores, while 13 respondents showed no change. No respondents experienced a decrease in scores after the intervention. The Wilcoxon Signed Rank Test showed a significant difference between pretest and posttest scores with a p-value of 0.000 ($p < 0.05$). These findings indicate that health service quality education had a significant effect on improving phlebitis prevention practices among healthcare workers at Community Health Centers in Makassar City.

INTRODUCTION

Phlebitis is a complication that often occurs after intravenous (IV) insertion and is characterized by inflammation of the vein walls, causing pain, swelling, and redness (Sagoe et al., 2026). In primary healthcare services, phlebitis rates are still frequently reported because the quality of healthcare services remains inconsistent and educational programs for healthcare workers are not yet optimal (Subhi et al., 2024). This condition indicates that healthcare service quality plays an important role in preventing phlebitis and improving patient safety.

The quality of care is influenced by the ability of healthcare workers to maintain aseptic principles and perform proper IV insertion techniques (Sun et al., 2025). Several studies confirm that improving service quality is not sufficient through knowledge alone. Healthcare workers require continuous education, repeated practice, and direct supervision to ensure consistent implementation of standard operating procedures (Sembiring and Sinaga, 2024). Effective educational interventions have also been shown to improve clinical skills and adherence to phlebitis prevention procedures among healthcare workers (Demiroğlu Dost & Tosun, 2025).

According to the World Health Organization (WHO), the acceptable incidence rate of phlebitis is approximately 5% per year. However, international surveys indicate that the average incidence rate reaches 8.7%, with variations across regions. The Western Pacific region, including Indonesia, reports a phlebitis incidence of around 9%, while the global incidence may reach 19.3% (Marsh et al., 2020). In Indonesia, the incidence of phlebitis remains higher than national and international standards, reaching 50.11% in government hospitals and 32.70% in private hospitals (El-Shazly et al., 2026). These findings demonstrate that phlebitis remains a significant healthcare problem requiring effective prevention strategies.

The situation at several inpatient Community Health Centers (Puskesmas) in Makassar City also highlights the need to strengthen healthcare service quality. The Bara-Baraya Community Health Center recorded several adverse events associated with suboptimal hygiene practices (Survei Internal Puskesmas Bara-Baraya, 2022). In addition, the Mamajang and Patingalloang Community Health Centers experience high workloads and variations in the implementation of standard procedures, which may increase the risk of infection and phlebitis among patients. Therefore, educational programs focusing on healthcare service quality are considered important to improve healthcare workers' compliance with phlebitis prevention procedures (Mobed et al., 2025).

Previous studies have primarily focused on phlebitis prevention in hospital settings and emphasized clinical or technical factors, such as catheter type, duration of infusion, and insertion techniques (Wulansari, n.d.). Meanwhile, studies examining the effect of healthcare service quality education on phlebitis prevention practices among healthcare workers in inpatient Community Health Centers are still limited (Scholarworks et al., n.d.). In addition, few studies have specifically evaluated the effectiveness of educational interventions in improving healthcare workers' adherence to phlebitis prevention procedures in primary healthcare settings. This condition indicates a research gap that needs to be addressed to improve patient safety and healthcare service quality at Community Health Centers (El-Sayad et al., 2023).

Therefore, this study aimed to analyze the effect of health service quality education on phlebitis prevention practices among healthcare workers at inpatient Community Health Centers in Makassar City.

METHODS

This study employed an analytical research design with a quasi-experimental one-group pretest-posttest approach. The study aimed to determine the effect of nursing service quality education on phlebitis prevention among nurses at Community Health Centers in Makassar

City. A quantitative quasi-experimental approach without a control group was applied to assess changes in phlebitis prevention practices before and after the educational intervention.

The population of this study consisted of all nurses working at inpatient Community Health Centers in Makassar City. The study was conducted from January to March 2025 at Bara-Baraya Community Health Center, Mamajang Community Health Center, and Pattingalloang Community Health Center. A total of 50 nurses were selected as respondents using a purposive sampling technique based on predetermined inclusion and exclusion criteria. The sample size was considered adequate to evaluate changes in phlebitis prevention practices before and after the educational intervention within the quasi-experimental study design.

The inclusion criteria were nurses who had worked for at least one year, were actively involved in infusion services, had never received structured training on phlebitis prevention and nursing service quality, and were willing to participate in the study by providing informed consent. The exclusion criteria included nurses who were on leave or sick during the data collection period, those who were unable to attend the entire series of educational sessions, and those who did not complete the pretest or posttest questionnaires.

The intervention involved the provision of education on nursing service quality. The educational sessions were delivered using audiovisual media, presentations, and interactive discussions covering topics such as nursing service quality standards, safe infusion techniques, and phlebitis prevention and management. The education was conducted through structured sessions to ensure that all respondents received the same material.

Data were collected using validated pretest and posttest questionnaires and observation sheets to assess phlebitis prevention practices before and after the intervention. Instrument validity was assessed using the Pearson Product-Moment correlation test, and all questionnaire items were found to be valid. Reliability testing was conducted using Cronbach's Alpha coefficient, and the results showed a Cronbach's Alpha value of 0.82, indicating that the instruments were reliable and suitable for data collection.

The collected data were processed through coding, editing, and scoring and were subsequently tabulated for analysis. Statistical analysis was performed using the Wilcoxon Signed-Rank Test in the Statistical Package for the Social Sciences (SPSS) version 20.0 to determine differences and evaluate the effect of the educational intervention. A p-value of less than 0.05 was considered statistically significant. This study received ethical approval from the Health Research Ethics Committee of the Faculty of Public Health, Muslim University of Indonesia.

RESULTS

Respondent characteristics

Based on table 1, the characteristics of the respondents show that the majority of respondents are female, namely 45 people (90%), while there are 5 men (10%). The majority of the respondents are in early adulthood, namely 33 people with ages ranging from 26–35 years, followed by 15 late adults, namely with ages ranging from 36–45 years, and the remaining 2 people are early elderly with ages ranging from 46–55 years. For length of service, the majority of respondents were in the 4–6 years category, as many as 21 people (42%),

followed by 1–3 years as many as 15 people (30%), 7–9 years as many as 12 people (24%), and 10 years as many as 2 people (4%).

Table 1. Distribution Of Respondents by Gender, Length of Service and Age.

Respondent characteristics		n	%
Jenis Kelamin	Man	5	10,0
	Woman	45	90,0
Age	Early Adulthood	33	66,0
	Late Adulthood	15	30,0
	Early Elderly	2	4,0
Length of Service	1-3 Years	15	30,0
	4-6 Years	21	42,0
	7-9 Years	12	24,0
	≥10 Years	2	4,0
Total		50	100,0

Source: Primary Data, 2025

Table 2. Distribution of Phlebitis Prevention Categories Before Education (n=50)

SOP Procedure	According to SOP		Not According to SOP		Not Performed	
	n	%	n	%	n	%
Procedure 1 (P1)	38	76,0	12	24,0	0	0,0
Procedure 2 (P2)	41	82,0	9	18,0	0	0,0
Procedure 3 (P3)	14	28,0	17	34,0	19	38,0
Procedure 4 (P4)	37	74,0	12	24,0	1	2,0
Procedure 5 (P5)	36	72,0	11	22,0	3	6,0
Procedure 6 (P6)	36	72,0	11	22,0	3	6,0
Procedure 7 (P7)	13	26,0	20	40,0	17	34,0
Procedure 8 (P8)	22	44,0	26	52,0	2	4,0
Procedure 9 (P9)	35	70,0	13	26,0	2	4,0
Procedure 10 (P10)	20	40,0	28	56,0	2	4,0
Procedure 11 (P11)	20	40,0	12	24,0	18	36,0
Procedure 12 (P12)	19	38,0	31	62,0	0	0,0
Procedure 13 (P13)	7	14,0	20	40,0	23	46,0
Procedure 14 (P14)	38	76,0	10	20,0	2	4,0
Procedure 15 (P15)	8	16,0	19	38,0	23	46,0
Procedure 16 (P16)	13	26,0	34	68,0	3	6,0
Procedure 17 (P17)	16	32,0	34	68,0	0	0,0
Procedure 18 (P18)	42	84,0	5	10,0	3	6,0

Source: Primary Data, 2025

Table 2 presents nurses' compliance with phlebitis prevention standard operating procedures (SOPs) before the educational intervention. Compliance levels varied considerably across the assessed procedures. The highest compliance rates were observed for P18 (84.0%),

P2 (82.0%), P1 (76.0%), and P14 (76.0%). In contrast, the lowest compliance rates were found for P13 (14.0%), P15 (16.0%), P7 (26.0%), and P16 (26.0%). Several procedures also showed substantial proportions of activities that were not performed, particularly P13 and P15 (46.0% each), followed by P3 (38.0%) and P11 (36.0%). These findings indicate variability in adherence to phlebitis prevention SOPs among nurses prior to the educational intervention.

Table 3. Comparison of Phlebitis Prevention Categories Before and After Education

Variable	N	Negative Ranks	Positive Ranks	Ties	<i>p-value</i>
Post Test	50	0	37	13	<0.001

Source: Primary Data (Processed), 2025

Table 3 shows that 37 respondents experienced increased posttest scores, while 13 respondents had unchanged scores after the educational intervention. No respondents experienced decreased scores. The Wilcoxon Signed Rank Test showed a statistically significant difference between pretest and posttest scores ($p < 0.001$).

DISCUSSION

The results showed that health service quality education had a significant impact on phlebitis prevention in community health centers in Makassar City (Table 3). Educational interventions improved clinical practices among healthcare workers, particularly in previously deficient areas such as aseptic technique, catheter size selection, and intravenous (IV) line monitoring. The educational materials focused on the three main causes of phlebitis, namely infectious, chemical, and mechanical factors, thereby making the intervention more targeted.

Infectious phlebitis occurs when microorganisms enter the IV line as a result of improper aseptic practices. Langingi et al. (2022) explained that infection is the primary cause of phlebitis, while Safitri et al. (2023) highlighted the increased risk when IV insertion is not preceded by appropriate skin disinfection or is performed using non-sterile equipment. Mimoz et al. (2024) demonstrated that non-adherence to aseptic procedures increased complications, whereas the consistent use of catheter care bundles reduced their occurrence. Marsh et al. (2020) emphasized the importance of regular dressing assessment, and Guanche-Sicilia et al. (2021) added that hand hygiene is a critical measure for preventing contamination.

Chemical phlebitis is caused by fluids or medications with high concentrations or osmolarities that may irritate the vein wall (Puspitasari & Saelan, 2023). Cernuda-Martínez et al. (2025) found that the type of medication administered and the duration of catheter insertion were strongly associated with an increased risk of phlebitis. These findings are supported by Md Vera Susiladewi et al. (2023), who emphasized that careful medication selection, appropriate dosage, controlled infusion rates, and regular monitoring of vein conditions are essential for preventing chemical irritation.

Mechanical phlebitis occurs as a result of physical trauma to the vein, such as the use of an inappropriately sized catheter or excessive catheter movement (Afriza et al., 2024). This study identified the continued use of cannulas that were too large for the patient's venous condition. Yasuda et al. (2021) emphasized that insertion sites located in highly mobile areas

increase the risk of phlebitis, whereas Jois Maragani et al. (2021) highlighted the importance of catheter stabilization in preventing repeated friction.

The observational findings revealed persistent inconsistencies in practices, including failure to perform hand hygiene before IV insertion, touching the insertion site after disinfection, and securing catheters in non-sterile areas. These findings are consistent with those of Alshagrawi and Alhodaithy (2024), who reported that workload, time constraints, and the work environment significantly influence compliance with infection prevention and control (IPC) measures. The effectiveness of educational interventions is further supported by studies conducted by Meszaros et al. (2023), Nuraini and Prasetyorini (2024), and Tegegne et al. (2025), which demonstrated that direct coaching, practical demonstrations, and repeated practice are more effective than theoretical instruction alone. However, sustainable behavioral change still requires routine supervision and adequate facilities, as reported by Sinaga, Lousiana, and Simbolon (2022) and Margao et al. (2023). Therefore, educational programs should be implemented periodically and accompanied by system-level improvements to ensure that phlebitis prevention practices are performed more consistently and effectively.

CONCLUSION

This study concludes that nursing service quality education is effective in improving phlebitis prevention practices among nurses at Community Health Centers in Makassar City. The educational intervention provides an interactive and structured learning environment that enhances understanding and promotes the implementation of safe infusion practices. Nurses, as frontline healthcare providers, are strategically positioned to consistently implement preventive measures in daily clinical practice. Therefore, the provision of regular and continuous education on service quality and phlebitis prevention is essential for strengthening patient safety and improving the overall quality of nursing care.

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