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OBSERVATIONAL STUDY ON THE ANALYSIS OF PHLEBITIS INCIDENCE AND CONTRIBUTING FACTORS IN THE CLASS 2 INPATIENT WARD AT dr. SOEBANDI REGIONAL HOSPITAL JEMBER

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ABSTRACT

Rumah sakit dapat menyebarkan infeksi nosokomial, termasuk phlebitis, dalam 72 jam setelah pasien dirawat. Phlebitis, yaitu peradangan pada vena yang sering disebabkan oleh pemasangan infus, dapat menyebabkan infeksi sistemik yang parah. Studi ini meneliti kejadian phlebitis di ruang rawat inap kelas 2 di RSD dr. Soebandi Jember, menggunakan metode analitik observasional dan sampel kuota dari 88 pasien dewasa dari populasi 756 pasien, dipilih dengan rumus Slovin. Observasi dilakukan dari 10-18 September 2024 menggunakan Skala Visual Infusion Phlebitis (VIP) dan data rekam medis. Hasil menunjukkan 77 pasien (87,5%) No mengalami phlebitis, dan 11 pasien (12,5%) mengalami phlebitis: 8 pasien (9,1%) dengan derajat 1 ringan dan 3 pasien (3,4%) dengan gejala derajat 2. Faktor yang berkontribusi meliputi usia, jenis kelamin, penyakit kronis, dan reaksi terhadap obat-obatan tertentu. Studi ini menekankan pencegahan infeksi melalui kepatuhan terhadap standar prosedur operasional untuk perawatan infus.

ABSTRAK

Hospitals can spread nosocomial infections, including phlebitis, within 72 hours of admission. Phlebitis, an inflammation of veins often caused by IV lines, can lead to severe systemic infections. This study examines the incidence and contributing factors of phlebitis in Class 2 inpatient wards at RSD dr. Soebandi Jember, using observational analytic methods and a quota sampling of 88 adult patients from a 756-patient population, selected via Slovin's formula. Observations from September 10-18, 2024, involved the Visual Infusion Phlebitis Scale (VIP) and medical records. Results showed 77 patients (87.5%) without phlebitis, and 11 patients (12.5%) with phlebitis: 8 (9.1%) with mild degree 1 and 3 (3.4%) with degree 2 symptoms. Contributing factors include age, gender, chronic diseases, and reactions to certain medications. These findings suggest the importance of adherence to standard operating procedures for IV care to prevent infections. Practical implications include improving nurse training on IV care protocols to minimize phlebitis and related complications, thereby enhancing patient outcomes.

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Introduction

Healthcare facilities, including hospitals, long-term care centers, and outpatient clinics, are potential sources of infections acquired during patient care. These infections, known as Healthcare-Associated Infections (HAIs), typically develop after 72 hours of admission or event discharge, affecting vulnerable patients (World Health Organization, 2020). HAIs are caused by various pathogens, such as bacteria, viruses, or fungi, and can lead to severe complications, including systemic bloodstream infections, organ damage, and mortality. Among the types of HAIs, phlebitis—an inflammation of the veins—is a common complication associated with intravenous therapy (Rusli et al., 2023). Phlebitis affects a significant proportion of hospitalized patients, particularly those with peripheral intravenous catheters (PIVCs). According to the World Health

Organization (2024), the prevalence of HAIs globally ranges between 5.7% and 19.1%, with severe consequences for patients in critical care settings, such as ICUs and septic patients. Studies indicate that 35% to 50% of inpatients with PIVCs experience phlebitis, influenced by factors such as catheter size, patient age, and duration of catheter use (Zingg et al., 2023).

At the national level, research conducted by Pinto et al. (2024) in a medical ward of a national hospital reported phlebitis rates of 39.3% due to cannula size, 26.8% due to age, and 37.5% due to cannula duration. Regionally, studies in Central Java highlighted phlebitis rates reaching 86.7% among Class 3 patients at RSUD Tugurejo Semarang. Similarly, in Santa Elisabeth Hospital Medan, phlebitis occurred in 60% of inpatients in the early stages and 21% at high risk (Karo et al., 2024). Phlebitis is categorized based on its cause: mechanical, chemical, or infective. Mechanical phlebitis occurs due to friction from foreign objects (e.g., cannulas) within veins, causing (Stokowski et al., 2009 Higginson & Parry, 2011). Chemical phlebitis arises from intravenous medications or fluids with high or low pH and osmolarity (Kohno et al., 2009; Higginson & Parry, 2011). Infective phlebitis results from bacterial colonization at the cannula site, which can progress to systemic bloodstream infections (Malach et al., 2006 in Higginson & Parry, 2011). Clinically, phlebitis presents with symptoms such as pain, redness, swelling, induration, warmth, fever, and palpable venous cords (Hinkle & Cheever, 2018)in severe cases. These symptoms necessitate prompt evaluation and intervention to prevent progression to systemic infections (Torné-Ruiz et al., 2023).

Nurses play a pivotal role in preventing phlebitis-related infections through proper care of PIVCs, including routine assessment of insertion sites and adherence to aseptic techniques. Standard practices, as outlined, SPO DPP PPNI, (2021) include obtaining informed consent before catheter insertion, performing hand hygiene, disinfecting insertion sites with 70% alcohol, ensuring proper catheter fixation, and applying transparent dressings. Aseptic techniques are essential to reduce cross-infection risks, particularly during invasive procedures in patients susceptible to infections. Infection control measures, including maintaining hospital cleanliness and rigorous protocols, are critical to minimizing nosocomial infections (Higginson & Parry, 2011).

Locally, the January 2024 nursing evaluation at RSD Dr. Soebandi Jember reported a phlebitis rate of 25.8%, with 8 of 31 Class 2 inpatients exhibiting symptoms such as pain, redness, swelling, and warmth at IV catheter sites. However, detailed analyses of phlebitis types, severity, and contributing factors were not provided. This data gap prompted further investigation into the incidence of phlebitis and its contributing factors at the hospital. Through this study, the researcher aims to comprehensively analyze phlebitis incidence in the Class 2 inpatient ward at RSD. Dr. Soebandi contextualizes the findings with regional and national prevalence trends. By identifying key factors influencing phlebitis rates, the study seeks to inform strategies for enhancing patient safety and quality of care.

Research Methodology

Research Design

The research employs an observational analytic design, which examines real-life phenomena, events, or situations in depth without intervention, analyzing relationships among the variables involved. In observational analytic research, the researcher not only records what is directly observed but also seeks to understand the underlying meaning and patterns of the phenomenon (Sugiyono, 2019). This study was conducted in the Class 2 inpatient ward of RSD Dr. Soebandi from September 10 to 18, 2024. Inclusion criteria include patients aged 18 years and older, whether newly admitted or referred from other units, such as the Emergency Room (ER) or ICU, with an intravenous catheter in place for ≥48 hours. The 48-hour duration was selected because research indicates that the highest incidence of phlebitis occurs within the first 48 hours of catheter placement (Furlan & Lima, 2021). Exclusion criteria are patients aged under 18 years.

Research Sample

The population for this study consists of all patients with intravenous catheters in the Class 2 inpatient ward of RSD dr. Soebandi, totaling 756 adult patients as of August. The sampling technique used is quota sampling, which selects samples from a population with specific characteristics until the desired quota is met according to inclusion and exclusion criteria (Sugiyono, 2019).

The sample quota was determined using Slovin's formula, which is used when the population size is known and relatively large. Slovin's formula allows the researcher to represent the entire population so the study findings can be generalized without requiring a sample size table. Slovin's formula is as follows (Sugiyono, 2019):

$$n = \frac{756}{1 + 756\,(0{,}1)^2}$$

n = research sample
N = research population
e = margin of error (10% or 0.1)

If the study population consists of 756 adult patients with IV lines, the sample size is calculated as follows:
n = 88.3, rounded to 88 patients

Data Collection
The incidence of phlebitis in adult patients with intravenous catheters at RSD Dr. Soebandi Jember was assessed using the Visual Infusion Phlebitis (VIP) Scale, adapted from Jackson (1998) in (Gorski et al., 2016). The VIP Scale evaluates phlebitis based on standardized criteria such as pain, erythema, swelling, and the presence of a palpable venous cord. It is a validated tool widely used in clinical settings with high interrater reliability (above 0.80), ensuring consistent and accurate assessment. Data collection involved daily observations over the study period conducted by trained nurses to minimize bias. Observations focused on assessing phlebitis severity and related patient characteristics, such as age and gender, while documenting environmental factors that could influence outcomes.

Data Analysis
Descriptive analysis was used for categorical data such as gender, the severity degree of phlebitis, and cross-tabulation between characteristics and phlebitis occurrence, presented in frequency and percentage based on severity levels. Numerical data, such as age, were presented as Mean and Standard Deviation if the data were normally distributed. The data was presented as Median and Percentile Values if it was not normally distributed.

Result

The characteristics of the respondents in this study include age, gender, and chronic disease. Age data are presented as mean and standard deviation because the data are typically distributed (p-value = 0.200 or p-value> 0.05). Gender data are presented in terms of frequency and percentage. The results of the respondent characteristics are presented in the table below:

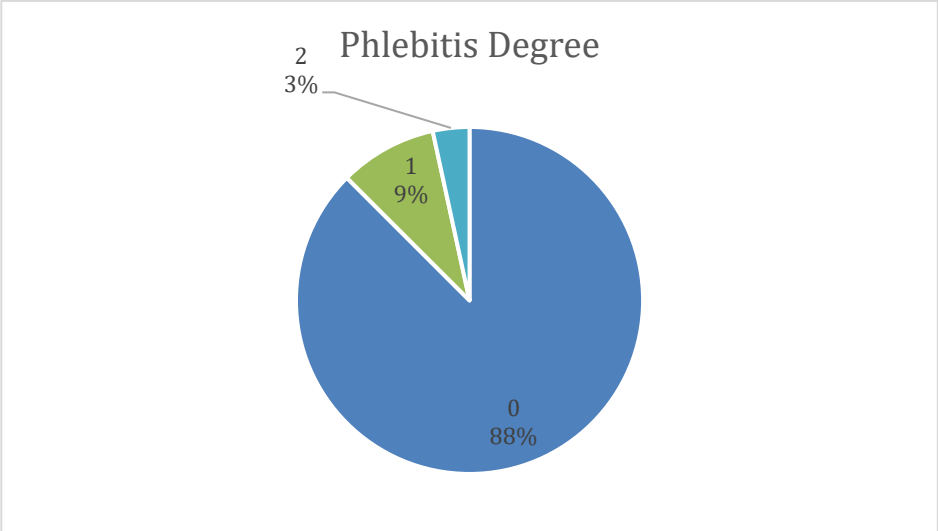
Table 4.1 Mean and Frequency Distribution of Characteristics of Adult Patients with Intravenous Catheters in Class 2 Inpatient Ward of RSD Dr. Soebandi Jember, September 2024 (n = 88).

Respondent Characteristics	f (%)
Age	
Mean ± SD	50.57 ± 14.517
Gender	
Male	47 (53,4%)
Female	41 (46,6%)
Chronic Disease	
Yes	65 (73,9%)
No	23 (26,1%)
Antibiotic Medication	
Yes	36 (40,9%)
No	52 (59,1%)
Analgesic Medication	
Yes	43 (48.9%)
No	45 (51,1%)

Based on Table 1, the average age of the 88 respondents was 50.57 years. More than 50% of the respondents were male, with 47 individuals (53.4%) having intravenous catheters. Most patients had chronic diseases, with 65 individuals (73.9%) having chronic conditions. More than 50% of the patients received antibiotics, 52 individuals (59.1%) received antibiotics, and 45 individuals (51.1%) received analgesics, all of whom had intravenous catheters.

Incidence of Phlebitis in Patients
The incidence of phlebitis in adult patients with intravenous catheters at RSD dr. Soebandi Jember was assessed using the Visual Infusion Phlebitis Scale (VIP). The research results based on the degree of phlebitis are displayed below:

Table 2 Frequency Distribution of Phlebitis Incidence in Adult Patients in Class 2 Inpatient Ward of RSD dr. Soebandi Jember, September 2024 (n = 88)



Phlebitis Incidence	f (%)
Phlebitis	
Yes	11 (12,5%)
No	77 (87,5%)
Phlebitis Degree	
0	77 (87,5%)
1	8 (9,1%)
2	3 (3,4%)

Figure 1 Phlebitis in Adult Patients with Intravenous Catheters in Class 2 Inpatient Ward at RSD dr. Soebandi Jember

Table 4.2 shows that most patients did not experience phlebitis or had a grade 0, with 77 individuals (87.5%). Meanwhile, 11 individuals (12.5%) experienced phlebitis, with eight individuals (9.1%) having grade 1 and 3 individuals (3.4%) having grade 2.

Table 3 Distribution of Phlebitis Indicators Using Visual Infusion Phlebitis Scale (VIP) in Patients at Class 2 Inpatient Ward, RSD dr. Soebandi, September 2024 (n = 88)

Indicator	f (%)
IV line appears healthy	77 (87,5%)
One of the following signs is present: a. Slight pain near the IV line b. Slight redness near the IV line	8 (9,1%)
Two of the following signs are present: a. Pain at insertion site b. Redness/erythema c. Swelling	3 (3,4%)
All of the following signs are present: a. Pain along the cannula b. Redness/erythema c. Induration/hardening at the insertion site and along the vein	0 (0%)
All of the following signs are present: a. Pain along the cannula b. Redness/erythema c. Induration/hardening at the insertion site and along the vein d. Hard vein palpable	0 (0%)
All of the following signs are present: a. Pain along the cannula b. Redness/erythema c. Induration/hardening at the insertion site and along the vein d. Hard vein palpable e. Fever >38°C	0 (0%)

Based on the data in Table 3, most patients had a healthy intravenous line, with 77 individuals (87.5%). Meanwhile, eight individuals (9.1%) experienced slight pain or redness near the IV line. A small number of patients experienced two symptoms (pain at the insertion site, redness, or swelling), totaling three individuals (3.4%).

Table 4 Cross-tabulation of Respondent Characteristics with the Incidence of Phlebitis in Patients in Class 2 Inpatient Ward, RSD dr. Soebandi Jember, September 2024 (n = 88).

Characteristics	*Phlebitis*				Total		Mean ± SD
	Ya		No				
	f	%	f	%	f	%	
Age	11	12,5%			11	12,5%	53,18 ±18,357
Gender							
Male	6	6,8%	41	46,6%	47	53,4%	
Female	5	5,7%	36	40,9%	41	46,6%	
Chronic Disease	10	11,4%	55	62,5%	65	73,9%	
Yes	1	1,1%	22	25%	23	26,1%	
No							
Antibiotic Medication	6	6,8%	30	34,1%	36	40,9%	
Yes	5	5,7%	47	53,4%	52	59,1%	
No							
Analgesic Medication	4	4,5%	39	44,4%	43	48,9%	
Yes	7	7,9%	38	43,2%	45	51,1%	
No							

Based on the data in Table 4, the average age of the patients who experienced phlebitis was 53.18 years. Nearly 50% of male patients did not experience phlebitis (41 individuals or 46.6%), but six male patients (6.8%) did. Most patients with

chronic diseases did not experience phlebitis (55 individuals or 62.5%), but 10 individuals (11.4%) with chronic diseases did.

Table 4 also shows that more than 50% of patients receiving antibiotics did not experience phlebitis (47 individuals or 53.4%). However, six individuals (6.8%) who received antibiotic injections had phlebitis. Nearly 50% of patients receiving analgesics did not experience phlebitis (39 individuals or 44.4%), while seven individuals (7.9%) who experienced phlebitis did not receive analgesic injections.

Discussion

Respondent Characteristics Analysis

The study's results showed that the average age of patients with an intravenous catheter was 50.57 years, and more than 50% were male, with 47 males (53.4%) having an intravenous catheter. This aligns with the study from Akyüz & Turan (2024)which most patients were male, totaling 109 (64.9%) of 168 registered patients, with an average age of 56.71 ± 17.97 years. Similarly Çiftçi, Akgün, & Demirdağ, 2024), it was found that 148 (59.9%) out of 247 patients with intravenous catheters were male. There was no significant relationship between age and gender with the placement of an intravenous catheter.

Most patients had chronic diseases, with 65 patients (73.9%) having an intravenous catheter. This is consistent with Daud & Mohamad, (2021) those who found that nearly 50% of patients with chronic diseases required an intravenous catheter. A study Çiftçi, Akgün, & Demirdağ, 2024) also indicated that 163 patients (66.6%) with chronic conditions required intravenous catheters. The insertion of intravenous catheters in chronic patients aims to deliver intravenous medications, fluids for hydration, and nutritional therapy such as albumin replacement for patients with impaired digestion. Blood samples may also be tested through capillary blood collection near the skin surface. Emergency blood transfusions are also administered via intravenous catheters for patients who have experienced blood loss. Intravenous catheters are also required for chemotherapy in cancer patients and for dialysis access in patients with kidney failure (Gorski et al., 2016; Open Resources for Nursing, 2023).

Over 50% of the patients were given antibiotics, totaling 52 (59.1%) with intravenous catheters. This is in line with Akyüz & Turan (2024)the 129 patients (76.8%) receiving intravenous catheters who were given antibiotics. Intravenous antibiotics are used to treat infections rapidly, ensuring direct delivery into the bloodstream. This is crucial for treating serious or acute infections where a quick response is required to prevent complications. This also provides an adequate dosage and immediate therapeutic effect.

The study also revealed that over 50% of patients received analgesics, with 45 patients (51.1%) with intravenous catheters receiving pain relief. Akyüz & Turan (2024) Similarly, it was reported that most patients with peripheral intravenous catheters received analgesics, totaling 116 patients (69%). Intravenous administration of analgesics provides faster pain relief than oral medication, which is beneficial for acute pain situations. Analgesics are crucial in managing pain levels effectively, allowing for adjustment based on the patient's response. For patients with chronic pain or those undergoing procedures requiring prolonged analgesia, continuous intravenous analgesic therapy can provide stable pain control, enhancing patient comfort and outcomes during medical care (Pastino & Lakra, 2023)

Phlebitis Incidence Analysis

The research findings show that, in general, most patients did not experience phlebitis, with 77 people (87.5%) not affected. This aligns with the study in Kassahun et al. (2022) which 318 individuals (76.1%) did not experience phlebitis. Patients receive proper intravenous catheter care using nurses' standard operating procedures for infusion insertion. According to (Ekaputra & Fatmawati, 2022)the article, nurses' compliance with the standard operating procedures for infusion insertion is closely related to the occurrence of phlebitis. Appropriate nursing interventions can prevent infections such as phlebitis by ensuring the correct use of catheters, including maintaining intravenous therapy, aseptic techniques, proper dressing selection, limiting catheter insertion time to no more than 72 hours, avoiding needle punctures near joints, wrists, or antecubital fossae, and correctly diluting and administering medications as per protocols (Guanche-Sicilia et al., 2021). Therefore, adherence to the standard operating procedures reduces the incidence of phlebitis.

This study was conducted on patients with intravenous catheter care for durations of 48 hours or longer. Following this Furlan & Lima (2021), phlebitis most commonly occurs within 48 hours. This is because patients with peripheral cannula durations of 48–96 hours are more likely to experience complications from peripheral intravenous catheters than those with a duration of less than 24 hours due to potential biological inflammatory responses in patients more susceptible to

such complications (Kassahun et al., 2022). Researchers have suggested that intravenous catheter dwell time should be extended to 72–96 hours if there is no risk of infection or phlebitis. The average dwell time for peripheral intravenous catheters is 43–76 hours. Their study found that peripheral intravenous catheters are typically replaced because patients experience phlebitis, with catheter occlusion and expiration also being reasons for removal (Akyüz & Turan, 2024).

This study's most frequent degree of phlebitis was Grade 1, with eight patients (9.1%) experiencing it. However, the Infusion Nurses Society recommends a phlebitis incidence of 5% or less. The results of this study show a higher phlebitis rate than the recommended threshold. The study also revealed that of the eight patients who experienced phlebitis, 1 received 1 gram of Cefotaxime, 1 received 500 mg/ml of Metamizole sodium, 2 received 1 gram of Ceftriaxone, 1 received 20 mg/ml of Furosemide, 1 received Clanexi, 1 received 1500 mg of Amoxicillin and sulbactam, and 1 received Tramadol intravenously. This finding is consistent with Kassahun et al. (2022) those who found that most complications were Grade 1, bot phlebitis, and infiltration, with 388 people (71.9%) affected. This is similar to a study in China, where most phlebitis (88.4%) and infiltration (93.7%) were Grade 1 (Liu et al., 2022). A study in Japan also found that 72.6% of phlebitis cases were Grade 1 (Yasuda et al., 2021).

The study's most common symptom of phlebitis was mild pain or redness experienced by eight patients (9.1%). This is consistent with the findings that 84.4% of phlebitis cases involved pain or redness. Pain is not an absolute factor for diagnosing Grade 1 phlebitis, as erythema (redness) is a key sign of early phlebitis on this scale, and pain may or may not be present. However, pain can be an early indication of the possible development of phlebitis, even without erythema. Nurses should assess and prevent this condition.

The study also found three patients (3.4%) experienced pain, redness, swelling, or even hardening in the intravenous area, based on the Visual Infusion Phlebitis Scale (VIP) adapted from Jackson (1998) in Gorski, Hadaway, Hagle, McGodrick, & Doellman 2016), with six indicators of phlebitis. Phlebitis, characterized by redness, pain, and swelling, along with pus discharge in bacterial phlebitis cases, is the most common complication of peripheral intravenous catheters (Akyüz & Turan, 2024). Phlebitis disrupts peripheral vascular pathways and may require a new intravenous catheter (Çiftçi et al., 2024; Gorski et al., 2016).

The study's average age of patients who developed phlebitis was 53.18 years. This aligns with the research of Simões, Vendramim, & Pedreira (2022), where the average age was around 59.79 years, with ages ranging from 30 to 60 years. Other findings show that the risk of phlebitis increases in the age group under 60 (Mandal & Raghu, 2019). This is due to the aging process, which leads to more fragile blood vessels, slower cell and tissue regeneration, an increased tendency for coagulation, and a less effective immune system (Farah et al., 2021). Age also increases the risk of phlebitis, as older adults are more prone to fragile, inelastic veins that collapse easily. Aging also triggers thrombus formation and hypercoagulation, further increasing the risk of phlebitis (Karo et al., 2024).

Cross-tabulation in the study shows that male patients with intravenous catheters had the highest incidence of phlebitis, with six males (6.8%) affected. This aligns with the survey Daud & Mohamad (2021), which found that male patients had a higher incidence of phlebitis than female patients. Kaphan et al. (2024) reported that over 50% of male patients developed phlebitis, with 276 males (55.5%) affected. This may be due to more male patients being admitted to orthopedic and medical wards, which are busier than maternity and postpartum wards, where female patients are more common (Daud & Mohamad, 2021).

Further cross-tabulation indicates that most patients with chronic diseases did not experience phlebitis, with 55 patients (62.5%) unaffected. This is consistent with Simões et al. (2022) finding that 826 individuals (66.7%) with chronic diseases did not experience phlebitis. This is because these patients received neutral medications and infusions aministered correctly. However, 10 patients (11.4%) with chronic conditions were most likely to experience phlebitis. This is consistent with Farah et al. (2021), which found that 50% of phlebitis cases occurred in patients with chronic diseases, with 4 out of 8 patients in this study affected. The most common phlebitis cases occurred in patients with a history of Diabetes Mellitus and Hypertension, with percentages of 32.89% and 25%, respectively. This is due to reduced blood flow in peripheral tissues, weakening immune systems, slowed cell regeneration, and endothelial wall injury.

Cross-tabulation also showed that more than 50% of patients who received antibiotics did not experience phlebitis, with 47 patients (53.4%) unaffected. This is because the medication and infusion administration were correct. According to Larsen et al., (2022), some antibiotics cause less irritation to veins than others, reducing the risk of phlebitis. Antibiotics with a lower risk of phlebitis include Azithromycin monohydrate (3%) and Amoxicillin sodium (6%).

Cross-tabulation also showed that patients who developed phlebitis more often received injectable antibiotics, with 6 patients (6.8%) affected. This is consistent with the research by Çiftçi, Akgün, & Demirdağ, (2024), where 85.5% of

patients receiving antibiotics did not develop phlebitis, but 14.9% developed phlebitis after receiving antibiotics. This occurs because of the extravasation impact on the patient after receiving the medication (Kaphan et al. 2024). Chemical phlebitis can directly relate to medications with extreme pH, osmolarity, and/or irritative substances. Drugs with extreme pH are more likely to cause chemical phlebitis, with the risk increasing the more acidic or alkaline the medication.

Injectable antibiotics, such as omeprazole, cefotaxime, ceftriaxone, and piperacillin-tazobactam, are more likely to cause phlebitis compared to antiemetic injections like ranitidine and ondansetron. Antibiotics typically have an acidic pH, which can irritate blood vessel walls. At the same time, antiemetics tend to have neutral pH levels, are less irritative, are often diluted correctly, and are administered with techniques that minimize vein irritation, thus reducing phlebitis risk (Farah et al., 2021; Larsen et al., 2022).

The cross-tabulation of analgesic medication with the incidence of phlebitis in this study shows that almost 50% of patients who received analgesics did not develop phlebitis, with 39 patients (44.4%) unaffected. Conversely, seven patients (7.9%) who developed phlebitis did not receive analgesic injections. This suggests that the nurses effectively implemented phlebitis prevention protocols and standard operating procedures. Tsegaye, Alem, Tessema, & Alebachew (2020) reported that effective intravenous therapy includes proper access care, infusion control, assessment for signs of phlebitis during saline solution changes, medication administration, and constant monitoring. Hanson & Haddad (2024) also, nurses play a critical role in medication administration, ensuring that prescriptions are accurately checked and the correct medication is given to the right patient at the right dose and time. Adherence to the "10 rights" of medication administration, which include correct drug, patient, dose, route, time, assessment, education, documentation, and response evaluation, reduces phlebitis.

On the other hand, the study also found that a small number of patients who experienced phlebitis received intravenous analgesic injections, with four patients (4.5%) affected. This is consistent with the findings from Kaphan et al. (2024), which showed a clear link between analgesic medications and phlebitis. The use of analgesics had a p-value of 0.01, indicating a significant association with complications such as phlebitis, particularly in elderly patients who may experience reduced body function, decreased skin elasticity, and a higher likelihood of needle dislodgement or vascular conditions such as atherosclerosis that affect blood flow. According to Kartini, Istianti, Faizah, Sari, & Nursalam (2022), the attitude and knowledge of nurses are crucial in ensuring compliance with intravenous catheter care. Nurses must maintain strict aseptic techniques to ensure catheter safety, administer medications correctly, routinely inspect catheter sites for infection, verify medication orders and dosages, monitor patients during and after administration, and document everything accurately. Therefore, adherence to proper protocols and standard operating procedures is essential in reducing the risk of phlebitis.

Study Limitations

This study has several limitations that warrant careful consideration when interpreting the results. First, the study was conducted in a single hospital, RSD Dr. Soebandi Jember focuses on a specific patient population. This localized setting may limit the generalizability of the findings to other healthcare facilities or regions with different demographic, clinical, and operational characteristics. Future studies conducted across multiple institutions or areas could provide a broader understanding of phlebitis incidence and contributing factors. Second, the sample size, determined using Slovin's formula, may not fully represent the entire population of patients with intravenous catheter placement. While quota sampling ensured adherence to inclusion criteria, selection bias is possible, as not all eligible patients could be included due to logistical constraints. A larger and more diverse sample obtained through randomized sampling methods may help enhance the representativeness of future studies. Third, the observational design of this study poses inherent limitations. Although this design effectively identifies associations between factors and outcomes, it does not allow for establishing causal relationships. For instance, while certain factors were associated with phlebitis, their direct role as causal contributors cannot be conclusively determined. Incorporating experimental or longitudinal designs in future research may provide deeper insights into causality. Additionally, this study focused exclusively on patients with intravenous catheters in place for 48 hours or more, as prior research indicated this duration poses the highest risk for phlebitis. However, excluding patients with shorter catheter durations may have led to an incomplete understanding of the broader spectrum of phlebitis incidence. Future studies should consider including patients with varying catheter durations to capture a more comprehensive picture of the condition. To address these limitations, further research is recommended, encompassing larger sample sizes, diverse healthcare settings, and alternative methodological approaches, such as randomized controlled trials or multicenter studies. By doing so, future studies can validate the findings of this research and contribute to the development of more robust guidelines for preventing and managing phlebitis across various clinical environments.

Conclusion

The management of phlebitis requires regular monitoring of intravenous access sites, adherence to proper catheter insertion techniques, use of appropriately sized catheters, compliance with aseptic procedures, and minimizing catheter use duration. Nurses play a pivotal role in mitigating the risk of phlebitis by routinely assessing patients for signs such as pain, redness, swelling, and warmth. Best practices recommend evaluating IV catheter sites at least every eight hours to detect early symptoms and ensure timely interventions. Intravenous catheters should be replaced within 48 to 72 hours or sooner if complications arise, as prolonged use increases the risk of phlebitis. To enhance patient outcomes, nurses must document findings, follow established aseptic protocols, and educate patients to report any discomfort or unusual changes at the IV site.

Practical Implications for Clinical Practice

Nurses should incorporate routine monitoring and timely interventions into their practice to effectively prevent and itis in hospital settings. Key strategies to reduce complications include ensuring consistent evaluation of IV sites, adherence to aseptic techniques, and timely catheter replacement. Additionally, hospitals should establish standardized phlebitis prevention protocols and provide regular training for nurses to enhance compliance with evidence-based practices. By adopting these measures, healthcare providers can improve patient safety, reduce the prevalence of HAIs, and foster a culture of high-quality care.

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Conflict of Interest

The authors declare that they have no competing interests.

Credit Author Statement

Dodi Wijaya: Conceptualization, methodology**,** Formal Analysis, validation, Project administration, writing-original draft. **Sofia Rosa Dewi:** Investigation, resources, funding acquisition**. Anisah Ardiana:** Validation, software, data curation**. Achmad Sigit:** Writing-review & editing.

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