

RESEARCH ARTICLE (ORIGINAL)

Peripheral intravenous catheter-associated phlebitis and drug administration: Retrospective incident analysis

Flebite associada a cateter venoso periférico e a administração de medicamentos: Análise retrospectiva de incidentes

Flebitis asociada al catéter venoso periférico y a la administración de fármacos: Análisis retrospectivo de incidentes

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Abstract

Background: Phlebitis is a complication associated with peripheral intravenous catheters and an adverse event.

Objective: To analyze peripheral intravenous catheter-associated phlebitis incidents associated and drug administration to adult inpatients and their consequences.

Methodology: Quantitative, retrospective, descriptive, and cross-sectional study. Non-probabilistic convenience sampling technique was used, with 96 adult patients hospitalized in 2019 selected in the area of medicine at a Hospital Center in Lisbon. The type of phlebitis incident was characterized using the Visual Infusion Phlebitis scale adapted and translated to European Portuguese. Patient harm was categorized according to the International Classification for Patient Safety (ICPS).

Results: Of the documented phlebitis incidents, 78% obtained a score 2 on the VIP PT-PT scale. According to the ICPS, 87.5% resulted in mild harm and 12.5% in moderate harm. Antibiotics were the most frequent therapeutic group.

Conclusion: Phlebitis has an impact on patient safety. The importance of nursing care is reinforced, with a focus on surveillance and early detection of phlebitis to prevent complications.

Keywords: nursing; hospitalization; patient safety; peripheral venous catheterization; phlebitis; adult

Resumo

Enquadramento: A flebite é uma complicação associada à utilização de cateter venoso periférico, classificada como evento adverso.

Objetivos: Analisar os incidentes de flebite associada ao cateter venoso periférico e aos medicamentos administrados em doentes adultos internados e as suas consequências.

Metodologia: Estudo quantitativo, retrospectivo, descritivo e transversal. Técnica de amostragem não probabilística por conveniência sendo selecionados 96 doentes adultos internados em 2019, na área da medicina de um Centro Hospitalar em Lisboa. O grau de flebite foi avaliado pela escala Visual Infusion Phlebitis Score Português Portugal (VIP PT-PT) traduzida e adaptada para Português Europeu. O dano foi categorizado de acordo com a classificação internacional sobre segurança do doente (CISD).

Resultados: Dos incidentes de flebite documentados, 78% classificados com score 2 pela escala VIP PT-PT. Pela CISD, 87,5% resultaram em dano ligeiro e 12,5% em moderado. Os antibióticos foram o grupo terapêutico mais frequente.

Conclusão: A flebite tem impacto na segurança do doente. Reforça-se a importância dos cuidados de enfermagem com enfoque na vigilância e deteção precoce de flebite.

Palavras-chave: enfermagem; hospitalização; segurança do paciente; cateterismo venoso periférico; flebite; adulto

Resumen

Marco contextual: La flebitis es una complicación asociada al uso de catéteres venosos periféricos clasificada como acontecimiento adverso.

Objetivos: Analizar los incidentes de flebitis asociada al empleo de catéteres venosos periféricos y a la administración de fármacos en pacientes adultos hospitalizados y sus consecuencias.

Metodología: Estudio cuantitativo, retrospectivo, descriptivo y transversal. Técnica de muestreo no probabilístico por conveniencia, se seleccionaron 96 pacientes adultos ingresados en 2019 en el área médica de un centro hospitalario de Lisboa. El grado de flebitis se evaluó mediante la escala Visual Infusion Phlebitis Score Portugués Portugal (VIP PT-PT), traducida y adaptada al portugués europeo. El daño se categorizó según la Clasificación Internacional sobre Seguridad del Paciente (CISD).

Resultados: De los incidentes de flebitis documentados, el 78% se clasificó con una puntuación de 2 según la escala VIP PT-PT. Por la CISD, el 87,5% resultó en daño leve y el 12,5% en moderado. Los antibióticos fueron el grupo terapéutico más frecuente.

Conclusión: La flebitis repercute en la seguridad del paciente. Se refuerza la importancia de los cuidados de enfermería centrados en la vigilancia y la detección precoz de la flebitis.

Palabras clave: enfermería; hospitalización; seguridad del paciente; cateterismo venoso periférico; flebitis; adulto



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Introduction

As health systems become more complex, the different contexts of care practice and all its actors face enormous challenges. Best practices and the main challenges currently faced by health organizations require adopting strategies that promote safe health care. Quality of care and patient safety are key aspects and determinants in the development of health systems (Direção-Geral da Saúde, 2011). Creating a safety culture encourages these organizations to adopt a proactive and transparent approach that promotes organizational and behavioral changes in the prevention and management of adverse events. The structuring axis is evidence-based continuous improvement and error-based learning, seeking to control risks and minimize the occurrence and impact of healthcare-related adverse events. Reporting and management of adverse events is a strategy used to identify their contributing factors and develop improvement plans for reviewing work systems and processes (Infusion Nurses Society [INS], 2021).

The Hospital Center where this study was conducted integrates several hospital units that have been using incident reporting systems since 2001. In 2011, a single electronic system was integrated for patient safety incident reporting. The organization and classification of the types of incidents in this electronic platform are in accordance with the International Classification for Patient Safety (ICPS), created by the World Health Organization (WHO) and published by the Portuguese Directorate-General of Health in 2011.

As a result of WHO's third global patient safety challenge, "Medication without Harm," launched in 2017 and in response to an improvement project regarding the recording and monitoring of peripheral intravenous catheter (PIVC)-associated phlebitis, underway in the Medical Area in collaboration with the Patient Safety Office of this hospital center, an update of the reporting system was promoted that same year. Together with a working group from this clinical area, a form was created with specific fields for reporting phlebitis incidents in the "Patient Accidents" category concerning: (i) device characteristics; (ii) catheter location and length of stay; (iii) type and frequency of drug/fluid administration; (iv) phlebitis characterization (signs and symptoms); and (v) interventions/measures implemented.

The growing number of this type of patient safety incident record, observed over subsequent years in this hospital center, justified carrying out a multi-incident analysis of 2018 and 2019. This analysis found that the reports described a greater number of phlebitis in patients undergoing antibiotic, antipyretic, and diuretic therapy. Hence the need to further explore this issue, with a view to developing an improvement plan for the prevention of PIVC-associated phlebitis. Good practices in the insertion and management of intravenous drug/fluid administration devices contribute to preventing and/or minimizing the occurrence of phlebitis and its possible consequences, promoting the quality of nursing care, patient safety, and increased health gains (Infusion Nurses Society [INS], 2021).

The general objective of this research study was to analyze

PIVC-associated phlebitis incidents and the drugs administered to adult inpatients and their consequences. The following specific objectives were defined: to characterize PIVC-associated phlebitis incidents documented in the patient safety incident reporting system; to identify the drugs administered to patients with reported PIVC-associated phlebitis; to classify the consequences of phlebitis incidents using the Portuguese version of the Visual Infusion Phlebitis scale and according to the ICPS; and to describe the measures implemented after a phlebitis incident.

Background

In a patient safety culture, incident prevention should be based on the search for its real determinants. This should be a concern of all those involved, namely nurses. PIVC management requires specific technical and scientific skills for their insertion, maintenance, monitoring, and prevention and treatment of possible complications (Gorski et al., 2021).

PIVCs are the most commonly used intravascular access devices in hospital settings for medication/contrast agent administration, blood/hemoderivative transfusions, and parenteral nutrition (Braga et al., 2018). Between 58.7% to 86.7% of inpatients have a PIVC inserted during their hospital stay, "representing a significant and differentiated portion of the care performed by nurses" (Braga et al., 2018, p. 2). Phlebitis is a complication associated with PIVC use. Because it is an incident that results in unnecessary harm to the patient, it is classified as an adverse event (Direção-Geral da Saúde, 2011).

Its impact varies and can be severe. Its occurrence may be avoidable, and the consequences, if any, may be minimized. To this end, it is essential that nurses identify the main risk factors, detect their presence early, and intervene in their mitigation.

The Infusion Nurses Society (INS) defines phlebitis as an inflammation of a vein that may be accompanied by pain/tenderness, erythema, swelling, purulence, and/or palpable venous cord.

An integrative literature review (Urbanetto et al., 2017) concluded that most articles described the association between phlebitis and several risk factors, such as duration of catheterization; puncture site; length of hospital stay; number of venous accesses; reason for removal; antibiotic administration; intermittent maintenance; and insertion in emergency situations. Also, Lee et al. (2019) conducted a study with the aim of identifying predictive factors of phlebitis in orthopedic inpatients. Factors were identified in several categories: individual (quality/fragility of the vein); chemical (use of contrast and drugs/fluids with high or low pH or high osmolarity); mechanical and infectious (hand hygiene and nurses' experience).

Phlebitis can be chemical, mechanical, infectious, or post-infusion (INS, 2021). Chemical phlebitis may be related to infusates with dextrose infusion (>10%); extremes of pH or osmolarity; certain medications (depending on dosage and length of infusion) such as potassium chloride,

amiodarone, and some antibiotics; (INS, 2021). Factors like “particulates in the infusate; too large an outer diameter of a catheter for the vasculature with inadequate hemodilution; excessive infusion rate” (Gorski et al., (INS, 2021, p. S138) can be related to this type of phlebitis. Phlebitis incidents have an impact on health outcomes as well as on healthcare spending. In Spain, up to 30% of hospital-acquired bacteremia is related to the use of intravascular devices, leading to increased morbidity and higher hospital expenses, which are estimated to be around €18,000 per incident (Muñoz et al., 2018). Also, Furlan and Lima (2020) conducted a quantitative survey with the aim of identifying the cost of procedures to treat phlebitis. A total of 107 phlebitis incidents were reported, referring to 96 patients and 656 procedures, and the total average cost estimate was US\$ 866.18 /year. In Portugal, peripheral venous catheterization is an intervention of the general care nurse, guided by the nursing care quality standards defined by the Portuguese Nurse Association (Ordem dos Enfermeiros, 2001). In addition, the nurse’s intervention is crucial in the prevention of adverse events and the permanent search for excellence in health care (Ordem dos Enfermeiros, 2001).

Research questions

What drugs were most frequently administered to patients with reported PIVC-associated phlebitis; What were the consequences of the reported phlebitis incidents and the measures implemented? Does the phlebitis incident report contain information that can relate this adverse event to drug administration?

Methodology

According to the nature of the problem and the objectives set out, a quantitative, retrospective, descriptive, and cross-sectional study was conducted.

The population of this study included all patients aged 18 years or older admitted to the medical services of a Hospital Center in Lisbon in 2019, a total of 12,254. Of these, 6 038 (49%) are female, and 6 216 (51%) are male. A sample was composed according to the inclusion criteria: age over 18 years; hospitalized in the medical services; incidents reported in the medical area, in the typology “Patient accidents” and whose triggering mechanism was identified as “peripheral vascular access with phlebitis”. A non-probability convenience sampling method obtained a sample of 96 patients admitted to medical services, with phlebitis incidents reported in the internal reporting system, with a representativeness of 0.78%.

The first phase of this study occurred between May and July 2021. It started with the search for all incidents classified under “Patient accidents” and related to phlebitis, reported between 01/01/2019 and 31/12/2019, from the internal patient safety incident reporting system.

First, data were collected from the information recorded in the reports. Then, the medical record was analyzed,

collecting information about the phlebitis incident and its consequences from nursing records, clinical diaries, and discharge notes - through the electronic medical record. Information was also collected in the Integrated Medication Circuit Management System regarding the medications administered on the day of phlebitis detection and in the previous 24 hours.

A database was built (using Microsoft Excel 2016) with the following variables, obtained from the reports and records of the clinical files: patient’s characterization data (age, gender); catheterization (catheter type and gauge; anatomical site of catheter insertion; solution for skin antisepsis at the time of puncture); catheterization maintenance conditions (PIVC dwell time; type and frequency of dressing; catheter with a needless connector); conditions associated with the detection of phlebitis (during the dwell stay or after administration of intravenous drugs/fluids); drugs or other fluids administered through the catheter with associated phlebitis; consequences (signs, symptoms); and interventions performed.

The phlebitis incidents were characterized through the application of the Portuguese version of the Visual Infusion Phlebitis Scale (Ventura, 2019), and the type of harm was categorized according to the ICPS (Direção-Geral da Saúde, 2011). This scale allows assessing the degree of phlebitis through the observation of six signs and symptoms: pain; swelling; erythema; induration; palpable venous cord; and fever. Formal authorization was obtained from the authors through email contact.

This research project received a favorable opinion from the Board of Directors of the hospital center after assessment by the Ethics Committee for Health (process no. 1076/2021) and the Office of Research.

Results

Regarding the sample characterization, the 96 phlebitis incidents relate to 63 (65.6%) male patients and 33 (34.4%) female patients.

Patients were aged between 27 and 97 years, 72% of whom were older than 65. Regarding the PIVC dwell time: 60 incidents recorded 4 or fewer days of dwell time. The most frequent catheter location sites were the forearm ($n = 32$) and right hand ($n = 13$). Regarding PVC gauge: 36 (37.5%) reports were 20 gauge (G); 10 reports (10.4%) were 18G; 8 reports (8.3%) were 22G; and the remaining 42 reports (43.8%) did not identify the gauge. In 60 incidents, phlebitis was detected while the catheter was in place, and in 26 incidents, it was detected after removal. In the remaining 10 incidents, the moment of detection is not recorded, or the moment of detection is not identified. Regarding the type of PIVC dressing: 76 reports (79.2%) identified sterile transparent dressing; one report (1%) referred to non-sterile adhesive; and 19 (19.7%) did not identify the type of dressing used. Regarding the frequency of PIVC dressing, 44 reports (45.8%) reported doing it at the time of catheter replacement. The records of 55 incidents (57.3%) stated that the catheter had a needless connector for intermittent

drug administration. Continuous infusion was recorded in 21 incidents (21.9%), with sodium chloride (7.3%) and polyelectrolyte solution (4.2%) being the most frequent types. The remaining 20 (20.8%) incidents did not report whether the catheter had a needleless connector or not. In six incidents (6.2%), the adminis-

tration of electrolytes on the day of phlebitis detection or 24 hours before was recorded. In incidents associated with antibiotic administration, 1 (28; 29.2%) or 2 antibiotics (14; 14.6%) were administered to the same patient.

These data are summarized in Table 1.

Table 1

Sample distribution according to variables related to medication administration (N = 96)

Variables	Frequency	
	Absolute: No. of incidents (n)	Relative: Percentage of incidents (%)
Catheter with a needleless connector for intermittent drug administration		
Yes	55	57.3%
No	21	21.9%
Unknown	20	20.8%
Total	96	100%
Type of Continuous Infusion		
Sodium chloride	7	7.3%
Polyelectrolyte solution	4	4.2%
Sodium Chloride + Polyelectrolyte solution	2	2.1%
5% dextrose in Sodium Chloride	1	1%
Glucose-polyelectrolyte solution	1	1%
Other infusions	6	6.3%
Without continuous infusion	55	57.3%
Unknown	20	20.8%
Total	96	100%
Administration of electrolytes		
Magnesium sulfate	3	3.1%
Monopotassium phosphate	2	2.1%
Potassium chloride	1	1%
Without administration of electrolytes	90	93.8%
Total	96	100%
Administration of antibiotics		
1 antibiotic	28	29.2%
2 antibiotics	14	14.6%
Without antibiotic	54	56.2%
Total	96	100%

The most commonly administered therapeutic groups were: antibiotics ($n = 42$); diuretics ($n = 21$); analgesics and antipyretics ($n = 14$); and proton pump inhibitors ($n = 12$). The most commonly administered drugs were: furosemide ($n = 21$); pantoprazole ($n = 12$); paracetamol ($n = 11$); piperacillin + tazobactam ($n = 10$); and amoxicillin + clavulanic acid ($n = 9$).

As for the interventions performed after phlebitis detection, the following were identified in the incident reporting system and/or electronic medical record: ice application ($n = 79$); site surveillance ($n = 78$); catheter removal ($n = 71$); dressing ($n = 22$); and topical treatment

($n = 4$).

According to the ICPS, 84 phlebitis incidents (87.5%) resulted in mild harm and 12 (12.5%) in moderate harm. All incidents with moderate harm required a more specific clinical intervention with the need for antibiotic therapy. In these situations, the intravenous route ($n = 7$) was more frequent than the oral route ($n = 5$). The most frequent Visual Infusion Phlebitis scale scores were: score 2 ($n = 75$; 2 signs or symptoms: pain near the insertion site, erythema and/or edema) and 3 ($n = 15$; pain along path of cannula, erythema, and induration). These data are summarized in Table 2.

Table 2

Sample distribution according to variables related to consequences (N = 96)

Variables	Frequency	
	Absolute: No. of incidents (n)	Relative: Percentage of incidents (%)
Degree of harm (according to the ICPS)		
Mild	84	87.5%
Moderate	12	12.5%
Total	96	100%
Signs and symptoms observed, according to the VIP PT-PT scale		
Score 1 – Slight pain near insertion site OR slight redness near insertion site	3	3%
Score 2 – Two of the following are evident: Pain at insertion site; Erythema; Swelling	75	78%
Score 3 – All of the following signs are evident: Pain along path of cannula; Erythema; Induration	15	16%
Score 4 – All of the following signs are evident and extensive: Pain along path of cannula; Erythema; Induration; Palpable venous cord	1	1%
Score 5 – All of the following signs are evident and extensive: Pain along path of cannula; Erythema; Induration; Palpable venous cord; Pyrexia	2	2%
Total	96	100%

Note. ICPS = International Classification for Patient Safety; VIP PT-PT scale = Portuguese version of the Visual Infusion Phlebitis Scale Score.

Discussion

The importance of gender as a risk factor for the onset of phlebitis has been evidenced in several studies. This study found a higher number of male patients (65.6%). In an integrative literature review that included 14 original articles, 57.1% described the association of risk factors for the onset of phlebitis, and only one article identified gender as a risk factor, assigning prevalence to the female gender (Urbanetto et al., 2017), which contradicts the data of our study.

As for the catheter location, the most frequent anatomical sites were the forearm (33.3%) and hand (23%), which corroborates data from studies that identify a higher incidence of complications in catheters inserted in the forearm (Lv & Zhang, 2020) and in the dorsum of the hand (Enes et al., 2016). In the sample studied, 20G was the most frequent (37.5%), followed by 18G (10.4%) and 22G (8.3%). Analyzing the study population (12,254), 20G PIVCs were the most used (50.7%), followed by 22G at 44.9% and 18G at 4.4%.

The data found are supported by the recommendations of the INS (2021), which states that catheters larger than 20G are the most likely to cause phlebitis. In a study developed in a Portuguese healthcare institution, 18G was the most prevalent (Nobre & Martins, 2018).

Most incidents identify the sterile transparent dressing for PIVC fixation (79.2%). This practice is in accordance with the INS (2021), so it does not seem to be associated with the occurrence of phlebitis. The degree of phlebitis detected during dwell time (62.5%) was higher than that

identified after removal. Contrary to these data, a cohort study (Urbanetto et al., 2016) with 171 PIVC patients observed that the frequency of phlebitis after catheter removal was higher than the frequency of phlebitis during dwell time.

The most frequent PIVC dwell time was up to four days (62,5%). The Centers for Disease Control and Prevention recommend that PIVCs be replaced every 72-96 hours. A study conducted by Urbanetto et al. (2016) found that a long catheter dwell time influences the onset of phlebitis. In this study, out of 167 catheters inserted for “more than 72 hours, 24 (14.4%) had signs and symptoms of phlebitis” (Urbanetto et al., 2016, p. 7). A systematic review with meta-analysis concludes that increasing PIVC dwell time does not result in an increased risk of phlebitis and bloodstream infection (Eufrazio et al., 2021). This study concluded that routinely replacing PIVCs “is an ineffective practice that should be changed” and “replacement is safe only when there is a clinical indication” (Eufrazio et al., 2021, p. 82). In 55 incidents (57.3%), the catheter had a needleless connector for intermittent drug administration. In 21 (21.9%) of the 96 incidents, the catheter was being used for continuous infusion solution administration. However, an observational and prospective study with 1069 patients concluded that there are no significant differences in the incidence of phlebitis and infiltration between the use of needleless connectors and the use of infusions to maintain permeability (Liu et al., 2020).

From this study sample, the most frequently administered therapeutic groups were: antibiotics (43.8%); diuretics

(21.9%); analgesics and antipyretics (14.6%); and proton pump inhibitors (12.5%). In the meta-analysis developed by Lv and Zhang (2020), antibiotic administration was identified as an important risk factor for the onset of phlebitis. The results of this study align with those obtained in this meta-analysis regarding antibiotic administration. It should be noted that the most frequently administered drugs were: furosemide ($n = 21$); pantoprazole ($n = 12$); paracetamol ($n = 11$); piperacillin + tazobactam ($n = 10$); and amoxicillin + clavulanic acid ($n = 9$). A study aiming to categorize intravenous drugs as to osmolarity, pH, and vesicant nature according to different levels of risk of tissue injury found that: furosemide was identified as a moderate-risk drug (due to the high pH); piperacillin + tazobactam (4 g/50 mL) was also identified as a moderate-risk drug (due to the high osmolarity); and paracetamol as a low-risk drug (Manrique-Rodríguez et al, 2021). These authors argue that selecting the most appropriate route of administration and vascular access device is crucial to minimize the risk of complications, such as phlebitis.

According to the ICPS, 12 incidents were classified as moderate harm, requiring antibiotic therapy for treatment (5 oral and 7 intravenous). The INS (2021) recommends consistently using a standardized scale for assessing the PIVC insertion site for signs and symptoms of phlebitis. Therefore, the authors chose to use the Portuguese version of the Visual Infusion Phlebitis scale (Ventura, 2019). Regarding the phlebitis classification according to this scale, most phlebitis incidents were classified with score 2 (78%; Table 2). In a study that included 317 inpatients and 532 PIVCs (Atay et al., 2018), phlebitis score 1 was the most common after applying the Portuguese version of the Visual Infusion Phlebitis scale. Therefore, it was found that this scale is applicable in retrospective studies, such as this study, and the relevance of its systematic use in care practice for the prevention and early detection of phlebitis was highlighted.

After phlebitis was detected, the following interventions were performed: ice application ($n = 79$); site surveillance ($n = 78$); catheter removal ($n = 71$); dressing ($n = 22$); and topical treatment ($n = 4$). In this last measure, the application of bacitracin or trolamine is mentioned. If phlebitis is present, the INS recommends determining the possible etiology, applying warm compress, elevating the limb, providing analgesics as needed, and considering anti-inflammatory medication (INS, 2021, p. S138). Topical gels or ointments to treat phlebitis require further study for efficacy (INS, 2021). In the case of chemical phlebitis, the INS (2021) recommends evaluating infusion therapy and need for different vascular access, different medication, slower rate of infusion, or more dilute infusate, and, if suspected, removing the catheter.

The limitations of this study include the difficulty in obtaining detailed information (in the patient's incident report and clinical record) on aspects related to the catheter (dwell time, location, gauge, and use of needleless connector), the dressing used, and phlebitis (time of

detection and status at discharge). In a qualitative study conducted in a Portuguese hospital (Salgueiro-Oliveira et al., 2019), the lack of identification of the exact PIVC insertion site and dwell time were also identified as limitations. The importance of this record is emphasized by Lv and Zhang (2020), who state that recording the date and time of PIVC insertion can help determine the possibilities and feasibility of catheter site change. Also, in a multicenter epidemiological study carried out in France on PIVC-related adverse events (Miliani et al., 2017), the authors concluded that monitoring is paramount for at least 48h after catheter removal as it allows for early identification and mitigation of potential harm during patient care.

Conclusion

This study characterized incidents of phlebitis, which is a nursing care-sensitive indicator. It also identified the most commonly administered drugs to patients with reported phlebitis associated with PIVCs, as well as their consequences. The results highlight the impact of phlebitis incidents on patient safety, length of hospital stay, and the patient's health status. This study reinforces the importance of nursing intervention in the surveillance and early detection of complications associated with phlebitis. The phlebitis categorization by the Portuguese version of the Visual Infusion Phlebitis scale showed that most phlebitis incidents were classified as score 2 - early stage of phlebitis. These values proved to be higher than those presented in the consulted literature (score 1). Thus, the authors recommend the introduction of the Portuguese version of the Visual Infusion Phlebitis and its consistent and standardized application throughout the organization for the early detection of signs and symptoms of phlebitis. Given the difficulty in obtaining detailed information that would allow a deeper analysis, the authors suggest a greater investment in improving the quality of records. On the other hand, recognizing phlebitis as a patient safety incident highlights the importance of its reporting. Therefore, knowing the profile of patients admitted will allow developing improvement plans that promote the definition of best practice procedures, monitoring their implementation, and introducing this theme in the organization's transversal training plan. Given the multifactorial nature of phlebitis, future studies should use larger samples and add new variables for a more accurate characterization of its contributing factors.

Knowing the risk factors, causes, and consequences of phlebitis may contribute to developing strategies that promote patient safety and the quality of drug preparation and administration practices, as well as appropriate PIVC management by monitoring PIVC insertion sites. This may contribute to reducing the occurrence of this type of incident during hospitalization.

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