Risk Factors Associated With the Development of Phlebitis

RESUMO

Objetivo: Investigar os fatores de risco associados ao desenvolvimento de flebite em adultos. Métodos: Trata-se de uma revisão integrativa de literatura nas bases MEDLINE/PubMed, Literatura Latino-Americana e do Caribe em Ciências da Saúde, Base de Dados da Enfermagem, Índice Bibliográfico Español en Ciencias de la Salud, Bibliografia Nacional em Ciências da Saúde Argentina, Index Medicus para o Pacífico Ocidental e Centro Nacional de Informação de Ciências Médicas de Cuba. Para isso apropriou-se dos descritores de ciência em saúde para realizar a busca com intervalo temporal de 2019 a 2024, sendo nas línguas portuguesa, inglesa e espanhola. Resultados: Nota-se que das 10 produções incluídas para a revisão, evidenciou-se que o tempo de internação, o uso de antibióticos, o local da punção e a idade do doente são os fatores mais frequentes associados à complicação. Além disso, poucas produções especificaram qual a etiologia da flebite e calibre do dispositivo de infusão foi associado à maiores incidências de flebite. A comunicação interprofissional e o registro adequado em prontuário são partes fundamentais no cuidado e prevenção da flebite. Conclusão: A prevenção de flebite é um cuidado que deve ser inerente a todos os profissionais de saúde, em especial ao médico e ao enfermeiro. Cabe a eles a discussão sobre os medicamentos de uso do paciente, acidez, osmolaridade, treinamento da equipe multiprofissional, e a identificação de pacientes passiveis de desenvolvimento de flebite, a fim de proporcionar melhor hospitalização e redução de eventos adversos.
DESCRITORES: Flebite; Evento Adverso no Local da Infusão; Assistência Hospitalar; Segurança do paciente.

ABSTRACT

Objective: To investigate the risk factors associated with the development of phlebitis in adults population. Methods: This is an integrative literature review including the MEDLINE/PubMed databases, Latin American and Caribbean Literature in Health Sciences, Nursing Database, Spanish Bibliographic Index in Health Sciences, National Bibliography in Health Sciences Argentina, Index Medicus for the Western Pacific and Cuba's National Center for Medical Sciences Information. The health science descriptors were used to carry out the research between from 2019 to 2024, in Portuguese, English and Spanish. Results: About that of the 10 articles included for the review, the length of stay, the use of antibiotics, the puncture site and the patient's age are the most frequent factors associated with the complication. Furthermore, few studies specified the etiology of phlebitis and the caliber of infusion device was associated with higher incidences of phlebitis. Interprofessional communication and adequate medical records are fundamental resourses in the care and prevention of phlebitis. Conclusion: Preventing phlebitis is a care that must be inherent to all health professionals, especially doctors and nurses. It is up to them to discuss the patient's medications, acidity, osmolarity, training of the multidisciplinary team, and the identification of patients likely to develop phlebitis, in order to provide better hospitalization and reduce adverse events.
DESCRIPTORS: Phlebitis; Adverse Event at the Infusion Site; Hospital Care; Patient Safety.

RESUMEN

Objetivo: Investigar los factores de riesgo asociados al desarrollo de flebitis en la población adulta. Métodos: Se realizó una revisión integrativa de la literatura que incluyó las bases de datos MEDLINE/PubMed, Literatura Latinoamericana y del Caribe en Ciencias de la Salud, Nursing Database, Índice Bibliográfico Español en Ciencias de la Salud, Bibliografía Nacional en Ciencias de la Salud Argentina, Index Medicus para el Pacífico Occidental y el Centro Nacional de Información en Ciencias Médicas de Cuba. Se utilizaron descriptores en ciencias de la salud para realizar la investigación entre 2019 y 2024, en portugués, inglés y español. Resultados: De los 10 artículos incluidos en la revisión, la duración de la hospitalización, el uso de antibióticos, el sitio de punción y la edad del paciente fueron los factores más frecuentes asociados con la complicación. Además, pocos estudios especificaron la etiología de la flebitis y el calibre del dispositivo de infusión se asoció con una mayor incidencia de flebitis. La comunicación interprofesional y una historia clínica adecuada son recursos fundamentales en la atención y la prevención de la flebitis. Conclusión: La prevención de la flebitis es una atención que debe ser inherente a todos los profesionales de la salud, especialmente médicos y enfermeras. Les corresponde discutir la medicación del paciente, la acidez, la osmolaridad, la capacitación del equipo multidisciplinario y la identificación de pacientes con probabilidad de desarrollar flebitis, con el fin de brindar una mejor hospitalización y reducir los eventos adversos.
DESCRIPTORES: Flebitis; Evento Adverso en el Sitio de Infusión; Atención Hospitalaria; Seguridad del Paciente.

DOI: https://doi.org/10.36489/nursing.2025v29i323p10708-10727

Lucas Dalvi Armond Rezende
Nurse. Master's student in Medicine in Endocrinology at the Faculty of Medicine of the Federal University of Rio de Janeiro. Lecturer in the Nursing Department at the Salesian University Center (UniSales).
ORCID: https://orcid.org/0000-0002-3313-852X.

Marco Antônio Oliveira Brito
Medical student at the Escola Superior de Ciências da Santa Casa de Misericórdia de Vitória.
ORCID: https://orcid.org/0009-0001-5711-0353

Davi de Souza Catabriga
Physician. Resident in the General Surgery Medical Residency Program at the Santa Casa de Misericórdia de Vitória Hospital (HSCMV).
ORCID: https://orcid.org/0000-0003-2937-9731

Lucas Zon de Andrade
Physician. Resident in the Internal Medicine Residency Program at the Santa Casa de Misericórdia Hospital in São Paulo (HSCMV).
ORCID: https://orcid.org/0000-0002-0325-5047

Gabriel Confalonieri Bertoldi
Medical student at the Escola Superior de Ciências da Santa Casa de Misericórdia de Vitória.
ORCID: https://orcid.org/0009-0003-3046-7744

Dhener Havel Ribeiro Silva Nascimento
Nurse. Resident of the Multiprofessional Residency Program in Emergency and Trauma Nursing at Contagem Hospital.
ORCID: https://orcid.org/0000-0002-0325-5047

Paula de Souza Silva Freitas
Nurse. Master's and Doctorate in Collective Health from UFES. Lecturer in the Nursing Department at the Federal University of Espírito Santo. Lecturer in the Graduate Program in Nursing (PPGENF) - Professional Master's Degree at UFES.
ORCID: https://orcid.org/0000-0001-9066-3286

Received: 05/02/2025
Approved: 05/17/2025

INTRODUCTION

Intravenous infusion therapy is a technical-scientific procedure that is mainly carried out in a hospital environment by doctors, and especially by nursing staff. Peripheral access is performed by inserting a catheter into a peripheral vein, mainly the dorsal venous network of the hands and forearm[1].

Phlebitis is the inflammation of a vein and is a common complication associated with the use of peripheral intravenous catheters. Some aspects have been described as risk factors for the onset of phlebitis, such as: length of time the catheter has been in place, puncture site, length of hospital stay, use of antibiotics, emergency intervention, gender and number of punctures per patient[2,3].

Phlebitis is classified according to the clinical signs presented by the patient into four grades: grade 1 - erythema around the peripheral intravenous catheter (PIC), with or without pain; grade 2 - local pain with erythema and/or edema; grade 3 - local pain with erythema, edema, induration, palpable venous cord; grade 4 - local pain with erythema, induration and formation of a palpable venous cord > 2.5cm with purulent drainage. In addition, phlebitis can be characterized according to the causal factors into mechanical, bacterial, post-infusion and chemical phlebitis4.

According to the National Patient Safety Program, health care should be carried out with a view to patient safety, promoting a reduction in care risks to the minimum acceptable level. According to the Infusion Nurse Society, the acceptable rate of phlebitis should be 5% or less for a given population. It is therefore necessary to reflect critically on the role of healthcare professionals, especially doctors and nurses, in caring for patients with intravenous devices, given that phlebitis can be an initial route to more complex conditions, such as sepsis[3,5].

The aim was to review the literature on risk factors for developing phlebitis in order to improve evidence-based practice, understanding its pathophysiology and preventive factors.

METHOD

This is an integrative literature review in order to synthesize the studies and generate knowledge about the chosen topic[6]. The ILR is a research method developed in evidence-based medicine, which allows evidence to be incorporated into clinical practice. Its purpose is to gather and systematize the results of research on a given topic or issue, contributing to the robustness of the subject. To do this, RIL has six stages which will be described below[7].

The study followed the six stages proposed for an integrative literature review, including synthesizing the guiding question, searching for primary studies, extracting the selected data, analyzing the included studies, interpreting the data and presenting the review. The Preferred Reporting Items for Systematic Review and Meta-Analyses extension (PRISMA)[8] was used to summarize the study selection process and its stages, as shown in Figure 1.

In the first stage of the research, the topic was chosen, along with the guiding question: "What is the scientific evidence about the risk factors associated with the development of phlebitis?". In addition, keywords were chosen in Portuguese and English using the Descriptors of Health Science/Medical Subjects Headings (DeCs/MeSH): Phlebitis, Peripheral Venous Catheterization, Peripheral, Medical Care and Nursing Care.

Data was searched in the Medical Literature Analysis and Retrieval Sys-

DOI: https://doi.org/10.36489/nursing.2025v29i323p10708-10727

tem Online MEDLINE/PubMed, Latin American and Caribbean Health Sciences Literature (Lilacs), Nursing Database, Spanish Bibliographic Index in Health Sciencesography , Argentine National Bibliin Health Sciences (BINACIS), Index Medicus for the Western Pacific (WPRIM) and Cuba's National Medical Sciences Information Center (CUMED), in English, Portuguese and Spanish.

The inclusion criteria were: original articles available online in full, with a publication year between 2019 and 2024, in Portuguese, English and Spanish, and carried out with adult subjects with a peripheral intravenous catheter, admitted to an inpatient unit, maternity hospital, emergency room or intensive care unit. In addition, monographs, dissertations or theses and preprints were excluded.

To select the articles, the title and abstract of the article were first analyzed to ensure that they met the study's objective and established criteria. Once the relevant studies had been identified, a thorough and exploratory reading was carried out, highlighting the main and relevant points found. Table 2 shows the bibliographic data on the year of publication, authors, title of the article and objective, while Table 3 shows the main findings, as well as the level of evidence, design and study population.

The classification proposed by Melnyk and Fineout-Overholt (2015)7was used to classify the level of evidence of the studies: strong, moderate and weak. Its description is shown in Table 1 below.

Table 1 - Definition and classification of the level of evidence

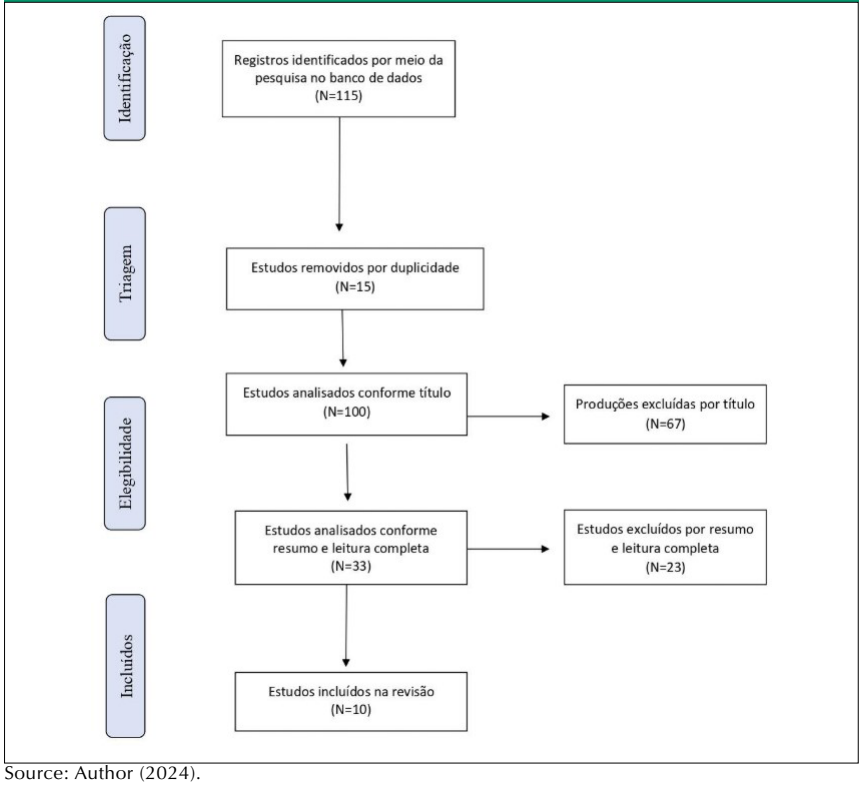
NE	CLASSIFICAÇÃO
Strong	Level 1 - the evidence comes from a systematic review or meta-analysis of all relevant randomized controlled clinical trials or from clinical guidelines based on systematic reviews of randomized controlled clinical trials; Level 2 - evidence derived from at least one well-designed randomized controlled trial
Moderate	Level 3 - evidence obtained from well-designed clinical trials without randomization; Level 4 - evidence from well-designed cohort and case-control studies; non-randomized clinical trial, case-control or cohort
Weak	Level 5 - evidence from systematic reviews of descriptive and qualitative studies; Level 6 - evidence derived from a single descriptive or qualitative study; Level 7 - evidence from the opinion of authorities and/or expert committee reports

Source: Adapted from Melnyk and Fineout-Overholt (2015).
Legend: NE - Level of Evidence.

RESULTS

A total of 115 articles were found in the research carried out in the databases mentioned, 15 of which were excluded due to duplicates. After this process, 100 articles were read by title and abstract, and 67 were excluded. Of the remaining 33 articles, 23 were excluded because they did not fully address the research topic. In this way, 10 (8.69%) articles were selected for the review.

Figure 1 - PRISMA flowchart for article selection.



Source: Author (2024).

DOI: https://doi.org/10.36489/nursing.2025v29i323p10708-10727

The countries of origin of the studies were Brazil with seven articles (70%), followed by one from Spain (10%%) and two from the United States (20%). The journals were not repeated, with one publication each: *Revista de Epidemiologia e Controle de Infecção, Revista da Escola de Enfermagem da USP, Investigacion y educacion en enfermaria*, Revista *Gaúcha de Enfermagem, Revista de Enfermagem Referência, Jornal Brasileiro de Economia da Saúde, Nursing Research and Practice, Revista Baiana de Enfermagem*, Cogitare Enfermagem and Healthcare. There was a prevalence of journals with a nursing scope, with only three journals with an open scope on health sciences.

There has been an increase in searches and research in recent years, especially in 2023 with three articles (30%), 2021 with two articles (20%), 2022 with two articles (20%), 2017 with one article (10%) and 2019 with one article (10%). Table 2 shows the articles included, according to year, journal published, article title and research objective.

Quadro 2 - Quadro sinóptico com os artigos incluídos por autores, título, ano e periódico publicado.

Nº	Quote	Journal	Article	Objective
1	Pereira et al., 2019[9]	Revista de Epidemiologia e Controle de Infecção	Patient safety in the context of phlebitis reported at a university hospital	This study aims to describe phlebitis reported at a university hospital and thus contribute to possible actions to improve the quality of care and patient safety.
2	Furlan et al., 2021[10]	Revista da Escola de Enfermagem da USP	Evaluation of the occurrence of the adverse event phlebitis in patients of a Clinical Hospitalization Unit	Analyze the causes and reasons associated with the occurrence of phlebitis in a medical inpatient unit of a large private general hospital.
3	Cortés et al., 2022[11]	Investigacion y educacion en enfermeria	Evaluation of indicators of a Vascular Access Device Program led by nursing professionals at a high-complexity university hospital in Colombia	Evaluate outcome indicators of the nurse-led specialized vascular access program over a one-year period
4	Urbanetto et al., 2018[1]	Revista Gaúcha de Enfermagem	Risk factors for the development of phlebitis: an integrative literature review	To describe the scientific evidence published in the literature on the risk factors for the development of phlebitis.
5	Tendeiro et al., 2023[12]	Revista de Enfermagem Referência	Phlebitis associated with peripheral venous catheters and drug administration: Retrospective analysis of incidents	Analyze the incidents of phlebitis associated with peripheral venous catheters and medications administered to adult inpatients and their consequences.
6	Ribeiro et al., 2023[13]	Jornal Brasileiro de Economia da Saúde	Peripheral venous catheter-associated phlebitis in cardiology: incidence, risk factors and associated costs	To determine the incidence of phlebitis, associated risk factors and direct treatment costs.
7	Kassahun et al., 2022[14]	Nursing Research and Practice	Incidence and Associated Factors of Failed First Peripheral Intravenous Catheters among Adult Patients at Medical Surgical Wards in Public Referral Hospitals of West Amhara, Ethiopia, 2021	The aim of this study is to evaluate the incidence and failure factors of first peripheral intravenous catheters among adult patients in public referral hospitals in the Amhara region of Ethiopia.
8	Mota et al., 2020[15]	Revista Baiana de Enfermagem	Incidence and characterization of electronically reported phlebitis in a teaching hospital	To analyze the incidence and notifications of phlebitis in a teaching hospital.
9	Guanche–icilia et al., 2021[16]	Healthcare	Prevention and Treatment of Phlebitis Secondary to the Insertion of a Peripheral Venous Catheter: A Scoping Review from a Nursing Perspective	Identify available evidence on nursing interventions for prevention and treatment of phlebitis secondary to peripheral venous catheter insertion.
10	Furlan et al., 2023[17]	Cogitare Enfermagem	Peripheral intravenous catheter insertion, maintenance and removal process: preventive risk analysis	Demonstrate the applicability of Healthcare Failure Mode and Effect Analysis (HFMEA) to preventively analyze the risks related to the insertion process, maintenance and removal of peripheral intravenous catheters.

Source: Author (2024).

DOI: https://doi.org/10.36489/nursing.2025v29i323p10708-10727

In order to present the relevant findings of the 10 studies selected, Table 3 shows the study design, subjects involved, level of evidence, number of vascular accesses and main findings. In the main findings, an active search was carried out for the frequency of phlebitis, variables associated with phlebitis, degree of phlebitis, treatment interventions and place of hospitalization.

As for the first category, 37.5% presented phlebitis as a frequency and 62.5% as an incidence, when applicable. With regard to the category of variables associated with phlebitis, it was found that length of stay, antibiotic use, puncture site and patient age were the most frequent factors associated with the complication.

In addition, although only 30% of the studies described the degree of phlebitis observed in the patients, the Visual Infusion Phlebitis (VIP) scale was used more frequently by the authors. Furthermore, based on this scale, grade 1 and grade 2 phlebitis were found in greater numbers.

With regard to interventions to treat the complication of peripheral venous access, removing the catheter and applying ice to the affected area were the main measures cited by the authors, followed by the use of topical treatment.

As for the place where the patients were hospitalized, both intensive and non-intensive clinical care unit patients were observed, when specified in the study.

Chart 3 - Synoptic table showing the design, subjects involved and main findings of the articles included.

Nº	Design Subjects involved Level of evidence	Principais achados
1	**Study:** Retrospective observational **Subjects:** 76 patients **Level of evidence:** 4 - Moderate	**Frequency of phlebitis:** 100% of patients. **Variables associated with phlebitis:** Hospitalization for more than 21 days, use of antibiotics, heart disease, metabolic disorders and infectious diseases. **Degree of phlebitis:** Not described **Interventions Treatment:** Ice compress (44.7%), access change (34.2%) and limb elevation (2.6%). **Place of hospitalization:** Inpatient Unit/Medical Clinic and Intensive Care Center
2	**Study:** Retrospective observational **Subjects:** 96 patients **Level of evidence:** 4 - Moderate	**Frequency of phlebitis:** 100% of patients. **Variables associated with phlebitis:** Use of an intravenous device for more than 24 hours; antibiotic therapy; use of immunoglobulin; comorbidities such as systemic arterial hypertension, diabetes mellitus, sepsis and chronic renal failure. **Phlebitis grade:** grade 1 (29.9%), grade 2 (45.8%), grade 3 (22.4%) and grade 4 (1.9%) **Interventions Treatment:** Not described. **Place of hospitalization:** Clinical hospitalization unit.
3	**Study:** Retrospective descriptive **Subjects:** 1210 participants **Level of evidence:** 4 - Moderate	**Frequency of phlebitis:** 2 patients **Variables associated with phlebitis:** The overall observed rate of phlebitis per catheter-day was 2.03 (30 events/14,713 catheter-days x 1000 catheter-days). **Degree of phlebitis:** Not described. **Interventions Treatment:** Removal of catheter site **Place of hospitalization:** Cardio-Infantile Unit.
4	**Study:** Integrative literature review **Subjects:** 14 articles **Level of evidence:** 5 - Weak	**Frequency of phlebitis:** The minimum rate of phlebitis was 3% and the maximum was 59.1%. **Variables associated with phlebitis:** length of stay; anatomical region of puncture; use of antibiotics. **Degree of phlebitis:** Not applicable **Interventions Treatment:** Not described. **Place of hospitalization:** Not applicable
5	**Study:** Retrospective observational. **Subjects:** 96 patients **Level of evidence:** 4 - Strong	**Frequency of phlebitis:** 100% of patients. **Variables associated with phlebitis:** Male gender (65%), age over 65 (72%), length of stay, location of puncture, catheter gauge, administration of electrolytes (6.2%), and antibiotic therapy (28%). **Phlebitis grade:** When applying the VIP PT-PT scale, the most frequent scores were: score 2 (n = 75; 2 signs or symptoms: pain near the venous catheterization site, erythema and/or edema) and 3 (n = 15; pain along the catheter path, erythema and induration adjacent to the site). **Interventions Treatment:** Applying ice (n = 79); monitoring the site (n = 78); removing the catheter (n = 71); making a dressing (n = 22); and applying topical treatment (n = 4). **Place of hospitalization:** Medical inpatient unit.

DOI: https://doi.org/10.36489/nursing.2025v29i323p10708-10727

6	**Study:** direct cost, quantitative, descriptive, correlational and retrospective study **Subjects:** 2,374 cases **Level of evidence:** 4 - Moderate	**Frequency of phlebitis:** 294 phlebitis (12.38%). **Variables associated with phlebitis:** length of hospitalization, age of patient, use of intravenous amiodarone. Multivariate analysis of the incidence of phlebitis, using OR and a 95% confidence interval, shows that length of hospitalization (OR: 1.06; CI: 1.05-1.07) and stay in the non-intensive care unit (OR: 1.66; CI: 1.13-2.43) increase the likelihood of developing phlebitis. complication. **Degree of phlebitis:** Not described. **Interventions Treatment:** Not described. **Place of hospitalization:** Cardiology intensive and non-intensive care unit.
7	**Study:** multicenter prospective observational study **Subjects:** 423 patients **Level of evidence:** 2 - Strong	**Frequency of phlebitis:** 23% of patients **Variables associated with phlebitis:** Complications related to the peripheral catheter were observed in 124 (29.7%, CI: 25.6-34) patients. Phlebitis accounted for the majority, 100 (23.9%) of the complications. As for the severity of the complications, the majority of complications were grade 1 in both phlebitis and infiltration **Phlebitis grade:** The severity of phlebitis was graded using the Visual Phlebitis Inspection Scale (VIP). The scale can range from 0, indicating no symptoms of phlebitis, to 5, with signs of purulent drainage, redness and a palpable cord longer than 3 inches. Grade 1 was obtained: 69 (16.5%); Grade 2: 29 (6.9%); Grade 3: 2 (0.5%) **Interventions Treatment:** Not described. **Place of hospitalization:** Public referral hospitals in the Amhara region, Ethiopia.
8	**Study:** retrospective observational study **Subjects:** 277 cases **Level of evidence:** 4 - Moderate	**Frequency of phlebitis:** The proportion of the incidence of reported phlebitis varied between 1.45% and 26.09% in the months of the study. **Variables associated with phlebitis:** Race, gender, marital status, puncture site, education, age, material used for puncture, degree of damage, previous identification of risk and conduct adopted. **Degree of phlebitis:** Not described. **Interventions Treatment:** Removal of venous access (63.27%), the use of cold or hot compresses (40.51%) and the use of antibiotics and/or anti-inflammatories (3.61%). Only 3.25% of professionals mentioned in-service education with the health team. **Place of hospitalization:** Teaching hospital, located in Salvador, Bahia, Brazil.
9	**Study:** Scope review **Subjects:** 52 articles **Level of evidence:** 5 - Weak	**Frequency of phlebitis:** Not described. **Variables associated with phlebitis:** Asepsis at the time of puncture, quality control of the venous network, puncture site, type of device used, age Degree of phlebitis: Not described. **Interventions Treatment:** Ointment based on aloe vera, chamomilla recutita in moist compresses, topical diclofenac, heparin "Essaven" gel, nitroglycerin patch 5 mg and anti-inflammatory or corticosteroid in warm or moist compresses. On the other hand, the application of calendula, piroxicam and sesame oil has a level of evidence of 1C **Place of hospitalization:** Not applicable.
10	**Study:** theoretical study **Subjects:** not applicable **Level of evidence:** 7 - Weak	**Frequency of phlebitis:** Not applicable. **Variables associated with phlebitis:** periodic training, antisepsis, type of material used in the puncture and presence of previous phlebitis. **Degree of phlebitis:** Not applicable **Interventions Treatment:** Not applicable **Place of hospitalization:** Not applicable

Source: Author (2024).

DISCUSSION

In Brazil, in situations where peripheral access is limited, the decision to keep the catheter beyond 96 hours depends on the integrity of the skin, duration of therapy, type of therapy prescribed, and should be documented in patient records[18].

Thus, there is a need to reflect on the real benefits of routinely changing peripheral access, considering the risks of damaging intravenous therapy. It is known that this can generate discomfort, acute pain and anxiety caused by the future need for new punctures, which compromises patients' well-being during hospitalization[18].

The pathophysiology of phlebitis involves an inflammatory process characterized by rapid evolution. Sensitizing the vascular endothelium, either by rubbing the venous device or by the acidity/hyperosmolarity of the solution administered, generates the release of bradykinin and histamine, inflammatory mediators that cause vasodilation and increase vascular permeability. Thus, the inflammatory process begins, favoring the extravasation of proteins and plasma into the interstitial space, determining edema[19].

DOI: https://doi.org/10.36489/nursing.2025v29i323p10708-10727

With the increase in platelet aggregation stimulated by histamine, there is thrombotic formation along the vessel wall that extends into the lumen of the venous device, giving rise to the palpable venous cord and erythema[19].

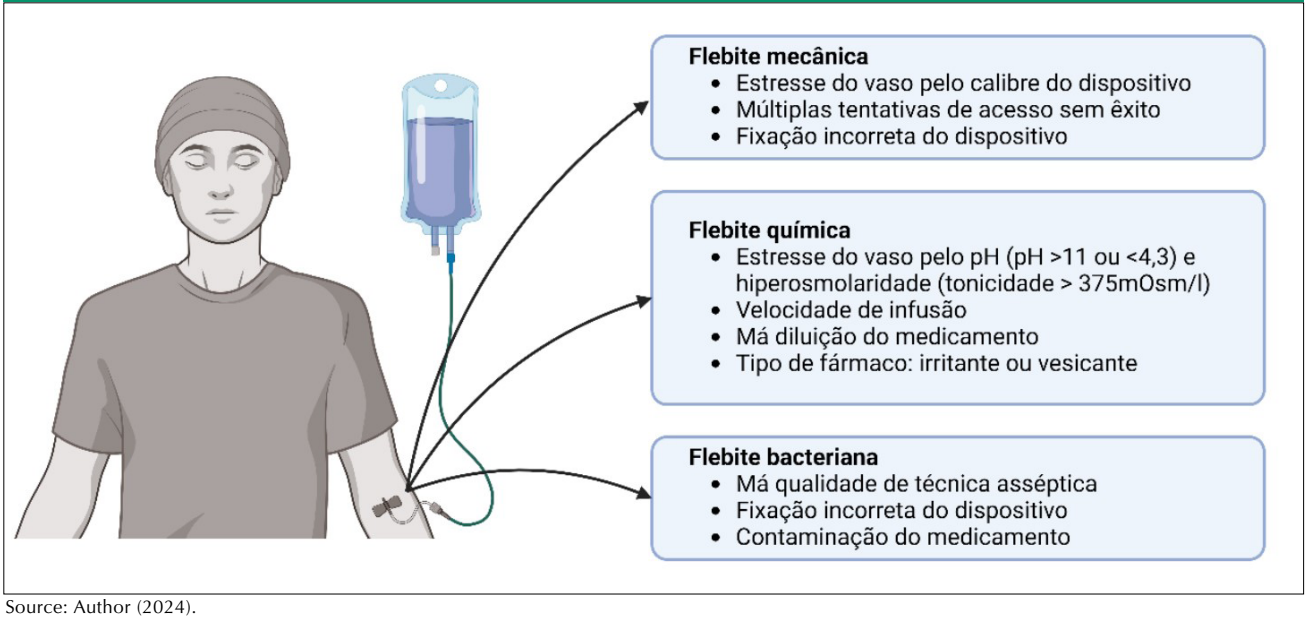
Phlebitis has several classifications according to its origin: mechanical, chemical or bacterial. Mechanical phlebitis occurs when the tunica intima venosa suffers some abrasion due to mechanical stress, which can be related to inadequate fixation of the device, caliber or material. Chemical phlebitis occurs when the infused solution damages the tunica intima due to extremes of pH and osmolarity, and can also occur due to inappropriate dilutions, the presence of undissolved drug particles, rapid infusion speed, and the characteristic of the drug administered, which can be vesicant or irritant[16,19,20].

It should be noted that the more acidic the infused compound, the greater the risk of developing chemical phlebitis. It should be noted that the glucose solutions used to dilute chemotherapy drugs have a pH of between 3.5 and 6.5, while saline solutions have a pH of 5.5. Substances with a pH of more than 11 or less than 4.3 are considered irritating drugs for the vascular endothelium[10,21].

In addition, hypertonic fluids, those with a tonicity greater than 375 mOsm/l, increase the risk of chemical phlebitis, and solutions with a tonicity greater than 600 mOsm/l can induce chemical phlebitis in less than 24 hours[10,22]. Kokotis (1998)23showed that increasing the volume of dilution significantly reduced the incidence of phlebitis, and also inferred that the more extreme the pH of the solution, the greater the volume of solvent should be.

Bacterial phlebitis is the least common type in infusions with peripheral devices, and is related to inadequate aseptic technique, ineffective fixation and contamination of the solution to be infused[10]. Figure 2 below shows the causes of phlebitis.

Figure 2 - Causes of phlebitis development.



Source: Author (2024).

Based on the 10 articles included in this review, it can be seen that the number of publications is sufficient to meet the needs, if we consider the importance of this indicator in the quality of care. The frequency/incidence of phlebitis ranged from 1.35% to 59.1%. The results of this review showed a wide range of findings, and higher than the 5% recommended by the Infusion Nurses Society[4].

Main precautions to prevent phlebitis

Adopting general measures to prevent phlebitis is easy to implement, such as basic hygiene notions and the correct use of PPE. Hand hygiene is one of the main measures for preventing infections, but it has been reduced due to carelessness on the part of professionals, requiring continuous training and a change in behavior to increase adherence[13,16].

In addition, asepsis of the catheter insertion area is also essential to prevent infection, with greater evidence of efficacy in the use of chlorhexidine preparation >0.5% with alcohol or 2% aqueous chlorhexidine. The adoption of scales for classifying and identifying phlebitis, as well as a good physical examination with appropriate palpa-

DOI: https://doi.org/10.36489/nursing.2025v29i323p10708-10727

tion and inspection of the veins, can help prevent phlebitis[13,16].

Guidance for patients and their families is an important complementary prevention measure. The team should educate them about the occurrence of complications, as well as how to identify and prevent them. In this sense, the perception of phlogistic signs is a way of alerting the patient to these situations. This can lead to an early search for specialized help, favoring intervention at an early stage of the disease[17].

Interprofessional communication and proper recording in medical records are fundamental parts of phlebitis care and prevention. Important data such as the exact location of the catheter, a description of the decisions made and updates on the possible occurrence of phlogistic signs can help with early management and avoid possible complications. However, this data is constantly out of date or incompletely recorded, making it necessary to reinforce with the team the importance of filling out medical records clearly, objectively and completely. It is also necessary to increase communication between the team, especially in situations where shifts are changed, so that care can continue in an appropriate manner, with awareness of the patient's full condition[13].

The use of peripherally inserted catheters has divergent opinions in the literature about how long they should be used and when they should be replaced. However, the removal of non-essential catheters and attention to phlogistic signs at the insertion site are situations with greater consensus for the prevention of phlebitis. In addition, the use of saline ampoules has been shown to have a greater risk of complications when compared to syringes with saline content, since it increases the possibility of infections and catheter failure[10,17].

Determining the cause of phlebitis is also a fundamental part of the management process, as certain classes of drugs can lead to the development of chemical phlebitis. Drugs associated with extremes of pH or irritants have a higher risk. The main associations are with antibiotics, especially amoxicillin with clavulanic acid, and diuretics such as furosemide[12].

In this sense, it is essential to reflect on the real need to use these drugs, especially antibiotics, since their common use can also lead to the development of bacterial resistance. In addition, assess the need for a different vascular access, change the dilution of the drug or reduce the flow of removal, or even remove the catheter, if there is a risk. Also, consider the possibility of drug origin[10,12,17].

This is justified because of the incidence of phlebitis. An incidence study was carried out in a cardiology unit, which assessed the development of phlebitis over a 4-year period. Among the 3,729 patients evaluated, there was an incidence of around 294 cases of phlebitis, which was more common in males. The people with the highest incidence of phlebitis were those with an average length of stay of 13.3 days. However, this goes against the INS, which recommends an acceptable rate of phlebitis of 5% or less, regardless of the population involved[4,13].

In addition, in an observational study conducted with 423 patients over a one-month period, it was noted that 418 people were followed up for more than 2,000 hours with a peripheral catheter. Among the device's cannulation size, a higher prevalence was found in gauge (G)18 and 20, with these patients having the highest rates of mechanical phlebitis[14].

The role of the multi-professional team in preventing phlebitis

When discussing the role of the multi-professional team in preventing phlebitis, it is important to highlight the participation of patients over the age of 60, as the elderly have a high degree of capillary fragility and the tunica intima of the vessel is more prone to developing inflammatory processes. This highlights the need for the care team to pay more attention to elderly people using peripheral vascular access[9].

Faced with this situation, the nurse's role as leader of the nursing team is important for building and organizing quality care, and in the continuing education of technicians and assistants, who are responsible for many nursing procedures, including venipunctures, for the most part, and records[9].

In the study carried out by Mota et al,[15]most phlebitis was identified and notified, with nurses standing out in this regard with over 90% of notifications. With regard to prior identification of the risk of phlebitis, approximately half of the patients had been assessed by the unit nurse as being at risk of developing phlebitis.

Identifying nurses as the main notifiers ratifies the importance of this professional category for the quality of health care, since notification can be carried out by any member of the team. Notifications of undesirable events should be made by front-line professionals such as doctors, nurses, technicians and nursing assistants, without excluding the responsibilities of other members of the multi-professional team[9,15].

It should also be noted that continuous periodic training, changes in professional behavior and in the culture of the institution are important for improving adherence to hand hygiene, given that poor hygiene is the main cause of phlebitis. In addition, the use of the traditional approach combined with audiovisual media and innovative technology-mediated techniques has been associated with better positive results in training for the entire multi-

DOI: https://doi.org/10.36489/nursing.2025v29i323p10708-10727

disciplinary team[10,11,17].

A limitation of this review is the lack of information and data on the treatment of phlebitis, as only four articles mention the intervention and level of evidence for treatment. Another important point is the lack of information on post-infusion phlebitis, a factor that no article mentioned.

CONCLUSION

The risk factors for developing phlebitis are diverse and involve aspects related to clinical management as well as interaction and communication within multi-professional teams. The maintenance of peripheral catheters beyond 96 hours, depending on the integrity of the skin and the therapeutic need, must be carefully documented and justified in order to minimize complications.

Education and guidance for patients and their families also play a crucial role in prevention. Efficient interprofessional communication and accurate medical records are vital to ensure continuity of care and the prevention of complications.

In addition, it is up to the doctor and nurse to work as a team with clinical reasoning to identify possible patients susceptible to developing phlebitis, discussing acidity, osmolarity as well as assessing the need for specific vascular catheters and the suitability of therapies. Integrating these approaches can significantly improve the quality of care provided to patients, reducing the incidence of phlebitis and promoting a safer and more comfortable environment during hospitalization.

References

1. Urbanetto JD, Freitas AP, Oliveira AP, Santos JD, Muniz FD, Silva RM, Schilling MC. Fatores de risco para o desenvolvimento da flebite: revisão integrativa da literatura. Rev Gauch Enferm [Internet]. 7 jun 2018 [citado 15 abr 2024];38(4). Disponível em: https://doi.org/10.1590/1983-1447.2017.04.57489.

2. Abolfotouh MA, Salam M, Bani Mustafa AA, White D, Balkhy H. Prospective study of incidence and predictors of peripheral intravenous catheter-induced complications. Ther Clin Risk Manag [Internet]. Dez 2014 [citado 14 abr 2024]:993. Disponível em: https://doi.org/10.2147/tcrm.s74685.

3. Braga LM, Parreira PM, Oliveira AD, Mónico LD, Arreguy-Sena C, Henriques MA. Phlebitis and infiltration: vascular trauma associated with the peripheral venous catheter. Rev Lat Am Enferm [Internet]. 17 maio 2018 [citado 15 abr 2024];26. Disponível em: https://doi.org/10.1590/1518-8345.2377.3002.

4. Infusion Nurses Society (US). Infusion Nursing Standards of Pratice. J Infus Nurs [Internet]. 2011 [citado 2014 out. 08];34(1S):1-110. Disponível em: http://engage.ahima.org/HigherLogic/System/DownloadDocumentFile. ashx?DocumentFileKey=2238ee0a-c2df-4d1a-affa-f69f2ce41856.

5. Ministério da Saúde (BR). Portaria nº 529, de 1º de abril de 2013. Institui o Programa Nacional de Segurança do Paciente (PNSP). Diário Oficial [da] República Federativa do Brasil. 2013 abr 2;150(62 Seção 1):43-4.

6. Mendes DS, Silveira RCCP, Galvão CM. Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem. Texto Contexto Enferm [Internet]. 2008 out-dez [citado 2024 abr 04];17(4):758-64. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid =S0104-07072008000400018.

7. Melnyk BM, Fineout-Overholt E. Evidence-based practice in nursing & healthcare: a guide to best practice. 3rd ed. Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins; 2015.

8. Moher D. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. Ann Intern Med [Internet]. 18 ago 2009 [citado 14 abr 2024];151(4):264. Disponível em: https://doi.org/10.7326/0003-4819-151-4-200908180-00135.

9. Pereira MS, Cunha VV, Borghardt AT, Lima ED, Santos TF, Portugal FB. A segurança do paciente no contexto das flebites notificadas em um hospital universitário. Rev Epidemiologia Control Infeccao [Internet]. 2 abr 2019 [citado 13 jul 2024];9(2). Disponível em: https://doi.org/10.17058/reci.v9i2.12099.

10. Furlan MD, Lima AF. Avaliação da ocorrência do evento adverso flebite em pacientes de uma Unidade de Internação Clínica. Rev Esc Enferm

DOI: https://doi.org/10.36489/nursing.2025v29i323p10708-10727

USP [Internet]. 2021 [citado 13 jul 2024];55. Disponível em: https://doi.org/10.1590/s1980-220x2020017103755.

11. Cortés OL, Parra YM, Torres DA, Monroy P, Malpica JC, Pérez EP, Mojica C. Evaluation of indicators of a vascular access device program led by nursing professionals in a high-complexity university hospital in colombia. Investig Educ En Enfermeria [Internet]. 28 mar 2022 [citado 13 jul 2024];40(1). Disponível em: https://doi.org/10.17533/udea.iee.v40n1e12.

12. Tendeiro P, Diniz A, Mendes C, Bordalo I, Chainho M, Ramos S, Sousa P. Flebite associada a cateter venoso periférico e a administração de medicamentos: análise retrospetiva de incidentes. Rev Enferm Ref [Internet]. 13 jun 2023 [citado 13 jul 2024];VI Série(Nº2). Disponível em: https://doi.org/10.12707/rvi22069.

13. Ribeiro S, Valente S, Sousa S, Lopes ML, Abreu N, Alves E. Flebite associada ao cateter venoso periférico em cardiologia: incidência, fatores de risco e custos associados. J Bras Econ Saude [Internet]. Abr 2023 [citado 13 jul 2024];15(1):71-80. Disponível em: https://doi.org/10.21115/jbes.v15.n1.p71-80.

14. Kassahun CW, Abate AT, Tezera ZB, Beshah DT, Agegnehu CD, Getnet MA, Abate HK, Yazew BG, Alemu MT. Incidence and associated factors of failed first peripheral intravenous catheters among adult patients at medical surgical wards in public referral hospitals of west amhara, ethiopia, 2021. Nurs Res Pract [Internet]. 22 jan 2022 [citado 13 jul 2024];2022:1-9. Disponível em: https://doi.org/10.1155/2022/8261225.

15. Mota RS, Da Silva VA, Mendes AS, Barros ÂD, Dos Santos OM, Gomes BP. Incidência e caracterização das flebites notificadas eletronicamente em um hospital de ensino. Rev Baiana Enferm [Internet]. 9 jul 2020 [citado 13 jul 2024];34. Disponível em: https://doi.org/10.18471/rbe.v34.35971.

16. Guanche-Sicilia A, Sánchez-Gómez MB, Castro-Peraza ME, Rodríguez-Gómez JÁ, Gómez-Salgado J, Duarte-Clíments G. Prevention and treatment of phlebitis secondary to the insertion of a peripheral venous catheter: a scoping review from a nursing perspective. Healthcare [Internet]. 19 maio 2021 [citado 13 jul 2024];9(5):611. Disponível em: https://doi.org/10.3390/healthcare9050611.

17. Furlan MD, Saba A, Berger S, Lima AF. Processo de inserção, manutenção e retirada de cateter intravenoso periférico: análise preventiva de riscos. Cogitare Enferm [Internet]. 2023 [citado 13 jul 2024];28. Disponível em: https://doi.org/10.1590/ce.v28i0.88604.

18. Agência Nacional de Vigilância Sanitária (BR). Infecção de corrente sanguínea; orientações para prevenção de infecção primária de corrente sanguínea [Internet]. Brasília: ANVISA; 2010 [citado 2014 out 4]. Disponível em: http://portal. anvisa.gov.br/wps/wcm/connect/ef02c3004a04c83ca-0fda9aa19e2217c/man ual+Final+preven%-C3%A7%C3%A3o+de+infec%C3%A7%-C3%A3o+da +corrente.pdf?MOD=AJPERES.

19. Reis PE, Carvalho EC. Phlebitis due to the insertion of peripheral venous catheters: issues relevant to nursing care. Rev Enferm UFPE Line [Internet]. 26 dez 2010 [citado 13 jul 2024];5(1):134. Disponível em: https://doi.org/10.5205/reuol.1371-10512-1-le.0501201118.

20. Johann DA, Danski MT, Vayego SA, Barbosa DA, Lind J. Risk factors for complications in peripheral intravenous catheters in adults: secondary analysis of a randomized controlled trial. Rev Lat Am Enferm [Internet]. 2016 [citado 13 jul 2024];24. Disponível em: https://doi.org/10.1590/1518-8345.1457.2833.

21. Holzmann-Pazgal G. Healthcare-Associated infections in children [Internet]. Cham: Springer International Publishing; 2018. Central Line-Associated Bloodstream Infection (CLABSI); [citado 13 jul 2024]; p. 95-106. Disponível em: https://doi.org/10.1007/978-3-319-98122-2_6.

22. Nolte J. Understanding and preventing phlebitis. J Assoc Vasc Access [Internet]. Dez 2016 [citado 13 jul 2024];21(4):261. Disponível em: https://doi.org/10.1016/j.java.2016.10.063.

23. Kokotis K. Preventing chemical phlebitis. Nursing [Internet]. Nov 1998 [citado 13 jul 2024];28(11):41-7. Disponível em: https://doi.org/10.1097/00152193-199811000-00021.

DOI: https://doi.org/10.36489/nursing.2025v29i323p10708-10727