

Millenium, 2(Edição Especial Nº14)



A EFICÁCIA DE UMA INTERVENÇÃO SISTEMATIZADA DE CUIDADOS DE ENFERMAGEM NA PREVENÇÃO E IDENTIFICAÇÃO DE FLEBITES

THE EFFECTIVENESS OF A SYSTEMATIZED NURSING CARE INTERVENTION IN THE PREVENTION AND IDENTIFICATION OF PHLEBITIS

LA EFICACIA DE UNA INTERVENCIÓN SISTEMATIZADA DE CUIDADOS DE ENFERMERÍA EN LA PREVENCIÓN E IDENTIFICACIÓN DE LA FLEBITIS

Filipa Oliveira¹  <https://orcid.org/0009-0008-7722-0956>

Isabel Gomes¹  <https://orcid.org/0009-0002-3266-5683>

Ana Rita Oliveira¹  <https://orcid.org/0000-0003-3014-2598>

¹ Unidade Local de Saúde de Matosinhos, Hospital Pedro Hispano, Matosinhos, Portugal

Filipa Oliveira - filipa.oliveira@ulsm.min-saude.pt | Isabel Gomes – isabel.gomes@ulsm.min-saude.pt | Ana Rita Oliveira - anarita.oliveira@ulsm.min-saude.pt



Corresponding Author :

Ana Rita Capela Oliveira

Rua Professor Rocha Pereira nº87 5ªA

4250-007– Porto - Portugal

anarita.oliveira@ulsm.min-saude.pt

RECEIVED: 14th December, 2023

REVIEWED: 31th January, 2024

ACCEPTED: 06th February, 2024

PUBLISHED: 29th February, 2024

DOI: <https://doi.org/10.29352/mill0214e.33949>

RESUMO

Introdução: A utilização de cateteres venosos periféricos (CVP) é o procedimento de enfermagem mais comum e acarreta riscos para os clientes, nomeadamente, o desenvolvimento de uma flebite. Foi criado, a nível institucional, um protocolo de cuidados de enfermagem ao CVP, de forma a padronizar as práticas dos enfermeiros.

Objetivo: Analisar a incidência de flebite associada ao CVP antes (Grupo A) e após (Grupo B) a implementação do protocolo; caracterizar as flebitis associadas ao CVP; Identificar fatores de risco que contribuem para o desenvolvimento de flebitis associadas ao CVP.

Métodos: Realizou-se um estudo observacional, quantitativo e descritivo, com amostras não probabilísticas por conveniência, em que cada grupo é constituído por 50 participantes.

Resultados: Após a implementação do protocolo, verificou-se a diminuição na taxa de incidência de flebitis de 26% para 12%, assim como decréscimo das flebitis de grau 3, sendo identificadas apenas flebitis de grau 1 e 2. Constatou-se, ainda, que cerca de 90% dos participantes que apresentavam flebite, estavam sob antibioterapia, nomeadamente Amoxicilina + Ácido Clavulânico e Flucloxacilina.

Conclusão: O protocolo instituído poderá ter benefícios no que diz respeito à diminuição da incidência de flebitis, pela uniformização de práticas com base na evidência científica, proporcionando uma melhor qualidade de cuidados e menores custos associados ao internamento hospitalar.

Palavras-chave: flebite; cateter venoso periférico; segurança do doente; prática baseada na evidência; cuidados de enfermagem

ABSTRACT

Introduction: The use of peripheral venous catheters (PVC) is the most common nursing procedure and carries patient risks, including developing phlebitis. A nursing care protocol for PVC was created at the institutional level to standardize nurses' practices.

Objective: To analyze the incidence of phlebitis associated with PVC before (Group A) and after (Group B) implementation of the protocol; Characterize phlebitis associated with PVC; Identify risk factors that contribute to the development of phlebitis associated with PVC.

Methods: An observational, quantitative, and descriptive study was carried out, with non-probabilistic samples for convenience, in which each group consisted of 50 participants.

Results: After implementing the protocol, there was a reduction in the incidence rate of phlebitis from 26% to 12%, as well as a decrease in grade 3 phlebitis, with only grade 1 and 2 phlebitis being identified. It was also found that around 90% of the participants with phlebitis were undergoing antibiotic therapy, namely Amoxicillin + Clavulanic Acid, and Flucloxacillin.

Conclusion: The protocol could have benefits in reducing the incidence of phlebitis by standardizing practices based on scientific evidence, providing better quality of care, and lowering the costs associated with hospitalization.

Keywords: phlebitis; peripheral venous catheterization; patient safety; evidence-based practice; nursing care

RESUMEN

Introducción: El uso de catéteres venosos periféricos (CVP) es el procedimiento de enfermería más frecuente y conlleva riesgos para los clientes, concretamente el desarrollo de flebitis. Se creó un protocolo de cuidados de enfermería para el CVP a nivel institucional con el fin de estandarizar las prácticas de las enfermeras.

Objetivo: Analizar la incidencia de la flebitis asociada a la CVP antes (Grupo A) y después (Grupo B) de la aplicación del protocolo; caracterizar la flebitis asociada a la CVP; Identificar los factores de riesgo que contribuyen al desarrollo de la flebitis asociada a la CVP.

Métodos: Se realizó un estudio observacional, cuantitativo y descriptivo, con muestras no probabilísticas por conveniencia, en el que cada grupo estaba formado por 50 participantes.

Resultados: Tras aplicar el protocolo, se produjo una reducción de la tasa de incidencia de flebitis del 26% al 12%, así como una reducción de las flebitis de grado 3, identificándose únicamente flebitis de grado 1 y 2. También se descubrió que alrededor del 90% de los participantes con flebitis recibían tratamiento antibiótico, concretamente Amoxicilina + Ácido Clavulánico y Flucloxacilina.

Conclusión: El protocolo podría tener beneficios en términos de reducción de la incidencia de la flebitis mediante la estandarización de prácticas basadas en pruebas científicas, proporcionando una mejor calidad de la atención y reduciendo los costes asociados a la hospitalización.

Palabras Clave: flebitis; catéter venoso periférico; seguridad del paciente; práctica basada en la evidencia; cuidados de enfermeira

DOI: <https://doi.org/10.29352/mill0214e.33949>

INTRODUCTION

The insertion of peripheral venous catheters (PVC) is essential in providing healthcare in a hospital setting. This device is the most common invasive procedure and, among the different types of vascular access, the most widely used. It allows the administration of intravascular fluids, pharmacological therapy, blood components, parenteral nutrition, and contrast products (Guanche-Sicilia et al., 2021; Marsh et al., 2020).

However, this is not a harmless procedure, and there is a risk of local infection that can develop into a bloodstream infection. The most common route of infection is the migration of microorganisms from the skin of the insertion site along the subcutaneous path, with colonization of the catheter tip (Braga et al., 2018). Bloodstream infections associated with vascular devices increase morbidity and health costs due to a significant increase in the average length of stay for this type of patient, as well as an increase in the lethality rate (Salma et al., 2019).

Other risks associated with the use of PVC are hematoma, infiltration, extravasation, obstruction, and phlebitis. The most frequent complications of PVC use are phlebitis and infiltration, the former of which can contribute to the development of an infectious process (Zingg et al., 2023).

The scientific community has widely investigated the existence of phlebitis and the factors that increase the risk of developing this incident associated with PVC. The factors identified in the studies related to the type of medication administered, the anatomical site where the PVC is inserted, the length of time the PVC is left in place, the frequency of infusions, and nursing care when inserting and maintaining the PVC (Braga et al., 2018; Salma et al., 2019; Société française d'hygiène hospitalière, 2019).

In 2021, the interest in developing this study arose due to an increase in the incidence of phlebitis associated with this device in the reality in which we currently work, which motivated us to start a more in-depth investigation on this subject. The Infusion Nurses Society (Infusion Nurses Society, 2021) recommends a phlebitis rate of less than 5%, and in the context of this study, we obtained a rate of 26%. We also found that national health authorities publish no more recent standards on the precautions to be taken when using PVC and the needs observed in the context of practice.

All these aspects can be improved through the care nurses provide, based on scientific evidence that supports standards of good practice and standardizes the care provided, thus contributing to the continuous improvement of nursing care and promoting patient safety (Lladó Maura et al., 2023). That said, developing protocols that standardize nursing interventions promote educational activities and make professionals aware of the risk factors for the occurrence of phlebitis is urgent and fundamental to ensure excellence in care (Oliveira et al., 2019).

Thus, after a thorough review of the literature, we began to draw up and implement an institutional protocol to prevent complications associated with PVC, namely phlebitis, in patients undergoing peripheral vein catheterization in a hospital setting. The protocol was published in 2021, approved by the Nursing Directorate, and is duly registered on the Document Management platform (nº3139.0), being available for consultation by all health professionals at the institution. The protocol presents various nursing interventions based on scientific evidence and is structured by thematic areas as follows:

- Professional equipment

1. safe equipment is highly recommended in the context of protecting professionals, particularly clean gloves to avoid accidents due to exposure to blood exposure.
2. Hand hygiene is mandatory immediately before inserting the catheter, handling the catheter, or handling the infusion system.
3. Using sterile gloves is also recommended if the insertion site is palpated after skin antiseptics.

- Choice of puncture site and material

1. The site chosen for the puncture should be inspected in a distal-proximal direction, preferably on the upper limbs, and areas of flexion should be avoided.
2. The caliber of the PVC should be between 18G and 22G, depending on the condition and availability of the patient's peripheral venous network, the condition of the skin, the age, and the fluids to be infused.
3. In the case of the elderly population, some specific aspects should be considered: the fragility of the skin, the loss of adipose tissue, and changes in the vascular system, such as thickening and hardening of the inner and middle layers of the veins, and progressive sclerosis of the veins.

- Antisepsis of the skin

1. Before inserting a PVC, the skin must be antiseptic with an alcoholic antiseptic solution. The most recommended solutions in the literature are chlorohexidine and alcohol at 70°C, but there is no consensus on which is the most advantageous for eliminating microorganisms.
2. However, there is unanimity on the need to wait for the antiseptic to dry spontaneously before starting the invasive act of puncture.
3. It is also recommended that the rules for using antiseptics should be according to the manufacturer's indications.

- Fixing the PVC

1. It is strongly recommended that the PVC is secured using a sterile, transparent bandage, allowing permanent monitoring of the insertion site.

DOI: <https://doi.org/10.29352/mill0214e.33949>

2. Optimization of the PVC is recommended when the bandage is detached, dirty, or contaminated and should be carried out under the same aseptic conditions as the insertion site.
3. Promote complete adherence of the bandage to the skin so that it becomes a watertight barrier to the entry of microorganisms.

- Disinfecting and handling the PVC or infusion system

1. To maintain a closed system during discontinuous use of vascular access, it is possible and recommended to use bidirectional valves.
2. It is highly recommended to disinfect the valve septum and thread before use by rubbing it with 70% alcohol or alcoholic chlorohexidine for at least 15 seconds.
3. Flushing with saline solution is recommended before and after discontinuous use of the perfusion line.
4. The flush should be carried out with 5-10mL of solution and, in case of a blood transfusion, between 10-20mL. It can also be done with 5% glucose.
5. It is recommended to use devices that avoid manipulating the base of the catheter, as this increases the risk of phlebitis.
6. Changing the infusion devices within 4 days is recommended, but never more than 7 days.

- Removing the PVC

1. Removal of the PVC is mandatory in the event of a suspected local or systemic infection related to the catheter.
2. It is highly recommended to remove any PVC as soon as it is no longer needed.
3. Reassessment of the need to maintain peripheral access should be carried out at least daily.

- Changing the PVC

1. It is recommended to change a PVC with poor aseptic conditions.
2. It is recommended to replace the PVC in the event of: clinical signs (local or systemic) suggestive of infection: erythema, pain, redness, heat, palpable venous cord in the course of the vein and/or purulent drainage; obstruction.

- Monitoring and documentation of care

1. It is highly recommended to ensure that information regarding the PVC is documented in each person's file with the following information:
 - a. Caliber of the PVC.
 - b. Insertion site.
 - c. Date of insertion.
2. It is highly recommended to monitor the catheter insertion site at least daily, to monitor and document any catheter-related complications.

- Administration of antibiotic therapy

1. The following precautions are therefore recommended when patients are prescribed intravenous antibiotics:
 - Flush 10-20mL before starting the infusion.
 - Reconstitution immediately before administration.
 - Flush 10-20mL at the end of the infusion.

- Iron administration

1. In view of the incidence of phlebitis in patients receiving intravenous iron infusions, the following precautions are suggested:
 - Flush 10-20mL before starting the infusion.
 - Dilute one ampoule of intravenous iron (100mg/5mL) in 250mL of saline solution and infuse for 1 hour.
 - Flush 10-20mL at the end of the infusion.
 - If possible, use a PVC exclusively for iron administration.

- Administration of blood components

1. The following precautions are therefore recommended when patients are prescribed the administration of blood compounds:
 - Flush 10-20mL before starting the infusion.
 - Use an access with a caliber equal to or greater than 20G.
 - Never exceed 4 hours of infusion in the case of red blood cell transfusion and 30 minutes in the case of platelet pool transfusion.
 - Never administer blood compounds in an infusion line with other drugs or serotherapy.
 - Flush 10-20mL at the end of the infusion.

Subsequently, we considered the need to compare results before and after the implementation of the protocol, thus measuring the results that are sensitive to nursing care.

DOI: <https://doi.org/10.29352/mill0214e.33949>

Based on these assumptions, the general objective of this research project is To analyze the incidence of phlebitis associated with PVC before and after the implementation of the institutional protocol. Specific objectives were defined: Characterize phlebitis associated with PVC; Identify risk factors that contribute to the development of phlebitis associated with PVC.

1. THEORETICAL FRAMEWORK

Phlebitis is defined as inflammation of the intimal layer of the vein, resulting from a response to tissue damage associated with the use of a PVC and accompanied by different signs and symptoms, such as erythema, pain, edema, the appearance of a palpable cord along the vein and/or purulent drainage (Infusion Nurses Society, 2021).

Phlebitis can be classified as chemical, mechanical, or infectious. The first may be directly related to irritation of blood vessels due to the administration of drugs with extreme pH levels, solutions with osmolarity greater than 600mOsm/L and/or other irritating substances (Simões et al., 2022). Mechanical phlebitis, on the other hand, can be caused by mechanical friction provoked by the catheter on the vein wall. Possible causes are the catheter insertion technique, the catheter not being properly fixed, and the caliber of the catheter being larger than the caliber of the vein itself (Biyik Bayram et al., 2023; Pittiruti et al., 2023). Finally, infectious phlebitis can be caused by contamination of the solution, the catheter insertion site, and the device (Pittiruti et al., 2023).

The diagnosis of phlebitis should be made whenever the signs identified above appear, and the Portuguese Phlebitis Scale should be applied (Table 1), which was validated in 2016 for the Portuguese population, as a way of monitoring and standardizing its incidence and evaluation (Braga et al., 2016). This scale is used to assess and characterize the existence of phlebitis and ranges from grade 0 to grade 4, which increases as the severity of phlebitis progresses (Braga et al., 2016).

Table 1 - Portuguese Phlebitis Scale

| Grade | Clinical Criteria |
|-------|---|
| 0 | No symptoms |
| 1 | Pain at the site or areas adjacent to the catheter during administration of solution or medication, OR Erythema at the access site with or without pain |
| 2 | Access site pain AND edema AND erythema |
| 3 | Pain at access site AND erythema OR edema, AND Redness along the vein AND Palpable venous cord |
| 4 | Pain at access site AND erythema AND/OR edema, AND Redness along the course of the vein, E Palpable venous cord >2.5cm long, E Purulent drainage |

There are several measures that nurses can consider in their clinical practice, such as frequent surveillance of the site where the PVC is located. It is recommended that health professionals use observation documentation on each shift, using validated scales that facilitate early detection of the presence of phlebitis and its categorization in terms of degree of severity (Braga et al., 2018; Guanche-Sicilia et al., 2021; Oliveira et al., 2019; Ribeiro et al., 2023).

The hospitalized individual or their family caregiver should also be encouraged to participate in the timely identification of the first signs and symptoms of complications due to the presence of PVC (Braga et al., 2018; Guanche-Sicilia et al., 2021; Oliveira et al., 2019).

Regarding the anatomical site of insertion of the PVC, choose the regions of the forearm or arm and avoid areas of the hand and flexion, such as the wrist and antecubital fossa. The lower limbs should not be selected either, and if a catheter is in this location, it should be replaced as soon as possible in a location in the upper limbs (Guanche-Sicilia et al., 2021; Oliveira et al., 2019; Pittiruti et al., 2023).

Just as important as the insertion technique is the care given to the venous access during its use, which affects the useful life of the device, making it possible to prolong its permanence and, above all, avoid any complications associated with the PVC, with more serious consequences for the patient (Société française d’hygiène hospitalière, 2019).

The length of stay of the PVC has been pointed out as a risk factor for the development of phlebitis, with the first 3-4 days of the PVC being reported as potentiating the occurrence of phlebitis (Cernuda Martínez et al., 2023; Lima et al., 2020; Tendeiro et al., 2023). However, there is little unanimity on the recommended length of stay for the PVC. The evidence suggests that PVC replacement should be based on clinical signs and the useful life of the materials (recommended by the manufacturer of these devices) and that systematic replacement after 72 or 96 hours is not recommended. (Société française d’hygiène hospitalière, 2019).

Other risk factors that should be assessed by nurses when selecting the type of venous catheter (peripheral or central) best suited to the situation are the duration of the intravenous therapy prescription, combined with the characteristics of the drugs (irritant and/or vesicant, pH, and osmolarity) (Braga et al., 2018; Guanche-Sicilia et al., 2021; Oliveira et al., 2019).

DOI: <https://doi.org/10.29352/mill0214e.33949>

As for the removal of the PVC, this should be as early as possible, and it is highly recommended to remove any PVC as soon as it is no longer needed, rather than during the previously defined period (Société française d'hygiène hospitalière, 2019; Zingg et al., 2023). Also, when the first signs of suspected phlebitis are identified or when the catheter is not working correctly, it should be removed immediately (Braga et al., 2018; Cernuda Martínez et al., 2023; Guanche-Sicilia et al., 2021; Oliveira et al., 2019).

Thus, the use of PVC is a practice in nursing care involving the maintenance of an aseptic technique in its insertion, an appropriate fluid administration technique, and the use of adequate material resources (Société française d'hygiène hospitalière, 2019).

Given the importance of nurses in preventing complications associated with these devices, it is essential to better understand the existence of phlebitis and the risk factors that contribute to its development, thus improving the quality of nursing care.

2. METHODS

2.1 Study type and sample

Considering the aforementioned problems and the proposed objectives, an observational, quantitative, and descriptive study was carried out.

The sample for this study was made up of 50 people in 2021 before the institutional protocol was implemented (Group A) and 50 people in 2022 after the institutional protocol was implemented (Group B). The following inclusion criteria were applied: people over the age of 18; people who were hospitalized in the Orthopedics and Traumatology service of a Local Health Unit in the Porto region; people with phlebitis reported by any member of the nursing team at the time of changing shifts.

This study was authorized by the Board of Directors of the Local Health Unit, following a favorable opinion from the Ethics Committee (nº72/CES/JAS) and the institution's Local Information Protection and Security Committee (nº69/CLPSI/2023).

2.2 Data collection tools

The data collection instrument applied to individuals in groups A and B who had phlebitis consisted of a form adapted to the objectives outlined. It was filled in by the researchers of this study. The data recorded on the form enabled a database to be built for each group, using Microsoft Excel 2022, with the following variables: sociodemographic characterization (gender and age); duration of hospitalization; characterization of peripheral catheterization (caliber, anatomical site of puncture); pharmacological therapy and other intravenous fluids administered (antibiotic therapy, analgesia, other intravenous medication, serotherapy); existence of phlebitis; categorization of phlebitis (grades of the Portuguese Phlebitis Scale) (Braga et al., 2016).

2.3 Statistical analysis

To characterize, describe, and analyze the data, descriptive statistics were used to calculate absolute (n) and relative (%) frequencies. The frequency values were then compared between groups A and B.

3. RESULTS

3.1 Sociodemographic characterization

Regarding the characterization of the sample (Table 2), Group A was created before the existence of the institutional protocol, while Group B was created after the implementation of the institutional protocol. Each group is made up of 50 people.

In Group A, 34 (68%) participants were female and 16 (32%) male, while in Group B, 32 (64%) participants were female and 18 (36%) male. As for age, Groups A and B had 36 (72%) people and 33 (66%) people over 61, respectively.

Table 2 – Sociodemographic characterization

| | Group A (N=50) | | Group B (N=50) | |
|---------------|----------------|-----|----------------|-----|
| | N | % | N | % |
| Gender | | | | |
| Female | 34 | 68% | 32 | 64% |
| Male | 16 | 32% | 18 | 36% |
| Age | | | | |
| <50 | 6 | 12% | 6 | 12% |
| 50-60 | 11 | 22% | 8 | 16% |
| 61-70 | 6 | 12% | 5 | 10% |
| 71-80 | 15 | 30% | 11 | 22% |
| 81-90 | 6 | 12% | 15 | 30% |
| >90 | 6 | 12% | 5 | 10% |

DOI: <https://doi.org/10.29352/mill0214e.33949>

3.2 PVC characterization

As for the information on the use of PVC (Table 3), the caliber of these devices in the two samples ranged from 18 Gauge (G) to 22G, although the 20G caliber stood out as the most used (80% in Group A and 70% in Group B).

Regarding the anatomical puncture site, the forearm/arm was the most frequent anatomical site in both samples (78% and 70%).

Table 3 – PVC characterization

| | Group A (N=50) | | Group B (N=50) | |
|--------------------|----------------|-----|----------------|-----|
| | N | % | N | % |
| PVC caliber | | | | |
| 18G | 4 | 8% | 9 | 18% |
| 20G | 40 | 80% | 35 | 70% |
| 22G | 6 | 12% | 6 | 12% |
| PVC site | | | | |
| Forearm/Arm | 39 | 78% | 35 | 70% |
| Antecubital fossa | 7 | 14% | 5 | 10% |
| Wrist/hand | 4 | 8% | 10 | 20% |

3.3 Therapeutics administered via catheter

The therapy administered via PVC was also analyzed (Table 4), with only 14% in Group A and 18% in Group B receiving continuous infusion serotherapy and around half of the participants in each group receiving intravenous antibiotics, some prophylactically and others therapeutically. Of the antibiotics prescribed, Amoxicillin + Clavulanic Acid and Flucloxacillin were the most common, with 48% and 24% in Group A and 46% and 29% in Group B, respectively. The other antibiotics (Cefazolin, Ceftriaxone, Gentamicin, Piperacillin + Tazobactam, and Vancomycin) were used the least.

Another variable under analysis concerns prescribed intravenous analgesia, where around 62% of participants in Group A and 70% of participants in Group B had this prescription. Of these analgesics, the most common were Paracetamol and Tramadol, in contrast to Ketorolac, Parecoxib, and Pethidine, which were the least used.

In addition to antibiotics and analgesia, around 50% of the participants in both groups had other intravenous therapy with the following drugs: Dexamethasone, Iron, Furosemide, Metoclopramide, Ondansetron, and Pantoprazole.

Table 4 - Characterization of the therapy administered

| | Group A (N=50) | | Group B (N=50) | |
|----------------------------|----------------|-----|----------------|-----|
| | N | % | N | % |
| Continuous infusion | | | | |
| Yes | 7 | 14% | 9 | 18% |
| No | 43 | 86% | 41 | 70% |
| Antibiotics | | | | |
| Yes | 27 | 54% | 29 | 58% |
| No | 23 | 46% | 21 | 42% |
| Analgesia | | | | |
| Yes | 31 | 62% | 35 | 70% |
| No | 19 | 38% | 15 | 30% |
| Other therapeutics | | | | |
| Yes | 26 | 52% | 23 | 46% |
| No | 24 | 48% | 27 | 54% |

3.4. Phlebitis incidence and characterization

Looking at the incidence of phlebitis, Group A had 13 participants (26%) with phlebitis, and Group B had 6 participants (12%) with phlebitis. About this phenomenon, sociodemographic data, the categorization of phlebitis, the characterization of PVC, and the therapy used were also analyzed (Table 5).

As for the sociodemographic characterization of the participants, there was homogeneity when comparing the two groups in the variables gender and age group. In both groups, the female sex was more expressive, and in terms of age, people over 71 were the most susceptible to phlebitis.

According to the Portuguese Phlebitis Scale (Braga et al., 2016), in Group A, there were grade 1, 2, and 3 phlebitis, with 46% of grade 3 phlebitis. In Group B, only grade 1 and 2 phlebitis were identified.

The caliber of PVC most chosen by the professionals was 20G in both groups, unlike the insertion site of this device, which in Group A was the antecubital fossa. Still, in Group B, it was the forearm/arm that was most used.

DOI: <https://doi.org/10.29352/mill0214e.33949>

We noticed that, as a standard feature in both groups, around 90% of the patients who had phlebitis were on antibiotic therapy, and, of these, about 50% were on Amoxicillin + Clavulanic Acid. In addition to this antibiotic, Flucloxacillin is also associated with 24% of phlebitis in Group A and 29% in Group B, and the other antibiotics are not very significant.

Table 5 - Phlebitis characterization

| | Group A (N=13) | | Group B (N=6) | |
|-------------------------------|----------------|-----|---------------|-----|
| | N | % | N | % |
| Gender | | | | |
| Female | 9 | 69% | 4 | 67% |
| Male | 4 | 31% | 2 | 33% |
| Age | | | | |
| <50 | 2 | 15% | 0 | 0% |
| 50-60 | 2 | 15% | 1 | 17% |
| 61-70 | 2 | 15% | 1 | 17% |
| 71-80 | 3 | 23% | 2 | 33% |
| 81-90 | 3 | 23% | 2 | 33% |
| >90 | 1 | 9% | 0 | 0% |
| Grade of phlebitis | | | | |
| Grade 0 | 0 | 0% | 0 | 0% |
| Grade 1 | 3 | 23% | 3 | 50% |
| Grade 2 | 4 | 31% | 3 | 50% |
| Grade 3 | 6 | 46% | 0 | 0% |
| Grade 4 | 0 | 0% | 0 | 0% |
| PVC caliber | | | | |
| 18G | 1 | 8% | 0 | 0% |
| 20G | 8 | 61% | 4 | 67% |
| 22G | 4 | 31% | 2 | 33% |
| PVC site | | | | |
| Forearm/Arm | 4 | 31% | 4 | 67% |
| Antecubital fossa | 6 | 46% | 2 | 33% |
| Wrist/hand | 3 | 23% | 0 | 0% |
| Therapy used | | | | |
| Paracetamol | 10 | 77% | 4 | 67% |
| Amoxicillin + Clavulanic Acid | 6 | 46% | 3 | 50% |
| Tramadol | 4 | 31% | 3 | 50% |
| Metoclopramide | 4 | 31% | 3 | 50% |
| Flucloxacillin | 3 | 23% | 2 | 33% |
| Cefazolin | 1 | 8% | 0 | 0% |
| Ceftriaxone | 1 | 8% | 0 | 0% |
| Vancomycin | 1 | 8% | 0 | 0% |
| Iron | 1 | 8% | 0 | 0% |
| Piperacillin + Tazobactam | 0 | 0% | 1 | 17% |

4. DISCUSSION

In this study, we found and highlighted the reduction in the incidence rate of phlebitis from 26% to 12% before (Group A) and after (Group B) the implementation of the protocol. However, these results are still below the 5% phlebitis rate recommended by the Infusion Nurses Society (Infusion Nurses Society, 2021). In other studies, this rate has varied, ranging from 6.1% (Simões et al., 2022), 11.5% (Braga et al., 2018), 12.38% (Ribeiro et al., 2023), 18.09% (Salma et al., 2019) and 23.9% (Kassahun et al., 2022).

With regard to the sociodemographic characteristics of the participants with phlebitis, in both groups, it was found that females were more expressive (69% and 67%), contrary to another study which points to males (65.6%) as a risk factor for developing phlebitis (Tendeiro et al., 2023).

Older age can also contribute to phlebitis; in this study, participants aged over 71 were the most susceptible, 55% in Group A and 66% in Group B. Other authors have found a statistically significant increase in phlebitis rates after the age of 45 (Salma et al., 2019), above 50 (Cernuda Martínez et al., 2023) and over 65 (Tendeiro et al., 2023). This data can be explained by advancing age when there are changes in the skin, which becomes thinner and more fragile, loss of around 20% of the subcutaneous tissue, thickening, and hardening of the inner walls of the veins, which can make it difficult to insert the PVC (Société française d'hygiène hospitalière, 2019). The aging process also leads to a decrease in the immune response, contributing to the risk of developing phlebitis (Cernuda Martínez et al., 2023).

Among the 19 cases of phlebitis in this study, Group A had grade 1 phlebitis (23%), followed by grade 2 (31%) and grade 3 (46%), while in Group B, half had grade 1 phlebitis and half grade 2.

DOI: <https://doi.org/10.29352/mill0214e.33949>

In other studies, the classification of phlebitis was diverse, and in some, it was found that grade 1 phlebitis was the most prevalent (Kassahun et al., 2022; Ribeiro et al., 2023), while in others, grade 2 was more significant (Salma et al., 2019; Simões et al., 2022). Grade 3 phlebitis was rarely reported, and no studies on grade 4 phlebitis were identified. These results align with those obtained in Group B in this study after the implementation of the protocol.

Regarding the selection of the length and caliber of the PVC, scientific evidence states that the caliber of the catheter should be as small as possible (Pittiruti et al., 2023) since it must not exceed the diameter of the blood vessel selected for puncture, allowing blood to pass into the vessel and promoting hemodilution of the solutions to be infused (Guanche-Sicilia et al., 2021). In this way, using smaller catheters helps reduce phlebitis, as it avoids mechanical irritation of the inner walls of small-diameter veins (Salma et al., 2019).

In the current study, the 18G catheter was only used in Group A, while the 22G and 20G catheters were registered in both groups, with the 20G standing out as the choice in more than half of the participants. These results corroborate the studies by Berger et al. (2022), Salma et al. (2019), and Tendeiro et al. (2023) describing the three calibers, 18G (13%; 5.24%; 4.4%), 20G (41%; 68.10%; 50.7%) and 22G (39%; 26.67%; 44.9%) with relative frequencies like this study.

In Group A, the antecubital fossa was the most chosen insertion site (46%), followed by the forearm/arm (31%) and finally the wrist/hand (23%), but in Group B, this last site was not observed in any of the participants with phlebitis, with the forearm/arm being used in the majority (67%) of people, followed by the antecubital fossa in the remainder. Our results are in line with the measures implemented in the protocol and which are in line with the evidence; the selection of the PVC insertion site should be appropriate, giving preference to the forearm and avoiding joint areas, the wrist and antecubital fossa, which increase the risk of mechanical phlebitis related to the movement of the catheter (Guanche-Sicilia et al., 2021; Simões et al., 2022; Société française d'hygiène hospitalière, 2019). In addition to the location of the PVC, the condition of the venous accesses should also be assessed, prioritizing the choice of straight, palpable, and well-filled blood vessels (Guanche-Sicilia et al., 2021).

About the therapy used as a risk factor for the development of phlebitis, antibiotic therapy has a major influence on this event. Around 90% of the participants in this study with phlebitis were on antibiotic therapy; of these, around half were on Amoxicillin + Clavulanic Acid, and almost a third of people were prescribed Flucloxacillin, with these two antibiotics being the most significant. Our results are in line with the study by Salma et al. (2019), which also mentions the same antibiotics associated with a higher frequency of phlebitis, and the study by Simões et al. (2022) points to Amoxicillin + Clavulanic Acid and other antibiotics with a pH between 8.0 and 10 may contribute to an increased risk of developing chemical phlebitis.

We also believe that it is essential to understand whether there are any aspects in the preparation of the antibiotic that may have an influence on the incidence of phlebitis, such as the solvent used, reconstitution, dilution, stability time, and infusion time. According to the information provided by INFARMED, both antibiotics, Amoxicillin + Clavulanic Acid and Flucloxacillin, are not stable after reconstitution and need to be administered immediately (INFARMED, 2017, 2019). Another particularity concerns the solvent used, which must be water and not a saline solution, for the preparation of injections. It would, therefore, seem pertinent for another study to explore nurses' practices regarding the preparation of these drugs and whether this could have an impact on the incidence of phlebitis associated with PVC.

Therefore, to prevent phlebitis, before selecting a PVC, the nurse should include an assessment of the patient, namely their preference, age, skin characteristics, and available venous accesses, as well as analyzing the benefits and risks associated with each type of catheter (Braga et al., 2018; Guanche-Sicilia et al., 2021; Oliveira et al., 2019).

Regarding the limitations of this study, we can mention that the research was only carried out in a single service, with a non-probabilistic sample and a small number of people with phlebitis, which compromises the generalizability of the results. We also found that the length of stay in the PVC and the number of these devices inserted in each person, along with the other data, could be exciting variables to analyze. Another limitation was the lack of evaluation of the evolution/resolution of phlebitis after its detection and consequent removal of the PVC.

CONCLUSION

The results of this study, which compares the incidence of phlebitis between the two groups, suggest that the protocol instituted in the service could have benefits in terms of reducing the incidence of phlebitis associated with PVC by standardizing practices based on scientific evidence.

It can be concluded that phlebitis can be characterized by degrees of severity, and there are several risk factors that can contribute to its development, such as the female sex, advanced age, larger catheters, joint areas as a PVC placement site, and the use of antibiotic therapy.

However, longitudinal studies are needed in different types of services to corroborate our conclusions and to explore other variables that may influence the incidence of phlebitis associated with PVC.

With this study, we realized that phlebitis is a multifactorial event that health professionals should be concerned about. Therefore, it is recommended that they employ various strategies to identify and assess the occurrence of phlebitis.

DOI: <https://doi.org/10.29352/mill0214e.33949>

As implications for practice, the results suggest that nurses play a fundamental role in preventing and reducing the incidence of phlebitis associated with PVC, using protocols that reflect the systematization of interventions, providing a better quality of nursing care and lower costs associated with hospitalization. It also reinforces the need for nurses to use validated scales to standardize the assessment of the insertion site and surrounding areas of the PVC to facilitate documentation and support decision-making in resolving phlebitis.

AUTHOR CONTRIBUTIONS

Conceptualization, F.O.; I.G. and A.R.O.; data curation, F.O.; I.G. and A.R.O.; formal analysis, F.O.; I.G. and A.R.O.; investigation, F.O.; I.G. and A.R.O.; methodology, F.O.; I.G. and A.R.O.; project administration, F.O.; I.G. and A.R.O.; resources, F.O.; I.G. and A.R.O.; supervision, F.O.; I.G. and A.R.O.; validation, F.O.; I.G. and A.R.O.; visualization, F.O.; I.G. and A.R.O.; writing-original draft, F.O.; I.G. and A.R.O.; writing-review and editing, F.O.; I.G. and A.R.O.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

REFERENCES

- Biyik Bayram, Ş., Gülnar, E., Akbaytürk, N., & Çalışkan, N. (2023). Incidence of Infiltration and Phlebitis and Risk Factors Among Chemotherapy Patients: An Observational Prospective Cohort Study. *Journal of Nursology*, 26(1), 18–26. <https://doi.org/10.5152/JANHS.2023.2287143>
- Braga, L. M., Parreira, P. M., Oliveira, A. de S. S., Mónico, L. dos S. M., Arreguy-Sena, C., & Henriques, M. A. (2018). Phlebitis and infiltration: Vascular trauma associated with the peripheral venous catheter. *Revista Latino-Americana de Enfermagem*, 26. <https://doi.org/10.1590/1518-8345.2377.3002>
- Braga, L. M., Salgueiro-Oliveira, A. de S., Henriques, M. A. P., Rodrigues, M. A., Rodrigues, C. J. V., Pereira, S. A. G., & Parreira, P. M. D. S. D. (2016). Translation and adaptation of the Phlebitis Scale for the Portuguese population. *Revista de Enfermagem Referencia*, 4(11), 101–109. <https://doi.org/10.12707/RIV16048>
- Cernuda Martínez, J. A., Suárez Mier, M. B., Martínez Ortega, M. del C., Casas Rodríguez, R., Villafranca Renes, C., & Del Río Pisabarro, C. (2023). Risk factors and incidence of peripheral venous catheter-related phlebitis between 2017 and 2021: A multicentre study (Flebitis Zero Project). *Journal of Vascular Access*. <https://doi.org/10.1177/11297298231189963>
- Guanche-Sicilia, A., Sánchez-Gómez, M. B., Castro-Peraza, M. E., Rodríguez-Gómez, J. Á., Gómez-Salgado, J., & Duarte-Clíments, G. (2021). Prevention and Treatment of Phlebitis Secondary to the Insertion of a Peripheral Venous Catheter: A Scoping Review from a Nursing Perspective. *Healthcare*, 9(5), 611. <https://doi.org/10.3390/healthcare9050611>
- INFARMED, I. P. - Autoridade Nacional do Medicamento e Produtos de Saúde. (2017). *Amoxicilina + Ácido clavulânico: Folheto informativo*.
- INFARMED, I. P. - Autoridade Nacional do Medicamento e Produtos de Saúde. (2019). *Flucloxacilina: Folheto informativo*.
- Infusion Nurses Society. (2021). Infusion Therapy Standards of Practice. *Journal of Infusion Nursing*, 44(Sup. 1), S1–S224. <https://doi.org/10.1097/NAN.0000000000000396>
- Kassahun, C. W., Abate, A. T., Tezera, Z. B., Beshah, D. T., Agegnehu, C. D., Getnet, M. A., Abate, H. K., Yazew, B. G., & Alemu, M. T. (2022). 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. *Nursing Research and Practice*, 2022. <https://doi.org/10.1155/2022/8261225>
- Lima, N. D. O., Sousa, M. O. F. de, Peres, E. M., Gomes, H. F., Pires, B. M. F. B., Leite, D. C., Cunha, C. V., & Kubota, T. M. (2020). Caracterização da utilização de cateteres venosos periféricos em unidade clínica de um hospital universitário / Characterization of the use of peripheral venous catheters in a clinical unit of university hospital. *Journal of Nursing and Health*, 10(3). <https://doi.org/10.15210/jonah.v10i3.18367>
- Lladó Maura, Y., Berga Figuerola, M. L., Rodríguez Moreno, M. J., Lluç Garvi, V., Soler Felsner, E. E., Rodríguez-Rodríguez, A., Almendral, A., Limón, E., & Fusté, E. (2023). Care bundle for the prevention of peripheral venous catheter blood stream infections at a secondary care university hospital: Implementation and results. *Infection, Disease and Health*, 28(3), 159–167. <https://doi.org/10.1016/j.idh.2023.02.001>

DOI: <https://doi.org/10.29352/mill0214e.33949>

- Marsh, N., Webster, J., Ullman, A. J., Mihala, G., Cooke, M., Chopra, V., & Rickard, C. M. (2020). Peripheral intravenous catheter non-infectious complications in adults: A systematic review and meta-analysis. In *Journal of Advanced Nursing*, 76(12), 3346–3362. <https://doi.org/10.1111/jan.14565>
- Oliveira, A. D. S. S., Basto, M. L., Braga, L. M., Sena, C. A., Melo, M. N., & Parreira, P. M. D. S. D. (2019). Nursing practices in peripheral venous catheter: Phlebitis and patient safety. *Texto e Contexto Enfermagem*, 28. <https://doi.org/10.1590/1980-265x-tce-2018-0109>
- Pittiruti, M., Van Boxtel, T., Scoppettuolo, G., Carr, P., Konstantinou, E., Ortiz Miluy, G., Lamperti, M., Goossens, G. A., Simcock, L., Dupont, C., Inwood, S., Bertoglio, S., Nicholson, J., Pinelli, F., & Pepe, G. (2023). European recommendations on the proper indication and use of peripheral venous access devices (the ERPIUP consensus): A WoCoVA project. *Journal of Vascular Access*, 24(1), 165–182. <https://doi.org/10.1177/112972982111023274>
- Ribeiro, S., Valente, S., Sousa, S., Lopes, M. L., Abreu, N., & Alves, E. (2023). Flebite associada ao cateter venoso periférico em cardiologia: incidência, fatores de risco e custos associados. *Jornal Brasileiro de Economia Da Saúde*, 15(1), 71–80. <https://doi.org/10.21115/JBES.v15.n1.p71-80>
- Salma, U., Sarker, M. A. S., Zafrin, N., & Ahamed, K. S. (2019). Frequency of peripheral intravenous catheter related phlebitis and related risk factors: A prospective study. *Journal of Medicine (Bangladesh)*, 20(1), 29–33. <https://doi.org/10.3329/jom.v20i1.38818>
- Simões, A. M. N., Vendramim, P., & Pedreira, M. L. G. (2022). Risk factors for peripheral intravenous catheter-related phlebitis in adult patients. *Revista Da Escola de Enfermagem*, 56. <https://doi.org/10.1590/1980-220X-REEUSP-2021-0398EN>
- Société française d'hygiène hospitalière. (2019). Prévention des infections liées aux cathéters périphériques vasculaires et sous-cutanés. https://www.sf2h.net/k-stock/data/uploads/2019/05/HY_XXVII_SF2H_CATHETERS-2019.pdf
- Tendeiro, P. I. S. D. N., Diniz, A. M., Mendes, C., Bordalo, I. M. S. V. L., Chainho, M. da C., Ramos, S. M. S. V., & Sousa, P. P. (2023). Peripheral intravenous catheter-associated phlebitis and drug administration: Retrospective incident analysis. *Revista de Enfermagem Referencia*, 6(2). <https://doi.org/10.12707/RVI22069>
- Zingg, W., Barton, A., Bitmead, J., Eggimann, P., Pujol, M., Simon, A., & Tatzel, J. (2023). Best practice in the use of peripheral venous catheters: A scoping review and expert consensus. *Infection Prevention in Practice*, 5(2). <https://doi.org/10.1016/j.infpip.2023.100271>