

Phlebitis indicator and nursing care in children and adolescents with peripherally inserted central catheter*Indicador de flebitis y cuidados de enfermería en niños y adolescentes con catéter central de inserción periférica**Indicador de flebite e cuidados de enfermagem em crianças e adolescentes com cateter central de inserção periférica***Wilza Cabral Rodrigues da Silva¹**

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Submission: 11-12-2020**Approval:** 11-21-2020**Abstract**

The aim of this study was to analyze the prevalence of phlebitis in children and adolescents who used a peripheral venous catheter and a peripherally inserted central catheter (PICC), using the Maddox scale. This is an exploratory-descriptive, retrospective and documentary study, with quantitative clarifications. Ethical-legal precepts were contemplated. A general mean incidence of phlebitis of 0.20% was evidenced. There was a higher incidence of grade 3+ phlebitis in 16 (50%) in children using PICC. Given the above, it is suggested that health teams should institute indicators of adverse events in phlebitis, aiming at prevention and early detection for better care quality. Despite the 48 conducts used by Nursing in the research scenario, it is necessary to establish protocols based on scientific evidence. That is: Apply cold compresses alternating with warm compresses; swabs with chamomile infusion.

Descriptors: Phlebitis; Catheter; Pediatric Nursing; Nursing Care.**Resumen**

El objetivo de este estudio fue analizar la prevalencia de flebitis en niños y adolescentes que utilizaron un catéter venoso periférico y un catéter central de inserción periférica (CCIP), utilizando la escala de Maddox. Se trata de un estudio exploratorio-descriptivo, retrospectivo y documental, con aclaraciones cuantitativas. Se contemplaron preceptos ético-legales. Se evidenció una incidencia media general de flebitis del 0,20%. Hubo una mayor incidencia de flebitis de grado 3+ en 16 (50%) en niños que usaban PICC. Teniendo en cuenta los hallazgos del estudio, se sugiere que los equipos de salud deben instituir indicadores de eventos adversos en flebitis, con el objetivo de la prevención y detección temprana para una mejor calidad de la atención. A pesar de las 48 conductas utilizadas por Enfermería en el escenario de la investigación, es necesario establecer protocolos basados en la evidencia científica. Es decir: Aplicar compresas frías alternando con compresas calientes; hisopos con infusión de manzanilla.

Descriptores: Flebitis; Catéter; Enfermería Pediátrica; Atención de Enfermería.**Resumo**

Objetivou-se analisar a prevalência de flebite em crianças e adolescentes que fizeram uso de cateter venoso periférico e cateter central de inserção periférica (PICC), utilizando Escala de Maddox. Trata-se de um estudo exploratório-descriptivo, retrospectivo e documental, com elucidações quantitativas. Foram contemplados os preceitos ético-legais. Evidenciou-se uma média geral de incidência de flebite de 0,20%. Houve maior incidência de flebite grau 3+, em 16 (50%) em crianças utilizando PICC. Levando em consideração os achados do estudo sugere-se que as equipes de saúde devam instituir indicadores de eventos adversos em flebitis, visando a prevenção e a detecção precoce para melhor qualidade assistencial. Apesar das 48 condutas utilizadas pela Enfermagem do cenário da pesquisa, faz-se necessário estabelecer protocolos baseados em evidências científicas. Quais sejam: Aplicar em sítio compressas frias alternadas com mornas; compressas com infuso de camomila.

Descriptores: Flebite; Cateter; Enfermagem Pediátrica; Cuidados de Enfermagem.

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Introduction

The quality of care is increasingly being discussed among health professionals, who seek excellence in care, with the reduction of adverse events, such as the appearance of phlebitis, when sometimes using a venous catheter peripheral or central, not to mention other occurrences¹.

Quality is defined by the literature as a set of attributes that includes a level of excellence in the activities performed by the professional, such as the efficient use of resources, reduction of risks to the patient and a high degree of patient satisfaction, considering essentially the existing social values¹.

Therefore, quality indicators are fundamental in care planning, particularly in the hospital area, a way of monitoring and evaluating the quality of care, developing better, the organization, evaluation, coordination, control, and direction of the activities performed in hospitals¹.

For a better elucidation of the adverse event of "phlebitis", it is necessary to rescue some related concepts, described right after. Phlebitis involves increased capillary permeability, allowing the extravasation of proteins and fluids to the interstitial space. In that case, the traumatized tissue becomes inflamed chemically or physically. In the immune system, leukocytes accumulate at the site of inflammation, consequently presenting a greater or lesser area of erythema and tenderness, depending on the severity of the degree of phlebitis, which may occur in peripheral catheter and peripherally inserted central catheter (PICC)^{2,3}.

The consequence of phlebitis is the persistence of pain and local edema for days and even weeks, which may extend the hospitalization. It should be noted that INS³ establishes an acceptable frequency of phlebitis at 5% or less in any population, children, or adults, internationally. Phlebitis can be classified as mechanical, chemical, bacterial and post-infusional²⁻⁵.

On the other hand, in more prolonged intravenous therapies, with the use of hyperosmolar drugs and, with pH extremes, the use of the peripherally inserted central catheter (PICC) is inevitable, which consists of a long intravenous device, from 20 to 60 centimeters long, the gauge varies between 1 to 6Fr (French). There is PICC with single, double, triple or quadlumen lumen, that is, it has 1 to 4 ways. The valved catheters are produced with silicone and polyurethane materials, which support a greater flow of solutions. It is inserted in the peripheral vein, maintaining its final position in the superior or inferior vena cava, recommended by the central catheter, according to the literature^{6,7}.

In this context, the nursing team must be aware and technically and scientifically prepared to ensure the prevention of adverse events, including the risk of phlebitis. Hence, the importance of complying with the recommendations of the World Alliance for Patient Safety,

In this regard, the importance of nursing in reducing risk factors for phlebitis is emphasized, implementing evidence-based practices (EBP), which involves the definition of the problem by Nursing, decision making, as well as critical evaluation of the available evidence, which integrate the best evidence clinical skills, as well as patient values and preferences⁹.

The best evidence comes from relevant scientific research, which produces reliable and applicable results in clinical practice. As for professional expertise, it is related to the knowledge and skills developed by the health professional, as well as clinical experience acquired for updating and critical analysis of the scientific literature. Thus, the greater the expertise, the greater the ability to use scientific evidence, thus involving the patient in the clinical decision, seeking to respect their preferences and values, thus adapting local actions and conditions⁹.

Working as a nurse in a public pediatric hospital, together with the team, we seek to develop care protocols, based on evidence-based practices, aiming at risk prevention with respect to intravenous therapies, carrying out preventive-educational actions and providing a safe environment. We always evaluate the infrastructure, equipment and quality supplies used by the service, as well as our nursing assistance, with permanent education, based on technical-scientific knowledge and above all humanistic. Regarding intravenous therapy, we used the Maddox Scale, as an indicator of quality of care aiming at the prevention of risks and possible damages during the administration of parenteral solutions to pediatric patients. The need for the constant search for excellence in care and, my experience with more than fifteen years, providing care in pediatrics, were the two main reasons that instigated me in carrying out this research.

Given the above, we will seek to answer the guiding question: What prevalence of phlebitis notifications and nursing care using the indicator to classify the degree of phlebitis in children and adolescents who used a peripherally inserted central catheter (PICC)?

This study is justified by the relevance of the theme in Pediatric Nursing, and may contribute as a quality indicator, aiming at a better planning of Nursing care in intravenous therapy. The objective of this study was to analyze phlebitis notifications and nursing care in children and adolescents who used a peripherally inserted central catheter (PICC), using the indicator to classify the degree of phlebitis.

Methodology

This is an exploratory-descriptive, retrospective and documentary case study, with quantitative clarifications. It took place at the public pediatric hospital located in the metropolitan region of the East Zone of São Paulo, with care for pediatric patients aged between 0 and 18 years,



exclusively by the Unified Health System (SUS). The data were collected through the phlebitis notification forms filled out by Nursing. Data collection took place between October 2014 and January 2017, being carried out by the researcher, after authorization by the Nursing Division Directorate.

All phlebitis notification forms and their respective degrees in children and adolescents who used PICC from January 2012 to December 2016 were included. There were no exclusion criteria.

As for the assessment of the PICC insertion site, it was performed by the institution's nurses using the Maddox scale to classify the degree of phlebitis. It was adapted by the service as follows: Grade 0: Absence of reaction; Grade 1: Sensitivity to touch on the I.V. portion of the cannula; Grade 2: Continuous pain, without erythema; Grade 3: Continuous pain, with erythema and edema, palpable hard vein less than 8 cm above the I.V. site (cannula); Grade 4: Continuous pain, with erythema and edema, hardening, hardened palpable vein more than 8 cm from the I.V.; Grade 5: Apparent venous thrombosis. All signs of 4, plus venous flow = 0, may have been stopped due to thrombosis^{10,11}.

The prevalence of phlebitis was calculated using the following formula: number of existing cases of phlebitis / number of patients with central venous access x 100³.

For association of qualitative variables and the degree of phlebitis, tables with crossed frequencies are presented, as well as the p value for Fisher's exact test. A significance level of 5% was considered, that is, when the p-value is less than 0.05, we have evidence of the existence of an association.

The study addressed ethical issues, according to the Resolution of the National Health Council (CNS) No. 466, of December 12, 2012, approved at the place of study and by the Research Ethics Committee of the Institute of Medical Assistance of Public Servants, under protocol No. 2,057,166.

Results

In this stage, results of descriptive statistics of the variables of interest are presented, which allows the characterization of the sample. Between 2012 and 2016, we identified 32 notifications of phlebitis, of the 962 children and adolescents who used PICC, with a prevalence of 3.33%.

It is observed that half of the patients 16 (50%) had phlebitis grade 3 and grade 1 was the second most frequent grade in sample 7 (21%). Eighteen (56.3%) were male and attended at the neonatal unit 16 (50%). The most frequent catheter insertion site was upper limbs 14 (43.8%), and caliber 3 French 18 (56.3%). The vast majority used antibiotics 29 (90.6%), the fixation dressing used transparent film 28 (87.5%), half used continuous and intermittent infusion 16 (50%), regarding the vesicant drug 30 (93.8%), irritating 7 (21%), there was an association of more drugs 20 (62.5%) and all used extreme pH drug.

The results presented in Table 1 indicate that there was no evidence in the association of the degree of phlebitis with the variables studied. Therefore, considering a significance level of 5%, that is, when the P-value is less than 0.05, we have no evidence of association.

Thus, it was not significant. For qualitative variables, we can see in Table 2, the nursing conduct, according to the degree of phlebitis, we have no evidence of an association. Among the 32 PICC, we identified 8 nursing procedures applied to phlebitis in different degrees.

The most used procedure was a warm compress in 9 (60.0%), and it was decided to remove the PICC in 7 (53.8%) children, after finding phlebitis grade 3 in both situations. It is worth remembering that the ducts were associated with each other, making 48 simultaneous applications.

Table 1. Distribution according to the degree of phlebitis and result of Fisher's exact test. São Paulo, SP, Brazil, 2017

	Phlebitis Grade	1-2		3		4-5		P-value
		N	%	N	%	N	%	
Sex	Feminine	3	21,4%	7	50,0%	4	28,6%	0,462
	Male	7	38,9%	9	50,0%	2	11,1%	
Catheter insertion site	HEAD	3	42,9%	4	57,1%	0	0,0%	0,176
	CERVICAL	1	33,3%	1	33,3%	1	33,3%	
	LOWER MEMBERS	2	25,0%	2	25,0%	4	50,0%	
	UPPER LIMBS	4	28,6%	9	64,3%	1	7,1%	



Fr catheter	1,9	1	20,0%	3	60,0%	1	20,0%	0,524
	2,0	1	100,0%	0	0,0%	0	0,0%	
	3,0	7	38,9%	7	38,9%	4	22,2%	
	4,0	1	12,5%	6	75,0%	1	12,5%	
Dressing / fixation	Transparent film	9	32,1%	14	50,0%	5	17,9%	0,448
	Transparent film and gauze	0	0,0%	1	50,0%	1	50,0%	
	No information	1	50,0%	1	50,0%	0	0,0%	
Infusion type	Continuous	0	0,0%	1	50,0%	1	50,0%	0,433
	Continuous and flashing	4	25,0%	8	50,0%	4	25,0%	
	Intermittent	6	42,9%	7	50,0%	1	7,1%	
Antibiotic	Yes	10	34,5%	14	48,3%	5	17,2%	0,565
	No	0	0,0%	2	66,7%	1	33,3%	
Vesicant drug	Yes	8	26,7%	16	53,3%	6	20,0%	0,121
	No	2	100,0%	0	0,0%	0	0,0%	
Irritating drug	Yes	4	57,1%	1	14,3%	2	28,6%	0,087
	No	6	24,0%	15	60,0%	4	16,0%	
Extreme pH	Yes	10	31,3%	16	50,0%	6	18,8%	
High osmolarity	Yes	2	40,0%	1	20,0%	2	40,0%	0,184
	No	8	29,6%	15	55,6%	4	14,8%	
Use of more than two antibiotics	Yes	8	33,3%	13	54,2%	3	12,5%	0,371
	No	2	25,0%	3	37,5%	3	37,5%	
Association of more drugs	Yes	5	25,0%	10	50,0%	5	25,0%	0,494
	No	5	41,7%	6	50,0%	1	8,3%	



Use of serum with electrolytes	Yes	1	8,3%	7	58,3%	4	33,3%	0,071
	No	9	45,0%	9	45,0%	2	10,0%	
Use of parenteral nutrition	Yes	2	50,0%	1	25,0%	1	25,0%	0,494
	No	8	28,6%	15	53,6%	5	17,9%	

Table 2. Distribution according to nursing conduct according to the degree of phlebitis and result of Fisher's exact test. São Paulo, SP, Brazil, 2017

Phlebitis Grade	Nursing conduct	1-2		3		4-5		P-value
		N	%	N	%	N	%	
Catheter removed	Yes	3	23,1%	7	53,8%	3	23,1%	0,621
	No	6	35,3%	9	52,9%	2	11,8%	
Cold compresses	Yes	0	0,0%	0	0,0%	1	100,0%	0,188
	No	10	32,3%	16	51,6%	5	16,1%	
Warm compresses	Yes	5	33,3%	9	60,0%	1	6,7%	0,481
	No	4	26,7%	7	46,7%	4	26,7%	
Compresses with tea	Yes	0	0,0%	3	60,0%	2	40,0%	0,117
	No	9	36,0%	13	52,0%	3	12,0%	
Warm compress alternating with cold	Yes	2	33,3%	4	66,7%	0	0,0%	0,692
	No	7	29,2%	12	50,0%	5	20,8%	
Asepsis (alcoholic chlorhexidine / degermantic / 70% alcohol)	Yes	2	66,7%	1	33,3%	0	0,0%	0,409
	No	7	25,9%	15	55,6%	5	18,5%	
Member observation / circumference	Yes	1	33,3%	2	66,7%	0	0,0%	1,00
	No	8	29,6%	14	51,9%	5	18,5%	
Application of hirudoid according to medical prescription	Yes	0	0,0%	2	100,0%	0	0,0%	0,669
	No	9	32,1%	14	50,0%	5	17,9%	
TOTAL		13		28		7		48

Note: * The "Not informed" frequencies were not considered in the Fisher test.

Source: Silva, Waisberg, Silva⁷.

Discussion

The INS³ establishes a possible incidence of phlebitis of up to 5% in visits by children or adults.

The INS³ and ANVISA¹² recommend inspecting the catheter insertion site; regarding the presence of phlogistic

signs, value the patient's complaint in relation to any discomfort and assessment of the catheter insertion site every 4 hours or according to the patient's condition, as well as the use of the phlebitis classification scale.

Regarding the classification of the degree of phlebitis using the Maddox scale, the highest incidence with phlebitis



grade 3, in 16 (50%) notifications regarding the peripherally inserted central catheter (PICC). Such results suggest that in the central path there may be complications such as: triggering of infection, obstruction, and occlusion, therefore, a care protocol should be maintained, with the Nursing Care Systematization⁶.

As for the caliber (Gauge-G or French-Fr) of the PICC, no association was observed at a level of 5% significance.

The literature describes that criteria should be considered when choosing the caliber, and it is suggested in children weighing less than 2 kg, the insertion of 1.9Fr catheters, equivalent to 24G. In children, between 2 and 6kg, 2.8Fr catheters, equivalent to 22G, should be inserted. In those weighing between 6 and 20 kg, 3.0Fr catheters, equivalent to 20G, can already be inserted. Finally, in those weighing over 20 kg, 4.0 Fr catheters, equivalent to 18G, are suggested⁴⁻⁷.

The use of an imaging method (venous ultrasound) before the insertion of the PICC allows to determine the ideal insertion zone - green zone - (Zone Insertion Method - ZIM) the caliber of the vein and to select the PICC caliber compatible with the vein caliber (preferably 1/3 of the caliber of the vein), reducing complications at insertion (such as vein transfixation and difficulty in progressing the catheter) and post-insertion (such as phlebitis and venous thromboembolism). In addition, ultrasonography assists in visualizing the vein during puncture and insertion of the catheter. To reduce the incidence of complications and patient safety, an individualized assessment of each patient by the nurse is essential to indicate the insertion of a venous catheter with final positioning in the peripheral or central vein (superior vena cava)¹³.

Thinking about the local service, Nursing seeks to implement such criteria, corroborating the recommendations of ANVISA¹², which recommends catheters with smaller caliber because they cause a lower incidence of mechanical phlebitis, preventing irritation of the vein wall by the venous device and less obstruction of blood flow within the blood vessel.

On the other hand, drugs administered by peripheral venous catheters are more susceptible to chemical phlebitis, and central venous catheters, to mechanical phlebitis due to the continuous abrasive presence of the intravenous catheter, despite the biocompatibility of the catheter constituent material to be made of polyurethane or silicone¹².

Regarding the age group, the occurrence of undesirable situations may be related to the anatomical-physiological characteristics of the venous network of newborns and infants³.

As for the nursing care practices described in this study, they corroborate the INS3 recommendations, claiming that at the first sign of phlebitis, the catheter should be removed and cold compresses should be applied,

followed by warm compresses in the affected area, with elevation of the limb 24 to 48 hours, trying to administer analgesics and anti-inflammatory drugs according to medical prescription.

It also points out that cold compresses, in the initial phase, help to reduce pain. Warm compresses, on the other hand, cause dilation, increasing the distribution and absorption of the extravasated drug, and should be applied within 24 hours to 72 hours after the drug is overflowed, for 15 to 30 minutes every 4 hours³.

Still, when it comes to the application of warm compresses, chamomile tea, a study¹⁴ describes that it can be applied with anti-inflammatory purpose for phlebitis resulting from peripheral intravenous infusion of chemotherapy. As for the use of fatty acids, which keep the place moist while the dressing is occlusive, favoring debridement, if necessary¹⁵⁻¹⁷.

Regarding therapeutic procedures, based on protocols, Hydrogel is used topically, which keeps the environment moist and autolytic; silver sulfadiazine, being bactericidal and bacteriostatic; alginate with silver, which also keeps the environment moist and facilitates healing, and being bactericidal, hemostatic, with high absorption capacity^{17,18}.

Still in relation to topical anti-inflammatories such as hirudoid, they are recommended and used in our local service, as they are treatments considered safe and effective¹⁶.

Phlebitis is a complex process, and requires health professionals, in particular Nursing, to understand the biological, cognitive, immunological, and affective aspects of patients, as well as technical-scientific and managerial knowledge for assistance in the multidisciplinary context, seeking the excellence of care, based on care and management indicators.

As limitations of the study, there was a lack of data in notifications about the underlying pathology. In addition, the records of the notifications were performed at the onset of phlebitis, with no daily monitoring at the place of insertion of the PICC, making it impossible to compare the prevalence indicators between patients with and without phlebitis.

Conclusion

The findings of this study show the need for health teams to establish indicators of the prevalence of adverse events, particularly in this study of phlebitis for prevention and possible early interventions, aiming to offer, in addition to emotional support, safety and efficacy in care, avoiding health complications. Despite the 48 conducts used by Nursing in the research scenario, it is necessary to establish protocols based on scientific evidence. That is: Apply cold compresses alternating with warm compresses; compresses with chamomile infusion. The implementation of care protocols and guidelines aimed at preventing phlebitis are essential for safe care.



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