

THE INCIDENCE OF PHLEBITIS IN A MEDICAL CLINICAL UNIT

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ABSTRACT: The objective of this study was to verify the incidence of phlebitis in a clinical medical unit. A prospective cohort study was conducted using nonparticipatory observations guided by a structured questionnaire, with 100 patients admitted to the clinical medical unit, in whom 234 peripheral venous accesses were used. Phlebitis was identified in 60% of patients and in 55.6% of the peripheral venous accesses, and most of them remained intact for more than 72 hours (53%). The presence of phlebitis per patient was associated with longer hospitalization on the clinical unit ($p=0.002$) and a greater number of accesses per patient ($p<0.001$). Length of retention of venous access for more than 72 hours was also associated with the presence of phlebitis ($p<0.001$). Phlebitis occurred in the majority of the patients and peripheral venous accesses analyzed. Therefore, it is necessary to intensify the training protocols for nursing staff in order to reduce the rates of phlebitis.

DESCRIPTORS: Phlebitis. Peripheral catheterization. Patient safety. Nursing care.

INCIDÊNCIA DE FLEBITE EM UMA UNIDADE DE CLÍNICA MÉDICA

RESUMO: O objetivo desse estudo foi verificar a incidência de flebite em uma unidade de clínica médica. Foi realizado um estudo do tipo coorte prospectivo através de observação não participativa guiada por um questionário estruturado com 100 pacientes internados na clínica médica nos quais foram utilizados 234 acessos venosos periféricos. Identificou-se flebite em 60% dos pacientes e em 55,6% dos acessos venosos periféricos, sendo que a maioria permaneceu instalada por mais de 72 horas (53%). A presença de flebite por paciente foi associada maior tempo de internação na unidade ($p=0,002$) e maior quantidade de acessos por paciente ($p<0,001$). O tempo de permanência dos acessos venosos maior que 72 horas também foi associado à presença de flebite ($p<0,001$). Ocorreram flebitis na maioria dos pacientes e dos acessos venosos periféricos analisados. Dessa forma é necessário intensificar os treinamentos da equipe em enfermagem para redução dos índices de flebite.

DESCRIPTORIOS: Flebite. Cateterismo periférico. Segurança do paciente. Cuidados de enfermagem

LA INCIDENCIA DE FLEBITIS EN UNA UNIDAD CLÍNICA MÉDICA

RESUMEN: El objetivo de este estudio fue determinar la incidencia de flebitis en una unidad médica. Se realizó un estudio de cohorte prospectivo mediante observaciones no participantes guiadas por un cuestionario estructurado con 100 pacientes internados en la clínica médica en los cuales fueron utilizados 234 accesos venosos periféricos. La flebitis fue identificada en el 60% de los pacientes y en 55,6% de los accesos venosos periféricos, de los cuales, la mayoría permaneció instalado durante más de 72 horas (53%). La presencia de flebitis por paciente fue asociado con la hospitalización más prolongada en la unidad ($p=0,002$) y mayor número de accesos por paciente ($p<0,001$). El tiempo de permanencia del acceso venoso mayor que 72 horas también se asoció con la presencia de flebitis ($p<0,001$). La flebitis ocurrió en la mayoría de los pacientes y accesos venosos periféricos analizados. Por lo tanto, es necesario intensificar la formación del personal de enfermería para reducir las tasas de flebitis.

DESCRIPTORIOS: Flebitis. Cateterismo periférico. Seguridad del paciente. Atención de enfermería.

INTRODUCTION

Intravenous therapy has the objective of administering medications, fluids, electrolytes and blood products to patients. This therapy is most often administered through peripheral venous access, the installation of which is a routine procedure performed in the hospital environment under the responsibility of the nursing staff.¹⁻²

Peripheral venous access (PVA) is characterized as an invasive procedure due to the disruption of the natural protection of the skin and, consequently, leads to the communication of the venous system with the external environment.³

Despite the utility, PVA can cause complications; among these is phlebitis, that consists of an inflammation of the vein, causing pain, erythema, edema, and reduction of the rate of infusion,⁴ which could also lead to local and systemic infection.⁵

The predisposition for the development of phlebitis in a patient has, among its contributing factors, aseptic technique and skill in venous puncture of the professional who inserts the intravenous therapy, the osmolarity of the medications and fluids, length of stay, type and location of the catheter, age, sex and circulatory function.^{2,6}

Phlebitis is classified according to the phlebitis assessment scale⁷ as Grade 0 - no symptoms; Grade 1 - erythema with or without local pain; Grade 2 - erythema with pain and/or local edema; Grade 3 - in addition to the clinical signs of grade 2, the presence of a palpable fibrous cord along the vein; and Grade 4 - in addition to grade 3, presents a long palpable venous cord, with purulent drainage.

According to the Infusion Nurses Society, the acceptable rate of phlebitis in a given population of patients should be 5% or less.⁷

The invasive nature of PVA has worried professional nurses responsible for the implementation of intravenous therapy, as infections related to intravascular devices are complications that can compromise patient health, increase the length of hospital stay, and generate an increase in the costs of hospital care.⁸⁻⁹

Therefore, the objective of this study was to verify the incidence of phlebitis in patients with PVA in a clinical medical unit and to evaluate the factors associated with its occurrence.

METHOD

A prospective cohort study was conducted. The study population consisted of patients admitted in the clinical medical unit (6th floor) of the *Hospital Regional da Asa Norte*, Brasília, Federal District, who used PVA. This unit had 32 active beds.

The subjects were enrolled in the study according to admission to the unit and insertion of a PVA between June and September of 2011. Patients were evaluated daily while they had one or more PVA. The convenience sample consisted of 100 patients. Inpatients admitted to the clinical medical unit (6th floor) using peripheral venous access that was inserted in this unit, were included in the sample.

The instrument for data collection was previously tested in five patients (5% of the sample), which led to minor adjustments and adaptations, and after that it was considered adequate for the research objectives.

Excluded from the sample were patients hospitalized in the specialty of dermatology and hematology that occupied eight beds of the unit, due to the frequent immunodepression and immunosuppression of these patients; patients with PVA inserted in other units; and PVA that did not use a polyurethane catheter over the needle.

After applying the exclusion criteria, the study focused on patients admitted to the pulmonology specialty, distributed over a total of 18 beds, and cardiology specialty, with six beds.

This study was approved by the Ethics Committee of the *Fundação de Ensino e Pesquisa em Ciências da Saúde* (Foundation of Teaching and Research in Health Sciences) as opinion no. 204/11, and was conducted in accordance with Resolution no. 196/96 for research involving human beings, with signing of the Terms of Free and Informed Consent form by the participant.

The dependent variable was the presence of phlebitis and is, therefore, considered the outcome for the analysis of the independent variables that were allocated into two groups, those related to patients and those related to PVA. The independent variables analyzed relating to the patients were: gender, skin color, age, specialty of hospitalization, length of stay in the unit, number of PVAs

used. The independent variables analyzed related to PVA were: length of retention of the PVAs in hours, the dominant limb, gauge of the catheter, identification of the PVA (date, gauge and name of the person responsible for the insertion).

For a description of the characteristics of subjects and their PVAs, a percentage distribution of categorical variables and measures of central tendency for continuous variables was performed. In order to verify the association between the variables the chi-square test was applied and for analysis of the relationship of the variables with the presence of phlebitis (outcome), analysis occurred through logistic regression. The Statistical Package for the Social Sciences, version 20.0, was used for analysis. Statistical significance was considered when $p < 0.05$.

RESULTS

Of the 100 study participants, there was a predominance of males (59%) and Caucasians (56.6%). The mean age was 57.84 years (± 16.5), ranging from 20-94 years, and most patients were over 60 years of age (53%).

As for the length of stay in the studied unit, the mean was 17.86 days (± 14.37), ranging from 2-93 days, with the majority of patients remaining hospitalized for up to 20 days (76%).

The majority of the patients were hospitalized in the pulmonology speciality beds (79%), and the mean length of stay did not vary substantially between patients of pulmonology (17.37 days) and cardiology (19.71 days). In both specialties, the length of stay presented the same median (15 days).

A high percentage of patients used PVA only one time (41%), but the majority used it more than one time.

The presence of phlebitis was observed in the majority of patients (60%). There were more cases of phlebitis in pulmonology patients (64.6%) when compared with patients admitted to the cardiology beds (42.9%). Patients of pulmonology predominantly used more than one PVA (62%) when compared with those in cardiology

(47.6%). There were 234 PVA evaluated in the 100 participants.

In relationship to the length of retention of each PVA, it was verified that the majority were retained for more than 72 hours (53%).

There was no significant difference in the percentage of PVAs inserted in the right upper limb (48.3%) or left (51.7%) and in relationship to the insertion of PVA in the dominant (50%) or non-dominant (50%) upper limb.

With regard to the presence of phlebitis in the PVAs evaluated, phlebitis was identified in the majority of the access sites (55.6%). In the cases of phlebitis, there was a predominance of grade 1 (46.2%), followed by grade 2 (40%), grade 3 (18.3%) and there were no cases of grade 4 phlebitis.

The majority of the PVAs had the date of insertion identified (65.4%), but there was a very high percentage that did not have the date of insertion (34.6%).

With respect to gauge, many PVAs had no identification of the gauge used (36.3%). Of those PVAs with the gauge identified, there was a higher frequency of utilization of #20 gauge (53.7%), followed by #22 (28.8%) and a few with #18 (9.4%) and #24 (8.1%).

There were a large quantity of catheters without identification of the professional who performed the insertion (35.5%), and those with identification showed that nursing technicians were responsible for most insertions of the PCAs (90.7%) and very few were inserted by nurses (9.3%).

When the chi-square test was applied, there was a statistically significant association of cases of phlebitis with length of stay greater than 18 days ($p = 0.002$); with patients who used more than one PVA ($p < 0.001$); and those with length of catheter retention of more than 72 hours ($p < 0.001$) (Table 1 and 2).

There was no association of phlebitis with sex, skin color, age, medical specialty, gauge of the PVA, or the presence of date of insertion of the PVA (Tables 1 and 2).

Table 1 - Distribution of patients with and without phlebitis according to sex, skin color, age, specialty, length of stay, quantity of peripheral venous access between June to September 2011 in the Clinical Medical Unit (6th floor) of the Hospital Regional da Asa Norte. Brasília-DF, 2011

Variable	Categories	With phlebitis	Without phlebitis	p*
Sex	Male	35(58,3)	24(60)	0,868
	Female	25 (41,7)	16(40)	
Skin color	White	33(55,9)	24(58,5)	0,877
	Non-white	26(44,1)	17(41,5)	
Age	< 60 years	30 (50)	17(42,5)	0,462
	> 60 years	30(50)	23(57,5)	
Specialty	Pulmonology	51(85)	28(70)	0,071
	Cardiology	9(15)	12(30)	
Length of stay	<18 days	33(55)	34(85)	0,002
	> 18 days	27(45)	6(15)	
Quantity of PVA per patient	1	6(10)	35(87,5)	<0,001
	>1	54 (90)	5(12,5)	

* Qui-quadrado.

Table 2 - Distribution of peripheral venous access with and without phlebitis, according to length of catheter retention, gauge and identification of the insertion date from June to September 2011 in the Clinical Medical Unit (6th floor) of the Hospital Regional da Asa Norte. Brasília-DF, 2011

Variable	Categories	With phlebitis	Without phlebitis	p*
Length of catheter retention	< 72 hours	47 (36.2)	63(60.6)	<0.001
	> 72 hours	83(63.8)	41(39.4)	
Gauge of catheter†	Gauge 18 and 20	48(62.3)	46(63.9)	0.845
	Gauge 22 and 24	29(37.7)	26(36.1)	
Insertion date identified	Yes	79(60.8)	74(71.2)	0.097
	No	51(39.2)	30(28.8)	

* chi square; † only PVAs with identified gauge were considered (n=149).

A logistic regression was applied to analyze the influence of the variables on the outcome (presence of phlebitis), with the construction of two step by step models, one for the patient-related factors and the other for factors related to the PVAs. For this, variables with $p < 0.20$ were added to the models in the univariate analysis.

Among the factors related to the patients, in the multivariate analysis, the association of the presence of phlebitis with a greater quantity of PVAs inserted per patient was verified, (OR: 22.357, CI: 6.994-71.46, $p < 0.001$). And in relationship to factors related to the PVAs, there was an association between increased length of retention of the PVAs in days with the presence of phlebitis (OR: 1.010, CI: 1.005-1.016, $p < 0.001$).

DISCUSSION

Considering the maximum recommendation of 5% of cases of phlebitis in a population,⁷ the severity of the picture was realized when faced with

the elevated percentage of phlebitis identified in this study, which may have provided unnecessary risks to patients.

The presence of phlebitis was verified in 60% of participants, a percentage much higher than the 18.3% of a previous study with surgical patients.⁸ However, it was slightly lower than the 64.6% encountered in an Italian study with medical and surgical patients.⁵ In relationship to the 234 PVAs evaluated, phlebitis was observed in 55.6%, higher than the 25.8% of the study conducted in Campinas.⁹

Despite allowing the confrontation of actual situations, comparisons of rates of phlebitis of different studies must be performed with caution, because they may have been influenced by methodological aspects, such as for example, the study design, patient selection, evaluation time of the PVAs, as well as by the scenarios of conducting such studies.²

Although a high frequency of phlebitis was identified in the present study, the majority of cases

were identified as grade 1 (46.2%) and there were no cases of phlebitis grade 4, different results from those found in another study⁶ that showed 22.8% of cases of grade 1 phlebitis and 22.8% of grade 4.

There was no statistically significant association between gender and skin color with the presence of phlebitis, similar to other studies.^{1,6,8} However, other authors have identified association with the female gender.⁵

With regard to the length of stay in the clinical medical unit, the time of stay was greater than that encountered in a study conducted in Porto Alegre-RS.⁶ That said, there was a higher frequency of phlebitis in patients who remained hospitalized for more than 18 days, with a statistically significant association. However, this association was not observed in another study.⁶

A statistical association was identified between a greater quantity of PVAs used by a patient with the occurrence of phlebitis, an association also present in other studies.^{1,10} Mechanical or chemical trauma caused by previous use of PVAs may increase the risk of phlebitis in that region or in the same limb.¹ With consideration of the medical specialties, there were more cases of phlebitis in pulmonology patients, possibly because they had a higher quantity of PVAs inserted.

In the majority of the cases, the PVAs remained for more than 72 hours, which resulted in increased risk to the patients due to this variable being statistically associated with higher incidence of phlebitis. This association was also observed in another study.¹¹ Although more recent studies suggest that there is no benefit in routine replacement of PVA every 72 or 96 hours, when compared with the change indicated through clinical evaluation¹²⁻¹³ the present study showed, in multivariate analysis, that the chance of phlebitis increases with longer days of retention of the PVAs. Thus, it is noticed that the retention time is a variable with a significant association with the occurrence of phlebitis.

In relationship to the gauge of the device used in the PVAs, statistical association was not observed with the occurrence of phlebitis, as in other studies.^{1,14}

The date of installation of the PVAs was not identified in many cases (34.6%). However this percentage was even lower than the amount of PVAs that were not identified in a study conducted in Portugal (78%).¹⁵ There was no association between the presence of the insertion date with the occurrence of phlebitis, as verified by other authors.¹⁶

As a limitation, it should be pointed out that other factors already related with a higher incidence of phlebitis, such as for example, type of catheter stabilization, type of medication administered, anatomical location of PVAs, infusion type (continuous or intermittent), primary pathology of the patient, frequency of medication administration^{1,5,8,11,14-15} were not analyzed in this study and may have influenced the occurrence of phlebitis.

There was a preference for analyzing factors that were more restricted to nursing practice and subject to the decisions and attitudes of these professionals. Furthermore, to ensure greater uniformity in the sample to obtain more pure data, the exclusion of immunocompromised or immunosuppressed patients was established, as well as PVA inserted in other units, and considering the same type of catheter stabilization and catheter type (polyurethane) for all situations analyzed.

Another limitation was the lack of verification of technique for insertion of the PVA as well as the technique for medication administration, which are factors that also contribute to the incidence of phlebitis.¹

It was not possible to measure how much these other factors could have contributed to the peculiarity of some results, primarily in that it presented a very wide confidence interval. Moreover, the convenience sample selection as well as its size may also have contributed to the eccentricity of the respective outcome and therefore should be highlighted as a limitation.

However, despite the limitations, the results of this study may provide support for reconsidering some points of the conduct of the nursing staff, such as the insertion and maintenance of PVAs within the context of performance.

The training of the nursing staff, the use of protocols for PVA insertion and maintenance, in addition to frequent monitoring of patients using PVA are strategic measures already used and associated with reduced occurrence of phlebitis in other studies.¹⁶⁻¹⁸

Given the above, it is possible to realize the relevance of this topic in the activities of nursing professionals who routinely deal with PVA. Considering the risks associated with phlebitis, the need to seek scientific evidence to structure and support methods and guidelines in order to ensure patient safety by providing improvements in the quality of nursing care is understood.

CONCLUSION

The high incidence of phlebitis identified in this study is demonstrated as a worrying result, considering that is above the recommended percentage. This may favor unnecessary morbidity in the patients and may have generated increased hospital costs.

The nursing staff has a primordial role in the responsibilities of intervention and maintenance of the PVAs and a professional commitment to develop competencies to reduce the occurrence of phlebitis. Educational activities are recommended in order to promote reflection, behavior change and awareness regarding this problematic issue

We suggest that further research on the same theme should be conducted to provide new data to serve as indicators to assist the achievement of improvements in nursing care.

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