Cogitare Enfermagem

ORIGINAL ARTICLE

EFFECTIVENESS OF AN EDUCATIONAL INTERVENTION FOR THE PREVENTION OF PERIPHERAL VENOUS CATHETER COMPLICATIONS

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ABSTRACT

Objective: To evaluate the effectiveness of an evidence-based practice educational intervention in preventing peripheral venous catheter complications. Method: observational study with educational intervention for nursing professionals of a hospital in Minas Gerais, Brazil, about flushing, push-pause and locking techniques. Convenience sampling: 181 catheters in the pre-intervention group and 157 in the post-intervention group. The incidence of complications was evaluated and compared by the Chi-square and Fisher's exact tests. Results: the incidence of complications in the post-intervention group was: 4.5% for obstruction (p=0.000), 10.8% for accidental removal (p=0.265) and 1.9% for phlebitis (p=0.847). The use of the flushing, push-pause and locking techniques resulted in a significant reduction in the incidence of obstruction. onclusion: the educational intervention enabled updated knowledge and the implementation of flushing, push-pause and locking in nursing practices. The study is a contribution to nursing intervention planning to reduce the occurrence of obstruction.

DESCRIPTORS: Nursing; Catheterization, Peripheral; Catheter Obstruction; Patient Safety; Evidence-Based Practice.

HOW TO REFERENCE THIS ARTICLE:
Almeida ACN de, Pires MH, Santana I de S, Salgado P de O, Toledo LV, Parreira P, et al. Effectiveness of an educational intervention for the prevention of peripheral venous catheter complications. Cogitare Enferm. [Internet]. 2022 [accessed "insert day, monh and year"]; 27. Available from: http://dx.doi.org/10.5380/ce.v27i0.87276.

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INTRODUCTION

Intravenous drug administration is one of the most common nursing procedures performed in hospitalized patients, and it is performed with the use of short peripheral or central venous catheters of the needled or over-the-needle type. The needled short peripheral venous catheter is indicated for the administration of a single dose of medication and can remain in place for up to eight hours to administer the second dose. The short needle catheter, on the other hand, is the device of choice for up to seven days of therapy. Both short peripheral venous catheters are contraindicated for administering irritating or vesicant medications with pH ≤5 or ≥9[1-4]. These catheters should be removed every 72 or 96 hours in the absence of complications, according to institutional protocol, or by clinical indication in the presence of signs and/or symptoms of complications such as phlebitis, infiltration, obstruction, accidental removal, or infection[4-5].

The peripheral venous catheter, when compared to central venous catheters, is low cost, easy and quick to insert, and does not require surgical dressing. However, the process of peripheral venous puncture and the permanence of a catheter in the patient's vein lumen involves complex nursing care. It requires specific knowledge, skills, and abilities of the professional to evaluate and make decisions about the indication and choice of the type of catheter to be inserted, in addition to individualized nursing interventions for the patient during the stay. The expected nursing outcome is to prevent and reduce complication rates, regardless of the triggering factor, and to provide quality care that ensures patient well-being[4-5].

Approximately 90% of hospitalized patients receive infusion of drugs and other fluids intravenously. There is a risk of developing some type of complication associated with the catheter or insertion site and in adjacent areas before completing intravenous therapy with complication rates ranging from 1.8% to 55.5%, resulting in removal and insertion of a new catheter[2,6-9].

Peripheral venous catheter obstruction is a complication with an incidence as high as 26.5%[1,6,8,10-11]. It can be identified when there is resistance to infusion flow and/or no reflux of blood through the catheter and is caused by the formation of a blood clot or precipitation of drugs in the catheter lumen, or by mechanical problems. In general, there is no reversal of catheter permeability, and its removal is required[8].

To maintain permeability of the peripheral venous catheter and consequently reduce failures and prevent obstruction, the flushing technique associated with the pulsatile technique (push-pause) is indicated. One should use a syringe larger than 10ml manually prepared or pre-prepared with saline solution 0.9% (SF 0.9%), before and after administration of intravenous drugs. It is also essential to perform, at the end of the pulsatile flushing, the locking technique to maintain positive pressure in the system (intermediate extensor and catheter) and thus avoid blood return to the catheter lumen and, consequently, obstruction[4,6,12-13].

Phlebitis is one of the most studied complications, with incidence between 11.5% and 36.7%[1-2,8-9]. It is classified according to its causal agent in bacterial, mechanical, or chemical, evolving with an inflammatory process easily identified by the presence of clinical signs/symptoms in the tissues near the catheter insertion site, such as pain, hyperemia, heat, edema, palpable fibrous cord in more advanced stages and, in more severe cases, with the presence of purulent secretion, characterizing an unintentional adverse event[8,14].

Infiltration is a complication resulting from the infusion of intravenous drugs in tissues near the catheter insertion site, with risk of causing tissue injury. The incidence of infiltration varies between 3.8% and 19.2% according to the use or not of scales[1-2,7-8,10,15].

The occurrence of complications related to the use and permanence of the peripheral

venous catheter may jeopardize patients' safety and well-being[1-2,8]. Therefore, it is necessary that the nursing team initially assesses the patient's venous network, the prescribed intravenous therapy, the expected time of therapy and the patient's preferences. In a second moment, the professional must perform the selection and insertion of the catheter and implement care, to minimize the risks of complications during its dwelling.

Subsequently, it is essential to manage care during removal and post-removal of the catheter, in addition to patient/caregiver education, which permeates all care. It is also recommended that nursing professionals reflect on their practices, implement protocols based on the best scientific evidence, and in accordance with the characteristics of patients, the nursing team, and the reality of the institution[1,3,16-17].

It has been verified, especially in cases of patients whose venous network is difficult to puncture, where there are often three or more unsuccessful puncture attempts, that the use of imaging technologies, such as ultrasound to evaluate the peripheral venous network and to guide venipuncture by intravenous therapy teams and/or nurses with specific skills has contributed to increase the success rate of catheter insertion and reduce peripheral vascular trauma, improving safety and health outcomes [3,18].

In this sense, to implement educational strategies for the development of nursing professionals' skills related to the care resulting from the insertion and permanence of peripheral venous catheters is essential to prevent and reduce predictable/preventable complications and adverse events, to ensure quality nursing care[7,16].

Therefore, knowing the results of quality indicators sensitive to nursing care within the process of care of patients with peripheral venous catheters is essential to support the planning and implementation of nursing interventions, with a view to preventing complications and reducing harm, thus enabling a transfer of knowledge based on scientific evidence and in line with the context. From this perspective, the present study aimed to evaluate the effectiveness of an educational intervention of evidence-based practice in the prevention of complications in peripheral venous catheter.

METHOD

Two independent observational studies were conducted, with observation of two groups at different times. The cohorts were interleaved by an educational intervention directed to nursing professionals, responsible for the management of peripheral venous catheters.

The study was developed in a medical clinic (27 beds) of a teaching hospital (114 beds) in Minas Gerais - Brazil, which sees patients of high complexity, for clinical and surgical treatments.

Convenience sampling was adopted, and data collection occurred during 30 consecutive days. The sample of the first part of the study - pre-intervention group - was composed of 75 adult patients (November 20 to December 20, 2018) and the second stage - post-intervention group - of 98 patients (January 2 to 31, 2020). The data collection period of the second stage was chosen by convenience of the researchers, considering the time needed to assess whether professionals had incorporated the educational intervention in nursing practices.

Inclusion criteria for the pre- and post-intervention groups were patients aged ≥18 years; using a short peripheral venous catheter; of the needle type; and for administration of intravenous medications and blood products. Patients with central venous catheters were excluded from both groups. Patients were included in the study as from the insertion of the first catheter in the clinical service and were followed until the hospitalization outcome

(discharge, death, or transference) in both groups. It is worth mentioning that the patients used one or more catheters during the data collection period and could have more than one catheter concomitantly.

The data from the pre- and post-intervention group were recorded in a specific instrument, which was adapted for the objectives of the present study[11]. It contains the patients' age (years), length of hospitalization, and variables related to the peripheral venous catheter, such as caliber (gauge), insertion site, catheter length of stay (hours), and complications, such as phlebitis, post-removal phlebitis, infiltration, obstruction, and accidental catheter removal.

In both groups, age and length of hospital stay were obtained from the patient's medical chart to identify homogeneity among them. To access the catheter-related data with greater fidelity, two researchers performed a daily assessment of the patients at the catheter insertion and removal site at the end of day and night shifts, to identify signs of complications.

To standardize the assessment in the pre- and post-intervention studies, we used the Portuguese phlebitis and infiltration scales[14-15]. Moreover, we also considered other secondary sources, different from the patient's medical record, to record the complications resulting from the use of the catheter, i.e., the nursing records in the patient's medical record, or the patient/ caregiver's reports. These sources were necessary because the catheter was fixed to the skin with non-sterile white tape, like adhesive tape, making it often difficult for the researcher to evaluate. Obstruction and accidental removal depended primarily on assessment during nursing care and record keeping, as there was no clinical evidence at the catheter removal site for the researcher to identify such complications.

Based on the analysis of the results of the pre-intervention study, an educational intervention was designed that followed a protocol prepared by the authors based on a literature review and was approved by the nursing coordination of the institution.

The literature review was performed in MEDLINE, CINAHL, SciELO and LILACS databases with the following descriptors: flush* OR wash* OR patency AND peripheral venous catheter OR peripheral intravenous OR vascular access device OR peripheral venous access. Publications between 2008 and 2018 in Spanish, English, Italian and Portuguese were selected. The snowball technique was used to include studies referenced in the Infusion Nurses Society Guideline published in 2016 which, after being revised, gave rise to the new version, published in 20214 and relevant publications that were known to the authors or were not identified in the database search or the snowball technique. Therefore, three guidelines and 16 articles were included.

The educational intervention was carried out in two stages: 1) three months from data collection in the pre-intervention group (March and April/2019) and 2) with the realization of low-fidelity clinical simulation. The first stage occurred during working hours, in a hospital auditorium, in eight sections, with an average of 10 professionals in each section. All 78 nursing professionals participated, as planned by the nursing coordination. There were no exclusion criteria in this stage. An expository lecture was performed using Microsoft Power Point® (30 minutes), with emphasis on the results of the variables studied in the pre-intervention group and on risk factors and care to prevent complications evidenced in the study, which were discussed in the light of scientific evidence.

The second moment lasted 60 minutes during which a low-fidelity clinical simulation on the effective implementation of the flushing, push-pause, and locking techniques was performed[12-13] with the following resources: manikin, short peripheral venous catheter over a needle, two-way intermediary extensor with clamp (flow-cutting) and the luer lock (double thread), 10-mL syringe with the luer lock, and vial of 0.9% saline solution (0.9% saline solution). Initially, the researcher demonstrated the techniques, and then each professional performed them under the direct supervision of the researcher. When necessary, the pertinent instructions were given again to correct failures, and the professional repeated

the technique until it was performed correctly and reported safety in execution. In the last stage of the section, there was a space for the professionals to clarify their doubts, which had not been previously clarified, and they reported on the learning acquired, the difficulties and benefits of implementing the techniques in clinical practice.

In the second stage - post-intervention group - the same method was used as described above in the pre-intervention group, regarding the inclusion and exclusion criteria of patients, the study variables, the data collection instrument, the use of the phlebitis and infiltration assessment scales[14-15], the assessment of complications by the researchers, and the use of secondary sources.

In the post-intervention group, the flushing technique, i.e., catheter flushing, was performed by manual administration using a 10-mL syringe filled with 0.9% saline solution through the lumen of the catheter, with a volume equivalent to twice the lumen of the catheter and the two-way extensor, that is, around 5 mL for the peripheral venous catheter[4,9,12]. The push-pause (pulsatile) technique was performed in association with flushing by applying intermittent and rapid pressure on the syringe plunger while the entire volume of 0.9% Saline Solution was administered. The locking technique consisted in closing the two-way extensor clamp simultaneously with the end of the administration of the last milliliters of 0.9% saline during flushing with the push-pause technique, that is, before disconnecting the syringe from the catheter's two-way extensor[4,12-13]. Figure 1 shows a schematic representation of the study's operationalization.

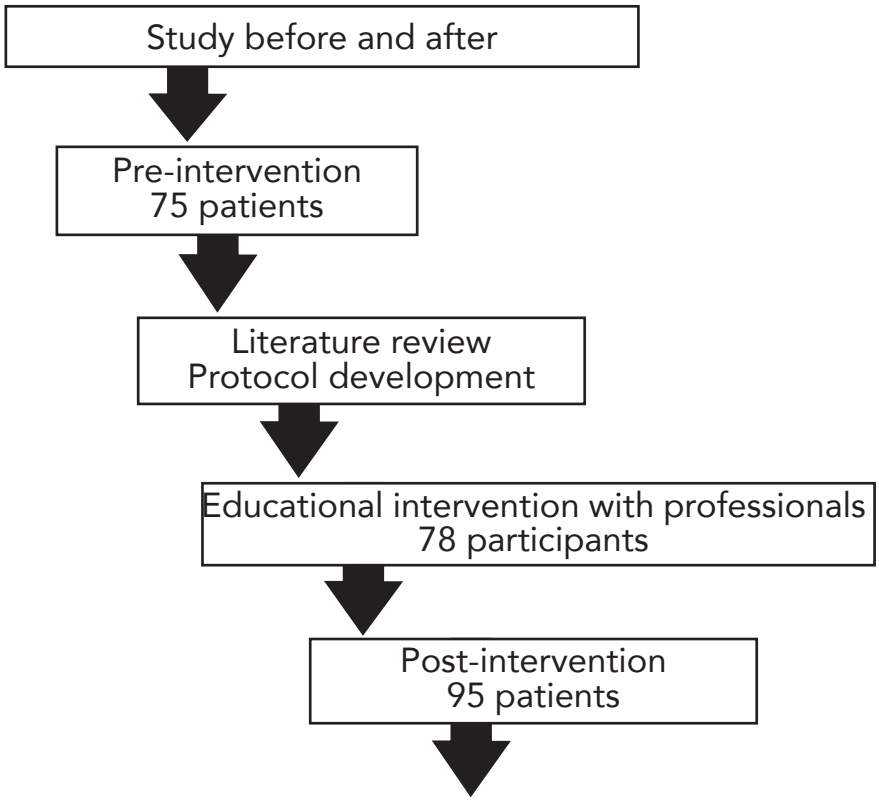

Figure 1 - Schematic representation of the operationalization of the study, Viçosa, MG, Brazil, 2020

The pre- and post-intervention data were analyzed using descriptive statistics, expressed as relative and absolute frequency, measures of central tendency (mean and median) and dispersion (standard deviation and quartiles), and inferential statistics. We

used the software Statistical Package for the Social Sciences, v. 24. The normality of data distribution was assessed based on the Kolmogorov-Smirnov test. The mean age of the participants was compared using Student's t test for independent samples. The median length of stay of the patients was compared using the Mann-Whitney test. The incidences of complications before and after the educational intervention were calculated. Comparisons of variables related to the peripheral venous catheter between groups were performed by Pearson's Chi-square and Fisher's Exact tests. The significance level adopted was $p<0.05$.

The study was approved by the Ethics Committee on Research Involving Human Beings of the Federal University of Viçosa. Opinion nº. 2,965,478/2018.

RESULTS

In the pre-intervention group 75 patients were evaluated, totaling 181 peripheral venous catheters and in the post-intervention group 98 patients, with 157 catheters. Regarding the patients' characteristics, homogeneity between the groups was verified based on the comparison of age and length of stay. The mean age of the patients was 66.9 years (±17.2) in the pre-intervention group and 65.5 years (±18.8) in the post-intervention group (p=0.479). Regarding the length of hospital stay, the median was nine days (Q_1=5; Q_3=16) among patients in the pre-intervention group and seven days (Q_1=4; Q3=12) among patients in the post-intervention group (p=0.204).

The 78 nursing professionals (10 nurses, 67 technicians, and one nursing assistant) participated in the educational intervention. In the sample analyzed, 60 (77.0%) were women with a mean age of 37.5 years (20 to 66 years, ±8.9), and 58 (74.5%) had worked in the institution for less than five years. Regarding training, 56 (71.8%) professionals had participated in a course on venous catheter recently and 46 (59.0%) on flushing at some point during their professional training.

The first part of the study pointed out that obstruction was the complication with the highest incidence in the pre-intervention group (20.4%). After the educational intervention, using the flushing, push-pause and locking techniques, the incidence of obstruction was reduced from 20.4% to 4.5% (p<0.001). However, there was an increase in the incidence of infiltration from 9.4% to 17.8% (p=0.023) (Table 1).

Table 1 - Incidence of complications in peripheral venous catheters in the pre- and post-intervention groups. Viçosa, MG, Brazil, 2020

Complications	Pre-intervention (n=181)	Post-intervention (n=157)	p*
	n (%)	n (%)	
Obstruction	37 (20.4)	7 (4.5)	<0.001
Infiltration	17 (9.4)	28 (17.8)	0.023
Accidental Removal	27 (15.0)	17 (10.8)	0.265
Phlebitis	4 (2.2)	3 (1.9)	0.847
Post-removal phlebitis	3 (1.6)	1 (0.6)	0.627

*Pearson's Chi-square or Fisher's Exact test

Source: Authors (2020).

In the comparative analysis of the characteristics of the peripheral venous catheters that presented, or not, obstruction, in the pre- and post-intervention groups, no differences were found regarding the insertion site, catheter caliber, and length of catheter stay (Table 2).

Table 2 - Association between the caliber, insertion site and length of permanence of the peripheral venous catheter and the occurrence of obstruction in pre- and post-intervention groups. Viçosa, MG, Brazil, 2020

	Pre-Intervention Obstruction n(%)		p*	Post-Intervention Obstruction n(%)		p*
Variables	**Yes (n=37)**	**No (n=144)**		**Yes (n=7)**	**No (n=150)**	
Catheter Size† (Gauge)						
18	-	4 (2.78	0.583	-	1 (0.6)	1.000
20	8 (21.6)	34 (23.6)	0.798	1 (14.2)	60 (40.0)	0.252
22	28 (75.6)	97 (67.3)	0.329	6 (85.7)	88 (58.6)	0.245
24	1 (2.7)	9 (6.2)	0.690	-	1 (0.6)	1.000
Catheter insertion site†						
Back of the hand	12 (32.4)	47 (32.6)	0.981	3 (42.8)	46 (30.6)	0.678
Forearm	17 (45.9)	75 (52.0)	0.582	3 (42.8)	78 (52.0)	0.713
antecubital fossa	2 (5.4)	4 (2.7)	0.604	1 (14.2)	12 (8.0)	0.461
Arm	6(16.2)	18 (12.5)	0.552	-	14 (9.3)	1.000
Catheter dwell time† (days)						
≤ 24 hours	5 (13.5)	7 (4.8)	0.129	-	4 (2.6)	1.000
1	8 (21,6)	37 (25,9)	0,766	1 (14,2)	38 (25,3)	0,890
2	13 (35,1)	45 (31,2)	0,799	3 (42,8)	36 (24,0)	0,474
3	7 (18,9)	20 (13,8)	0,612	2 (28,5)	26 (17,3)	0,727
4	4 (10,8)	30 (20,8)	0,242	1 (14,2)	42 (28,0)	0,765
5	-	5 (3,4)	0,628	-	4 (2,6)	1,000

*Pearson's Chi-square or Fisher's Exact test; †Catheter - Peripheral Venous Catheter

Source: Authors (2020).

Regarding the variables related to infiltration, it was verified that in both samples there was a statistically significant difference only between the catheter permanence time equal to 96 hours (four days) and the proportion of catheters that presented infiltration or not (p=0.048 and p=0.001 respectively) (Table 3).

Table 3 - Association between caliber, insertion site and length of permanence of peripheral venous catheters and the occurrence of infiltration in pre- and post-intervention groups. Viçosa, MG, Brazil, 2020

Variables	Pre-Intervention Infiltration n(%)		p*	Post-Intervention Infiltration n(%)		p*
	Yes (n=17)	No (n=164)		Yes (n=28)	No (n=129)	
Catheter Size†(Gauge)						
18	-	4 (2.4)	1.000	1 (3.5)	-	0.161
20	3 (17.6)	39 (23.7)	0.766	9 (32.1)	48 (37.2)	0.934
22	12 (70.5)	113 (68.9)	0.886	13 (46.4)	77 (59.6)	0.495
24	2 (11.7)	8 (4.8)	0.239	1 (3.5)	-	0.161
Not Informed	-	-		4 (14.2)	4 (3.1)	-
Place of catheter insertion†						
Dorsum of hand	6 (35.2)	53 (32.3)	0.803	11 (39.2)	38 (29.4)	0.309
Forearm	-	6 (3.6)	1.000	14 (50.0)	67 (51.9)	0.852
antecubital fossa	9 (52.9)	83 (50.6)	0.855	1 (3.5)	12 (9.3)	0.466
Arm	2 (11.7)	22 (13.4)	1.000	2 (7.1)	12 (9.3)	1.000
Catheter dwell time† (days)						
≤ 24 hours	1 (5.8)	11(6.7)	1.000	1 (3.5)	3 (2.3)	1.000
1	7 (41.1)	38 (23.1)	0.180	11 (39.2)	28 (21.7)	0.087
2	6 (35.2)	52 (31.7)	0.977	8 (28.5)	31 (24.0)	0.793
3	2 (11.7)	25 (15.2)	1.000	7 (25.0)	21 (16.2)	0.412
4	-	34 (20.7)	0.048	1 (3.5)	42 (32.5)	0.001
5	1 (5.8)	4 (2.4)	0.786	-	4 (3.1)	0.904

*Teste Qui-quadrado de Pearson ou Exato de Fisher; †Cateter - Cateter Venoso Periférico
*Pearson's Chi-square or Fisher's Exact test; †Catheter - Peripheral Venous Catheter
Source: Authors (2020).

DISCUSSION

The sample studied consists mostly of aged with a mean age of 66.9 and 65.5 years (pre- and post-intervention respectively), similar to other contexts[7-8,19]. Knowing the profile of patients is extremely important for the planning of nursing care in peripheral venipuncture, because with aging there is a decrease in turgor and elasticity of the skin due to collagen deficiency, in addition to increased capillary sensitivity, and consequently the risk of bleeding and hematoma formation, among other changes[20]. These characteristics are fundamental to the care process, for decision making about the use or not of tourniquet, for the choice of the type of catheter, selection of the caliber and site of venipuncture, and type of adhesive cover for fixing the catheter to the skin, and the periodicity of assessment of the insertion site.

Regarding the most common complication of peripheral venous catheters, the sample of the first stage of the study showed that obstruction was the main incident, with results considerably higher than those described in the literature[1,6,8]. The occurrence of obstruction

results in some negative outcomes, such as the impossibility of drug administration; the failure of clearance, in turn, results in catheter removal with consequent increase in costs and risk of stress for patient and nursing professional, besides the risk of peripheral vascular trauma for the patient due to the need of a new venous puncture and increased nursing care time[21].

No association was found between obstruction and caliber, nor between the insertion site and the days of catheter permanence. A clinical trial diverges from this result because it found that intermittent flushing with Saline Solution 0.9% increases the length of catheter permanence when compared to its absence[22].

This study showed a lower incidence of obstruction (4.5%) after the educational intervention on the techniques of flushing, push-pause and locking with a 10 ml syringe manually prepared with 0.9% saline solution (p=0.000), corroborating the results of another study that used syringes pre-filled with 0.9% saline solution6. It is worth mentioning that in this study it cannot be said that these techniques were performed at all the recommended times, i.e., before, between and after each drug, blood product/ hemoderivatives and venipuncture, because it was not the subject of this investigation.

Pulsatile flushing of the catheter with 0.9% saline solution before, between, and after drug administration is a nursing care that aims to evaluate, maintain permeability, and prevent catheter obstruction. To perform pulsatile flushing, the use of 0.9% saline solution and a volume equivalent to twice the lumen of the catheter and its connections/extension is recommended[9,12]. However, the professional should consider some factors in relation to the volume of 0.9% saline solution when performing the flushing: prescription of fluid restriction; medical diagnosis of heart failure or renal failure; caliber, type and size of the catheter; characteristics of the intravenous solution; patient's age; blood collection; and administration of viscous solutions, contrast or blood products/hemoderivatives, as they may require a greater volume of 0.9% saline solution due to density/viscosity[12].

The incidence of infiltration evidenced was like the rates of other studies[1-2,10]. Monitoring the conditions of the skin and tissues near the catheter is extremely important for early detection of infiltration and decision-making[15].

Regarding the association of infiltration occurrence and length of stay, a lower proportion of infiltration was found among patients who remained with the catheter installed for 96 hours in both groups. The use of validated scales, such as the infiltration scale, may help monitoring, assessment, measurement, and documentation of the degree of infiltration and early detection of the first symptoms for decision making, to remove the catheter and treat the adverse event, if necessary, preventing evolution to higher degrees and higher risk of tissue damage[15].

Further investigations are necessary to analyze the influence of pulsatile flushing on the incidence of infiltration, as there was a significant increase (p=0.023) in the post-intervention group (17.7%). No studies were found that associated the pulsatile flushing technique with risk factors for infiltration10. This technique is considered the most efficient for cleaning the catheter and preventing obstruction and is based on the shear stress of the solution on the catheter wall[23]. However, an experimental study observed that uniform flushing produced less damage to the vascular endothelium and surrounding tissues when compared to pulsatile flushing, and a lower infiltration rate[13].

The low incidence of phlebitis in this study may have been influenced by the removal of the catheter after 96 hours at the insertion site, as established in the protocol of the institution studied. In other studies, in similar settings, the rate was 4.6% to 44%[2,10,24-25]. It is suggested that further research be conducted to assess the influence and cost-benefit of the scheduled removal every 96 hours on the incidence of phlebitis and other complications, and studies to validate the phlebitis and infiltration scales for the Brazilian population, because the version available so far has been validated for the Portuguese population[15-16].

Accidental removal of the peripheral venous catheter was another complication evidenced in this investigation with an incidence of 15% and 10.8% (pre- and post-intervention respectively), like other studies and with rates between 3.8 and 10%[1-2,7]. However, this complication is rarely described and subject of analysis and discussion in studies.

The patient himself/herself may inadvertently remove the catheter, especially those with advanced age and decreased consciousness, with mental confusion, or even by the nursing professional during mobilization of the patient in bed or body hygiene, for example. Furthermore, accidental catheter removal may be associated with humidity and with the type and quality of the cover used to fix the catheter to the skin. These factors may compromise patient safety, because during the time elapsed between the removal of the catheter and the identification of the problem by the professional, the prescribed intravenous therapy is not administered. Furthermore, inadvertent removal of the catheter without alignment with the skin exposes the patient to the risk of peripheral vascular trauma and risk of compromising the integrity of the skin and tissues adjacent to the insertion site. The absence of compression on the site after catheter removal exposes the patient to the risk of bleeding in the area[3,14,26]. Therefore, the risk factors for accidental catheter removal need to be investigated to support care recommendations for prevention.

This study points out gaps in the evidence on risk factors for catheter obstruction, particularly in relation to some types of administered solutions, because they have higher density and viscosity, such as contrast solutions, blood products/hemoderivatives, and in relation to the respective volumes of 0.9% saline solution necessary to perform flushing effectively for each type of solution. Therefore, further research is suggested to improve the evidence and contribute to nursing practices in peripheral venous catheterization.

As limitations of this study, we consider: data from a single service; a non-probabilistic sample; the absence of validated scales for the Brazilian population to assess the signs/symptoms and degrees of phlebitis and infiltration. Other limitations were: absence of interobservers to assess the signs/symptoms of complications and the respective degrees of phlebitis and infiltration; the need to use data from secondary sources other than the medical chart on the occurrence of obstruction and accidental removal (time of insertion and removal of the catheter), such as verbally consulting the nursing professionals responsible for the patient or the patient/caregiver himself, since the data were not always described in the medical chart, affecting data reliability; and the non-evaluation of the characteristics of the solutions administered in the catheter is also configured as a limitation, since this is an important factor for the occurrence of complications.

CONCLUSION

Obstruction, associated with peripheral venous catheter use in the pre-intervention group, was the complication of highest incidence, and infiltration increased significantly in the post-intervention group.

The educational intervention enabled changes in nursing practices with the implementation of flushing, push-pause and locking techniques, and the results of the post-intervention group showed a significant reduction in the incidence of peripheral venous catheter obstruction. Knowledge of outcome indicators sensitive to nursing care and continuing education contributed to improve nursing practices and health outcomes.

As contributions of this research, we highlight the exchange of knowledge and the changes that occurred in nursing practices in the service after the educational intervention, which were based on the best available evidence. In addition, the research contributed information for evaluation and intervention planning to reduce the occurrence of

complications related to peripheral venous catheterization as well as to improve patient safety and the quality of nursing care.

ACKNOWLEDGMENTS

Our thanks to the National Council for Scientific and Technological Development (CNPq) for granting the Scientific Initiation scholarship (Process: 40404272719).

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Received: 16/10/2021
Approved: 24/05/2022

Associate editor: Luciana Nogueira

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ISSN 2176-9133