



## Prevalence of phlebitis in adult patients admitted to a university hospital

Prevalência de flebites em pacientes adultos internados em hospital universitário

Prevalencia de flebitis en pacientes adultos ingresados en hospital universitario

Angela Elisa Breda Rodrigues de Souza<sup>1</sup>, João Lucas Campos de Oliveira<sup>2</sup>, Denise Costa Dias<sup>2</sup>, Anair Lazzari Nicola<sup>2</sup>

**Objective:** to identify the prevalence of phlebitis, related to demographic and clinical variables, in peripheral intravenous therapy in adult patients admitted to a university hospital in Paraná, PR, Brazil. **Method:** this is an observational research, cross / prospective with a quantitative approach, carried out in three units of the hospital. Data collection took place from October 2012 to August 2013, using a form to extract demographic and clinical variables from patients suitable to pre-established eligibility requirements. For analysis, we used the calculation of point prevalence. **Results:** from 221 analyzed by venous access, there were 42 with presence of the clinical criteria definition of phlebitis. It was found a prevalence of phlebitis in men; with evolution degree of 2; venous punctures were located on the back of the hand; 22G caliber/diameter catheters; with residence time of three days. **Conclusion:** It was concluded that through the prevalence of known phlebitis, nursing actions for the prevention and management of the event can be (re)designed.

**Descriptors:** Phlebitis; Catheterization, Peripheral; Nursing; Patient Safety.

**Objetivo:** identificar a prevalência de flebites, relacionada a variáveis demográficas e clínicas, na terapia intravenosa periférica em pacientes adultos internados em um hospital universitário do Paraná, PR, Brasil. **Método:** investigação observacional, transversal/prospectiva, realizada em três unidades de internação. A coleta de dados aconteceu entre outubro de 2012 até agosto de 2013, utilizando-se um formulário para captar variáveis demográficas e clínicas pré-estabelecidas. Para análise, utilizou-se cálculo da prevalência pontual. **Resultados:** dos 221 acessos venosos analisados, houve 42 com presença de critérios clínicos para definição de flebites. Constatou-se prevalência de flebites em homens; com grau de evolução 2; punções venosas localizadas no dorso da mão; cateteres de calibre 22G; com tempo de permanência por três dias. **Conclusão:** através da prevalência de flebites bem definida, ações de enfermagem à prevenção e manejo do evento podem ser (re)planejadas.

**Descritores:** Flebite; Cateterismo Periférico; Enfermagem; Segurança do Paciente.

**Objetivo:** identificar la prevalencia de flebitis, relacionada con variables demográficas y clínicas, en la terapia intravenosa periférica, en pacientes adultos ingresados en hospital universitario de Paraná, PR, Brasil. **Método:** investigación observacional, transversal/prospectiva, cuantitativa, realizada en tres unidades del hospital. La recolección de datos se llevó a cabo de octubre de 2012 a agosto de 2013, usándose formulario para extraer variables demográficas y clínicas pre-establecidas. Para análisis, se utilizó el cálculo de prevalencia puntual. **Resultados:** de los 221 accesos venosos analizados, 42 obtuvieron criterios clínicos para definición de flebitis. Hubo prevalencia de flebitis en hombres; grado de evolución 2; punciones venosas situados en la parte posterior de la mano; catéteres de calibre 22G; con tiempo de permanecía de tres días. **Conclusión:** través de la prevalencia de flebitis bien conocida, acciones de enfermería a la prevención y manejo del evento pueden ser (re)planeadas.

**Descritores:** Flebitis; Cateterismo Periférico; Enfermería; Seguridad del Paciente.

<sup>1</sup>Hospital de Base de Bauru. Bauru, SP, Brazil.

<sup>2</sup>Universidade Estadual do Oeste do Paraná. Cascavel, PR, Brazil.

Corresponding author: João Lucas Campos de Oliveira  
Rua Vitória, 1735, CEP: 85802-020. Cascavel, PR, Brazil. E-mail: enfjoalcampos@yahoo.com.br

## Introduction

The globalized, competitive and demanding environment in which organizations are providing services in our times is driving health institutions to become increasingly concerned about the quality of care. In this perspective, quality is a multifaceted and polysemic phenomenon, permeated by a joint set of actions in effective, efficient, fair, acceptable, and secure health<sup>(1)</sup>.

With regard to safety in health care, particularly in hospitals it is clear that the nursing staff has an important impact on the scope of desirable wellness, because it is the only professional category to monitor the hospitalized patient every day uninterrupted<sup>(2)</sup>. Thus, each activity performed by nursing care tends to be a contribution to the (in)security of hospital care<sup>(1)</sup>.

Notwithstanding nursing care options exercised during the hospital stay of each user/patient, there should be necessary emphasis on care related to peripheral venous therapy, considering that a clear majority of assisted users will need at least one peripheral venous access during the hospitalization period<sup>(3-4)</sup>; for infusion fluids, medications and/or nutritional support. Thus, nursing care in intravenous therapy is undoubtedly an element that deserves attention for the promotion of patient safety<sup>(5-6)</sup>.

Being from the result of invasive procedures and requiring constant management, intravenous therapy may involve the exposure of users to adverse events or complications<sup>(6-7)</sup>, and this underscores the relationship of nursing care in this area with security in care<sup>(5)</sup>. Among the most frequent complications related to intravenous therapy there is an epidemiological emphasis on phlebitis, which is defined as an inflammatory process developed in the intimal layer of a vein<sup>(8)</sup>.

Among other ways, phlebitis may be classified as follows: the most common type is mechanical phlebitis, related to the puncture or improper handling of the catheter or improper gauging of the vein; chemical phlebitis is related to infusion of drugs

of extreme pH and osmolarity, or even very rapid infusion; infectious phlebitis is related to catheter contamination at the time of venipuncture, or the colonization of the intravenous therapy system in handling; and post-infusional phlebitis, which refers to the inflammation of a vessel which no longer displays the catheter *in situ* and which manifests 48 to 96 hours after its removal<sup>(7)</sup>. The clinical manifestations of phlebitis are erythema, edema and pain to varying degrees when inserting a catheter; and in the case of infectious phlebitis<sup>(7)</sup>, its evolution may cause a palpable venous cord and pus in the insertion of the catheter.

In national hospital services, phlebitis appears as an adverse event of persistent epidemiological importance given the high incidence found in recent studies, which indicate values ranging from 25.8%<sup>(9)</sup> to 55.6%<sup>(4)</sup>, both considered high<sup>(7)</sup>. In addition, this event has the potential to cause organizational burden, such as increased costs related to prolongation of hospital stay<sup>(9)</sup>, as well as the consequences to users and their families because of the characteristic clinical complications. Thus, in targeting the safety and quality of care, nurses should seek to maintain that the indexes/phlebitis rates steadily fall, as well as establishing prevention measures for this event; actions which most certainly involve the work of nursing professionals<sup>(7,10)</sup>.

Despite what has been previously explained, a systematic review through analysis of 233 studies of recent international literature found that there are many phlebitis scales/rates, but none were fully validated for use in clinical practice<sup>(11)</sup>. Therefore, it is believed that studies aimed towards the prevalence of phlebitis itself are still important and internationally recommended<sup>(7)</sup>, because to know the factors involved in the prevalence of this event can be a valuable tool for each hospital organization in making more assertive decisions towards the prevention of complications, and adapted to each situation. Moreover, the results of each study regarding the presented theme may contribute to the formation of a theoretical framework

that supports more accurate nursing actions in the prevention and management of phlebitis and thus contribute to enhancement of the professional nurse.

Based on what was presented, the following leading question was investigated: *What is the prevalence of phlebitis in adult patients admitted to a university hospital?* To answer this question, the aim of this study was to identify the prevalence of phlebitis, related to demographic variables and treatments of peripheral intravenous therapy in adult patients admitted to a university hospital.

## Methods

This is an observational research of a cross-sectional prospective outline with a descriptive and quantitative approach. It was developed in three units for adults of a public teaching hospital in the state of Paraná, with an operational capacity of 195 beds all contracted under the National Health System (SUS), as well as being the reference hospital to a population of approximately two million inhabitants<sup>(12)</sup>.

The investigated units, hereinafter referred to as F2, G3 and F1, respectively, were intended for service in Clinical Medicine and general surgery, with 28 beds; clinical and surgical care in orthopedics and neurology, with 26 beds; and clinical and surgical Cardiovascular care, with 13 beds<sup>(12)</sup>. The hospitalization sectors mentioned were intentionally chosen given the greater possibility for inpatients to have peripheral venous access than in other adult wards, as the individuals admitted to the Intensive Care Unit and Emergency Room usually have central insertion.

The target study population consisted of all admitted patients in the three hospital units in question, who presented one or more peripheral venous insertions. The sample was made up of the patients who met the following eligibility criteria: 16 years of age or older, orientation level maintained, established by clinical judgment of the researched

nurse, and with catheter inserted in the inpatient unit.

Data collection was carried out between the period from October 2012 to August 2013 in F2 and G3 units, and from October to December 2012 in F1. The collection period was reduced in the last unit mentioned because it had stopped services at the hospital. At this stage of research, we developed a form based on the instrument description<sup>(4)</sup>. The form used considered the extraction of the following variables: Patient identification; inpatient unit; bed; medical diagnosis; gender; age; date and time of insertion of the IV line, as well as insertion location and diameter of the catheter; and if there were suggestive signs of phlebitis and what they were. The instrument was evaluated through pilot testing, which lasted for seven days in October 2012. The instrument was effective and did not need any adjustments to it.

The collection was performed as follows: every day, the researcher attended the three units and checked which patients had been peripherally punctured in each unit, on the respective day and who met the eligibility requirements. The instrument was then applied to each of the patients and the location of insertion access was observed, followed by the clinical notation and demographic data for each patient, in the aforementioned form.

In order to reduce the possibility of common biases to observational studies, data were collected by a single researcher in order to uniformly generate all the comments, and preferably during the night, between the hours of 19:30 to 21h30. The period chosen was because of fewer professionals and visitors to the units in addition to lower demand for care activities, allowing for evaluation of each insertion without interruption.

All peripheral venous access included in the study was attempted to be followed up until 96 hours after the removal in order to detect post-infusional phlebitis, provided that the patient remained in the unit. However, some accesses were removed from the patient on the day of discharge and therefore were not

observed after withdrawal.

The classification of phlebitis by degree of evolution followed the recommendations of *Infusion Nursing Standards of Practice*<sup>(7)</sup>. The original measurements underwent conversion from inches to centimeters(cm) for use in the Brazilian language and are described below:

Degree of development of phlebitis	Clinical criteria
0	No Symptoms
1	Erythema at the insertion site with or without pain
2	Pain at the insertion site with erythema and/or edema
3	Pain at the insertion site with erythema
	Line formation
	Palpable venous cord
4	Pain in venous access with erythema
	Line formation
	Palpable venous cord greater than 2.54cm
	Purulent drainage

**Figure 1** - Phlebitis Rating Scale by Evolution Degree

Data obtained by way of the mentioned form was analyzed by appropriate descriptive statistics for each variable, through Software Excel 2010. The age and gender were used to trace demographic and profile; the variables of time and place of detention were used to trace the epidemiological profile of the sample. The relationship between the variables and cases of phlebitis was performed by calculating the point prevalence, internationally recommended<sup>(7)</sup>. Through this calculation, the appearance of phlebitis was correlated with the following variables: gender; inpatient unit, degree of evolution; caliber, puncture site, and duration of venous access.

This study complied with all ethical requirements set out in the Council National resolution of Health No. 466/2012, and the research project was approved with the opinion number 014/2011, issued by the Research Ethics Committee of the Universidade Estadual do Oeste do Paraná. Patients who composed the samples were all informed of the objective thereof,

had voluntary participation and their identities were kept secret. They signed two identical copies of the Free Commitment Agreement and Informed consent by the participants themselves, or their guardian when the subject was younger than 18 years.

It should also be mentioned that the nursing team of the investigated unit were communicated to in all cases where clinical signs of phlebitis were found at any stage of development during the term of venous access.

## Results

The study included a sample of 174 subjects evaluated. Of these, 74 (42.53%) were females, and 100 (57.47%) were male. The age of the study participants ranged from 16 to 92 years, with a median of 42 (interquartile deviation=16). Most patients (31.03%) were between 21 and 30 years. Of the patients in the sample, it was possible to evaluate 221 peripheral venous accesses which were all done by catheter needle.

Most of the patients (45.41%) were in the medical clinic inpatient unit and general surgery (F2); 43.10% of the patients belonged to the inpatient unit of Clinical Neurology and Surgery and Orthopedics (G3); and with lower frequency, (11.49%) of the patients were in Clinical and Surgical Cardiovascular Unit (F1).

Of the 221 peripheral venous accesses analyzed, 42 had presence of clinical criteria for definition of phlebitis, which resulted in an incidence of 19%. Regarding the prevalence of phlebitis by gender, we found that the event was more prevalent among males (12.66%) compared to females (6.33%). In relation to inpatient units, there was equivalent prevalence (45.24%) in the units G3 and F2, which both had 19 cases of phlebitis; whereas F1 unit had four cases of phlebitis, a prevalence of 9.52%.

Table 1 shows the results obtained for the presence/absence of clinical signs of phlebitis and,

when present, the relationship between the degree of progress established by it<sup>(7)</sup>. It gives emphasis to the high incidence and prevalence of Grade 2 of the studied event.

**Table 1** - Sample distribution by presence/absence of clinical signs of phlebitis and their level of evolution

Phlebitis frequency	Prevalência (%)
Clinical criteria for phlebitis	
Absent	105 (47.5)
Present	42 (19.0)
Reference pain in the absence of other clinical criteria	74 (33.5)
Total	221 (100.0)
Degree of development of phlebitis	
Degree 1	4 (9.5)
Degree 2	24 (57.2)
Degree 3	14 (33.3)
Degree 4	-
Total	42 (100.0)

Table 2 shows the results of phlebitis cases related to the calibers of the Peripheral Intravenous Catheters. It alludes to highlighting the prevalence of phlebitis in 22G caliber catheters.

**Table 2** - Distribution of the sample for the presence of phlebitis, by caliber of Peripheral Intravenous catheters

Calibers of Peripheral Intravenous Catheters	Cases of phlebitis	Prevalence (%)
14	3	7.1
16	4	9.7
18	6	14.2
20	13	30.9
22	16	38.1
Total	42	100.0

Table 3 summarizes the results of the prevalence of phlebitis cases in relation to the site of peripheral venous puncture, highlighted by puncturing the back of the hand.

**Table 3** - Phlebitis Distribution by place of peripheral venous access insertion

Insertion site of peripheral venous puncture	Cases of phlebitis	Prevalence (%)
Veins in the back of the hand	22	52.5
Veins of the forearm	6	14.2
Median cubital region	2	4.9
Veins of the arm	6	14.2
Jugular vein	6	14.2
Total	42	100.0

Finally, Table 4 presents the results of the prevalence of phlebitis according to the duration (in days) of peripheral venous access. The catheters left for three days highlighted the highest prevalence.

**Table 4** - Distribution of the sample for the presence of phlebitis, for duration of peripheral venous access

Residence time of venous access (days)	Cases of phlebitis	Prevalence (%)
1	4	9.5
2	15	35.8
3	17	40.5
4	2	4.8
5	3	7.1
6	1	2.3
Total	42	100.0

## Discussion

The sample was mostly made up of young adults and also male, and the prevalence of clinical signs of phlebitis was doubled in men compared to women. Age found in the sample differs from a recent study, which found that more than half of the patients evaluated with incidence of phlebitis were older than 60 years<sup>(9)</sup>. Nevertheless, the present study corroborates the latest research cited in relation to the higher prevalence in males of the adverse events of phlebitis<sup>(9)</sup>. Thus, these results together with the literature mean that being male is possibly a predisposing factor for the development of phlebitis.

The overall incidence of observed phlebitis should be noted (Table 1). This is because, although there are few scientific initiatives to establish a limit of what is acceptable to the occurrence of this event, the *Infusion Nursing Standards of Practice*<sup>(7)</sup>, the leading international body of nursing in intravenous therapy, considers overall incidence of phlebitis of up to 5% acceptable. Taking this into account, it is evident that the participants in the study were exposed to very high rates of phlebitis, which alone can already be considered as a problem to be faced by the hospital organization, specifically the nursing team.

Despite what has been discussed above and from other national research all from nursing initiatives, superior results to our study have been found (19%); 24.7% in a hospital in Rio Grande do Sul<sup>(13)</sup>, 25.8% in São Paulo<sup>(9)</sup>, and 55.6% in the Federal District<sup>(4)</sup>. It is considered important to compare the results with other studies because phlebitis incidence rates have been used as an indicator of the quality of nursing care<sup>(14-15)</sup>. In addition, it is clear that in the national context, it is important for the nurse to know their patient/clientele, as well as the limits and possibilities of its specific employing organization, so that they may seek the best alternatives to reduce the incidence rate of phlebitis.

In Table 1, a higher prevalence of phlebitis classified as Grade 2 was found, followed by prevalence classified as Grade 3. This is important because both classifications already expose the patient to pain and erythema formation, as well as the possibility of palpable venous cord formation<sup>(7-8)</sup>. In addition, the prevalence of phlebitis classified as Grade 2 has also been observed in national and international studies<sup>(4,16)</sup>, as well as some prevalence very close to that of grade 1, which was the most prevalent in other national research<sup>(9)</sup>.

Because it is a completely undesirable event, the difference between the prevalence of phlebitis classified between Grades 1, 2 and 3 was significant, and it can impose an eminent need for specific technical training of professional nursing service

units to investigate in order to detect early signs of clinical symptoms of phlebitis. In these terms, there is scientific fact which indicates that educational intervention (training) to nursing professionals has the potential to reduce the occurrence of phlebitis in peripheral intravenous therapy<sup>(17)</sup> by 50%, and this has the potential to strengthen the training of these professionals to prevent the worsening of clinical symptoms related to phlebitis when trained to detect early signs of evolution.

The prevalence of phlebitis in the sample due to the caliber of the venous access assessed (Table 2) was higher in those who used 22G caliber catheters than the 20G caliber catheters. These data corroborate other studies which also indicate prevalence of phlebitis in smaller diameter catheters, i.e., those less than or equal to 20G<sup>(13,18)</sup>. Thus, although the nursing staff has an ethical commitment to patients in their care, these data also provide reason to pay close attention to caring for individuals when using smaller-sized catheters.

Clinical judgment by the professional nurse should be used to define the size and the length of the catheter that will enable the use of the IV line<sup>(7-8)</sup>. Thus, although the results indicate higher prevalence in this group, the prevention of the occurrence and the early detection/prevention of clinical development of phlebitis should certainly be a premise adopted to all nursing services that excel in quality and safety of care.

Higher prevalence of phlebitis development was also found in patients who had venous mediated accessed veins on the back of the hand (Table 3). The prevalence of the event in relation to this clinical feature was significant, given that the prevalence was much lower for the other evaluated localities (veins of the forearm/arm, median cubital region, and jugular vein). This may be due to the fact that the hand is known to be very important for human purposes and is therefore provided with extensive mobility and the vessels of this location are of smaller diameter, with less blood flow and therefore less hemo-dilution of

drugs and injected solutions, which can increase the irritation and/or inflammation of the inner layer of the vein<sup>(7-8)</sup>. Therefore perhaps because of the increased mobility of the hands (a predisposing factor for the development of mechanical phlebitis), associated with a greater potential for tissue irritability<sup>(7)</sup>, phlebitis was prevalent at this puncture site.

The prevalence of phlebitis in patients with venous access positioned at the back of the hand can also suggest a need for training of nursing staff in the researched inpatient units, because although to venipuncture this site is considered as an easy place for venous access, it is not suitable for prolonged intravenous therapy<sup>(7-8)</sup>; an element that is likely to be necessary for those who are hospitalized. Thus, through educational activities, nursing professionals can be better equipped for choosing alternative locations for venipuncture; for example, the jugular veins, which had very low prevalence of phlebitis compared to the back of the hand, and also are a valid alternative for patients with clinical features that impose puncturing difficulties<sup>(7-8)</sup>.

Another important factor found concerns in the prevalence of phlebitis in the sample relative to the length of stay, established in days, of peripheral venous access (Table 4). In this context, the prevalence described that stands out is that the IV lines remained for three days, or 72 hours, followed by the prevalence for those which remained for two days, or 48 hours. These data corroborate other research which shows that venous access that remained for 72 hours was also related to higher prevalence development of phlebitis<sup>(13)</sup>.

The establishment of venous access permanency time one has been a widely discussed and sometimes controversial issue. Accordingly, *guidelines* which have called for prevention of adverse events related to the intravenous therapy have established that there is no need to replace peripheral venous catheters when they do not possess defining clinical features for such a measure, as studies have shown that

there is no substantial difference in phlebitis rates for periods of more than or less than 72 hours<sup>(19)</sup>. Thus, the same *guidelines* recommend the removal and replacement of the catheter should the patient show signs of phlebitis, infection or improper operation<sup>(19)</sup>.

Reinforcing the given recommendations<sup>(19)</sup>, a study of Turkish origin found statistically significant relation to the development of phlebitis with catheters remaining for up to 48 hours<sup>(16)</sup>, supporting the view that the clinical assessment of phlebitis development overcomes the event occurring in patients who use peripheral venous access for more than 72 hours.

In contrast to what is recommended internationally, the changing of catheters in Brazil has usually been empirically shown by the Hospital Infection Control Committees of each institution, which usually sets 72 hours as the expiration of exchange<sup>(10)</sup>. In this sense, recent national studies<sup>(5,10)</sup> have found high frequency to non-conformity with the "validity" of venous catheters; and this, according to research cited, certainly stands as an indicator that deserves attention for the control and advancement of nursing care quality.

Considering the results and the literature consulted, it converges toward the assertion that the catheter duration time is one of the variables which in most cases depends on the nurse's decision<sup>(20-21)</sup>. Thus, in addition to other elements related to patient safety, such as infection related to the use of catheters, nurses can focus their attention on changing the venous access, the careful selection of the size of the catheter according to the needs of each individual and choose the vein according to need, and also consider whether there is an indication for a different catheter, for example, a peripherally inserted central catheter, in order to prevent the development of phlebitis in their patients.

Other precautions to be observed by the nursing staff include proper preparation of the skin prior to venipuncture, and the adoption of an intravenous catheter with sterile adhesive, preferably transparent

thereby enabling the stability of the catheter<sup>(21)</sup>. These measures are essential for patient safety and can possibly help decrease the occurrence of phlebitis.

## Conclusions

This study made it possible to identify the prevalence in the development of phlebitis in adult patients admitted to three units of a university hospital, according to demographic and clinical variables. Based on this, it was observed that the phlebitis was more prevalent in males; those who were admitted to a unit of Orthopedics, and clinical and surgical Neurology; evolution degree of 2; 22G caliber catheters; in venous punctures located on the back of the hand; and catheters remaining in place for three days.

We conclude that the prevalence of phlebitis in the investigated context is well defined, and therefore has the potential to support prevention and management of adverse events, such as training activities of the nursing team regarding the early detection of signs and progress of phlebitis, and rational choice of location for the peripheral venipuncture. Moreover, even indirectly, the study has the potential to contribute to the reaffirmation of the importance of the nurse's work in the prevention and management of phlebitis, because in the light of the knowledge of the prevalence of this event, the professionals may have to make their decisions more assertively based on actions aimed at safety of intravenous therapy.

The absence of inferential statistics is undoubtedly the most significant limitation of this research. Thus, coupled with the shortage of literature on the studied subject matter, it is recommended to perform more investigations with analytical skills and with a level of higher evidence; that even aims to analyze the knowledge of nursing staff in detecting signs of phlebitis, as well as the relationship between cause and effect of phlebitis with other clinical variables.

## Collaborations

Souza AEBR collaborated on the design of the research project, data collection and analysis, and critical review of the final draft of the manuscript. Dias DC and Nicola AL collaborated in the design of the project and critical review of the final draft of the manuscript. Oliveira JLC collaborated in the drafting and critical review of the final draft of the manuscript.

## References

1. Ministério da Saúde (BR). Portaria nº. 529, de 1º de abril de 2013. Institui o Programa Nacional de Segurança do Paciente. Brasília: Ministério da Saúde; 2013.
2. Magalhães AMN, Dall'Agnol CM, Marck PB. Nursing workload and patient safety – a mixed method study with an ecological restorative approach. *Rev Latino-Am Enfermagem*. 2013; 21(Spec):146-54.
3. Capdevilla JA. El cateter periférico: el gran olvidado de la infección nosocomial. *Rev Esp Quimioter*. 2013; 26(1):1-5.
4. Magerote NP, Lima MHM, Silva JB, Correia MDL, Secoli SR. Relation between phlebitis and peripheral intravenous catheter removal. *Texto Contexto Enferm*. 2011; 20(3):486-92.
5. Murasaki ACY, Versa GLGS, Belluci Júnior JA, Meireles VC, Vituri DW, Matsuda LM. Evaluation of care in intravenous therapy: a challenge for quality in nursing. *Esc Anna Nery*. 2013; 17(1):11-6.
6. Camerini FG, Silva LD. Patient safety: analysing intravenous medication preparation in a sentinel network hospital in Brazil. *Texto Contexto Enferm*. 2011; 20(1):41-9.
7. Infusion Nurses Society. Infusion nursing standards of practice. *J Infus Nurs*. [Internet]. 2011[cited 2014 Oct 19]; 34(1S). Available from: [http://www.ins1.org/files/public/11\\_30\\_11\\_Standards\\_of\\_Practice\\_2011\\_Cover\\_TOC.pdf](http://www.ins1.org/files/public/11_30_11_Standards_of_Practice_2011_Cover_TOC.pdf)
8. Royal Collage of Nursing. Standards for infusion therapy. Londres: RDN; 2010.
9. Abdul-Hak CK, Barros AF. The incidence of phlebitis in a medical clinical unit. *Texto Contexto Enferm*. 2014; 23(3):633-8.

10. Souza AEER, Oliveira JLC, Dias DC, Nicola AL. Nursing care quality in peripheral intravenous therapy: analysis by indicators. *Cogitare Enferm.* 2014; 19(3):478-84.
11. Ray-Burrell G, Cert G, Polit DF, Murfield JE, Rickard CM. Infusion phlebitis assessment measures: a systematic review. *J Eval Clinical Prac.* 2014; 20(1):191-202.
12. Hospital Universitário do Oeste do Paraná. Estrutura organizacional [Internet]. 2014 [citado 2014 out 19]. Disponível em: <http://www.huop.unioeste.br>
13. Ubanetto JS, Rodrigues AB, Dornelles FF, Rosa Filho JM, Gustavo AS, et al. Prevalência de flebites em pacientes adultos com cateter venoso periférico. *Rev Enferm UFSM.* 2011; 1(3):440-8.
14. Caldana G, Gabriel CS, Bernardes A, Évora YDM. Performance indicators for hospital nursing service: integrated review. *Rev Rene.* 2011; 12(1):189-97.
15. Gabriel CS, Melo MRAC, Rocha FLR, Bernardes A, Miguelaci T, Silva MLP. Use of performance indicators in the nursing service of a public hospital. *Rev Latino-Am Enfermagem.* 2011; 19(5):1247-54.
16. Pasalioglu KB, Kaya H. Catheter indwell time and phlebitis development during peripheral intravenous catheter administration. *Pak J Med Sci.* 2014; 30(4):725-30.
17. Woody G, Davis BA. Increasing nurse competence in peripheral intravenous therapy. *J Infus Nurs.* 2013; 36(6):413-9.
18. Ferreira LR, Pedreira MLG, Diccini S. Flebite no pré e pós-operatório de pacientes neurocirúrgicos. *Acta Paul Enferm.* 2007; 20(1):30-6.
19. O'Grady NP, Alexander M, Burns LA, Dellinger P, Garland J, Heard S. et al. Guidelines for the prevention of intravascular catheter-related infections. [Internet]. 2011 [cited 2014 Oct 19]. Available from: <http://www.cdc.gov/hicpac/pdf/guidelines/bsi-guidelines-2011.pdf>
20. Oliveira ASS, Parreira PMS. Intervenções de enfermagem e flebites decorrentes de cateteres venosos periféricos: revisão sistemática da literatura. *Rev Enf Ref.* 2010; 3(2):137-47.
21. Harada MJCS, Pedreira MLG. *Terapia venosa e infusões.* São Caetano do Sul: Yendis; 2011.