



Journal of Nursing

Revista de Enfermagem

UFPE On Line

ISSN: 1981-8963

ORIGINAL ARTICLE

PERIPHERAL VENOUS ACCESSES IN HOSPITALIZED CHILDREN: A PHOTOGRAPHIC STUDY

ACESSOS VENOSOS PERIFÉRICOS EM CRIANÇAS HOSPITALIZADAS: UM ESTUDO FOTOGRÁFICO

ACCESOS VENOSOS PERIFÉRICOS EN NIÑOS HOSPITALIZADOS: UN ESTUDIO FOTOGRÁFICO

Thaís Juliany Caldas de Almeida¹, Juliana de Oliveira Freitas Miranda², Luciano Marques dos Santos³, Rosana Castelo Branco de Santana⁴, Clímene Laura de Camargo⁵, Carlito Lopes Nascimento Sobrinho⁶

ABSTRACT

Objective: evaluate the conditions of peripheral venous accesses in children admitted to pediatric wards. **Method:** study with a quantitative approach, descriptive, prospective, which examined 53 peripheral venous accesses in children aged from 0 to 2 years in a public hospital in the countryside of Bahia, Brazil, between May and July 2010. Data were collected through photographic record and a form based on national and international practice guidelines for intravenous therapy. Descriptive statistics was used for data analysis. **Results:** most punctures were in the hands (64.1%), the longer permanence of accesses was up to 2 days (72%), in all peripheral accesses a catheter under the needle with non-sterile bandage was used, a splint was little used, and 39.6% of the accesses were accidentally removed. **Conclusion:** care for peripheral venous accesses among the children under study did not complied with many of the national and international practice guidelines devised to provide intravenous therapy. **Descriptors:** Peripheral Catheterization; Child; Pediatric Nursing.

RESUMO

Objetivo: avaliar as condições dos acessos venosos periféricos em crianças internadas em enfermarias pediátricas. **Método:** estudo de abordagem quantitativa, descritivo, prospectivo, que avaliou 53 acessos venosos periféricos em crianças de 0 a 2 anos de um hospital público do interior da Bahia, entre maio e julho de 2010. Os dados foram coletados a partir de registro fotográfico e formulário baseado em diretrizes práticas nacionais e internacionais para terapia intravenosa. Utilizou-se a estatística descritiva para análise dos dados. **Resultados:** a maioria das punções foi nas mãos (64,1%), o maior tempo de permanência dos acessos foi até 2 dias (72%), em todos os acessos periféricos foi utilizado cateter sob agulha com curativo não estéril, a tala foi pouco utilizada, e 39,6% dos acessos foram retirados acidentalmente. **Conclusão:** os cuidados com acessos venosos periféricos nas crianças estudadas mostraram-se em desacordo com muitas das diretrizes práticas nacionais e internacionais que orientam os cuidados com a terapia intravenosa. **Descritores:** Cateterismo Periférico; Criança; Enfermagem Pediátrica.

RESUMEN

Objetivo: evaluar las condiciones de accesos venosos periféricos en niños ingresados en enfermerías pediátricas. **Método:** estudio con un abordaje cuantitativo, descriptivo, prospectivo, que examinó 53 accesos venosos periféricos en niños de 0 a 2 años en un hospital público en el interior de Bahía, Brasil, entre mayo y julio de 2010. Los datos fueron recogidos a través de registro fotográfico y formulario basado en directrices prácticas nacionales e internacionales para terapia intravenosa. Se utilizó la estadística descriptiva para análisis de datos. **Resultados:** la mayoría de los pinchazos estaban en las manos (64,1%), la permanencia más larga de accesos fue hasta 2 días (72%), en todos los accesos periféricos se utilizó un catéter debajo de la aguja con apósito no estéril, se utilizó poco la férula, y 39,6% de los accesos se quitaron accidentalmente. **Conclusión:** los cuidados con accesos venosos periféricos entre los niños estudiados no cumplieron con muchas de las directrices de práctica nacionales e internacionales concebidas para cuidados con la terapia intravenosa. **Descriptor:** Cateterización Periférica; Niño; Enfermería Pediátrica.

¹Nurse. Specialist in Nursing in Neonatal and Pediatric Intensive Care Unit. Municipal Health Department of Feira de Santana. Feira de Santana (BA), Brazil. Email: thaisjuliany@yahoo.com.br; ²Nurse. MS in Nursing. Ph.D. student in Nursing at the Federal University of Bahia (UFBA). Professor at the Bahia State University of Feira de Santana (UEFS). Salvador (BA), Brazil. Email: julidefreitas@hotmail.com; ³Nurse. MS in Nursing from the UEFS. Feira de Santana (BA), Brazil. Email: lucmarxenfo@yahoo.com.br; ⁴Nurse. MS in Nursing. Bahia State Children's Hospital. Feira de Santana (BA), Brazil. Email: rosanacastelo@hotmail.com; ⁵Nurse. Ph.D. in Public Health. Professor at the UFBA. Salvador (BA), Brazil. Email: climenecamargo@hotmail.com; ⁶Physician. Ph.D. in Medicine and Health. Professor at the UEFS. Feira de Santana (BA), Brazil. Email: mon.ica@terra.com.br

INTRODUCTION

Intravenous therapy (IVT) is a set of knowledge and techniques, used by a multidisciplinary team that employs technology derived from various specialties, including actions that range from the choice of an intravenous device and preparation and administration of solutions and medicines to care of catheters, such as maintenance, salinization, dressing change and discard.¹ For these purposes, the intravenous devices more frequently used in hospitals are the peripheral catheters.²

To implement IVT in pediatric units, the nursing team needs to access the peripheral or central venous system, using devices with appropriate structure and composition, in order to reduce adverse events. Peripheral intravenous catheterization is the most common invasive procedure conducted in hospitalized patients in clinical practice, it is a part of the care provided for about half of the patients who need IVT and infusional therapy.^{3,4}

The practice of IVT can result in morbidity, increased hospital stay, and significant costs, even when based on scientific knowledge and those developed with appropriate technical skills, since daily use and insertion of peripheral intravascular devices are associated with the risk of complications that may have impact on a patient's clinical status and evolution.⁵

Through this context and professional experience in the pediatric wards in a public hospital in the countryside of Bahia, Brazil, there emerged the motivation to register, by means of photographic images, the conditions of peripheral vascular access and compare them with the recommendations provided by national and international literature, through the guidelines of the U.S.⁶ and Brazilian⁷ Infusion Nurses Society (INS) and the Brazilian National Health Surveillance Agency (ANVISA).⁸

In order to answer the question "What are the conditions of peripheral intravascular accesses in hospitalized children?", this study aims to examine the conditions of peripheral venous accesses in children admitted to pediatric wards.

METHOD

This is a study with a quantitative approach, descriptive, prospective, conducted in a mid-sized public hospital in the countryside of Bahia, in 2010. The population consisted of children aged from 0 to 2 years admitted to the pediatric wards of the hospital under analysis and submitted to peripheral venipuncture for IVT.

The non-random study sample consisted of 53 children (based on the monthly average number of children aged from 0 to 2 years in the previous year) admitted to pediatric wards, who have been using a peripheral intravenous device within the study period. Each of them had one of her/his peripheral venous access monitored on a daily basis since the first day of puncture until the day of removal. The inclusion criteria used were: children aged from 0 to 2 years, 11 months, and 29 days, using a peripheral intravenous device, whose hospital stay exceeded three days.

The age group pointed out above was chosen because, according to the literature, it is among nursing infants aged from 0 to 2 years that we found greater difficulties for puncturing and maintaining a peripheral venous access. The venous system show less thick caliber and it is less visible in nursing infants.⁹

Data were collected within the period from May to July 2010. To do this, we used a camera Sony Cyber-Shot, 14.1 megapixels, for the photographic records and asked people to fill a form based on the practice guidelines for IVT provided by the U.S. INS⁶, the Brazilian INS⁷, and ANVISA.⁸

During data collection, venous access was photographed on a daily basis and identified by using a badge with the name of an animal and the respective puncturing day (Figure 1). In addition to the analysis of photographs, to evaluate some aspects of venous access, such as pain and signs of local complication, follow-up was made in situ by the researchers, as some aspects could not be identified only by means of a photograph. For this local evaluation, the researchers washed their hands and wore gloves.



Figure 1. Illustration of the time a peripheral venous access was maintained.

Data were computed in the database built by the researchers and electronically processed in the software *Social Package for the Social Sciences* (SPSS). After that, there was a simple descriptive statistical analysis of absolute and relative frequencies of the variables under study.

This study complied with the principles of the Resolution 196/1996, from the Brazilian National Health Council (CNS), in force at the time it was conducted, being approved by the Research Ethics Committee of the State University of Feira de Santana (CEP/UEFS), under the Protocol 011/2010.

Before data collection, legal guardians were fully informed about the purposes of the study, the risks, benefits, and procedures used, and they signed the free and informed consent term.

RESULTADOS

The results of the absolute and relative simple frequencies of the sample consisting of 53 peripheral accesses punctured in hospitalized children are described in Table 1.

Table 1. Distribution of peripheral venous accesses features, according to the puncture site, intravenous device type, use of splint, dressing type, length of stay, and reason of access removal in hospitalized children. Feira de Santana, 2010.

Peripheral venous access features	n	%
Puncture site		
Peripheral venous plexus in the left hand	18	34.0
Peripheral venous plexus in the right hand	17	32.1
Peripheral venous plexus in the right foot	6	11.3
Peripheral venous plexus in the left foot	6	11.3
Right antecubital fossa	3	5.7
Right forearm	2	3.7
Left antecubital fossa	1	1.9
Intravenous device types		
Catheter under a Teflon needle	53	100
Dressing types		
Non-sterile	53	100
Use of splint		
No	48	90.6
Yes	5	9.4
Length of stay (days)		
One	19	38
Two	19	38
Three	11	21
Four	4	7
Reason of access removal		
Accidental removal	21	39.6
Hospital discharge	16	30.2
Access change after 72 hours	6	11.3
Infiltration or extravasation	4	7.5
Phlebitis	2	3.8
Bruise	2	3.8
Suspension of IVT	2	3.8

Almeida TJC de, Miranda JOF, Santos LM dos et al.

The venous plexus in the left and right hands were the sites most commonly used for establishing venous accesses. There was no peripheral venous puncture in sites like head, external jugular, left forearm, and legs in the children under study.

The catheter under Teflon needle, commonly known as Jelco, and non-sterile dressing were used in all accesses, in turn, the splint was rarely used. During data collection, we observed that the splints were made of non-washable material and prepared in a

Peripheral venous accesses in hospitalized children...

“handmade” way and improvised with wooden spatulas and adhesive tape (Figure 2).

Regarding the time devices were maintained, most remained patent from 1 to 2 days. Accidental loss was the main reason for the removal of devices, then there was removal due to hospital discharge and removal due to insertion time over 72 hours, according to the protocol adopted by the institution to change peripheral venous access. Local complications associated with IVT were infiltration or extravasation, phlebitis and bruises, identified in eight accesses.



Figure 2. Illustration of venous access stabilization with excessive non-sterile dressing and handmade splint.

DISCUSSION

IVT consists in the clinical practice of nursing workers as complex systems that enhance the occurrence of errors and adverse events capable of damaging a child undergoing hospital stay. In this regard, the implementation of nursing care based on scientific evidence is key, in order to provide a skilled, excellent, and safe assistance.

Peripheral intravenous catheterization requires from nursing workers a complex body of knowledge and the acquisition of manual skills for the insertion, maintenance, daily assessment, and removal of the intravascular catheter. Thus, it becomes challenging to choose the appropriate peripheral venipuncture site, in view of the nature of the drugs and intravenous fluids to be infused into the circulatory system of a hospitalized children, as well as the time of IVT and infusional therapy, seeking a longer length of permanence of the peripheral intravascular device.

It is recommended to use peripheral venous accesses when hospitalized individuals need IVT or infusional therapy that requires a length of stay below five days, whose osmolarity is below 500 mOsm/L, with a hydrogen potential between 5 and 9, or those

with a non-irritating or vesicant nature, due to the risk of local complications associated with infusional therapy^{6-8,10} and potential removal of the intravascular device.

What we see in the clinical practice of pediatric nursing workers is that the choice of veins in the upper limbs derives from acquiring the technical skill for the insertion of peripheral intravascular device or even the ease offered by the region for a professional in her/his daily routine.

In the unit under study, data showed that the most commonly used sites for insertion of the peripheral intravascular device were the upper limbs. However, when choosing the vein that would be used to implement the IVT, people did not take into account the nature of the drugs and solutions prescribed.

In a prospective cohort study conducted in a university hospital in the countryside of São Paulo, Brazil, the most commonly used peripheral veins were those in the forearm (43.9%), which are associated with a higher occurrence of phlebitis.¹¹ Data from a prospective cohort held in Minas Gerais, Brazil, showed that punctures were located in the back of the hand (51.2%), in the forearm (34.6%), and in the lower limbs (13.7%).¹²

In another study in Coimbra, Portugal, in two pediatric hospitals, the site chose for the

Almeida TJC de, Miranda JOF, Santos LM dos et al.

insertion of the peripheral vascular catheter were the hands, with a similar distribution between the right and the left sides.¹³

The U.S. and the Brazilian INS recommend that we always avoid punctures in bending areas, to prevent restricting the movement of a patient, especially when it comes to pediatric patients, and they indicate for peripheral cannulation veins in the dorsum of the hands, as well as metacarpal, cephalic, and basilic veins.^{6,7}

When providing care to a hospitalized child, veins in the upper limb may be used, because they have adequate size for the insertion of thicker intravenous devices. However, these veins can interfere with a child's routine in the hospital, especially in terms of recreation and food, when the venipunctured limb is the dominant one.¹⁴

In this regard, the data from this study indicate the need to examine the nature of the solutions to be infused, the time of therapy, and even a child's comfort, so as to define the best insertion site of the peripheral catheter, since the absence of this procedure may compromise the safety of IVT and infusional therapy, exposing the child to adverse events and further punctures. Thus, with a view to ensuring safety in the IVT and infusional therapy, there are formal recommendations^{6-8,10} for using vascular catheters based on material that does not bring damage to the inner layer of the vein used, thrombosis, and obstruction.

Among the recommended materials, polyurethane stands out, whose use is associated with lower incidence of infiltration, phlebitis, minimal bacterial adhesion, biofilm formation, and, consequently, bloodstream infections related to catheter use, in addition to longer stay.^{7,10} However, in this study, we observed the use of Teflon-based catheters, an information similar to that from a study conducted in Rio de Janeiro, Brazil.¹⁵

Another procedure that should be established in the peripheral vascular devices insertion site, in order to prevent local complications, is their adequate stabilization. This corresponds to the use of a material specifically designed and constructed to control the movement of the catheter hub, thus reducing movement within the vessel, the risk of inadequate catheter positioning, accidental leaks, and associate complications.^{7,8,10,16}

Besides the concern for stability, it is necessary to use sterile dressings in the insertion site^{6-8,10-13}, in order to reduce

Peripheral venous accesses in hospitalized children...

colonization and even infection in the insertion site of the intravascular device and the bloodstream, something which is not observed with the use of non-sterile dressings, as observed in the sample of this study. A research conducted in São Paulo, Brazil, showed that peripheral venous accesses covered with a non-sterile dressing, when compared to sterile dressings, are more affected by phlebitis.¹⁷

It is noteworthy that adhesive tape, a material commonly used by the team, only guarantees the safety of fixation without complications to the patient if it is sterile and/or positioned on the catheter in an aseptic way. Otherwise, fixation may interfere with the safe practice of intravenous therapy and even cause local complications that worsen a child's condition and postpone her/his recovery and well-being.¹⁶

We observed in this study a higher frequency of accidental loss of catheters and little use of splints to stabilize devices, and splints, when used, were handmade. Early and accidental loss may have been due to the absence of stabilization of the catheter hub. Regarding splints, their use for stabilization of peripheral catheters has been justified by nursing workers as a resource that assists in preventing accidental removal of the device in situ. However, this resource is not properly used in most cases when handmade, compromising the permanence of the intravenous device.¹⁶

Splints must be made of non-porous material, which enables easy cleaning, or they are disposable. They should also be proportional to the size of the stabilized region, ensuring an anatomical position of the region and they should be protected with gauze and stabilized with hypoallergenic tape.¹³

The absence of care for the peripheral venipuncture site aimed at patient safety may lead to major vascular trauma and increase a child's hospital stay, as the device will have lower patency for the use of drugs and solutions prescribed to a child's therapy.

When providing care for a child in need of IVT or infusional therapy, the increased length of stay of an intravascular catheter in situ should be a major goal of nursing professionals. This time should not be regarded as a criterion for removal of the intravascular device, as difficulties are observed in clinical practice in terms of peripheral venipuncture, among this clientele, over the days of hospitalization.

Almeida TJC de, Miranda JOF, Santos LM dos et al.

In neonatal and pediatric patients, the intravascular catheter should be maintained until the end of intravenous therapy, being removed immediately when there is suspicion of inflammatory signs, other complications, or also when inserted in emergency situations where the aseptic technique was not guaranteed, and this device should be changed within 24 hours.^{6-8,10}

Among the potential complications associated with peripheral venous catheterization, we identified 8 cases in this study, including infiltration or extravasation, bruises and phlebitis, seen as a major concern by nurses. In hospitalized patients undergoing intravenous therapy through peripheral vein, the occurrence of phlebitis becomes a stressful situation for the patient, family, and nursing team. Local pain, in a patient already very sensitized, ultimately results in additional suffering that has emotional impact both on the patient and her/his family members. Besides, for the nursing team, phlebitis may mean a previous phase to leakage of a drug and the need for emergency care.¹⁸

Through the results and discussion presented, it stands out as paramount developing an institutional policy to establish a routine of care for peripheral vascular catheters, as well as for IVT and infusional therapy.

CONCLUSION

Peripheral venous puncture is one of the most frequently used procedures in hospitalized children and its quality and effectiveness involves several aspects. This study identified some of these conditions in the children under study, signaling a practice contrary to many of the guidelines of the main literatures that rule IVT and infusional therapy in the national and international pediatric nursing.

Procedures recommended for these therapies in children with the use of splints, sterile dressings, closed system, systemic flushing, as well as constant observation and surveillance to identify early signs of complications, are part of a practice that aims at minimizing the risks associated with the therapy and ensure patient safety.

The study enabled grasping the need for a new behavior in pediatrics with regard to intravenous therapy. It is crucial to master the peculiarities of children, the practices that reduce the risk to the patient, and planning to institute the most appropriate therapy. Thus, it is possible to provide skilled nursing care for

Peripheral venous accesses in hospitalized children...

children and their families, who already undergo the stress of hospitalization and, therefore, they have the right to rely on good quality and safety services.

Exposing the issues covered in this study is of paramount scientific and social importance, since this allows pointing out the need for greater control over IVT and infusional therapy in children and professional qualification as for the safety of these therapy types, and such actions can determine improved quality of care for a child in public hospital services, by redesigning actions.

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Submission: 2015/06/30

Accepted: 2016/01/12

Published: 2016/02/15

Correspondence Address

Juliana de Oliveira Freitas Miranda
Rua das Palmeiras, 90, Ap. 201-M
Bairro Ponto Central
CEP 44075235 – Feira de Santana (BA), Brazil