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SYSTEMATIC REVIEW ARTICLE

NURSES' PRODUCTION REGARDING PERIPHERAL VENOUS CATHETERS USED IN PEDIATRIC PROCEDURES: SYSTEMATIC REVIEW

PRODUÇÃO DOS ENFERMEIROS A RESPEITO DOS CATETERES VENOSOS PERIFÉRICOS UTILIZADOS EM PEDIATRIA: REVISÃO SISTEMÁTICA

PRODUCCIÓN DE ENFERMERAS CON RESPECTO CATÉTERES VENOSOS PERIFÉRICOS EN PEDIATRÍA: REVISIÓN SISTEMÁTICA

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ABSTRACT

Objectives: to investigate the scientific production of nurses in relation to the peripheral venous puncture used in Pediatrics; to identify the emotional disorders suffered by children and their family members and ways to minimize such occurrences. **Method:** this is a literature review, systematic type, with a view to answering the research question << What nurses have produced on the issue of venous catheter puncture in Pediatrics, as to the means of minimizing the emotional disorders suffered by children? >> We have selected 11 scientific productions, indexed in LILACS and BDENF databases and SciELO collection. **Results:** regarding the minimization of the emotional trauma during venipuncture, children need to be counseled about the treatment, its objectives, and receive a caring attention at this time. **Conclusion:** it should be emphasized the training of the nursing staff in handling of intravenous devices, by scientifically preparing these professionals to implement effective interventions to reduce or prevent iatrogenic complications arising from intravenous therapies. **Descriptors:** Pediatric Nursing; Peripheral Catheterization; Nursing Practice Standards.

RESUMO

Objetivos: investigar a produção científica do enfermeiro em relação à punção do cateter venoso periférico utilizado em Pediatria; identificar os transtornos emocionais sofridos pela criança e sua família e meios de minimizar tais ocorrências. **Método:** revisão de literatura, tipo sistemática, com vistas a responder à questão de pesquisa << O que o enfermeiro tem produzido sobre a temática da punção de cateter venoso em Pediatria, quanto aos meios de minimizar os transtornos emocionais sofridos pela criança? >> Foram selecionadas 11 produções científicas, indexadas nas bases de dados LILACS, BDENF e coleção SciELO. **Resultados:** em relação à minimização do trauma emocional durante a punção, as crianças precisam ser orientadas sobre o tratamento, seus objetivos e receber atenção carinhosa neste momento. **Conclusão:** salienta-se a capacitação da equipe de enfermagem no manuseio de dispositivos intravenosos, embasando cientificamente esses profissionais ao implementar intervenções eficazes para reduzir ou evitar ocorrências iatrogênicas oriundas das terapias intravenosas. **Descritores:** Enfermagem Pediátrica; Cateterismo Periférico; Normas de Prática de Enfermagem.

RESÚMEN

Objetivos: investigar la producción científica de las enfermeras en relación con la punción venosa periférica en pediatría; identificar los trastornos emocionales que sufren los niños y sus familias y las formas de minimizar estos hechos. **Método:** una revisión de la literatura, del tipo sistemático, con el fin de responder a la pregunta de investigación << Lo que la enfermera ha producido sobre el tema de la punción venosa en Pediatria, como medio para reducir al mínimo los trastornos emocionales que sufren los niños? >> Hemos seleccionado 11 producciones científicas indexadas en bases de datos LILACS, SciELO y BDENF. **Resultados:** En cuanto a minimizar el trauma emocional durante la canulación, los niños necesitan ser aconsejados sobre el tratamiento, sus objetivos y recibir atención en este momento. **Conclusión:** hacemos hincapié en la capacitación del personal de enfermería en el manejo de dispositivos intravenosos, científicamente basando estos profesionales para llevar a cabo intervenciones eficaces para reducir o prevenir las ocurrencias iatrogénicas derivadas de tratamientos intravenosos. **Descriptores:** Enfermería Pediátrica; Cateterismo Periférico; Normas de la Práctica de Enfermería.

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INTRODUCTION

The intravenous therapy procedure has been the subject of research in the United States and Europe, as it is a widely used resource in drug therapy of the patient and might generate several complications. The venipuncture observation is extremely important, because, if the insertion site presents signs and symptoms of complications, therapy must be suspended, even if the in-situ catheter is installed for a period shorter than 24 hours, and the attitude must be taken by the nursing team, which has autonomy to make decisions pertaining to each case.¹

The use of this therapy has certain practical peculiarities ranging from the choice of the blood vessel until the access maintenance. Hence, it is extremely important that the nursing professional has scientific knowledge regarding the physiology and anatomy of the venous network. Thus, we need specific technical and scientific knowledge on the part of the nursing team on the mechanisms that involve the installation, maintenance and identification of signs indicative of possible complications to peripheral vascular bed and/or central. It is understood that the nursing professional must develop skills to prepare supervision and training strategies for health staffs concerning the prevention of potential complications related to the use of a venous access, as well as to minimize them in case of occurrence.

Although the indication of venous access is attached to the medical decision, its installation, maintenance and assessment are linked to the daily nursing care. Nonetheless, for this to efficiently happen, it is required to have quality during the nursing care, in order to prevent the complications arising from this procedure, such as: infiltration, bloodstream infections related to intravascular accesses and discomfort regarding the immobilization of punctured members.

The nursing professional indicates, together with the sector team, the appropriate device type, since the technical and legal competence that allow nurses to insert and manipulate the PICC is supported by the professional practice law. However, when selecting the device, this professional should consider the base pathology, the prescribed intravenous therapy, besides preference and physical, cultural and socioeconomic conditions of the patient.^{2,3}

Venipuncture is a technique in which a vein is punctured through the skin by a sharp and stiff stylus, which is as a metal needle or a

stylus partially covered by a plastic cannula that characterizes the catheters over needles. The peripherally placed cannulas are used for short periods of time. Devices such as centerline catheters and peripherally inserted central venous catheters (PICC) are for prolonged usage. These last ones are more effective than peripherally placed catheters for the administration of medications and solutions which are irritating to the veins.⁴ From the 90s of the twentieth century, in Brazil, PICC have increasingly been used, especially in Newborns.⁵

Thus, the vascular access by inserting an intravenous device is not a harmless procedure. Rather, it might be associated with the risk of infections with local or systemic manifestations. Nosocomial infections are influential in individual, social and economic life, since it is related to morbidity and mortality of admitted patients and the increased cost in hospital care and family life.

Research Guiding Question: What nurses have produced on the issue of venous catheter puncture in Pediatrics, as to the means of minimizing the emotional disorders suffered by children?

Study Object: Factors associated with peripheral venous catheter puncture used in Pediatrics.

Objectives: To investigate, through literature, the scientific production of nurses in relation to the peripheral venous catheter puncture used in Pediatrics and identify the emotional disorders suffered by children and their family members and ways of minimizing such occurrences.

METHOD

This is a systematic review on the scientific productions of nurses, which are related to peripheral venous catheterization in children in hospital environment. We have used a qualitative and exploratory approach. Inclusion criteria were: papers published in their full version, in English and that addressed the proposed theme. The temporal cutting covered the period 2005 to 2010. The qualitative approach is that one which is not concerned with the numerical representation, but seeks a deeper understanding of a social group or an organization. It encompasses the wholeness of human beings, by focusing on human experiences and attributing meanings to their livings and contexts.⁶

Procedures adopted for the critical analysis of the included papers:

Data collection was performed in the collection of the Virtual Health Library (VHL), where we sought the literary production through the following descriptors: “Pediatric nursing”, “Peripheral venous catheterization” and “Nursing care”. We have used the following databases: Scientific Electronic Library (SciELO), the Latin American and Caribbean Health Sciences (LILACS) and Brazilian Nursing Database (BDENF). When analyzing, separately, each one of the descriptors, it was found a large number of publications, which are listed in Figure below.

VHL - Virtual Health Library				
Descriptors	LILACS	BDENF	SciELO	Total
Pediatric nursing	764	665	070	1.499
Peripheral venous catheterization	168	034	00	202
Nursing care	5.641	4.443	859	10.943

Figure 1. Scientific productions found in the databases chosen within the VHL, individually.

Subsequently, we held the association of descriptors mentioned below, in order to perform an approximation of the found productions, that is to say, those ones that could contribute to the elucidation of the presented objectives.

VHL - Virtual Health Library				
VHL - Virtual Health Library	LILACS	BDENF	SciELO	Total
Pediatric nursing + Peripheral venous catheterization	11	10	00	21
Pediatric nursing + Nursing care	389	330	00	719
Peripheral venous catheterization + Nursing care	15	13	00	28
Pediatric nursing + Peripheral venous catheterization + Nursing care	05	07	00	12

Figure 2. Scientific productions found in the databases chosen within the VHL, dual or tri-associated.

The next phase, formed by thorough and exploratory reading of the selected articles, allowed the organization for the last step, which was intended to locate the stuff to compose the potential bibliography. At this step, the works that do not cooperated with information for this study, such as repeated papers and those ones which did not cover the proposed theme, were excluded. When performing a search in the SciELO database with the descriptor “Peripheral venous catheterization”, it was not found any scientific production type, however, when conducting the search by using as descriptor “Peripheral venous catheter”, five productions were found; as none of these productions addressed the proposed theme and for not being a recognized descriptor by MeSH, these productions were discarded.

Thus, 11 productions were selected to compose the potential bibliography. After this selection, we performed data interpretations and obtained two presentation categories or thematic axes, namely: << Continuing/permanent education as a strategy to upgrade the technical and scientific knowledge >> and << Relationship established among the child, family and its yearnings X the PVC and the nursing team >>.

◆ Review presentation

Potential Bibliography			
Scientific production	Year	Authorship	Database - Journal with volume and number
Prospective and randomized study, controlled on the length of stay of peripheral venous catheters in children, according to three types of dressings.	2005	Machado AF et al. ¹⁰	LILACS - Rev. Latino Améric. de Enf. 13(3) 291-298 mai-jun
Peripherally inserted central catheter: usage description in Pediatric and neonatal ICU.	2010	Baggio MA et al. ¹²	LILACS - Rev. Gaúcha de Enf; 31(1):70-76
Profile of the pediatric intravenous therapy in a university hospital and its association with the occurrence of infusion failures: Quantitative study.	2010	Martins TSS et al. ⁷	LILACS - Online Braz J. Nurs; 9(2)ago
Performing venous or arterial venipuncture: meaning to the nursing staff from the pediatric ICU.	2009	Correa HAO et al. ¹⁷	LILACS - Ver. Gaúcha de Enf; 30(3): 558-560, set.
Peripherally inserted central catheters in children from hospitals of the city of São Paulo.	2007	Vendramim P et al. ¹⁴	LILACS - Ver. Gaúcha de Enf; 28(3): 331-339
Care practices for children with peripheral venous catheters and their effects on family-nurse relationship.	2007	Araújo APMB ¹⁶	LILACS- ID: lil-315226
Venous catheterization: Nursing care in pediatric ICU	2008	Oliveira MIV et al. ⁹	Lilacs- Ver. Rene; 9(2): 90-97, abr-jun
Performance of nurses in caring for peripherally inserted central catheter in newborns.	2006	Rodrigues ZS et al ⁸	LILACS - Rev. Bras. Enf; 59(5): 626-629 set-out
The costs of the peripheral intravascular device in the admission values in a pediatric unit.	2010	Marthins TS & Silvino ZR ¹¹	BDENF - Rev. Enferm. UFPE Online; 4(2):557-567
The nurses' role before the feelings and attitudes of admitted children subjected to peripheral puncture.	2010	Gomes AVO et al ¹⁸	BDENF - Rev. Enferm. UFPE Online; 4(1): 375-380
Infusion failures in peripheral venous catheter usage in Pediatrics: integrative review	2009	Martins TSS & Silvino ZR ¹⁵	LILACS- Online Braz J. Nurs; 8(1)

Figure 3. Potential bibliography description after selective reading

DISCUSSION

After analyzing the potential bibliography, we performed an exploratory review, by making the identification of the publications period, scientific journals, country state in which the survey was held, study types of and profiles of professionals who conducted the research. Of the total of 11 scientific productions, 10 are scientific papers and only one is described as master dissertation. 54% have a qualitative approach and 45% have a quantitative approach. Regarding the publication year, 36% were published in 2010, 18% in 2009, 9% in 2008, 18% in 2007, 9% in 2006 and 19% in the year of 2005. It should be inferred that there has been a recent increase in the interest in researches concerning this issue in Brazil.

The aforementioned productions were published in the following scientific journals: 18% in Online Brazilian Journal of Nursing, 27% in *Revista Gaúcha de Enfermagem*, 9% in

Revista Brasileira de Enfermagem, 9% in *Revista da Rede de Enfermagem do Nordeste*, 9% in *Revista Latino-americana de Enfermagem*, 18% in Online Journal of Nursing UFPE and 9% cataloged by the UERJ Journal, which is available in the LILACS database. It is observed that all magazines are, exclusively, from the nursing field.

During the analysis, it was found that the research members were, in their totality, nurses, with different degree of titration. Regarding the location where the surveys were produced, 45% were produced in the Rio de Janeiro state, 18% in São Paulo state, 18% in Ceará state, 9% in Rio Grande do Sul state and 9% in Santa Catarina state. It is observed that 63% were performed in the Southeast Brazilian Region, which demonstrates a greater interest from the researchers of this region in this theme at stake.

◆ Thematic axis 1:
Continuing/permanent education as a

strategy to upgrade the technical and scientific knowledge

100% of the population surveyed by authors⁷ had phlebitis resulted from peripheral venous catheterization during admission. It is believed that the main factors that predisposed the occurrence of phlebitis were: dilution and administration of inappropriate medications, since at the admission unit in which the data were collected, such procedures are empirically performed, because it does not use any protocol or guide for medications administration; furthermore, the authors mention the use of the same peripheral venous access for infusion of more than one medication with a phlebitogenic potential. It is suggested the development of a guide containing methods for reconstitution, dilution, administration mode and infusion time of the main medicinal drugs used in the researched pediatric unit.

In research conducted in Fortaleza/CE/Brazil, with a view to investigating the nurse's role in caring of the Peripherally Inserted Central Catheter (PICC) in the Neonatal Intensive Care Unit⁸, the sample consisted of 17 nurses and data were collected through structured questionnaire. In the results, we have found that 09 subjects cited the basilic vein as the most suitable for puncture; 17 reported washing hands before and after handling and washing the catheter before and after the drug administration as the most important care procedures. We conclude that the handling of this device requires knowledge and skill by professionals.

With the aim at describing the nursing care experienced by nurses in peripheral venous catheters in Pediatric Intensive Care Unit⁹ in Fortaleza/CE/Brazil, it was observed that 100% of nurses have as their primary care to assess the venous network conditions of the child; 75% prioritize the identification of the infused solution type, 50% are concerned with the observation of physical conditions, 38% with the length of stay of therapy. As to the complications, 63% remove the device, 50% prefer to call the on-duty doctor and 25% observe signs of infection and report to it. Moreover, 50% think the amount of professionals is insufficient to provide assistance, and 13% still conduct bureaucratic functions. This fact contributes to 50% of them (nurses) delegate tasks to nursing assistants and technicians. It was concluded that nurses should have direct action, since the technical competence of such a procedure requires knowledge, besides skill. The nurse

should rethink the professional practice, by seeking the sedimentation of the roles of caring and managing as not severable from the nursing work.

A prospective study¹⁰ examined the influence of three types of dressings on the length of stay of peripheral venous catheters (PVC) in children. The data were composed of sterile gauze dressings (GE 1), sterile transparent film (GE 2) and hypoallergenic adhesive tape (GC). We have selected variables to control characteristics referring to children, professionals acting in the procedures and intravenous therapy. We have used 150 PVC, installed in 68 children, mostly preschoolers, male, mixed skin, eutrophic, with diseases of the gastrointestinal system. Most CVP were installed by nursing assistants in the veins of the dorsal arch of the hand. It was found that the type of dressing influenced in a significant way ($p=0.022$), the average length of stay of the studied PVC were: 1 GE (46,12 hours), GE 2 (29,53 hours) and GC (38,18 hours), being that the sterile gauze dressing kept catheter for a longer time. The results obtained in this study allowed us to conclude that the dressing type interfered with the length of stay of the PVC. It was found that dressings held with sterile gauze and hypoallergenic adhesive tape kept the PVC for a longer time, with an average of 46,12 hours.

By assessing the costs of the peripheral intravenous device in the Pediatric admission process, it was considered that the infusion failures are those that result in the interruption of the same as it is needed. Obstruction and accidental output of the intravenous device also constitute, hence, infusion failures. Regarding the costs involved with peripheral intravenous devices during admission in a pediatric unit, they were relatively low, when separately analyzed, however, when the infusion failures occur and there is a need of new peripheral intravenous devices insertions, repeating this procedure raises the staying costs of this client in its hospitalization period.¹¹

With the aim at describing the use of peripherally inserted central catheter (PICC) in a neonatal intensive care unit and pediatric, concerning the insertion, maintenance and removal, besides identifying the profile of children who receive PICC, through documentary analysis¹², it can be noted that, regarding the vessel for catheter insertion, the data found by researchers corroborate the literature, being that the basilic and cephalic veins are the vessels of first and second choice, respectively, for the

PICC insertion. The anatomy of these vessels is favorable, since it has fewer valves, possesses a higher gauge and their location is easy to perform and change dressings. Phlebitis has also been identified as a multifactorial cause of infusion failures, but having low incidence. The catheter rupture might be related to improper handling of the device; as to the migration, it might be prevented by using a suitable dressing to prevent such an occurrence. The migration can cause a lethal event of pericardial effusion, which is secondary to pericardial infusion, when the tip of the catheter migrates to the inside of the right atrium.¹³

It is up to the nurse to perform a daily and thorough review of the dressing, by observing the presence of moisture, dirtiness, ostium insertion integrity, fixation, as well as conducting the dressing and the legal notes inherent to its duties. Strategies such as staff training and continuing education are able to avoid or reduce the early removal of the catheter, by ensuring the performance in its maintaining, besides ensuring quality care to clients of pediatric and neonatal ICU.

By verifying the use of the Peripherally Inserted Central Catheter (PICC) in children served in hospitals of the city of São Paulo¹⁴, it was noted that, statistically, the PICC usage in private institutions is prevalent. It is suggested that the economic factor might be indicative of the difficulty of incorporating the healthcare practice at other institutions. Regarding the quality to perform such a procedure, it is suggested the need to introduce technical training courses at the academy, in order to train future professionals with regard to catheter insertion in greater amplitude.

To identify the evidence available in the literature about the major infusion failures related to the use of the peripheral venous catheter in Pediatric and propose strategies to reduce them¹⁵, it became clear that among the major infusion failures include: phlebitis, infiltration, bruising and obstruction. It is believed that to reduce the incidence of the main infusion failures in pediatric units, it is necessary to adopt strategies, such as: approach together the team in partnership with the permanent education sector and adoption of the use of the aseptic and correct technique for holding the peripheral venous puncture, in accordance with the nosocomial infection control commission. Nursing team has autonomy in choosing the peripheral venous puncture appropriate type, dressing type for fixation and for the routine of access exchange; however, the nurse must be based

on a careful and individual assessment of each pediatric patient. For this purpose, the professional must have scientific basis, which allows it to implement effective interventions, capable to reduce or prevent iatrogenic complications arising from intravenous therapies.

♦ Thematic axis 2: Relationship established among the child, family and its yearnings X the PVC and the nursing team

About the interaction between nurse-family member in child care with PVC (peripheral venous catheterization), with the aims at identifying performed nursing actions, whose scenario was a pediatric hospital, located in the city of Rio de Janeiro, we made use of non-directive interview to conduct data collection, with 18 nurses, stationed in admission units, where the family member was integrally present in care for the child with PVC.¹⁶ We finished with the importance of the need for the nursing team to conduct training activities aimed at addressing family, care systematization, establishment of partnerships with universities to experiences exchange and spaces for systematized meetings with admitted children's relatives, with a view to discussing and reflecting on the emerging aspects of daily life, in order to minimize and optimize the moment of crisis for the child and family. Thus, it became clear that the nurse as education agent must, from dialogical interactions, develop an action plan aimed at meeting the needs of children with PVC and their families, about the difficulties, fears and anxieties generated by the expectation of this care.

To understand the meaning that the venous and/or arterial puncture in children admitted to the PICU, for the nursing staff, we have conducted a survey along with nurses, nursing technicians and assistants of the Pediatric Intensive Care Unit (PICU).¹⁷ It was found that the puncture is seen by the nursing staff from the PICU as an important procedure, which is stressful for the child, family and staff itself, but, if is quickly performed, is good for the personal and professional egos.

With the purpose of describing the emotional consequences related to peripheral venous puncture in admitted children and discuss nurses' role to minimize these consequences, it is stated¹⁸ that there are productions on the theoretical scientific bases which address the emotional consequences that such a procedure generates in admitted children, by influencing in their physical, emotional and cognitive development, in

order to support the professional practice. It is emphasized that the preparation of the child before the procedure is an effective measure to minimize the fears and anxieties thereof. The proper preparation must take into account from the development stage of the child until the perception that this little being and its family have about the situation to be experienced. Such care should be considered, since the child has more fear of the unknown than of the known. Thus, we reduce the unknown elements and consequently minimize the fear. Therefore, a committed work and endowed with ethical, by nursing professional, can prevent or reduce the emotional consequences related to the peripheral venous puncture in admitted children hospitalized.

There are several factors that can trigger emotional disorders in admitted children. Venipuncture, as it is an unknown and painful procedure becomes a traumatic procedure for such a clientele. The admitted child goes through invasive experiments, which are generators of suffering, by causing reactions of fear, stress and anxiety. Thus, the child, when subjected to a long admission period, suffers emotional changes arising from excessive handlings. The peripheral venous catheterization technique for the implementation and success of intravenous therapy is widely used within pediatric admission units, due to low cost, easy handling and lack of surgical procedures for the insertion and maintenance. Nevertheless, the peripheral venous access has as disadvantage: the difficulty of its maintaining, when there is need for a prolonged therapy, which is a fact that will require the execution of several punctures, thus increasing the child's suffering.¹⁸

CONCLUSION

Regarding the minimization of emotional trauma during venipuncture, children need to be counseled on the treatment, its objectives, and receive a caring attention at this time. The use of toys has demonstrated efficacy in reducing the emotional disorders generated in the child during the peripheral venous catheter insertion, besides avoiding possible complications throughout the procedure, since a quiet child becomes cooperative. The nurse should advise parents and the children on all stages of the procedure at stake, by using an understandable approach and taking into consideration the sociocultural conditions of each family.

The environment must be suitable for the venipuncture practice, i.e., a pleasant and welcoming environment can facilitate the acceptance of the child regarding to the execution of the peripheral venous catheter insertion. The adequacy of technical procedures aims to rationalize their use, by reducing painful procedures or making them more effective, in order to achieve the promotion of a non-traumatic care that intends to eliminate or alleviate the psychological or physical suffering experienced by children and family members in healthcare situations.

The national productions related to the use of peripheral venous catheters in Pediatrics are still incipient. Among the healthcare professionals who scientifically investigated this issue, we highlight the nurses, what can be explained because it is usually a procedure performed by these professionals. It is recommended that the professionals acting directly in this venipuncture practice, perform studies to assess its practice, so that these professionals can raise an improved care practice and early identification of potential local complications, by optimizing the practice and aiming to reduce the time spent during the nursing care, thus generating ensuing improvement in the quality of the provided care.

It is believed that the implementation of collaborative surveys between researchers and healthcare nurses shall contribute to an interrelationship between care and practice, by corroborating the reduction of barriers related to the research results usage. Furthermore, it is recommended educational initiatives, such as continuing/permanent education programs in nursing, which contain lessons with issues related to the updating on intravenous therapy, in order to promote the upgrade of nursing professionals.

The venipuncture procedure must be addressed as a whole, in order to qualify the professional for the decision-making, which is related to all steps of the procedure in question, from its pre-installation until its post-installation and maintenance. It is worth mentioning that this study might contribute to the building of knowledge in professionals who perform the peripheral venous puncture, as it has sought to assess, in a critical and reflexive way, the care practice with regard to the peripheral venous access.

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