International Journal of Advanced Engineering Research and Science (IJAERS)
Peer-Reviewed Journal
ISSN: 2349-6495(P) | 2456-1908(O)
Vol-9, Issue-8; Aug, 2022
Journal Home Page Available: https://ijaers.com/
Article DOI: https://dx.doi.org/10.22161/ijaers.98.14

Handling of Peripherally Inserted Central Catheter (PICC) in Neonatal ICU

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Received: 05 Jul 2022,
Received in revised form: 31 Jul 2022,
Accepted: 05 Aug 2022,
Available online: 09 Aug 2022

Abstract— *This study has as research line Nursing Education and predominant area Nursing in Child and Adolescent Health Care. Where we will address as a theme the complications related to the handling of the picc catheter (peripherally inserted central catheter) in the NEONATAL ICU. The object of the study is the Iatrogenies related to the management of PICC in UTINEO. The interest in researching the subject arose after a technical visit made in a hospital unit of the public network in the ICUNEO sector, where it was observed the use of the catheter and its*

***Keywords*— Nursing, Intensive care, Neonatal ICU, Picc.**

implementation, being carried out by the nurse at the bedside, a fact that motivated us to carry out the study, since it brings great benefits to neonates. Qor being an invasive procedure does the correct manipulation if necessary to avoid contamination, which caused us to question whether complications in handling the PICC catheter can be avoided? Through this questioning we are ready to conduct a research that aims to identify the main complications that cause the interruption of treatment in neonates. Metodologically is a quantitative research, where the exploratory-descriptive method of bibliographic typology was used. Conclusion Given what was exposed and explored during the research trajectory, we realized that it is necessary to invest in training and continuing education programs, as well as establishment of protocols and care that allow better monitoring of the occurrence of complications related to the insertion and handling of PICC.

I. INTRODUCTION

This study has as research line Nursing Education and predominant area Nursing in the health care of children and adolescents. Where we will address as a theme the complications related to the handling of the PICC catheter (peripherally inserted central catheter) in neonatal ICU.

> "Technological advances in the health area have brought several benefits in several areas and lately a technology has been widely used in neonatal icu, picc (peripherally inserted central catheter), which was developed for drug administration and intravenous solutions. This being a long and flexible catheter, inserted through a peripheral vein that, through an introductory needle, progresses to the distal third of the superior vena cava or inferior vena cava, thus acquiring properties of central venous access "(Nogueira et al 2004).

> "It is a device that nurses have legal support for performing this procedure, so it is necessary that they have scientific knowledge that supports clinical decision-making and favors good care outcomes, continuously improving the quality of nursing care." Vendramim (2007, p.28).

The object of the research is the Iatrogenies related to the handling of PICC in neo ICU. The interest in researching the subject arose from a technical visit to a hospital unit of the public network in the ICUNEO sector, where it was observed the use of the catheter and its implantation being performed by the nurse at the bedside, a fact that motivated us to carry out the research, in which we identified that by COFEN resolution no. 258/2001, in Article 1, it considers it lawful for nurses to insert the PICC, but complements in Article 2 that every nurse to perform this procedure, must undergo a properly regulated qualification course.

Because it is still a new and invasive procedure, it is necessary to correct manipulation, thus avoiding contamination of the catheter insertion site, and one of the problems observed in our research made us question: Can complications in the handling of the PICC catheter be avoided?

Based on this questioning, we were ready to conduct a research that aims to identify the main complications that result in treatment interruption in neonates.

> The use of this therapy requires certain practical peculiarities ranging from blood vessel selection to access conservation. Therefore, it is extremely important that nurses have knowledge of the anatomy and physiology of the vascular system requiring professional qualification and qualification

(Rodrigues, Chaves & Cardoso, 2006 p.59).

In order to bring comfort and decrease the exposure of the NB to painful procedures, it is necessary for nurses to continuously seek training.

> In neonates, peripheral venous puncture is one of the procedures performed with a very delicate technique. For this assistance there are different types of peripheral devices on the market and the most used are: Scalp Needle Catheters, Abocath Flexible Catheters and Central Peripheral Insertion Catheters (PICC). (Rodrigues, Chaves&Cardoso,2006 p.59).

The justification for this study is due to the fact that the PICC device is an alternative of peripheral central venous access, which can be inserted by the nurse (a) bedside and which today has been used as a device of first choice in neonatal intensive care units.

The academic relevance of this study aims to contribute to educational measures, improving the quality of nursing care and the actions of professionals in this issue, because it is a still new and invasive procedure, introduced in Brazil in 1990, it is necessary to correct manipulation avoiding for neonates the various punctures throughout their hospitalization, which greatly increases the risk of complications.

The social relevance of this study lies in the benefits it may generate for neonates (reducing the number of venous puncture, in the safety of work and in improving the use of this procedure in neonates, thus minimizing pain, stress, exposure to risks and complications) and for the family facilitating the link between parents and the NB.

II. METHOD

The present study is characterized as an integrative review is a research method that allows the search, critical evaluation and synthesis of the available evidence of the theme investigated, and its final product is the current state of knowledge of the theme investigated, the implementation of effective interventions in health care and cost reduction, as well as the identification of gaps that direct the development of future research (Mendes, 2008)

Bibliographic research uses extensive literature to study and analyze different aspects of a theme, contributing to a more structured future research. The bibliographic research was operationalized through the electronic search of scientific articles in the database of the Virtual Health Library from the descriptors: "PICC, CCIP". We chose to use scientific articles as material because they consider the accessibility of this type of publication for health professionals (Dyniewicz, 2009).

This is a quantitative approach, where the method used will be exploratory-descriptive, a bibliographic review of scientific articles, books and theses will be carried out, and these are carefully selected and existing material. It is noteworthy that the main advantage of bibliographic research is the fact that it allows the researcher to cover a series of phenomena more widely than it could be in direct research.

For Gil (2006) bibliographic research is developed based on material already elaborated, that is, officially published material. They are composed mainly of books and scientific articles.

Table one. Inclusion and exclusion criteria for the construction of the research.

INCLUSION CRITERIA	EXCLUSION CRITERIA
Articles addressing the topic	Publications related to other paediatric diseases
Articles published in Portuguese	Publications related to the adult audience
Bibliographies related to picc management in neonatal ICU	Articles published in other languages
Articles published from 2010 to 2016	Publications prior to 2010

Source: Own elaboration.

III. LITERATURE REVIEW

Nursing, the newborn, the neonatal icu

Modern care in neonatology appeared in France in 1880. The incubator was created by obstetrician Stephane EtienneTarnier and there was in this period a sophistication of techniques and equipment, thus increasing the survival of preterm drinks, until then considered unviable.

> In 1914, pediatrician Julius Hess, created a care center for premature newborns at Michael Reese Hospital in Chicago, which was supported by nurse Evelyn Lundeen. The objective of this care center

was that the premature infant could receive immediate care as soon as he left the delivery room, ensuring specialized nursing care, making use of specific technologies to control and maintain the life of premature newborns (Rodrigues,2010).

It is important to emphasize that nursing was of paramount importance in the development of neonatology, and this fact was ratified by pediatrician Julius Hess with the publication of a scientific article that reports the best results in the care of premature newborns, when performed by nurses who received specialized training.

In the 1960s (between 1960 and 1970) the American Academy of Pediatrics began to consider neonatology as a specialty. Among the technologies that contributed to advances in the care of preterm and high-risk newborns, we can mention: thermoregulation, development of radiant heat appliances (incubator), ventilators with low pressure (inspiratory and expiratory), parenteral nutrition, use of catheters for venous infusion and neonatal transport (Christoffel, 2009).

Over time, more and more specialized centers have emerged and new technologies have been created that have ensured greater survival, as well as reduction of sequelae related to inadequate care.

In the 1990s, the importance of the insertion of family care was considered. The permanence of parents began to be valued in neonatal ICUs, a practice considered to date, being widely used to strengthen the bond between parents and newborns, favoring the success of treatment. These evidences caused the current models of neonatal intensive care incubator (Rodrigues, 2010).

According to the Ministry of Health, in Brazil, in 2010 there were 2,857,011 live births. Of this total, 201,929 were pre-terms with gestational age between 22 and 26 weeks, with the majority (84.1%) neonates aged between 32 and 36 weeks (Brasil, 2010).

The main population assisted in the NICU is characterized by preterm newborns (PTNB) who, according to the World Health Organization (WHO), are those with gestational age less than 37 weeks. It is a broad and heterogeneous group, because it includes children from the viability limit until near the end, presenting very variable physiological and pathological characteristics (Goulart et al, 2004).

A specificity of premature newborns is the fact of the occurrence of high rates of morbidity and mortality, in addition to the occurrence of sequelae that are often disabling or long-term, and may be due to their prematurity, inadequate treatment or lack of a technology that favors the care of premature newborns.

The modernization of the NEO ICU, with the use of state-of-the-art technologies, in addition to the standardization of nursing care (SAE), contributes to the reduction of iatrogenies that occurred in neonatal ICU.

Among the duties of the neonatologist nurse, we can mention: promotion of the adaptation of the NB to the external environment (thermoregulation, respiratory contribution and comfortable environment); Monitor the clinical picture, provide adequate nutritional support, help control infections, guide family members, standardize nursing care to newborns and mother, develop multidisciplinary activities, be an educator, establish THE and train the entire nursing team of the NEO ICU (Birindiba, 2016 p.15 apud Almeida, 2012).

It is necessary for nurses to always be aware of their duties and to continuously seek training to perform their function in the best possible way.

> For the proper performance of their activities it is necessary that nurses have scientific knowledge, technical skills and the ability to perform careful evaluations of patients under their care, and it is necessary that this professional is in a constant process of theoretical-practical training, knowing the new technologies and applying them to improve the health care process (Duarte, 2007).

Tintravenous erapia

Intravenous therapy began on rebirth after the discovery of blood circulation.

> Until the year 1400, no one knew the blood circulation, between 1400 and 1600, scientists of the time were unaware of important parts of the circulatory system. Only in 1616 did William Harvery discover the circulatory system and the difference between arteries and veins, and found that these structures contained blood inside them (Phillips, 2001).

"During the Second World War, nurses assumed functions such as: intravenous infusion, sutures, blood collection and vital signs verification (Phillips, 2001)" It is understood that at this time there was a need for the practice of intravenous solutions administration, where the pioneer was nurse Ada Plumer of the Massachusetts general hospital, first to minister intravenous solutions, in this period, the replacement of needles by catheters also arises; in 1980, the first peripherally inserted central catheters (PICC) emerged, which from 1990 on, began to be passed by a nurse in the USA. In Brazil, the practice emerged in 2000 as a new specialty in nursing, called intravenous therapy or vascular access; with the advancement of medicine this therapy has become increasingly necessary within Brazilian institutions and in the world.

Until 1920 vascular access was always obtained by means of a needle; in 1929 a German physician named Forssman anesthetized his own arm and inserted a urethral catheter into his anticubital vein, x-rayconfirming the catheter position in his right atrium, proving that a catheter could be safely inserted into a human heart.

"The use of PICC expanded from the 1980s onwards, with the improvement of the catheter, its initial use within UTIs-Neo and the subsequent dissemination to several hospital sectors, as well as home sectors" (Phillips, 2001).

"In Brazil, it has been employed since the 1990s in areas such as neonatology, pediatrics, intensive care, oncology and home care" (Vendramin, 2005).

In this sense, PICC has been widely used as an alternative of stable venous access and ensuring a safe and effective therapy for critically ill neonates.

Peripherally inserted central catheter (*PICC*)

According to Baiocco (2013) the peripherally inserted central catheter (PICC) is a new technology for intravenous therapy administration; being introduced in Brazil from 1990, first in neonatology, due to its diameter and flexibility, in 1995 the use was started in adults.

In 1996, the Brazilian Society of Intensive Care Nurses (SOBETI) was the first scientific entity to qualify and certify nurses for picc insertion.

Because it is a deep access it allows us: infusions of solutions with extremeph and osmolarity, vesicant or irritating drugs, blood products, PVC verification and NPT infusion.

This device has one, two or three lumens, is long (20 to 65 cm long), with caliber ranging from 14 to 24 Gauge or 1 to 6 French(Fr), is flexible and radiopaque, has smooth and homogeneous walls, is made with biostable and biocompatible material, such as silicone, polyurethane and polyethylene; the new technologies applicable result in less thrombogenic catheters with less capacity to promote colonization of bacteria (Baiocco, 2013).

The introduction of the catheter can be done at the bedside by qualified nurses; it is inserted by peripheral vein (preferential basilica, cephalic and median cubital) and is palpable, calibrosa and non-sinuous, which progresses through an introductory needle, with the help of blood flow, to the distal middle third of the superior or inferior vena cava.

Before insertion, nurses should consider some factors such as caliber and size of the appropriate catheter, venous puncture site, material required for maximum barrier paramentation, clinical conditions of neonates, such

as good peripheral, normothermic, hydrated perfusion, with oxygen saturation above 90%.

The PICC should be considered as a first choice access, and its indication needs to be discussed with the members of the multidisciplinary team, in order to ensure success in therapy and care actions.

> "Among the advantages related to the use of PICC as a care tool for neonates in the Intensive Care Unit (ICU- -Neo), the following stand out: the decrease in the frequency of venous punctures, the easy central venous access with the possibility of bedside insertion, the lower risk of complications related to insertion, when compared to other central venous accesses, the reduction of customer and team stress and low costs for implantation (Camargo et al., 2008)"

Therefore, the role of nurses working in UTINEO requires vigilance, skill, respect, updating and constant improvement, in view of the vulnerability of this clientele.

Indications of picc in neonatology:

As they report (Tamez & Silva *et al*., 2002), the indications for long-term venous access through PICC, with minimal handling and stress for the newborn, especially the low birth weight premature infant, include the need to: Schedule of intravenous therapy above seven days, antibiotic therapy, venous hydration and parenteral nutrition (NP), infusions of: hypertonic solutions, vesicant and irritating solutions or with extremes of pH and osmolarity, antineoplastic drugs, vasoactive drugs and blood components (for catheters above 4 Fr).

Contraindication of picc in neonatology:

The contraindications in the use of PICC as described by Feitosa, Antunes and Arantes (2002), Sadeck (2007), Teresa Neto (2009), Rodrigues and Magalhães (2008) are: Manage large volumes "in bolus" and under pressure, difficult peripheral venous access by repeated punctures with hematoma and thrombus formation, insertion site with skin lesions, swollen (relative) RN, when you have difficulty identifying a vein of adequate caliber, previous Venopuncture or venous dissection, orthopedic problems, negative response of the vein to the procedure, refusal of parents, dermatological problem, extremely small nb, hemorrhagic diathesis and disseminated intravascular coagulation.

Cuidados in catheter maintenance:

Daily assessment of the access site: permeability, signs of infection, catheter fixation, it is contraindicated to use syringes smaller than 10 ml, as they may rupture the catheter due to the pressure used.

Thenalysis of data

It is a detailed study on something, which can be applied in different areas of knowledge as a way to observe a given theme, and analyze the data of a problem and identify them.

Anddescriptive statistic:

"Descriptive statistics consists in the collection, analysis and interpretation of numerical data through the creation of appropriate instruments: tables, graphs and numerical indicators" (Reis, 1996).

In data interpretation we should use a more appropriate method depending on its nature which may be a verbal, numerical summary or use graphical methods to describe its characteristics.

"The data are the final result of the processes of observation and experimentation" (Vairinhos, 1996).

Qualitativedata:

We can describe qualitative data such as the representation of information that identifies some quality, category or characteristic. Example: gender, age...

Quantitative data:

We can describe quantitative data such as the representation of information resulting from characteristics with the possibility of being measured, which may be of a discrete (discontinuous) or continuous nature. Example: voting intention survey, seeks to estimate through the sample the total number of voters who would vote for each candidate (Reis,1996).

Data analysis tools

The research was carried out through the electronic search of scientific articles in the database of the Virtual Health Library (VHL) where the descriptors: Nursing were used. Intensive care. Neonatal ICU. Picc.

According to Severino (2007) An exploratory research was carried out that seeks to raise information about a given object, thus delimiting a work field, mapping the conditions of manifestation of this object.

The publications were initially evaluated by title, year and abstract, to make sure that they would meet the inclusion criteria. After were read in full.

In view of the above, 117 articles were excluded because they did not address the theme pertinent to the objective of this research or because they were in a foreign language.

The results of the selected publications are shown in **Chart 1**, as well as the main aspects analyzed.

Frame. Analysis of the articles.

Quantitative analysis of the articles found in the databases - 1st Stage			
DESCRIPTORS	VHL database		
	TOTAL	LILACS	SCIELO
NURSING	65.209	32.177	33.032
INTENSIVE TERPIA	11.236	7.466	3.770
NEONATAL ICU	1.383	1.124	259
PICC	299	246	53
TOTAL	78.127	41.013	37.144

Due to the large number of articles found, the descriptors were crossed in double refinement using only the filters, through the Lilacs, Scielo and Medline database, which resulted in the table below.

Quantitative analysis of the articles found in the databases - 2nd stage			
DESCRIPTORS	VHL database		
	TOTAL	LILACS	SCIELO
NURSING AND INTENSIVE CARE	3.537	1.941	1.596
NEONATAL ICU AND PICC	30	25	05
TOTAL	3.567	1.966	1.601

A picture. Analysis of the articles.

Source: Own Elaboration.

In all, 142 articles were found, of which 15 articles were analyzed, abstracts were read and those that fit the subject were selected. For the research, 10 articles were used that is arranged in the tables below.

Frame. Quantitative analysis of articles.

Quantitative analysis of the articles found in the databases - 3rd stage			
DATA	VHL database		
	TOTAL	LILACS	SCIELO
FOUND	142	133	09
ANALYZED	15	20	04
USED	10	07	03

Source: Own Development

Frame. Representation of the main aspects analyzed in the publications.

Authorship	Article Name	Sample study type	Goal	Results and Conclusions
Freitas & Nunes (2009)	The nurse in the praxis of peripherally inserted central catheter in neonates	Descriptive non-experimental study, with longitudinal design and prospective data collection on the practices of insertion, maintenance, picc removal and related complications.	Describe some variables related to the procedure of insertion, maintenance and removal of the peripherally inserted central catheter in neonates hospitalized in the ICU.	It is concluded, therefore, that picc is a technological advance in NICUs, providing advantages for the patient. It meets the needs of intravenous therapy, allows greater probability of remaining implanted until the end of treatment, reduces the stress of successive punctures, preserves the catheterized vessel.
Baggio, Bazzi & Bilibio	PERIPHERALLY INSERTED CENTRAL CATHETER: description of use in neonatal and pediatric ICU	Descriptive, retrospective, documentary survey	Describe the use of PICC in UTINEO PICU, regarding insertion, maintenance and removal, and identify the profile of children who received PICC	For better performance in catheter maintenance, training and continuing education of professionals are required, strategies aimed at qualifying care
Hills Teixeira, Barbosa & Barichello	Occurrence of complications related to the use of PICC in newborns	Retrospective, descriptive study with quantitative approach, in a large, public teaching hospital that serves high complexity patients in the city of Uberaba-MG	Identify the occurrence of picc-associated complications in newborns admitted to the neonatal intensive care unit	The results suggest that there should be investment in training and continuing education programs, establishment of care protocol, and conducting longitudinal studies that allow a better follow-up of the occurrence of complications related to the use of this type of catheter
Motta et al	Peripherally inserted central catheter: the role of nursing in its use in neonatology	Documentary research	Check the use of peripherally inserted central catheter in a neonatal intensive care unit (ICU)	In this study it was verified that the use of PICC is really important, because it is possible to observe the numerous benefits that this procedure brings to the newborn, especially with regard to the decrease in the number of punctures and, consequently, reduction of stress and pain, because this device, for the most part, remains the necessary time for treatment
Beautiful et al	Knowledge of	Descriptive, cross-	To analyze the	It is concluded that the

	neonatology nurses about peripherally inserted central venous catheter	sectional study with quantitative approach.	knowledge and practice of nurses about the use of PICC in newborns.	peripherally inserted central catheter is a technological advance in the NICU, providing several advantages to the newborn, especially those at high risk. However, despite the benefits of this technique, a large portion of the nurses surveyed did not have a license to insert the PICC and only two neonatal units used this technique in daily practice.
Teles	Insertion and maintenance of picc in icu: the need for peculiar nursing care	Bibliographic review of scientific articles, nursing journals and specialized protocols. Exploratory-descriptive	Describe nursing interventions based on care related to the implementation and maintenance of picc.	The study demonstrated the extremely important role of the nursing team with regard to practices and interventions with technical-scientific knowledge, during the implantation and maintenance of the PICC device in neonates hospitalized in the NICU.
Duarte et al	Factors associated with infection by the use of peripherally inserted central catheter in a Neonatal Intensive Care Unit	Epidemiological and analytical study, developed in a hospital in Belo Horizonte, Minas Gerais	To analyze the factors associated with infection by the use of peripherally inserted central catheter in newborns hospitalized in an intensive care unit	It is verified that it presents adverse events that may be due to conditions intrinsic to neonates or their management
Swerts et al	Nursing care in the face of complications of peripherally inserted central catheter in neonates	Descriptive observational study with quantitative approach	To evaluate nursing care in the face of complications related to peripherally inserted central catheter in neonates	The results of this study offer support for nursing professionals to be aware of the necessary interventions in the face of PICC complications in neonates
Brandon	The main complications regarding the peripherally inserted central catheter that result in discontinuation of treatment in	Exploratory bibliographic research	Identify the main complications regarding PICC that result in discontinuation of treatment in newborns and their respective	Given the complications resulting from the use of PICC, it is understood that to mitigate them, more investment in continuing education is needed for nursing professionals who manipulate this catheter

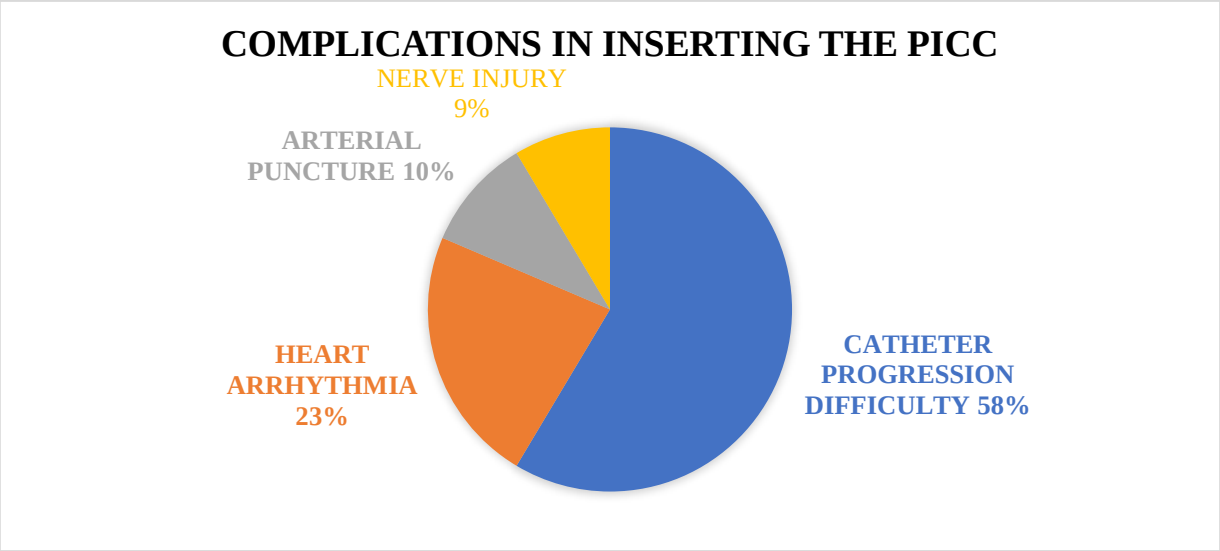
	newborns and their respective interventions		interventions	
Eaves	Prevention of primary infection of the bloodstream related to peripherally inserted central catheter	Exploratory bibliographic research	Check the implementation of SAE in the assistance of enf. to neonates using PICC in the literature and describe good picc-related prevention practices in NICU	For better performance in catheter maintenance and for measures to prevent infection infection from infection, training, updating on THE and continuing education of professionals are required.

Source: Own Elaboration.

Comcomplications related to picc:

The use of the PeripheralLy Inserted Central Catheter (PICC) has been increasing even with patients inside and outside the hospital. The complications are directly focused on the technique of the care provided, at the time of insertion and also for the entire period of catheter maintenance. Complications: First moment in insertion and the second moment in post-insertion can be divided into 2 types.

Comcomplications in picc insertion



Difficulty in Catheter Progression

The complication, but common that occurs at the time of arterial puncture, the most common causes of difficulty in catheter progression are associated with: inadequate positioning of the patient, poor catheter positioning, venospasm, inadequate catheter caliber, sclerosis, previous vein dissection, valve closure, venous bifurcation and marked venous angulation, several puncture attempts. Choosing the ideal vessel through ultrasound is a great ally for a correct puncture.

Cardiac Arrhythmia

Cardiac arrhythmia is caused when the catheter is displaced to the right atrium or right ventricle, when located within these structures it can cause myocardial irritation, erosion, perforation, cardiac tamponade, and subendocardial abscess. Using the appropriate patient measurement technique for proper positioning of the catheter tip. Stabilizing the catheter is of paramount importance so that it does not migrate into the cardiac chambers.

The signs and symptoms of cardiac arrhythmia caused by poor catheter positioning are: irregular pulse,

patient with palpitation and visualization of arrhythmias on the electrocardiogram or on the monitor tracing. When this occurs, it is recommended to bring the catheter and perform chest X-ray.

Arterial Puncture

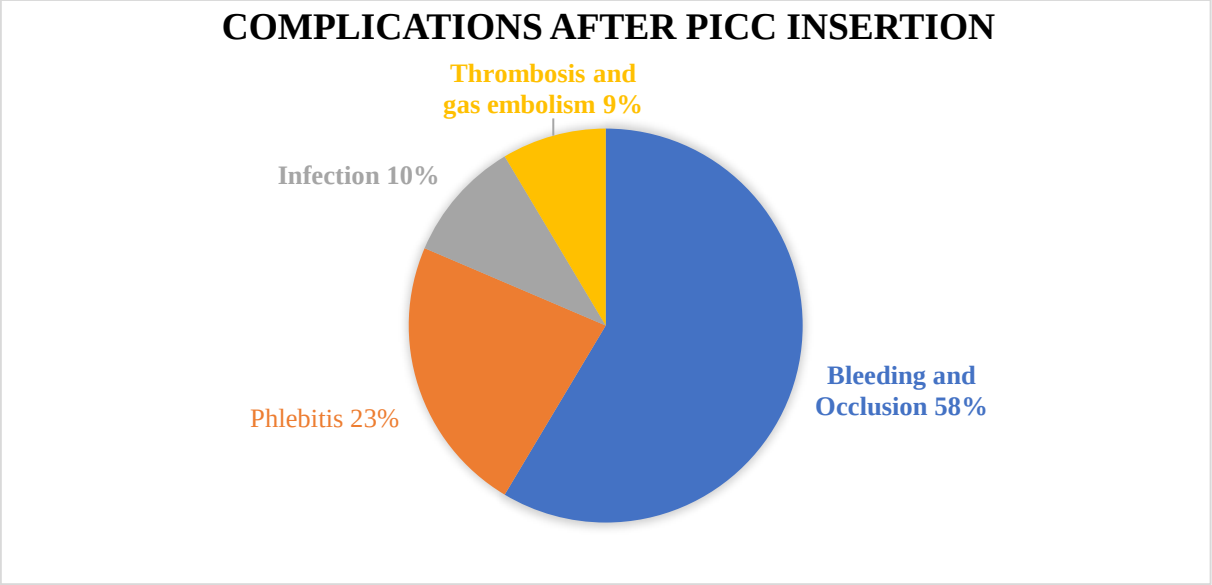
It is an uncommon mechanical complication due to the inclusion of the ultrasound-guided venous puncture technique. This arterial puncture occurs when at the wrong choice of the vessel. An indicator of arterial puncture is pulsatile blood flow and a blood reflux can also be observed to the equipment; blood staining is not a reliable indicator.

If the arterial puncture occurs, the catheter should be removed immediately and a compressive dressing should be performed. Observe the arterial pulses of the limb, hematoma formation, bleeding or compartment syndrome.

Nerve Injury

Puncture of a nerve is an unusual event during puncture of the PICC. The patient may present with tingling, numbness, and loss of strength in the punctured limb. When these symptoms occur, it is recommended for progression, remove the needle immediately, and evaluate the hand and arm for mobility. The use of ultrasound is indicated to guide the puncture thus avoiding this type of complication.

Complications in post-picc insertion



Phlebitis

It is a process that develops inside the wall of the blood vessel, in which the endothelial cells become inflamed and rough, favoring the adhesion of platelets. Phlebitis occurs due to mechanical, chemical or infectious factors.

Mechanical phlebitis occurs due to trauma during insertion, removal or movement of the PICC device inside the vessel, is evidenced 48 to 72 hours after insertion or removal. It is the most evidenced complication with PICC (Jesus, Secoli, 2008). Chemical phlebitis occurs due to the infusion of incorrectly diluted irritant medications or medications or the mixture of incompatible drugs, very rapid infusion and particles in the injected solution, with an aggression in the vein wall. (Jesus,S ecoli,2008). Infectious phlebitis is inflammation of the wall inside a vein associated with infection by microorganisms. Some factors may contribute to this complication developing, such as inadequate aseptic technique during the catheter insertion and maintenance procedure; failure to detect device integrity breaks and failure to evaluate the insertion site are determining factors (Jesus, Secoli, 2008).

Some factors reduce the occurrence of phlebitis between them include insertion by the basilica vein, catheter positioned with the tip in the superior vena cava, little movement during the introduction of the device, adequate fixation of picc to avoid retraction in the vein (Jesus & Secoli, 2007).

Infection

The risk of infection is associated with the site of access, the type of solution infused, the experience of the professional responsible for the procedure and the length of catheter permanence.

Local infection occurs due to microbial contamination of the device or infusion. Prevention occurs through aseptic techniques during catheter maintenance; this includes correct hand washing, care in the preparation

of intravenous drugs and disinfection of connectors and dânulas with 70% alcohol.

In local infections we found the following signs and symptoms: Local edema hyperemia, presence of purulent exudato (Baiocco, 2013).

Thrombosis

Deep vein thrombosis (DVT) is a well-known complication in PICC users. It can be painful, requires clotting therapy and catheter removal, which increases the patient's time in the hospital, deep vein thrombosis occurs in the second week of catheter use, and most cases are asymptomatic. Thrombosis is caused by fibrin and platelet adhesion that end up clogging the catheter into the lumen of the blood vessel. Traumas to venous endothelial tissue, interruption of the therapist for a long time, blood reflux through the catheter, slow rate of infusion and coagulopathies caused by diseases such as diabetes and cancer are factors that cause the formation of clots (Aiccous B, 2013).

PICC care protocols should address a flowchart for early diagnosis of upper extremity thrombosis in order to reduce the risk of complications and detect early central venous thrombosis (DVT). Postthrombotic syndrome can cause asymptomatic pulmonary embolism in one third of cases or symptomatic in 9% of cases (Baiocco, 2013).

Signs and symptoms of deep vein thrombosis in the upper extremities are arm edemas, pain, and leakage at the insertion site.

Gas Embolism

Gas embolism in picc patients is rare is lethal, the catheter insertion site is below the heart level, which helps maintain adequate pressure within the system. The causes of this complication: in the presence of air in the equipment, disconnections in the infusion system, inadequate technique in the performance of dressing changes and puncture in central accesses.

Signs and symptoms of gas embolism include hypoxia, mental confusion, dyspnea, aquicardia, hypotension, and chest pain.

Bleeding and Occlusion

Bleeding occurs within the first 24 hours after catheter insertion, coverage is made with compressive gauze. Occlusion results from partial or complete obstruction of the catheter, which hinders or prevents blood aspiration, causing the loss of its permeability. There are two types of obstruction: mechanics and thrombotics (Baiocco, 2013).

Thrombotic occlusion is originated by the adhesion of platelets and fibrins that occum the catheter and lumen of the vessel. Some factors contribute to the formation of a thrombus, such as traumas to the endothelial cells of the venous wall; some drugs such as phenytoin and diazepan may form crystals inside the catheter, obstructing it; discontinuation of prolonged therapy; catheter blood reflux; decreased infusion velocity, and states of hypercoagulopathies caused primarily by cancer or diabetes (Jesus & Secoli, 2008).

Mechanical occlusion is caused by bending or compression of your lumen and usually results from the migration of the device to a lower lumen vessel.

IV. DISCUSSION

In the present study we found that the use of PICC in the neonatal icu is extremely important, due to the various benefits that this procedure provides to the neonate, mainly reducing the number of peripheral punctures, pain and stress, besides establishing a safe venous access for infusion of prescribed therapy.

During data analysis, we observed the need to establish a constant training routine of nurses so that there is a decrease in iatrogenies related to the management of PICC and complications during its insertion. Among the articles used 40% address the importance of nurses being qualified and trained to perform the procedure, 20% verified the presence of adverse events resulting from conditions intrinsic to neonates or their management, 10% address ed the importance of nursing qualification for the insertion of picc, 20% emphasizes the importance of reducing the number of punctures, of stress and pain, because most of this device remains for as long as necessary for treatment, 10% detected that nurses in the sector were not qualified for such a procedure.

V. CONCLUSION

In view of what was exposed and explored during the research trajectory, we realized that it is necessary to invest in training and continuing education programs, as well as the establishment of protocols and care that allow better monitoring of the occurrence of complications related to the insertion and handling of picc. Nurses must be qualified to insert the PICC because the use of the device requires knowledge, dexterity and ability to handle it, thus reducing the occurrences that compromise its permanence.

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