



CENTRAL VENOUS CATHETER IN NEONATAL CARDIOLOGY UNIT: WHAT THE NURSES KNOW AND WHAT PRACTICE?

¹Marcia Helena Machado Nascimento, ²Mineusa do Carmo Maciel Sousa Pombo, ²Tatiana do Remédios Sousa de Barros, ³Renan de Souza Linard, ³Fábio Manoel Gomes da Silva, ³Tainá Priscila dos Santos Bezerra, ²Vanessa Kelly Cardoso Estumano, ⁴Sávio Felipe Dias Santos, ⁵Daniele Melo Sardinha, ⁶Rubenilson Caldas Valois and ⁷Maicon de Araújo Nogueira

¹Nurse, PhD in Rehabilitation Sciences. University Ninth of July UNINOVE-SP. Professor, University of the State of Pará UEPA, and University of the Amazon UNAMA. Leader of the Research Group PESCA-UEPA. Belém, PA, Brazil

²Nurse, University of the Amazon UNAMA. Belém, PA, Brazil

³Nursing Student, University of the Amazon UNAMA. Belém, PA, Brazil

⁴Nursing Student, University of the State of Pará UEPA. Belém, PA, Brazil

⁵Nursing Student, University Metropolitan Center of the Amazon UNIFAMAZ

Research Group Member PESCA-UEPA University of the State of Pará. Belém, PA, Brazil

⁶Nurse, PhD in Tropical Diseases. Federal University of Pará UFPA. Professor, University of the State of Pará UEPA and University Metropolitan Center of the Amazon UNIFAMAZ. Deputy Leader of the Group of Research PESCA-UEPA. Belém, PA Brazil

⁷Nurse, Master in Teaching and Health in the Amazon. University of the State of Pará UEPA. Professor, University of the State of Pará UEPA and University of the Amazon UNAMA. Belém, PA, Brazil

ARTICLE INFO

Article History:

Received 17th December, 2018

Received in revised form

12th January, 2019

Accepted 15th February, 2019

Published online 31st March, 2019

Key Words:

Intensive Care Units,
Neonatal; Infant, Newborn;
Neonatal Nursing; Catheterization,
Central Venous; Nursing Care.

ABSTRACT

Objective: To describe to know them and nurses' practices on the use of Central Veined Catheter in a public unity of Intensive Therapy Neonatal, in Belém-Pará. **Method:** Descriptive and exploratory study with a qualitative approach. The data was collected through in-depth interviews, in the period of August to October 2017, with the sample of coexistence ten nurses who work in intensive care unit specializes in neonatal cardiology. Data analysis was carried out based on the analysis of content of Bardin. **Results:** Three categories emerged: "use of central venous catheter in neonates with heart disease according to the knowledge of the nurses," "nursing practices for the maintenance of the central venous catheter in newborn" and "difficulties in management of catheter central venous in neonatal intensive care unit ". **Conclusion:** The present study has shown the theoretical and practical knowledge of the nurses of the neonatal intensive care unit. It was evidenced that the nurses of the institution have a good knowledge concerning the process of inserting and maintaining the central venous catheter, however there was a lack of knowledge on the part of the team in relation to the type of catheter used to agreement of the individualized clinical condition for each neonate.

Copyright © 2019, Marcia Helena Machado Nascimento et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Marcia Helena Machado Nascimento, Mineusa do Carmo Maciel Sousa Pombo et al., 2019. "Central venous catheter in neonatal cardiology unit: what the nurses know and what practice?", *International Journal of Development Research*, 09, (03), 26571-26575.

INTRODUCTION

Unity of Intensive Therapy Neonatal (UITN) are hospital services turned to the assistance of newborn serious, critical or life-threatening, which must have adequate technical structures, physical facilities, equipment and human resources,

*Corresponding author: Marcia Helena Machado Nascimento

Nurse, PhD in Rehabilitation Sciences. University Ninth of July UNINOVE-SP. Professor, University of the State of Pará UEPA, and University of the Amazon UNAMA. Leader of the Research Group PESCA-UEPA. Belém, PA, Brazil

to provide expert assistance and quality to newborns (Santos *et al.*, 2017). Newborns with heart disease during the entire period at UITN, they need individualized care and specialized care, such as: monitoring of vital data, laboratory analysis, ventilatory support and nutrition, careful with use of central venous catheter, vasoactive drug, prostaglandin, use of antibiotics for infection, treatment with blood products transfusion, careful with pre-and post-surgery cardiac, peritoneal dialysis and host the family of neonate (Lima, Silva and Siqueira, 2018; Pereira, 2014). The UITN conventional assistance similar to cardiological intensive

care unit, with regard to the development and growth of the newborn, in order to restore their physiological patterns and stabilize their dysfunctions; individualized care based on instruments and apparatus present in unity and careful attention to invasive devices, such as the central venous catheter (CVC) (Oliveira *et al.*, 2013). There are a variety of intravenous therapy devices, with this, it is necessary that the nursing professional holds the due knowledge about the devices, about its advantages and disadvantages, handling and maintenance, because the CVC must be used properly and safely, once will be administered medicines, annoying and vasoactive drugs, parenteral nutrition, hemodynamic monitoring among others that will offer the newborn a faster recovery and secure (Motta *et al.*, 2011). In Brazil, the professional nurse presents, in the legal form, in his professional service the technical competence of inserting and manipulating one of the types of CVC, mainly in the context of the UITN. This support comes from laws and resolutions, especially the Federal Nursing Council No. 243/2017 which makes it lawful to nurse the insertion procedures, fixing, maintenance and removal of peripherally inserted central venous catheter (PICC). However, to develop such activity the nurse should be submitted for qualification and/or professional training (Cofen, 2017).

It is emphasized that the PICC, in the context of the UITN, presents itself a great advancement what concerns a quality care to the patients, since this technology perfects the assistance, when fewer proceedings and risks were provided for the patient (Rosa *et al.*, 2014). Between indications and advantages of PICC, it stands out the maintenance of venous access for long and medium permanence therapies, decreasing multiple peripheral puncture, the administration of vesicants solutions, hiperosmolares and irritants, therapy with antibiotics for more than seven days, administration of blood and blood products, the ease of insertion and handling, and the reduction of pain and risk for infection (Silva *et al.*, 2013; Rosa *et al.*, 2014). In spite of countless positive points, the professional of nursing who is enabled and enabled doing the proceedings with the catheter and must know the possible complications what can take place with the use of the CVC, with the objective to intervene in the precocious form from the insertion, passing by the maintenance and ending in the removal, in other words, the nurse must be instrumentalized, especially the possible complications that enclose this instrument, like the possible obstructions and breaks of the catheter, infectious problems that result in sepsis and pneumothorax (Swerts *et al.*, 2013; Rosa *et al.*, 2014). In addition, it is of the utmost importance the team training to assess correctly the newborn in use of CVC, since any incorrect analysis may result in further complications for the patient, the early removal of the catheter and wrong maintenance. Therefore, the nurse should assess the catheter fixation period, typology and technique, in particular the insertion location will be punctured (Gomes and Nascimento, 2013). Therefore, it is of the utmost importance that the nurse prioritizes the care related to PICC insertion technique and maintaining other CVC's, as well as the aspects involving the choice of the veins, the expected results with the therapy and the relationship with other procedures, with the intention of improving the quality and safety of care provided to the newborn (Nobre *et al.*, 2016). Before that, the study has as objective describes the knowledge and practice of the nurses on the use of Central Veined Catheter in a public unity of Intensive Therapy Cardiology Neonatal, of Belém-Pará, Brazil.

MATERIALS AND METHODS

Descriptive, exploratory study with a qualitative approach, characterized as field research, held in a State hospital UITN, located in the metropolitan region of Belém, Pará, Brazil during the period from August to October 2017. The data was collected

through in-depth interviews, in which individuals were approached individually according to your availability to participate in the study, and to provide the minimum of embarrassment and discomfort. Sampling was performed for convenience, snowball process, in which the UITN nurses indicated the pairs to participate of the inquiry, constituting of ten nurses who work in intensive care unit references in cardiology neonatal. As criteria for inclusion are considered active in the UITN nurses, have at least two years of experience working in neonatology, be expert in neonatology and have experience with newborn care in use of CVC. Not included nurses who were absent from the institution at the time of data collection. The collected data were analyzed based on the methodological referential of Bardin content analysis (Bardin, 2016). This study has obtained approval of the Research Ethics Committee of the Hospital Foundation Clinics Gaspar Viana (FHCGV), CAAE 78649417.5.0000.0016, and number of approval: 2.370.751 and, met the prerogatives of the resolutions nº 466/12, 510/16 e 580/18 the National Health Council. All the participants signed an informed consent, getting a possession. Was preserved anonymity, identifying your lines through alphanumeric codes (E = Nurse), in ascending numerical order according to the order in which they were addressed. The sample size was based on saturation, considering that the number of subjects addressed was sufficient to permit certain recurrence of information. Saturated considered collecting data when no new element is found and the addition of new information becomes unnecessary, because it does not change the understanding of the phenomenon under study and the researcher should clarify the factors for him identified as involved in the genesis of the theoretical setting. Therefore, it is a criterion for establishing the validity of a set of data (Fontanella and Magdaleno Júnior, 2012).

RESULTS

In the analysis of the data, it was found that among the ten participants, all were of the female gender, with minimum age of 42 years and maximum of 56 years. With regard to marital status, three are married, two are single and just a one divorcee. The formation time varied from 20 to 30 years, all with specialty in neonatology, and with work time in UITN between 13 to 25 years and work time in cardiology from 9 to 12 years. The corpus of the study made possible the Organization of content from three categories: "use of central venous catheter in neonates with heart disease according to the knowledge of the nurses," "nursing practices for the maintenance of the central venous catheter newborn cardiac patients" and "difficulties in the management of central venous catheter in neonatal intensive care unit".

Use of central venous catheter in neonates with heart disease according to knowledge of nurses: This first category sought to observe what the nurses know about the use of Central venous catheter, regardless of your display (drug therapy extended; among other indications clinic gravity). How to show the lines described below:

"[...] I know that the CVC must be used in the newborn cardiac, for the complexity of the disease, when it is going to receive parenteral nutrition and Prostin and other drugs for stabilization hemodynamic [...] I know that only a PICC does not solve the drug demand". (E1)

"[...] Our newborn are serious cardiac patients who require prolonged drug therapy. The use and the type of central catheter depends on the patient's conditions and drugs to be infused". (E2)

"[...] Here in this UITN, 90 % they are patient cardiac. They use CVC, premature with cardiopathy or not. The necessity of the

CVC is for nutrition parenteral, antibiotics for more than 6 days, type of pathology that demands prolonged time of admission, vesicant and irritating drugs [...]". (E3)

"[...] When newborns need multiple drugs, such as: prostin, vasoactive drugs, antibiotics with prolonged parenteral nutrition infusion". (E4)

"[...] Being for newborn with complex cardiopathy is necessary beyond the PICC also the CVC (preferably with two lumens as the double lumen Catheter), if premature, only the PICC initially with a lumen. Due to the high risk of infection by handling the lumen" (E5).

"The permanence of the CVC is for the medicamental therapeutic necessity and of the clinical gravity of the newborn, it asks constant evaluation". (E6).

"[...] Our profile are babies with heart disease, those with acyanotic heart disease, we use a single CVC, more when the baby is serious or cyanotic cardiopathy, venous access is fragile, will receive, vasoactive drugs, can receive prostin, parenteral nutrition, is need central access with more than one lumen. One or two PICCs, does not support the drug therapy. Ideally over two central access" (E7)

"We use here, double lumen central catheter in neonates in post cardiac catheterization, cardiac surgery, in addition to the PICC, umbilical catheter, dissection, intra venous cath. The statement is a doctor, the maintenance of these catheters is of all the health team from the UITN" (E8)

That category revealed that the nurses know about the use of central venous catheter in neonates in neonatal intensive care with heart disease. Quote: "use in" premature newborns with heart disease or not, " newborns difficult peripheral venous access", those who are on prolonged treatment, newborns with heart disease on vasoactive drugs, vesicants and irritants. One can understand that nurses have extensive knowledge on this case.

The use of CVC, still depends on the severity of the newborn, the type of drug therapy, the use of multiple drugs against the need for central access only to newborns that make use of parenteral nutrition, the type cardiopathy congenital.

Practices related to the maintenance of the central venous catheter in newborn cardiac patients: In relation to the nurses' practices for the maintenance of CVCs, addressed important care, such as hand washing, asepsis of catheters and the bandages. As stated below:

"[...] my practice for maintenance of the CVC is related to permeability and with the prevention of infection of the bloodstream. Start with cleaning the hands and use alcohol gel, used for antisepsis with alcohol 70% in connections before administering any medication, keep a continuous infusion of physiological saline (0.5 to 1 ml) before and after each administration of medicine or exchange of equipment, and the use of tegaderm transparent dressing to secure the CVC ". (E2)

"[...] tegaderm transparent dressings as the UITN Protocol and washing of the catheter as well as Protocol, is the primordial is used for antisepsis with alcohol 70% in the handling of the connections ". (E3)

"[...] I do evaluation of the CVC in the same time-tables of the controls of the UITN, 3/3h. For the PICC, continuous physiologic

serum is used in infusion bomb in low flow and washing in bolus in syringe of 10 ml according to protocol of the institution". (E5)

"[...] for the CVC, to wash the hands, and it will use alcohol gel before and after the proceeding, to evaluate the insertion local and to do the dressing necessarily... and to cover with tegaderm. The exchange of the dressing takes place to each 7 days if there is need. Use syringe of 10 ml for the medicines infusion... the PICC wash regularly [...]to all the types of central access, we do investigation of permeated veined, local hyperemia". (E8)

"[...] side dish daily of the condition of the dressing, of the medicamental therapeutics, washing of the access and the permeability, alcohol use in the connections". (E10)

In this category, the practices carried out for maintenance of CVC, were: cleaning of the hands and use alcohol gel, permeability, daily monitoring CVC, curative exchange in routine and the use of transparent film to secure the CVC and used for antisepsis with alcohol 70% in the handling of the connections.

Difficulties in the handling of central veined catheter in newborn baby cardiopata in intensive therapy neonatal: In this category the nurses reported the difficulties encountered regarding the use of the CVC into the UITN, we observed that the greatest difficulty revealed is related to the type of catheter used for the clinical condition of the newborn falls a CVC when in fact it would require another as shown in the following reports:

"With the frequent acting, the difficulties give place to experience in this handling of the CVC, the vigilance is continuous, since factors inherent in the unstable clinical condition of the baby in use of CVC and Intracath, only one for infusion of several vasoactive drugs and Nutrition parenteral prune unfeasible the use of the catheter". (E1)

"[...] We have difficulties in management of newborns with the mono lumen PICC, receiving several infusions of drugs, with definite risk of obstruction of the catheter and the request by another central access is not met. Another situation is the inclusion of PICC in newborn with heart disease, limiting the access site, which we believe is bad formation in vascular anatomy, caused by heart disease and this damages the progression of CVC in the blood vessel. In this case, to be successful in the procedure, we consider a careful evaluation of venous access, massage in the path of the vein and valves and positioning of the newborn. But when they don't work, the suggestion of inserting another type of CVC, different from the PICC is ignored ". (E2)

"The great difficulty for me, [...] a newborn with congenital cardiopathy complex before and after surgery, requiring multiple drugs, high expansion volumes for correction of electrolytes and most of the time makes use only of a PICC or CVC of type Intracath in or Phlebotomy, and subclavian a lumen, is not enough. Another difficulty is the handling of drugs with CVC mono lumen and a peripheral venous access. With the advancement of technology have to offer more comfort and safety to our clients that is so vulnerable to the risk of infection of the bloodstream and to the external environment. " (E3)

"[...] is the poor quality of the PICC, lack appropriate dressing to secure the catheter and maintaining prolonged PICC. Indication of the premature withdrawal of medical professional any CVC and without having another central access alternative [...]". (E4)

"[...] dealing with the conduct of the medical professional who seems to not agree with there is need for more of a central venous

access, to add with a PICC, which can be a Intracath. Why insist the permanence of PICC only when the newborn is serious, needing prostaglandin, parenteral nutrition and blood products? The PICC has its peculiarities and there's still doubt by other non-nurses, as maintenance aspects PICC ". (E5)

"[...] limitation of access of PICC in newborns with cardiopathy, which seem to present different vascular anatomy of newborns without cardiopathy; early withdrawal of the CVC front of the newborn with cardiopathy clinical State unstable, requiring prolonged drug therapy [...]". (E9)

The listed in this category have revealed how difficulties in the management of CVC: the unstable clinical condition of the newborn and the use of CVC single or mono lumen for concurrent drug infusions; divergence of professional conduct medical and nursing in relation to withdrawal of the CVC, limiting the access site, poor quality of the PICC, lack of transparent cover (tegaderm) for dressing of the CVC, inadequate dwell time and withdrawal of catheter when the newborn requires drug therapy.

DISCUSSION

On the use of central venous catheter in neonates with cardiopathy second knowledge of nurses, the nurses show has knowledge as to the type of catheter insertion site, indication, importance of the bandage, medical conditions newborn, criteria for use, and withdrawal of the CVC. The successful use of the CVC in newborns with cardiopathy is coupled to the pursuit of scientific knowledge by nurses be through the professional experience trainings or competences. (Barbosa, 2011). The acquisition of the knowledge avoids complications and supports the knowledge to intervene to already installed problems. In this context, added the importance of adherence to standards of good practice for the prevention of infection of the bloodstream and apply them in the execution of the procedure (Jesus and Secoli, 2007; Barbosa, 2011). The need and the severity of the newborn, the amount of prescribed medications and the indication of parenteral nutrition influence in choosing the type of CVC in relation to the number of lumens (Mesiano and Merchán-Hamann, 2007). The depositions about the practices related to the maintenance of central venous catheter in newborn cardiac patients are similar to the study of Dias *et al.*, (2017) with 24 nursing professionals that have the knowledge to deal with the patient in use of CVC, maintenance and handling of CVC and correct care, perform asepsis, monitoring and prevention of injury and exteriorization of the CVC. The cleaning of the hands and solution use antiseptic and the use of antiseptics the base of alcoholic clorexidina, alcohol to 70 % through friction for 15 seconds before the access to the infusion system for administrations intravenous has been recommended and checked like important measure of control of infection (Frasca, Dahyot-fizelier and Mimos, 2010; Munoz-Price *et al.*, 2012).

The dressings transparent movies are pointed like the choice most adapted to cover the CVC, because of providing daily evaluation of the siege of insertion, and the gauze is recommended in situations of bleeding in the insertion place. It is known which infections prevention becomes efficient when the team of health enabled and trained for the handling of correct of the covers, as well as the adhesion of the cleaning of the hands and of other measures of prevention (Rosado, Romanelli and Camargos, 2011; Danks, 2006). The unstable clinical condition of the newborn and the use of CVC to just a concurrent drug infusion to lumen, was reported as difficulty in handling of the CVC. This statement is similar to a study that valued the choice of type of catheter in relation to the number of lumens, considering the need and the severity of the newborn, the prescribed drug therapy and the

indication of parenteral nutrition (Mesiano and Merchán-Hamann, 2007). In this study, it was found that all of the newborns with cardiopathy made use of the CVC, clinical record serious and received medications vesicants, vasoactive drugs, blood products, prostaglandin, among others. Justifiable reasons for central venous access. In neonatal intensive care unit there is a predominance of CVC insertion in newborns because they intravenous therapy for extended time of infusion of hypertonic and total parenteral nutrition solutions. The CVC is a technological resource indicated to sustain the therapy, with goals to save and prolong life (Gomes *et al.*, 2010). Several studies claim that the amount of number of lumens is equivalent to greater risk of infectious complications associated with CVC, due to the frequent manipulation of the connections and the infusion. A single triple lumen catheter favors occurrence of clinical sepsis associated with CVC, faster than a central mono lumen catheter (Gomes and Nascimento, 2013). Success in intravenous therapy for CVC is based on the routine practices that begin with the cleaning of hands, stabilization of catheters, dressings suitable, caring administration of infusions, until the withdrawal of this catheter, at the end of the treatment (Malagutti and Roehrs, 2012). The purpose of therapy is that the central venous catheters are removed by end of treatment. However, the complications still culminate with the removal of the catheter. The PICC breaks are associated with obstruction, as failure in continuous infusion of drugs (Câmara, Tavares and Chaves, 2007).

Limitations of the study: Although, consider that the number of participants reached the criteria of saturation, the size of the sample can be characterized as limitation of the study, since the small number weakens it data analysis. Another limitation concerns the possible biases of information, since the lack of attention, memory error, self-censorship, among others, can hide or distort facts, and mask feelings and emotions of the participants.

Conclusion

The results showed that the nurses of the UITN cardiological have satisfactory knowledge about the use of central venous catheter in neonates with cardiopathy, however, such skills and competencies are established from the everyday activities in UITN. About the practices related to the maintenance of central venous catheter in newborn with cardiopathy, the statements showed that nurses perform: cleaning of the hands and use alcohol gel, permeability, CVC's log monitoring curative trading routine, and the use of transparent film to secure the CVC and used for antisepsis with alcohol 70% in the handling of the connections. This care was similar to other studies. The practice of infusion of several drugs concomitantly with parenteral nutrition, CVC single, according to the literature, may cause more frequent and early removal occlusions. It is therefore concluded that the CVC type PICC, umbilical venous catheter, venous dissection, Intracath and double lumen catheter are technological advances in UITN cardiology, provide advantages to newborns, as, reduces stress and handling for punctures, meets the needs of intravenous therapy for longer time, likely to remain deployed until the end of treatment. It is therefore concluded that the CVC type PICC, umbilical venous catheter, venous dissection, Intracath and double lumen catheter are technological advances in UITN cardiology, provide advantages to newborns, as, reduces stress and handling for punctures, meets the needs of intravenous therapy for longer time, likely to remain deployed until the end of treatment.

REFERENCES

- Barbosa, J. P. 2011. 'The Importance of Nurses in the Handling of the PICC in the Neonatal Intensive Care Unit', *R pesd: cuid. fundam.* online, 3(2), pp. 1827–34. Available at: <https://www.redalyc.org/pdf/5057/505750888022.pdf>.

- Bardin, L. 2016. *Análise de Contéudo*. Almedina Brasil, São Paulo, Brazil.
- Câmara, S. M. C., Tavares, T. de J. L. and Chaves, E. M. C. 2007 'Cateter venoso de inserção periférica: análise do uso em recém-nascidos de uma Unidade Neonatal pública em Fortaleza', *Revista da Rede de Enfermagem do Nordeste*, 8(1), pp. 32–37. Available at: <http://periodicos.ufc.br/rene/article/view/5266> (Accessed: 2 March 2019).
- Cofen, C. F. de E. 2017. Resolução COFEN no 258/2011: Inserção de Cateter Periférico Central pelo Enfermeiro., [cofen.gov.br](http://www.cofen.gov.br). Available at: http://www.cofen.gov.br/parecer-de-relator-cofen-no-2432017_57604.html (Accessed: 28 February 2019).
- Danks, L. A. 2006. 'Central venous catheters: a review of skin cleansing and dressings', *British Journal of Nursing*, 15(12), pp. 650–654. doi: 10.12968/bjon.2006.15.12.21396.
- Dias, E. G. *et al.* 2017. 'Perfil e Atividades Desempenhadas pelos Profissionais de Enfermagem na Inserção e Manutenção do Cateter Venoso Central na Unidade De Terapia Intensiva', *Revista Saúde e Desenvolvimento*, 11(7), pp. 01-12. Available at: <https://www.uninter.com/revistasaude/index.php/saudeDesenvolvimento/article/viewFile/691/399>.
- Fontanella, B. J. B. and Magdaleno Júnior, R. 2012 'Saturação teórica em pesquisas qualitativas: contribuições psicanalíticas', *Psicologia em Estudo*, 17(1), pp. 63–71. doi: 10.1590/S1413-73722012000100008.
- Frasca, D., Dahyot-fizelier, C. and Mimos, O. 2010 'Prevention of central venous catheter-related infection in the intensive care unit', *Critical Care*, 14(212), pp. 1–8. doi: 10.1186/cc8853.
- Gomes, A. V. de O. and Nascimento, M. A. de L. 2013 'O processo do cateterismo venoso central em Unidade de Terapia Intensiva Neonatal e Pediátrica', *Revista da Escola de Enfermagem da USP*, 47(4), pp. 794–800. doi: 10.1590/S0080-623420130000400004.
- Gomes, A. V. O. *et al.* 2010. 'El catéter percutáneo en la unidad de cuidados intensivos neonatales: una tecnología del cuidado de enfermeira', *Enfermería Global. Servicio de Publicaciones, Universidad de Murcia*, 6(19), pp. 1–13. Available at: http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1695-61412010000200003 (Accessed: 2 March 2019).
- Jesus, V. C. de and Secoli, S. R. 2007 'Complicações Acerca Do Cateter Venoso Central De Inserção Periférica (Picc)', *Cienc Cuid Saude*, 6(2), pp. 252–260. doi: 10.4025/cienccuidsaude.v6i2.4174.
- Lima, T. G., Silva, M. de A. da and Siqueira, S. M. C. 2018. 'Diagnósticos e Cuidados de Enfermagem ao Neonato com Cardiopatia Congênita', *Revista da Sociedade de Cardiologia do Estado de São Paulo*, 28(1), pp. 101–109. doi: 10.29381/0103-8559/20182801101-9.
- Malagutti, W. and Roehrs, H. (2012) 'Terapia intravenosas: atualidades', *Atualidades São Paulo*, p. 448.
- Mesiano, E. R. A. B. and Merchán-Hamann, E. 2007. 'Bloodstream infections among patients using central venous catheters in intensive care units', *Revista Latino-Americana de Enfermagem*, 15(3), pp. 453–459. doi: 10.1590/S0104-11692007000300014.
- Motta, P. das N. *et al.* 2011. 'Cateter central de inserção periférica: o papel da enfermagem na sua utilização em neonatologia', *HU Revista*, 37(2), pp. 163–168. Available at: <https://hurevista.ufjf.emnuvens.com.br/hurevista/article/view/1402>.
- Munoz-Price, L. S. *et al.* 2012 'Effectiveness of stepwise interventions targeted to decrease central catheter-associated bloodstream infections', *Critical Care Medicine*, 40(5), pp. 1464–1469. doi: 10.1097/CCM.0b013e31823e9f5b.
- Nobre, K. S. S. *et al.* 2016. 'Cateter central de inserção periférica e dissecação venosa em bebês: estudo descritivo', *Online Brazilian Journal of Nursing*, 15(2), pp. 215–225. doi: 10.17665/1676-4285.20165420.
- Oliveira, F. J. G. de *et al.* 2013. 'Use of Central Venous Catheter in Patients Hospitalized in an Intensive Care Unit', *Rev Rene*, 14(5), pp. 904–10. Available at: <https://www.redalyc.org/pdf/3240/324028789006.pdf>.
- Pereira, S. J. F. 2014. 'O cuidado humanizado ao recém-nascido grave ou potencialmente graves: percepções e contribuições de alguns integrantes da equipe de enfermagem', *Dissertação (Mestrado Profissional Gestão do Cuidado em Enfermagem UFSC)*, 1(1), p. 203. Available at: <https://repositorio.ufsc.br/bitstream/handle/123456789/129367/330268.pdf?sequence=1&isAllowed=y>.
- Rosa, I. C. *et al.* 2014. 'Caracterização do uso do Cateter Central de Inserção Periférica em uma Uti Neonatal no Estado do Paraná', *Revista Da Universidade Vale Do Rio Verde*, 12(1), pp. 536–546. doi: 10.5892/ruvrd.v12i1.1405.
- Rosado, V., Romanelli, R. M. de C. and Camargos, P. A. M. 2011. 'Risk factors and preventive measures for catheter-related bloodstream infections', *Jornal de Pediatria. Sociedade Brasileira de Pediatria*, 87(6), pp. 469–477. doi: 10.1590/s0021-75572011000600003.
- Santos, L. F. *et al.* 2017. 'Forces interfering in the mothering process in a neonatal intensive therapy unit', *Texto e Contexto Enfermagem*, 26(3), pp. 1–10. doi: 10.1590/0104-07072017001260016.
- Silva, T. C. B. *et al.* 2013. 'Knowledge of the team of nursing on insertion and maintenance of the central catheter of peripheral insertion in just born', *Enfermería Global*, 12(32), pp. 11–20. Available at: http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1695-61412013000400002&lang=pt.
- Swerts, C. A. S. *et al.* 2013. 'Cuidados de enfermagem frente às complicações do cateter central de inserção periférica em neonatos', *Revista Eletrônica de Enfermagem*, 15(1), pp. 156–162. doi: 10.5216/ree.v15i1.13965.
