Indications for use of the Peripherally Inserted Central Catheter in the critical adult

RESUMO | OObjetivo: Apresentar as indicações do uso do Cateter Central de Inserção Periférica no paciente adulto crítico. Método: Trata-se de uma revisão integrativa de literatura realizada na Biblioteca Virtual de Saúde, PubMed e EBSCO, resultando em uma amostra de dez artigos publicados entre julho de 2014 e julho de 2019. Resultado: O Cateter Central de Inserção Periférica apresenta diversas indicações e seu uso tem crescido nas Unidades de Terapia Intensiva adulto. Conclusão: Trata-se de uma tecnologia promissora no tratamento adultos críticos acometidos por diversas doenças, possibilitando mais conforto durante o tratamento e possui alto nível de evidência. Além de seguro, eficiente, com bom custo-benefício, pode ser puncionado pelo enfermeiro habilitado, à beira-leito, evita os riscos associados ao transporte e traz uma nova dimensão de cuidado para o enfermeiro. É uma alternativa viável para substituição ao Cateter Venoso Central, entretanto a sua escolha deve ser feita de maneira criteriosa.
Descritores: Adulto; Unidade de Terapia Intensiva; Cateteres; Enfermeiro.

ABSTRACT | Objective: To present the indications for the use of the Peripherally Inserted Central Catheter in critically ill adult patients. Method: This is an integrative literature review carried out at the Virtual Health Library, PubMed and EBSCO, resulting in a sample of ten articles published between July 2014 and July 2019. Result: The Peripherally Inserted Central Catheter has several indications and its use has grown in adult Intensive Care Units. Conclusion: This is a promising technology in the treatment of critically ill adults affected by various diseases, providing more comfort during treatment and with a high level of evidence. In addition to being safe, efficient, and cost-effective, it can be punctured by a qualified nurse, at the bedside, avoiding the risks associated with transport and bringing a new dimension of care to nurses. It is a viable alternative to replace the Central Venous Catheter, however its choice must be made judiciously
Descriptors: Adult; Intensive care unit; Catheters; Nurse.

RESUMEN | OObjetivo: Presentar las indicaciones de uso del catéter central de inserción periférica en pacientes adultos críticamente enfermos. Método: Se trata de una revisión integradora de la literatura realizada en la Biblioteca Virtual en Salud, PubMed y EBSCO, dando como resultado una muestra de diez artículos. Resultado: Se trata de una revisión integradora de la literatura realizada en la Biblioteca Virtual en Salud, PubMed y EBSCO, dando como resultado una muestra de diez artículos publicados entre julio de 2014 y julio de 2019. Conclusión: Se trata de una tecnología prometedora en el tratamiento de adultos críticamente enfermos afectados por diversas patologías, brindando mayor comodidad durante el tratamiento y con un alto nivel de evidencia. Además de ser seguro, eficiente y rentable, puede ser perforado por una enfermera cualificada, a pie de cama, evitando los riesgos asociados al transporte y aportando una nueva dimensión de atención a las enfermeras. Es una alternativa viable para reemplazar el catéter venoso central, sin embargo, su elección debe hacerse con prudencia
Descriptores: Adulto; Unidad de terapia intensiva; Catéteres; Enfermero.

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INTRODUCTION

At the hospitals, the Intensive Therapy Units(UTI) are sectors of reference at the treatment of critical adult patients that are in life' s risk caused by some dysfunction of their physiological systems. For that reason it is needed to guarantee for them a functional and safe venous access during the assistance, regarding that they may need intravenous medication for long periods. (1)

One of the commonly made procedures in a hospitalization is the use of a puncture for venous access, where multiple tries of peripheral venous puncture may lead the patient to suffering, increasing of the anxiety and discomfort. Due to unsuccessful tries, the

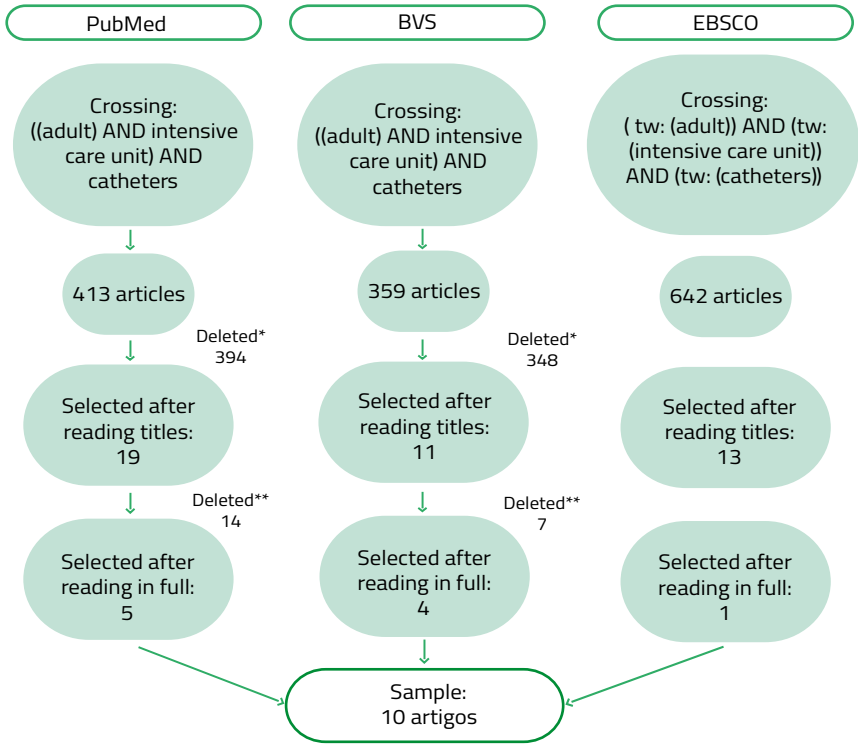
professional may feel frustrated beyond elevate the hospitalization costs and the nursing work time. To avoid this type of situation, the selected catheter must be according to the patient's indicated infusion therapy according to its clinical situation. (2-3)

The most used catheter at the severely ill adult patients is the Central Venous Catheter (CVC), although there are other types of catheters which may be used and that must increase the benefits for the critical patient. Between those, it is the Peripherally Inserted Central Catheter - PICC. The PICC is a central venous catheter semi-implanted of long permanence that is inserted in a peripheral vein and grows until the distal third of the superior or proximal vena cava, where it can stay for until two years and six months. (4-5)

This catheter use was described for the first time in 1929 by the doctor Werner Theodor Otto Forssmann, winning the medicine Nobel Prize in 1956. In Brazil, the PICC started to be used in 1990 initially in newborn and pediatric patients, but actually it can also be used in adults. (4, 6)

Beyond being safe, efficient, with good cost-benefit, it must be convenientment punctured by the trained assistential nurse, at bedside, avoid the risks associated with the transport and bring a new care dimension for the nurse. (7) Therefore, in a way to minimizing the adverse events and guaranteeing a safer and qualified assistance, the nurse must be qualified to indicate/contraindicate this catheter puncture. (6) That way, this study study was presenting indications of PICC uses at the critical adult patient.

Diagram I - Research method



Deleted*: not selected after reading the abstracts

Deleted **: not selected for not answering the guiding question

Source: Prepared by the authors, 2019.

METHOD

It is about an Integrative Revision of the literature, that has happened in a virtual form through the following phases: (I) researching problem, (II) searching the the literature, (III) sample categorization, (IV) studies evaluation, (V) results interpretation and (VI) acknowledgement synthese. (8)

It was used for publishing available at the database of the Health Virtual Library (BVS), EBSCO and PubMed. Due to the specificity of each database, the searching strategies variates, according to what shows the diagram I.

For composing a sample of the study, it was used the descriptor (DeCS/MeSH) "adult", "intensive therapy unit" and "catheters". For making publication' s searching the inclusion criteria were established, being: articles, teses, monographies and dissertations written in Portuguese, English or Spanish published between july 2014 and july 2019. The double researches that do not respond to this study objective were excluded.

After the selection of the study's population through the descriptor crossing at the selected databases, all of the publications had their titles and abstracts evaluated, excluding those who did not answer to these research objectives.

RESULTS

After the criteria analysis a sample of ten articles fully readed was found and after that their major information was synthesized at Table 1.

From the selected articles, 30% were published in 2017; 30% in 2016; 20% in 2018 and finally, 10% in 2019 and 2015. Of the selected studies, 50% are of cohort type and the rest represent 10% for each study: retrospective and observational; Project evidence-implementation; Foresight of Unique Center; descriptive and qualitative and multivariate analysis. It found ten indications more common for PICC use, which is

outstanding at table 2.

The Peripherally Inserted Central Catheter has several indications for the routine infusion of fluids and medications. It was noticed that the factors of infusion of different drugs by intravenous route, as well as antibiotic therapy, parenteral nutrition, chemotherapy and vasoactive drugs are more recurrent in terms of indications and applicability.

Table 1 - Synthesis of the selected studies

Nº of the Article	Title	Database	Type of study	Year
A1 [9]	Efficacy and safety of peripherally inserted central venous catheters in acute cardiac care management.	BVS	Cohort	2018
A2 [10]	Inpatient Peripherally Inserted Central Venous Catheter Complications: Should Peripherally Inserted Central Catheter Lines Be Placed in the Intensive Care Unit Setting?	BVS	Cohort	2017
A3 [11]	Complication rates among peripherally inserted central venous catheters and centrally inserted central catheters in the medical intensive care unit.	BVS	Cohort	2016
A4 [12]	Peripherally inserted central venous catheter safety in burn care: a single-center retrospective cohort review.	BVS	Cohort	2015
A5 [13]	Safety and feasibility of ultrasound-guided placement of peripherally inserted central catheter performed by neurointensivist in neurosurgery intensive care unit.	PubMed	Retrospective and Observational	2019
A6 [14]	Management of peripherally inserted central catheter use in an intensive care unit of a teaching hospital in Brazil: a best practice implementation project.	PubMed	Project evidence-implementation	2018
A7 [15]	Validation of Peripherally Inserted Central Catheter-Derived Fick Cardiac Outputs in Patients with Heart Failure.	PubMed	Foresight of Unique Center	2017
A8 [16]	Burn patients' experience of peripherally inserted central catheter insertion: Analysis of focus group interviews from a South Korean burn center.	PubMed	Descriptive and qualitative	2016
A9 [17]	Variation in prevalence and patterns of peripherally inserted central catheter use in adults hospitalized with pneumonia.	PubMed	Cohort	2016
A10 [18]	The microbiological characteristics and risk factors for PICC-related bloodstream infections in intensive care unit.	EBSCO	Multivariate Analysis	2017

Source: Made by the authors, 2019.

DISCUSSION

The Peripherally Inserted Central Catheter is an advance of modernity. Because, it is a specialized central catheter and its use has grown in hospitals for managing adult patients. (17) There was also an expansion of use in Intensive Care Units (18), emerging as a viable alternative to be used as short-term catheters, replacing non-tunneled central venous catheters. (11)

Despite this, it was observed that the catheter of choice in the emergency room was the CVC and the PICC was used as an elective procedure. (10) Compared to CVC puncture, PICC puncture can be considered less traumatic and safer than CVC puncture, because it uses ultrasound to guide the puncture, however, the movement of the catheter inside the vessel can damage the endothelium. (12)

Among the advantages of the PICC, we can mention its low cost and stability, being a long-term catheter. (18) Its use increases the patient's mobility (15), and does not need to be removed at the time of discharge from the ICU, allowing the administration of inotropic drugs outside of intensive care and, therefore, it can be used as a "bridge" in the hospital for reintegration into the community. (16) These features ensure central venous access for both initial resuscitation and general aftercare (13).

In addition, the PICC reduces the discomfort of changing the venous access in short periods, ensuring a venous access that supports large infusion flows of medications and can have multiple lumens. In addition, its placement is convenient because it does not have the risk of injuring the pleura or lungs, and it can be used concomitantly with other invasive devices such as mechanical ventilation, which are

Table 2: Indications of PICC at the Chronic Adult patient.

Artigos	Indicação
A1, A5, A6, A8, A10	Need of infusion of different drugs via intravenous (including vesicants drugs) in a period equal or bigger than 6 days;
A4, A5, A8, A9	Antibiotic infusion during a long time period;
A4	Infusion of foster drugs;
A4	Need of blood collection in patients with hard or limited venous network;
A4, A6, A8, A10	Parenteral nutrition infusion;
A4	CVC puncture issues due restrictions at the puncture local;
A5, A6, A9	Need for frequent blood testing;
A5	Difficult venous access;
A8, A10	Chemotherapy administration;
A9	Invasive hemodynamic monitoring.

Source: Prepared by the authors, 2019.

often necessary in the ICU. (9-18) The PICC proved to be an interesting device for use in intensive care centers specializing in major burns, being useful in patients with fragile vessels or those with a limited region due to burns. (16)

PICC has its advantages, however, its use is associated with higher risks of venous thromboembolism and bloodstream infection than CVC's in patients admitted to intensive care centers. However, PICC has a low risk of damage and infection by insertion, and its main complications are related to catheter maintenance. Therefore, this device must be used with greater discretion and its thrombotic and infectious complications must not be ignored and further studies must be carried out to obtain more accurate results. (10.12, 13, 17)

Thus, the PICC is reliable for measuring Central Venous Pressure and offers the possibility of invasive hemodynamic monitoring. (9) Faced with this possibility of monitoring, patients with weight loss, with high comorbidity scores, critically ill or diagnosed with sepsis were more likely to receive the PICC at the expense of other patients. (17)

Modern practices are being used, such as the insertion of smaller caliber PICCs, with the creation of teams specialized in insertion, in addition to better management of these central venous lines. In several units, this catheter is introduced by teams of specialized nurses who document the entire catheter insertion and maintenance process or by a radiologist in the interventional radiology room guided by fluoroscopy. However, it was portrayed that the choice of the catheter is performed by the physician responsible for the patient. (11-12-13)

CONCLUSION

The puncture of the Peripherally Inserted Central Catheter is a promising technology in the treatment of critically ill adult patients affected by various diseases, providing more comfort during treatment and having a high level of evidence.

Therefore, the insertion of the PICC was a viable alternative to replacing the CVC for the infusion of multiple drugs in many cases. However, the choice of use of this device must be judicious. Its use has several advantages and has grown in Intensive Care Centers for adults. Still, the autonomy of the role of the nurse qualified to insert the device brings a new perspective of care, safety and quality in critical patient care.

Given the above, further studies are needed on this device, its advantages, complications and its improvements for nursing care processes.

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