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REVIEW ARTICLE

Nurse's role in patient safety with central vascular catheters in the intensive care unit

El papel de la enfermera en la seguridad del paciente con catéteres vasculares centrales en la unidad de cuidados intensivos

Protagonização do enfermeiro na segurança do paciente com cateter vascular central na unidade de terapia intensiva

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Abstract

This is bibliographical research with a qualitative approach and descriptive character, which has as object of study the nurse working in the ICU, which aimed to identify the possible strategies used by nurses in the prevention and control of infections related to the central vascular catheter in the ICU. As a methodology, articles published in a virtual database were used. For this purpose, the Virtual Health Library database platform was used, in the LILACS, BDENF, MEDLINE and SciELO databases, with a time frame from 2008 to 2018. The morbidity and mortality rate related to disability in the management of CVC is worrisome due to the non-adoption of infection prevention and control strategies. Regarding patient safety, it is essential that there is a continuous assessment of the implementation, to identify whether the strategies were sufficient for professionals to assimilate the content of the protocols for patient safety. It is concluded that nurses need to master theoretical-scientific knowledge and technical skills in handling the CVC to provide patient safety, taking care to put into practice the strategies shown as possible means of preventing and controlling infections.

Descriptors: Nursing Care; Catheters; Patient safety; Vascular Access Devices; Intensive Care Unit.

Resumén

Se trata de una investigación bibliográfica de abordaje cualitativo y carácter descriptivo, que tiene como objeto de estudio a la enfermera que labora en la UCI, que tuvo como objetivo identificar las posibles estrategias empleadas por las enfermeras en la prevención y control de infecciones relacionadas con el catéter vascular central en la UCI. Como metodología se utilizaron artículos publicados en una base de datos virtual. Para ello se utilizó la plataforma de base de datos de la Biblioteca Virtual en Salud, en las bases de datos LILACS, BDENF, MEDLINE y SciELO, con un marco temporal de 2008 a 2018. La tasa de morbimortalidad relacionada con la discapacidad en el manejo del CVC es preocupante por la no adopción de estrategias de prevención y control de infecciones. En cuanto a la seguridad del paciente, es fundamental que exista una evaluación continua de la implementación, para identificar si las estrategias fueron suficientes para que los profesionales asimilen el contenido de los protocolos de seguridad del paciente. Se concluye que el enfermero necesita dominar los conocimientos teórico-científicos y las habilidades técnicas en el manejo del CVC para brindar seguridad al paciente, cuidando de poner en práctica las estrategias mostradas como posibles medios de prevención y control de infecciones.

Descriptores: Cuidados de Enfermería; Catéteres; Seguridad del Paciente; Dispositivos de Acceso Vascular; Unidad de Terapia Intensiva.

Resumo

Trata-se de uma pesquisa bibliográfica de abordagem qualitativa e caráter descritivo que tem como objeto de estudo o enfermeiro que atua na UTI, que objetivou identificar as possíveis estratégias utilizadas pelo enfermeiro na prevenção e controle das infecções relacionadas ao cateter vascular central na UTI. Como metodologia, utilizaram-se artigos publicados em base de dados virtuais. Para tal utilizou-se a plataforma de base de dados Biblioteca Virtual em Saúde, nas bases de dados LILACS, BDENF, MEDLINE e SciELO, com recorte temporal de 2008 a 2018. O índice de morbidade e mortalidade relacionadas à deficiência no manejo do CVC é preocupante devido a não adoção de estratégias para prevenção e controle das infecções. No que se refere a segurança do paciente, é fundamental que ocorra uma avaliação contínua da implantação, para identificar se as estratégias foram suficientes para que os profissionais assimilem o conteúdo dos protocolos para segurança do paciente. Conclui-se que o enfermeiro precisa ter domínio de conhecimento teórico-científico e habilidade técnica para manuseio do CVC para oferecer segurança ao paciente, tendo o cuidado de colocar em prática as estratégias evidenciadas como possíveis meios de prevenção e controle das infecções.

Descritores: Cuidados de Enfermagem; Cateteres; Segurança do Paciente; Dispositivos de Acesso Vascular; Unidades de Terapia Intensiva.

Introduction

Nosocomial Infection (HI) can be defined as a disease with an infectious cause acquired by the patient after admission to the hospital. It can manifest itself during hospitalization or after discharge if it is related to hospitalization or hospital procedures[1].

According to the National Health Surveillance Agency (Anvisa), the diagnosis of HI is made based on some clinical criteria that serve as guidelines. In this sense, the initial way for a case of infection to be considered nosocomial is to check whether the clinical manifestations started at least 72 hours after hospital admission[2].

In turn, studies indicate that it is essential to identify whether there was any diagnostic and/or therapeutic procedure during this period. It is also mentioned that the criteria must include clinical evidence (signs and symptoms), results of laboratory tests (microbiological, histopathological, and serological) and image studies (ultrasound, radiological, endoscopes, among others)[2].

In line with the context, the studies address that the HI can be seen as a major offender for highly complex patient care, as well as the prevention and control of invasive procedures, including the Central Vascular Catheters (CVC), which they are indispensable devices for the treatment of patients who need care in the ICU. However, the use of these instruments predisposes patients to develop local or systemic infections, the incidence of which depends on factors such as the type of catheter, the frequency of manipulation and factors related to the patient's characteristics[3].

Studies highlight that the hospital environment, especially the Intensive Care Unit (ICU), is inevitably a large reservoir of opportunistic pathogens, so that hospital infections can be acquired not only by patients who are more susceptible, but also by although less frequent, by visitors and hospital staff[4].

Studies show that the rate of nosocomial infections is higher in the ICU than in other hospital inpatient units, and the relative risk of death is three times higher in patients who acquire a nosocomial infection while hospitalized in these units. Urinary, respiratory and bacteremic infections are the most frequent and important hospital infections and possibly reflect the disruption of the body's natural defenses using invasive devices[5].

In view of the evolutionary process of care provided within the ICUs, as it is a complex sector, responsible for receiving patients who present different variations and need rapid and effective action, the increased probability of access to different types of infections emerges. can interfere with the effectiveness of patient care and recovery.

Patients admitted to the Intensive Care Unit (ICU) are considered critical and demand highly specialized care from the multidisciplinary health team. This care is offered using technologies such as invasive devices that offer life support and hemodynamic monitoring. The most used devices in the ICU are: orotracheal tube, tracheostomy tube, central venous catheter, peripheral venous catheter, arterial catheter, enteric catheter, indwelling urinary catheter and drains[6].

The study adds that the installation of these devices is a medical decision, and that unplanned removal can either happen due to poor handling of the device, or due to an action by the patient, causing the catheter to be dislocated, however, the nursing team, in his uninterrupted care and constant surveillance, he actively participates in the continuity of the implemented therapy[6].

It should be noted that this type of device is used for a variety of therapeutic applications such as hemodynamic monitoring, administration of fluids, drugs, blood products and parenteral nutrition, however, as mentioned above, there are associated risks, including colonization and bloodstream infection. Catheter-related bloodstream infection (CRBSI) stands out as the main complication resulting from the use of this device, being confirmed by laboratory tests. If the association between catheter and blood infection is not confirmed by laboratory tests, CVC is the most likely cause of infection, defined as CRBSI[7].

Regarding the consequences of unplanned removal, one can mention, for example, infections and increased length of stay in the unit, costs generated for the institution with the treatment of infections and prolonged hospitalization. With proper planning of nursing care and planned removal of the central venous catheter, patient safety and minimization of care-related risks are provided.[8].

The use of a peripheral intravenous catheter (PIC) is essential in hospitalized patients, and when peripheral intravenous access is not possible, one of the options is deep vascular access. For the insertion and maintenance of this procedure used for infusion of liquids and administration of medications, it is essential to follow procedures to ensure patient safety. When prolonged or inadequate, the use of these devices and the techniques associated with their installation or maintenance can trigger various complications or adverse events, such as inflammation, and we must be attentive to phlogistic signs[9].

Infections from vascular catheters occur in fewer numbers when compared to other sites, such as ventilator-associated pneumonia, urinary infections, and surgical wounds, however, they present a higher number of morbidity and mortality compared to the aforementioned[3].

As part of nursing care, patient safety in preventing complications resulting from the use of this type of technology, which is widely used in the ICU, should be discussed, due to the significant avoidable morbidity and mortality and additional expenses.

RDC No. 36 defines patient safety as reducing to an acceptable minimum the risk of unnecessary harm associated with healthcare. The established concept goes beyond the relationship between the bedside professional and the patient, it is also related to unsafe health care that can result in significant avoidable morbidity and mortality, additional expenses with the maintenance of health systems, in addition to representing a major concern in present[6].

Care protocols are fundamental tools to ensure the quality of care provided and aim to promote a safer and more effective care practice, as they are designed based on

the best scientific evidence and supported by the norms of bodies related to safe patient care. It is essential that there is an ongoing assessment of the implementation, to identify whether the strategies were sufficient for professionals to assimilate the content of the protocols for patient safety[10].

Given the above, it should be noted that the motivation that encouraged the development of this research arose as, in the teaching-learning process of the graduate course, it was possible to know theoretically the complexity of the CVC procedure performed in the ICU. the safety of the critical patient. Concern for this theme also emerged during research in articles that addressed the theme in the hospital environment and, also, the role of nurses in the ICU, envisioning the aspects associated with patient safety.

It should be noted that this topic is extremely relevant due to the need to disseminate information for the prevention and control of infections, considering that nursing plays the main role in care for patients with CVC, about direct care with maintenance and handling and the use of preventive measures that will be of great relevance throughout the assistance.

Even though the handling of a CVC after its insertion until its removal is the responsibility of the nurse and his team. Thus, the need for knowledge, skills and training of nurses and staff for the safe handling of intravascular devices, especially the CVC, is highlighted. Specifically, nursing care provided to patients using CVC can lead to complications, such as bloodstream infections, which increase the length of stay, morbidity and mortality and hospitalization costs[11].

Thus, it is worth saying that the professional nurse in the ICU develops relevant attributions in this context of care, considering that, in addition to the attributions of assistance, competence and skill, they still need to build a professional relationship with the entire nursing team, for excellence in execution of the continuing education process regarding the management of all stages of the CVC.

In view of this approach, both in the management and care scope, the nurse must supervise the nursing team and its procedures, invasive or not, according to the Nursing Practice Law, thus, both in direct supervision, in working together and in performance facing permanent education programs, the nurse has an important role in the identification and notification of cases of infection associated with health care[12].

Corroborating the context in which the Central Venous Catheter (CVC) is an intravascular system used for fluid therapy, administration of drugs, blood products, parenteral nutrition, hemodynamic monitoring, performance of other procedures and techniques, in renal replacement therapy, pacing, among others; it is a device considered indispensable in the practice of modern medicine, particularly in intensive care units (ICUs). This modality of access is subject to many complications, with infection with systemic manifestation being the most frequent; when handling these catheters, the nurse develops quality care and is carried out judiciously[13].

The CVC is inserted into the subclavian, internal jugular veins. Although its use in critically ill patients has benefits, this implant can generate risks to patients, such as thrombus formation and consequent embolism, in addition to primary bloodstream infections (IPCS)[11].

It is noteworthy that the continued use of the use of CVC can predispose patients to numerous complications, the most important of which is infection. These infections can be defined as CVC-associated IPCS or CVC-related infections.

It is also corroborated that relevant cases of CVC come from patients hospitalized in high-risk patient inpatient sectors, such as ICUs, where patients generally stay for long periods, and are highly exposed to multiple microorganisms, commonly due to these colonized.

Among the microorganisms, bacteria contribute to approximately 95% of infections, with a considerable percentage of bacterial isolates resistant to antimicrobials. Antimicrobial resistance is a global and growing concern. The transfer of resistant microorganisms between patients possibly occurs via the hands or respiratory tract of health professionals, which can become contaminated when they meet the patient and surfaces[11].

Given the problem presented, the role of nurses in patient safety with central vascular catheters in the ICU can be highlighted as an object of study.

To this end, the following guiding question was outlined: What is the role of nurses in patient safety with a central vascular catheter in the ICU?

According to the above, this theoretical construction provides nurses with theoretical-scientific knowledge, as a facilitator in the process of identifying possible risk prevention strategies and thus, offering safety to patients with CVC. With this help, the nurse will obtain information about the correct way to manage the CVC and its objectives, considering that it is necessary to obtain knowledge and skill to implement an effective practice that results in the treatment and recovery of the critical patient, especially because it is a a highly complex client, where the variability index is highly frequent.

In this sense, the theoretical basis contributes to society with the reduction of adverse reactions that can be caused by the lack of efficiency in the management of CVC, which will result in the achievement of higher quality in the care provided to clients, with the objective of reducing time hospitalization and enable a more effective recovery, even when these patients require intensive treatment.

Finally, the theoretical study brings an approach to the historical contexts of the CVC, in a rich but succinct way for a better understanding of the need for a complex practice, but efficient in its implementation. Describe the role of nurses in patient safety with central vascular catheters in the intensive care unit.

Methodology

It is bibliographical research with a qualitative approach and descriptive character. It is noteworthy that the bibliographical research that is developed with the aid of material already prepared, consisting mainly of books and scientific articles. However, in most studies some type of

work of this kind is required, there are researches developed exclusively from bibliographical sources[14].

Regarding the qualitative method, it is said that it is the process applied to the study of biography, representations, and classifications that human beings make about how they live, build their components and themselves, feel and think[15].

Descriptive research aims to describe the characteristics of a population, phenomenon, or an experience[14].

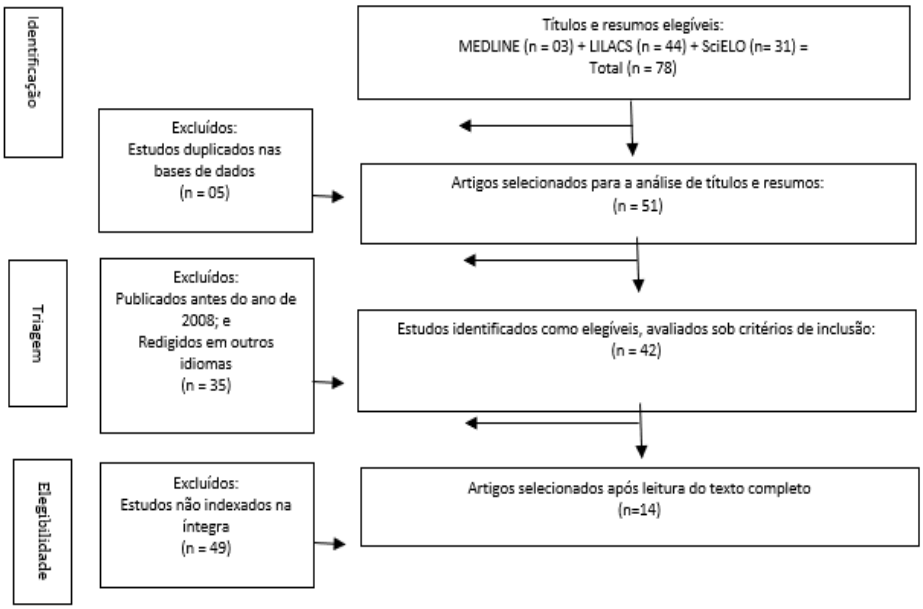
Data were collected in a virtual database. For this purpose, the Virtual Health Library (VHL) database platform was used, in the following database: Latin American and Caribbean Literature on Health Sciences (LILACS), International Literature on Health Sciences (MEDLINE), Scientific Electronic Library online (SciELO), among others, from April to May 2019.

The following descriptors were chosen Nursing Care; Catheter; Patient safety; Vascular; Intensive Care Unit found in the Health Science Descriptors (DECS).

The inclusion criteria were then established to carry out the research: texts in full and in Portuguese with an established theme approach and that obeyed the time frame from 2008 to 2018 and as exclusion criteria, incomplete texts and texts in a foreign language, texts that did not address the established theme and with a time frame of less than 2008.

All titles and abstracts of works identified in the databases, using the descriptors, and evaluated as eligible, were separated, and analyzed in full. The details of the selection of studies for the literature review are shown in Figure 1, prepared in accordance with PRISMA guidelines[16].

Figure 1. Studies selected and excluded for literature review. Rio de Janeiro, RJ, Brazil, 2019



It is observed in Figure 1 that in the LILACS, SciELO and MEDLINE databases 78 abstracts were found using the chosen descriptors. Of these, 05 were repeated and therefore, according to the selection criteria, were excluded. When applying the exclusion criteria in relation to the publication date prior to 2008, from the remaining 42 abstracts, 28 were excluded, being finally selected 14 articles for the literature review.

After to this selection, a reflective reading of the fourteen articles was carried out, where the results found in this reading were described and, a discussion arises related to the findings.

Results and Discussion

It can be said that IPCS is the most common type of infection related to the implantation of a central intravascular device, which increases the morbidity and mortality of patients and hospital costs. Although there are many associated risks, the use of CVC by critically ill patients is often unavoidable. Given the above, the performance of proper practices for catheter maintenance is essential for patient safety[11].

Care with techniques involving vascular access should be a priority for the entire team that assists the patient, including the nurse, so that effective surveillance, multi and interdisciplinary, offers prevention and control of possible complications. Considering the complexity of the implantation and handling of vascular access, it is essential to standardize and incorporate rigorous aseptic techniques in practice to prevent infection in this topography[12].

Vascular catheters can be made of various materials, contain one or more lumens, be impregnated with antimicrobials, antiseptics, or heparin. Current studies show that new strategies are being used in the manufacture of catheters: with modification of the catheter surface with hydrated molecules and non-stick properties, antibiotic-coated catheters or cuffs, silver-impregnated cuffs, heparin catheters and silver sulfadiazine-impregnated catheters, impregnated with intra- and extra-lumen antibiotics such as minocycline and rifampicin, short stays of less than two

weeks are related to reduced infection and are less effective when more than three weeks[17].

Corroborating the context, studies also point out that this technical standardization provides the prophylaxis of infections, considering that, when the insertion of the vascular catheter is performed by properly qualified professionals who demonstrate competence, there is a lower probability of tissue trauma and reduced use and permanence of the catheter, providing a great advantage in the cost-benefit evaluation[11].

The studies inform that current scientific evidence addresses that it is of great relevance to consider the use of central venous catheter, impregnated with antimicrobials for adult patients who need CVC for less than 10 days and who have a high rate of sepsis, or in institutions where the incidence of infectious complications related to the procedure remains high, aiming to prevent possible complications[17].

It is noteworthy that, within the various factors that can be considered prevention strategies for CVC infections and complications, it becomes a means of prevention for the CCIH evaluation of the procedure performed, as well as the contribution of theoretical and practical knowledge through the continuing education for this multidisciplinary team to feel safe in handling the catheter and performing primary care.

Given the above, although the handling of vascular access has become a daily nursing activity and, apparently, simple, it requires specific care and strict observation of prevention measures to reduce the possibility of iatrogenic events and ensure the quality of care and the safety of patients and professionals[11].

In this sense, the access of bacteria to the catheter can happen at the time of insertion, through colonization of the peri-orifice skin, contamination of the connections between the infusion system and the vascular access, the infusion of contaminated solutions used to maintain the permeability of the catheter, via the hematogenous route from another distant infectious focus, via contaminated transducers from patients and from the contaminated hands of healthcare professionals[3].

Also, in the context of prevention, it is worth highlighting a simple but relevant procedure as a prevention strategy where the performance of skin antisepsis, considering that this measure is intended to promote cleanliness, eliminate, or inhibit the growth of microorganisms, preventing its penetration into the bloodstream[11].

In addition, other preventive measures also aim to reduce the incidence of infections, including the proper choice of the insertion site, the type of catheter material, correct hand hygiene when handling the catheter, aseptic technique for insertion, antisepsis of the skin, catheters, and cuffs (subcutaneous portion of the catheter that has a coating) impregnated with antimicrobials, antiseptics, antibiotic prophylaxis[3].

Studies portray in their theoretical construction, several strategies related to prevention and within that, one can mention: hand hygiene before and after the procedure, and also, at each catheter handling; the use of sterile gloves; cleaning of the insertion site, the use of sponge impregnated with 2% chlorhexidine at the insertion; daily bathing of the patient with a 2% chlorhexidine solution; friction of the catheter hub with antiseptics; protection of catheter connections; checklist of the need for catheter maintenance; proper dressings; daily inspection and checklist of nursing and continuing education[11].

Accordingly, the studies strengthen that hand hygiene is a preventive technique, as well as skin preparation with 2% alcoholic chlorhexidine gluconate; the practice of daily verification of the need for CVC permanence; the friction of the connectors and connections of the central catheters with each handling and the semipermeable dressing[7].

The role of the nursing team, which works uninterruptedly in care, represents the largest percentage of workers in hospital institutions. The role of the nursing team in the adoption of appropriate techniques for the prevention of CVC-related infections has an important impact on the outcome associated with the use of these devices[10].

One of the strategies for the control of primary infections in the bloodstream associated with CVC is to enable health professionals to be aware of the measures recommended through continuing education. In this sense, hospital institutions must periodically review the care protocols related to vascular access, as well as reassess the education strategies, practices, and performance processes of professionals.

The use of a protocol for patient safety allows directing the professional's clinical practice and the standardization of care that provides continuity and effectiveness of interventions aimed at qualifying, systematizing, standardizing and guiding care safely to prevent divergent practices in the same environment or patient[10].

Most professionals are aware that this is an activity that is exclusive to nurses, however, due to the scarce number of professionals and the overload of activities, nurses do not prioritize dressing, which is often performed by professionals at a technical level[10].

The complexity of this assistance, changing the dressing of this device is determined as a private activity of the nurse, supported by the Law of Professional Nursing Practice. Additionally, the Code of Ethics of Nursing Professionals deliberates that the provision of services that, by their nature, are the responsibility of another professional, is strictly prohibited, except in cases of emergency[8].

The adoption of protocols enables safe practice in the preparation of the dressing, through aseptic technique, implying the use of sterile gloves, sterile gauze, and a disposable face mask. Procedural gloves should only be used to remove the old and dirty dressing; therefore, they should not have contact with the insertion point of the catheter. The use of an aseptic technique during the dressing has proven importance for patient safety in the prevention of primary infections in the bloodstream[8].

Disinfection of caps and injectors with 70% alcohol or alcoholic chlorhexidine, before handling the device.

Disinfection with a product containing alcohol is a relevant precaution in preventing infection, as it prevents the contaminant present on the external surface of the connectors from meeting the intraluminal catheter route[8].

The practice of washing the device with 0.9% SF after the administration of medications and solutions is also associated with a reduction in the occurrence of obstruction and infection rates, as well as avoiding wetting it is a safety practice for the maintenance and handling of the catheter. central venous, as moisture favors the proliferation of microorganisms, which can trigger systemic infections[8].

Conclusion

It is concluded that the occurrences in cases of CVC-related infections may arise from the absence of adequate systematized care, where the deficiency in the implementation of possible strategies capable of preventing or controlling the manifestation of infections, which can result in an increase in the period of hospitalization in the ICU and in several complications that can result in death.

It is also noted that the prevention and control of CVC-related infections are the responsibility of the nursing team, considering that the aforementioned is responsible for implementing most of the care for the patient, inserting the professional nurse as a guide in this practice, taking into account and this professional is responsible for the technical team, having, among his numerous attributions, the supervision and evaluation of the care provided by his team and also, making continuing education, in order to minimize any and all indicators that are offensive to the care effectively and properly.

Corroborating with it, it is also concluded that the nurse needs to have mastery of theoretical-scientific knowledge capable of resulting in a basis for each action performed and requested. It is also necessary to have technical skills to handle the CVC in a safe way, taking care to put into practice the strategies highlighted as possible means of prevention and control.

It is also worth emphasizing the need to have the nurse as a contributor in the preparation of evaluation instruments, based on scientific and practical knowledge, for the inspection of the quality of care provided in daily care, which can be seen as a possible strategy for coping with negative indicators, given that the indices found can be worked on to reduce any means of contamination or complications related to CVC.

References

1. Ministério da Saúde (BR). Prevenção e controle de infecção hospitalar [Internet]. Brasília (DF): MS; 2005 [acesso em 12 abr 2019] Disponível em: http://www.anvisa.gov.br/servicosaude/manuais/manual_pediatria.pdf
2. Agência de Vigilância Sanitária (Anvisa). Documento de referência para o Programa Naciona de Segurança do Paciente [Internet]. Brasília (DF): Anvisa; 2014 [acesso em 12 abr 2019]. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/documento_referencia_programa_nacional_seguranca.pdf
3. Netto SM, Echer IC, Kuplich NM, Kessler F. Infecção de cateter vascular central em pacientes adultos de um centro de terapia intensiva. Repositório Digital UFRGS [Internet]. 2009 [acesso em 02 mai 2019];30(3). Disponível em: https://www.lume.ufrgs.br/handle/10183/23638
4. Moura MEB, Campelo SMA, Brito FCP, Batista OMA, Araújo TME, Oliveira ADS. Infecção hospitalar: estudo de prevalência em um hospital público de ensino. Rev Bras En-ferm. 2007;60(4). DOI: 10.1590/S0034-71672007000400011
5. Macrconi EK, Freitas KAD, Paula NVK. Infecções relacionadas ao cateter venoso central em terapia intensiva. Rev Saúde.Com. 2021;17(4). DOI: 10.22481/rsc.v17i2.7331
6. Pereira LMV, Almeida LF, Franco AS, Marins ALCR, Ribeiro GSR, Macedo MCS. Retirada não planejada de dispositivos invasivos e suas implicações para a segurança do paciente crítico. Rev. pesqui. cuid. fundam.2018;10(2). DOI: 10.9789/2175-5361.2018.v10i2.490-495
7. Brachine JDP, Peterlini MAS, Pedreira MLG. Método Bundle na redução de infecção de corrente sanguínea relacionada a cateteres centrais: revisão integrativa. Rev Gaúcha Enferm. 2012;33(4). DOI: 10.1590/S1983-14472012000400025
8. Guimarães GL, Gouveia VR, Mendonza IYQ, Corrêa AR, Matos SS, Guimarães JO. Intervenções de enfermagem no paciente em hemodiálise por cateter venoso central. Rev. enferm. UFPE on line. 2017;11(3. DOI: 10.5205/1981-8963-v11i3p1127-1135
9. Alves JL, Mendes R, Clesnan J, Antunes AV. Prevalência de Flebite em uma Unidade de Internação Clínica de um Hospital Universitário Brasileiro de Alta Complexidade. Rev. bras. ciênc. saúde. 2018;22(3). DOI: 10.22478/ufpb.2317-6032.2018v22n3.27078
10. Barbosa CV, Canhesto NR, Couto BRGM, Guimarães GL, Mendoza IYQ, Gouveia VR. Saberes da equipe de enfermagem sobre cuidados com cateter venoso central. Rev. enferm. UFPE on line. 2017;11(11). DOI: 10.5205/reuol.23542-49901-1-ED.1111201710
11. Santos RP, Mariano LR, Takahashi LS, Erdmann MF. Prevalência de infecção hospitalar em Unidade de Terapia Intensiva – Um estudo retrospectivo. Rev Enferm UFSM. 2014;4(2). DOI: 10.5902/2179769211233
12. Mendonça KM, Neves HCC, Barbosa DFS, Souza ACS, Prado MA. Atuação da enfermagem na prevenção e controle de infecção de corrente sanguínea relacionada a cateter. Rev. Enferm UERJ [Internet]. 2011 [acesso em 12 abr 2019];19(2). Disponível em: https://repositorio.bc.ufg.br/bitstream/ri/16244/5/Artigo%20-%20Katiane%20Martins%20Mendonça%20-%202011.pdf
13. Andrade MR, Silva HG, Oliveira BGRB, Cruz ICF. Risco de infecção no cateter venoso central – revisão de literatura. Brazilian Journal of Nursing [Internet]. 2010 [acesso em 16 abr 2019];9(2). Disponível em: http://www.objnursing.uff.br/index.php/nursing/article/view/j.1676-4285.2010.3109/700
14. Gil AC. Como elaborar projetos de pesquisa. 5ª Edição. São Paulo: Atlas; 2008 Minayo MCS. O Desafio do conhecimento: pesquisa qualitativa em saúde. 11ª Edição. São Paulo. Hucitec; 2008
15. Galvão TF, Pansani TSA, Harrad D. Principais itens para relatar Revisões sistemáticas e Meta-análises: A recomendação PRISMA. Epidem Serv Saúde. 2015;24(2):335-42 DOI: 10.5123/S1679-49742015000200017

16. Tardivo TB, Neto JF, Junior JF. Infecções sanguíneas relacionadas aos cateteres venosos. Rev Bras Clim Med [Internet]. 2008 [acesso em 16 abr 2019];6: 224-227. Disponível em: http://files.bvs.br/upload/S/1679-1010/2008/v6n6/a224-227.pdf
17. Beordo JR. Segurança do paciente por meio da aplicação adequada do checklist de cirurgia segura. Glob. Acad. Nurs. 2021;2(1):e88. DOI: 10.5935/2675-5602.20200088