Measures of prevention and control of infection associated with the use of venous catheter peripheral and central

Medidas de prevenção e controle de infecção associadas ao uso de cateter venoso periférico e central

Medidas de prevención y control de infecciones asociadas con el uso de catéter venoso periférico y central

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REVISA

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RESUMO

Objetivo: Analisar os fatores de risco que causam infecções nos cateteres, bem como permear a ação do profissional de enfermagem e sua efetividade no controle preventivo. **Método:** Trata-se de pesquisa básica; descritiva e bibliográfica quanto aos procedimentos de coleta de dados. **Resultados:** Através das informações coletados dos mais de 40 artigos selecionados, se fez nítida a negligência de forma expressiva e acelerada nas punções em ambientes hospitalares e na assistência ofertada aos profissionais de enfermagem. Neste sentido com prevenção e promoção apropriada, seria possível promover de forma adequada à qualificação destes procedimentos, diminuindo os riscos de infecção no ambiente hospitalar. **Conclusão:** A utilização destes dispositivos, por vezes, torna-se imprescindível no tratamento por curtos ou longos período, entretanto os riscos da utilização destes equipamentos de forma imprudente ocasionam enfermidades persistentes e nocivas. Por isso a participação do enfermeiro se faz necessário como agente minimizador de riscos, tendo suma importância na manutenção da qualidade assistencial para o paciente, uma vez que esses profissionais precisam basear suas ações de cuidados em evidências científicas comprovadas.

Descritores: Cateter Central. Cateter Periférico; Fatores de Risco; Microrganismos Infecciosos; Cuidados de Enfermagem.

ABSTRACT

Objective: To analyze the risk factors that cause catheter infections, as well as to permeate the action of nursing professionals and their effectiveness in preventive control. **Method**: This is a basic research; descriptive and bibliographic as to data collection procedures. **Results:** Through the information collected from more than 40 selected articles, it became clear the negligence in an expressive and accelerated way in punctures in hospital environments and in the assistance offered to nursing professionals. In this sense, with appropriate prevention and promotion, it would be possible to adequately promote the qualification of these procedures, reducing the risks of infection in the hospital environment. **Conclusion**: The use of these devices, sometimes, becomes indispensable in the treatment for short or long periods, however the risks of using this equipment in an imprudent way cause persistent and harmful diseases. Therefore, the nurse's participation is necessary as a risk minimizer agent, with paramount importance in maintaining quality care for the patient since these professionals need to base their care actions on proven scientific evidence.

Descriptors: Central Catheter; Peripheral Catheter; Risk Factors

RESUMEN

Objetivo: Analizar los factores de riesgo que provocan cambios en los catéteres, así como permear la acción del profesional de enfermería y su efectividad en el control preventivo. **Método:** esta es una investigación básica; procedimientos de recogida de datos descriptivos y bibliográficos. **Resultados:** A través de la información recolectada de los más de 40 artículos seleccionados, se evidenció el descuido de la forma expresiva y acelerada de los pinchazos en los ambientes hospitalarios y en la atención brindada a los profesionales de enfermería. En este sentido, con una adecuada prevención y promoción, sería posible promover una forma adecuada para la calificación de estos procedimientos, reduciendo los riesgos de infección en el entorno hospitalario. **Conclusión:** El uso de estos dispositivos, en ocasiones, se vuelve imprescindible en el tratamiento por periodos cortos o largos, aunque los riesgos de utilizar este equipo de forma imprudente provocan enfermedades persistentes y nocivas. Por ello, la participación del enfermero es necesaria como agente minimizador de riesgos, teniendo una importancia primordial en el mantenimiento de la calidad de la atención al paciente, ya que estos profesionales necesitan sus acciones asistenciales en evidencia científica contrastada.

Descriptores: Catéter central. Catéter periférico; Factores de riesgo; Microorganismos infecciosos; Cuidado de enfermera.

REVIEW

Introduction

From the health perspective, the control of nosocomial infections is one of the main challenges in health care, in addition to integrating the picture of complications of the high mortality rate, they also make up the picture of deficiency in the control of procedures such as handling and hygiene.[1]

In the health system, the sector of epidemiological control and nosocomial infections are essential sectors for the control of the main infections that cause serious problems among inpatients.[2]

Discussions around the terms of infections and treatments are frequent, and the opinion of most authors corroborates the great concern about the consonance of these themes, but regardless of a deeper conception, these designs consider the patient as a temporal, relational existence and potential that is instituted throughout life and in relationships with others and the environment.[3]

The issues that are legitimately linked to human life, should prioritize the study of altruistic issues, and it is imperative to highlight aspects that are related to new techniques and methodologies that drastically reduce the deaths caused by infections caused by the human factor and incoherent handling of catheters.[4]

It is necessary to establish the really effective guidelines for the correct verification of hand hygiene, insertion sites, asepsis technique and antimicrobials that are related to the issues under analysis, in a linear manner and independent of the terms to be legitimized by the sanitary control.[5]

The new responsibilities arise, as we become more aware of the importance of the role of nursing as an ethical requirement in the promotion of the common good, and for that, it cannot be denied that science is a great ally for human survival and quality of life. life in society.[4]

There are several problems in the health system in Brazil, seen and evidenced widely by episodes in the public domain such as the lack of beds, the scarcity of economic, material and professional resources. Given this parameter, we will focus our research on the main parameters of infection control and list the main preventive measures in the use of central and peripheral catheters.[6]

A well-targeted and efficient infection follow-up and monitoring program should aim to improve the individual's physical and psychological capacity, enabling the reduction of physical sequelae and the functioning of the organs as a whole. A multidisciplinary team is needed to assess the techniques to be adopted, as each individual has distinct and individualized effects.[7]

At first we will focus on the aspects of guidance of nursing teams for all those involved in the processes on the use of catheters in a cumulative way and possible acquired pathologies, in order to decrease the time of orotracheal intubation, invasive and non-invasive mechanical ventilation, less number of complications, infections and shorter hospital stay.[8]

Given these parameters, the objective of our research project is centered on preventive factors against infections in patients using central and peripheral venous catheters in the hospital environment, in addition to listing the main safety measures for the effectiveness in the quality of health services.[9]

Based on the theories that will be emphasized, the relevance of this work is perceived, as well as its impact on the quality of life of the population served, as infection control is a public health need.[10]

The relationships relevant to health issues and the control/prevention of infections caused by the incorrect and negligent handling of devices such as the catheter, are considered an object of study aimed at multi-care demands. Considering that the nursing professional seeks to promote health, it is necessary to look at the inclusion of the population in relation to services and public infection control policies, since these services exist to, at a minimum, guarantee access and rights to more citizens. vulnerable.

Due to the risks associated with incorrect handling and unhealthy techniques used for insertion of both central and peripheral catheters. Based on this finding, the objective of this article was to analyze the risk factors that cause infections in catheters, as well as permeate the action of the nursing professional and its effectiveness in preventive control.

Method

This is basic nature research; descriptive and exploratory as to general objectives and bibliographic as to data collection procedures. This study was carried out through research in scientific articles published from the year 2000 onwards. Parameters are articles and theses published in sources such as: Scielo, PubMed / MedLine, Cochrane Library, Bank of Theses and Dissertations, in addition to articles from non-indexed journals. and textbooks.

About 80 articles were cataloged with subjects and standards pertinent to the selected theme, and they were analyzed through the outline of steps such as: definition of the theme, elaboration of the main questions pertinent to the research. After evaluating these requirements and qualitative analysis of the articles, about 40 articles were selected according to standards described by the Interdisciplinary Research Center (CIR), which considered the inclusion parameters (materials that intensified the importance of promoting and preventing the risk of infections in the use erroneous and negligent of invasive devices) and exclusion (articles without scientific origin) of the research and interpretation, in order to obtain information on each topic, in addition to reporting the importance of the nursing professional in managing prevention measures. With this assistance, results were elaborated that would contribute to possible reflections on the importance that this research aimed to accomplish.

Results and Discussion

Through the information collected from the more than 40 selected articles, the negligence was clearly expressed in an accelerated way in the punctures in hospital environments and in the assistance offered to nursing professionals. Most cases occur disproportionately to economic management and assistance monitoring, mainly due to the failure of managers in these departments. Thus, these factors reflect on the quality of care, thus contributing to the increase in cases of diseases and sequelae.

In this sense, with appropriate prevention and promotion, it would be possible to promote adequately the qualification of these procedures, reducing the proportions of comorbidities and mortality and thus contributing to the improvement in the patients' quality of life. The use of techniques for the evaluation of the management and quality sectors makes it possible to encompass all the processes of health-disease assessment and promoting health surveillance in these sectors.

However, the great difficulty for this therapeutic intervention, takes into account that the habits of the vast majority of professionals, have rules previously quantified and performed incoherently, so all these factors must be well investigated through health monitoring, thus promoting a feeling of well being. -being and a better result in assisting patients and professionals involved.

The pathologies often resulting from the wrong process in the insertion of the catheters, direct the deficiency in a negative way between the association between health and disease and the development of well-known diseases in these phases, thus responding equally to the treatments in which it is directed.

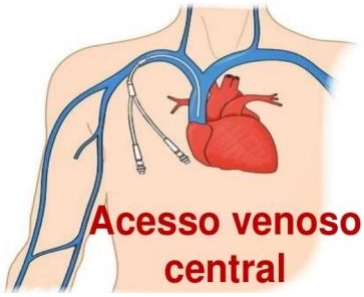
The physiological factors contribute considerably to these risks of infections, thus causing a probable deficiency in the treatments, which, when it becomes chronic, ends up generating contamination by pathological and extremely harmful agents. This exponential increase shows that public health policies and the lack of qualification of health professionals expose the need for training and constant updates so that the assistance provided to this public can be carried out with differentiated conduct and techniques.

Venous catheter: central and peripheral

During seventeenth-century research, studies that sought to unravel the physiology of blood vessels allowed medical interventions such as procedures that would make blood transfusions and treatments of patients in care therapy feasible. From the techniques that allowed the performance of punctures, it was possible through a flexible guidewire to introduce the insertion of catheters by puncture for the therapeutic purpose, thus being able to contribute to the maintenance of a patient at risk of life.[11]

Currently procedures that use the use of venous access devices have become indispensable for diagnosis and treatment, but despite the great benefit these procedures have a paradox, which is the risk of local and systemic infection associated with the use and handling, use of multiple lumens, severity of the disease, among others, which ends up causing a large number of comorbidities and mortality.[12]

Among the catheters that we will focus on in our research are the central venous catheter (CVC) and the peripheral venous catheter (CVP), which allow from medication administration to parenteral nutrition. The central venous catheters (figure 1), consist of accesses whose end is positioned in a large caliber vein and are used for the infusion of medication, nutrition and hemodialysis directly into the bloodstream, in addition to being a resource for blood collection.[13]



Central Venous Catheter
Source: UNIDERP, 2010.

This procedure is used for short to long term treatments, which can be venous or arterial, by puncture or dissection, implantable or not, and are produced in PVC, polyethylene, polyurethane, teflon, silicone or silicone. Such procedure must be performed by qualified doctors and nurses, thus avoiding repetitive punctures, preserving the patient's venous integrity and health.[14]

The most common types of central catheters are the port-a-cath and the peripherally inserted central venous catheter (CVCIP), which remain inserted throughout the treatment and this time of use can vary between weeks or even years.[15]

This type of catheter is positioned at high vascular flow, thus having advantages related to issues of osmolarity, use for therapeutic routes, volume monitoring, continuity of treatment for long periods and impossibility of peripheral venous access.[16]

To ensure excellence in the execution of insertions, examinations are performed before and after the fixation of the accesses, in order to check for the presence of possible clots and other interferences. This type of catheter, as well as others, restrict certain types of activities and require, during its performance, essential attention to safety standards in order to avoid possible complications.[17]

The technique used for this type of puncture follows requirements such as: strictly follow the principles of asepsis and antisepsis, qualified training, daily surveillance, better anatomical choice and insertion of the catheter (using the Seldinger technique), monitoring of hematological exams and of image.[18]

Like any invasive procedure, the main disadvantages and complications of this technique are related to lesions and infections in the skin, changes related to the size of the vein, neurological, orthopedic and coagulation disorders, renal and infections by microorganisms.[19]

Regarding the peripheral access catheter, they are devices of short duration and inserted through peripheral veins, being seen as a low risk procedure. They are manufactured in teflon or silicone, have low cost and short durability, being widely used in clinical practice.[20]

Source: UNIDERP, 2010.

This type of puncture is a technique widely performed by the nursing team to infuse solutions, collect blood, administer blood components or maintain venous access. The handling of this type of procedure is one of the most widespread, being used by about 70% of patients who are indicated for the insertion of invasive devices.[21]

The main complications of this type of catheter are characterized by the type of medication used, as these drugs can cause local discomfort, injuries or necrosis. To reduce these types of disorders, it is very important that the nursing professional knows the type of drug that will be administered.[20]

We have another question that should be taken into consideration and that is essential in the relationship with nursing care, that is, the professional must have early knowledge about the assessment of permeability of the vessel in order to minimize possible complications.[22]

Etiology of Causative Agents

Currently, hospital occurrences caused by healthcare-related infections (HAIs) continue to be worrying events throughout the health system, as they are one of the main causes of mortality and comorbidities in the hospital environment.[13]

These causative agents are introduced in various outpatient settings and are specifically present in invasive devices such as central and peripheral venous catheters, causing and favoring bloodstream infections that trigger various deleterious effects.[23]

These occurrences are diagnosed through tests such as blood cultures and/or culture of the catheter tip, however, due to the large contingency of cases and the delay in identifying the pathogen, the length of stay increases and the risk of contracting other comorbidities grows considerably.[17]

The pathogenesis of these infections is multifactorial and complex, as according to data already cataloged, most bacteremias are associated with catheters. This colonization begins at sites located at the insertion, in hematogenous pathway, intrinsic contamination and contamination by contact.[14]

The main access route for these types of infections is embedded in the tip of the catheters and the biofilm formation is the main pathogen coefficient. Microbial biofilms comprise a grouping of cells agglutinated under a surface and with each other and impregnated with extracellular polymeric substances.[24]

It is the microorganisms themselves that produce this composition and its fundamental principle is to increase the probabilities of survival of this pathogen

in a given environment. In addition to the formation of biofilms, other factors provide these infections in the bloodstream such as: immune status, pre-existing comorbidities, catheter permanence time, insertion difficulty, among others.[25]

These contaminations occur through extraluminal and intraluminal colonization of the catheter. In the first route, the bacteria appear on the patient's skin and places where the catheter is inserted and its connections, while internally they occur through the infusion of contaminated solutions and hematogenous dissemination.[26]

In these biofilms, one or more species can be identified, among which are Staphylococcus aureus, Staphylococcus coagulase negative, Klebsiella pneumoniae, Pseudomonas aeruginosa, Enterococcus spp., Candida auris, Aspergillus fumigatus and Fusarium solani.[27]

Staphylococcus aureus (more virulent) and Staphylococcus coagulase negative are Gram-positive bacteria (figure 3), have a thick cell wall surrounding the cytoplasmic membrane composed of peptideoglycans and teicoic acids. They can be aerobic or anaerobic facultative, of spherical or grouped morphology and when used the Gram method they acquire a purple color on their walls.[28]

They are present in the skin, nasopharynx and nasal fossae and are considered important agents of nosocomial infections that cause superficial and widespread infections with high severity. It has clinical importance due to the incidence of nosocomial infections, surgical wounds, pneumonia, abscesses, endocarditis and bacteremia and as multi-resistant bacteria.[29]

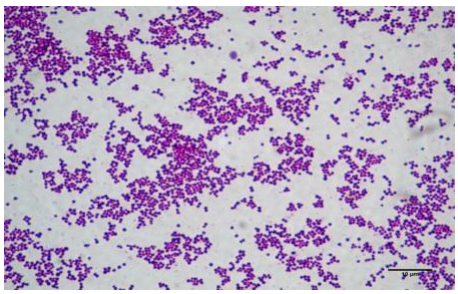


Figure 3: Bacterium *Staphylococcus*
Source: ANVISA, 2007.

Among Gram negative (figure 4), we can mention Klebsiella pneumoniae and Pseudomonas aeruginosa, they have a thinner cell wall, surrounded by two other membranes (internal and external). The outer one has lipopolysaccharide molecules. This outer membrane releases a toxic substance called endotoxins, which contribute to worsening symptoms during infections.[30]

They have rod-shaped, encapsulated shapes and acquire a reddish color when introduced to the Gram process. Infections of these types of bacteria occur in several places, causing pneumonia, urinary tract infection and bloodstream infection.[31]

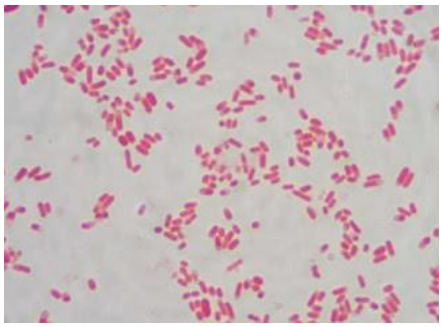


Figure 4 – Gram Negative Bacteria
Source: ANVISA, 2007.

Among the many microorganisms already mentioned, we have the filamentous fungi such as Aspergillus fumigatus and Fusarium solani (figure 5), which came to be considered as the cause of serious infections, resistant to antifungal agents and fatal when not treated or detected in time. They are described by yeasts or filamentous fungi, with access routes in the host through the upper airways or rupture in the epidermal barrier.[32]

Figure 5 – Fusarium Solani
Source: FAPESP, 2016.

Preventive measures

In the country, sepsis related to the use of catheters is a worrying public health problem that requires preventive and surveillance measures every day, making the provisions issued by everyone involved in this process effective. The high rates of nosocomial infections are one of the characteristics that have the greatest impact on mortality rates in hospital environments.[33]

Therapeutic processes with the use of these devices are of paramount importance, however, when used with inadequate practices, these insertions can contribute to the appearance and increased risk of infections, that is, when associated with a lack of planning and prevention methodologies are movements inadequate for maintaining and improving the quality of health care.[8]

One of the first steps that must be applied in the control of these infections is related to real notification, that is, it is necessary that inspection bodies, managers and health professionals, seek through the exchange of information to identify and effectively monitor the progress of these microorganisms. Another important point would be the development of new strategies that prioritize avoidable risk inspection when inserting and handling these catheters.[34]

According to Machado (2012)[35], the recommendations highlighted by hospital parameters encompass strategies for epidemiological control, such as hand hygiene and asepsis of procedures, but in addition to these guidelines, other points must be considered for control in the transmission of these microorganisms, among these are:

- Use of needle-free connectors, disinfection of infusion lines;
- Use of alcoholic chlorhexidine or 70% alcohol for antisepsis;
- Control and inspection of the site;
- Replacement of materials to be used daily;
- Conducting preventive blood culture exams;
- Evalution of multidisciplinar teams.

Based on these recommendations, hospital environments seek universal measures for infection control and composition of precautionary barriers, this compared to palliative measures that provide prevention models against the proliferation of these microorganisms, therefore, they need to configure the implantation in a concrete way. maintenance of criteria based on the well-being of the patient and the professionals involved.[35]

Importance of the Nursing Professional

The increase in invasive procedures in health care, started to demand an expansion in the constant follow-up and monitoring of hospitalized patients and in periods of supervision. This need is present every day due to the high rate of infections caused by the use of invasive devices, that is, this has become a critical and highly complex area.[36]

Given the repercussion and seriousness of this issue and the increase in mortality and morbidity rates, infections have become a concern not only in Brazil, but worldwide and have started to require plausible and accurate initiatives to minimize them, thus promoting quality of life in hospital care.[37]

In order to know and practice the recommendations for the control and prevention of these infections, the efforts of all the professionals involved are necessary and essential so that the levels of containment in the harmful and virulent effects of these pathologies can be reached..[38]

These measures must be adopted and put into practice by all those involved, from the management of quality and resources, sectors of attention to hygiene and in professional training programs for health and personnel, therefore, knowledge and adherence to these projects will be essential for reduce them.[39]

In multiprofessional teams that work practically 24 hours in follow-up, nursing is one of the categories that make up the largest portion of professionals working in all health services and at different levels of care, so it is necessary that periodic education and retraining programs are carried out. offered to nurses, so that the application of preventive measures such as hand hygiene and antisepsis of the materials used, become essential in the fight against hospital infections.[40]

Assessing the importance and responsibility of nurses with regard to their care practice and supervision activities, it is essential that constant processes of updating their knowledge are offered in order to consolidate the safe practice of patient care and their own health.[40]

In this context, the action of nursing professionals in the recommendations that permeate uninterrupted assistance when monitoring patients in a hospital environment, is necessary every day to enable the prevention and control of infection through the use of catheters and other procedures.[41]

Conclusion

In the research literature, the effectiveness of these devices as a preventive measure was evidenced through the joint actions of the bodies and medical professionals in the care and regulation of the various existing pathologies. The description of these segments proved to be the best way to provide assistance to patients, promoting greater safety and reducing costs of a prolonged hospitalization due to infections related to pathogens manifested in these devices.

The use of these devices sometimes becomes essential in the treatment for short or long periods, however the risks of using these equipment recklessly cause persistent and harmful illnesses. For this reason, the participation of nurses is necessary as a risk minimizing agent, having paramount importance in maintaining the quality of care for the patient, since these professionals need to base their care actions on proven scientific evidence.

We can see that the need for public health policies and monitoring in the qualification of professionals becomes evident in order to mitigate the risks of infection caused by the erroneous and negligent insertion of central and peripheral catheters.

The quality of care reflects the functional capacity and the incidence of diseases, making it possible to identify imminent or future risks, so that patients and nursing professionals can have a long and healthy life.

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