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RESEARCH

INFECTION RELATED TO CENTRAL VENOUS CATHETER: INDICATOR OF QUALITY OF CARE IN ONCOLOGY

INFECÇÃO RELACIONADA A CATETER VENOSO CENTRAL: INDICADOR DE QUALIDADE DA ASSISTÊNCIA EM ONCOLOGIA\*

INFECCIÓN CON RESPECTO AL CATÉTER VENOSA CENTRAL: INDICADORES DE CALIDAD DE LA ATENCIÓN EN ONCOLOGÍA

Valéria Pedro de Souza Menezes<sup>1</sup>, Ailse Rodrigues Bittencourt<sup>2</sup>, Maria de Fátima Batalha de Menezes<sup>3</sup>

ABSTRACT

**Objective:** to provide evidence "related infection central venous catheter for long-stay" as an indicator of quality of nursing care in oncology and identify process indicators correlated. **Methods:** Exploratory Survey in a clinical oncology inpatient unit, being investigated clinical and therapeutic catheters and related to nursing care. By calculating prevalence ratios were analyzed elements involved in the performance indicator results evaluated. **Results:** Processes associated with risk of infection were: frequency of renewal of dressings, maintenance of catheter patency, maintenance of closed infusion system and attention to signs of inflammation. **Conclusion:** Actions to prevent infection were contained in the spectrum of nursing actions, supporting the use of the indicator related infection central venous catheter for long-stay, as an important measure to be managed in oncology inpatient units. **Descriptors:** Quality indicators, Health care, Oncology nursing, Central venous catheterization, Infection.

RESUMO

**Objetivo:** Fundamentar "infecção relacionada a cateter venoso central de longa-permanência" como indicador de qualidade da assistência de enfermagem em oncologia e identificar indicadores de processo correlacionados. **Métodos:** Levantamento exploratório em uma unidade de internação clínica oncológica, sendo investigadas variáveis clínicas, terapêuticas e relativas aos cateteres e cuidados de enfermagem. Através do cálculo da razão de prevalências foram analisados elementos intervenientes no desempenho do indicador de resultado avaliado. **Resultados:** Processos associados ao risco de infecção foram: periodicidade da renovação de curativos, manutenção da permeabilidade do cateter, manutenção do sistema de infusão fechado e atenção a sinais flogísticos. **Conclusão:** Ações de prevenção de infecção estiveram contidas no espectro de ações do enfermeiro, corroborando-se o uso do indicador infecção relacionadas a cateter venoso central de longa-permanência, como importante medida a ser gerenciada em unidades de internação oncológica. **Descritores:** Indicadores de qualidade em assistência a saúde, Enfermagem oncológica, Cateterismo venoso central, Infecção.

RESUMEN

**Objetivo:** proporcionar evidencia "infección relacionada con catéter venoso central para larga estancia", como un indicador de la calidad de la atención de enfermería en oncología e identificar los indicadores de procesos correlacionados. **Métodos:** Estudio exploratorio en una unidad de hospitalización de oncología clínica, siendo investigadas catéteres clínicos y terapéuticos y relacionados con los cuidados de enfermería. Mediante el cálculo de las tasas de prevalencia se analizaron los elementos que intervienen en los resultados de los indicadores de desempeño evaluados. **Resultados:** Los procesos asociados con el riesgo de infección fueron: frecuencia de renovación de los apósitos, el mantenimiento de la permeabilidad del catéter, el mantenimiento del sistema de infusión cerrado y la atención a los signos de inflamación. **Conclusión:** Las acciones para prevenir la infección se encuentran en el espectro de las acciones de enfermería, que apoya el uso del catéter venoso indicador de infección relacionada con el centro de larga estancia, como una medida importante para ser administrado en las unidades de hospitalización de oncología. **Descriptor:** Indicadores de calidad de la atención de la salud, Enfermería oncológica, Cateterismo venoso central, Infección.

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\*Extracted from the monography "Evaluation Indicators of Quality of Nursing Care for the Patient Handling Clinical Oncology in Central Venous Catheters in Hospital Unit" presented in 2009, the National Cancer Institute José Alencar Gomes da Silva.  
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**INTRODUCTION**

The prevalence of cancer is increasing, thus becoming a disease of chronic evolution, requiring intense and complex treatments.<sup>1</sup> The therapeutic approach to cancer patients, given the natural history of the disease, is divided into general medical, surgical and palliative care accomplished exclusively or in tandem, may occur on an outpatient or inpatient.

Hospitalization services in clinical oncology, in particular, constitute scenarios hospital of high complexity, which concentrates patients for diagnosis, treatment or systemic complications from the treatment itself or the development of neoplasia. Among the therapeutic procedures intravenous therapy constitutes modality that follows the patient at all stages of treatment.

It is necessary therefore, venous access with good conditions for an adequate monitoring clinical evolution of cancer patients in order to ensure that the infusion, among others, anticancer drugs, antibiotics, electrolytes, blood products and parenteral nutrition.<sup>2</sup> Collections contained blood samples are essential to be able to assess: the response of the patient's immune system, its comorbidities, treatment response concerning the remission or progression of the disease and possible complications or toxicities.

Appropriate to the needs of this clientele, has spread the use of long-term central venous catheters (LT-CVC).<sup>3</sup> These devices allow medications to be infused and solutions directly into the superior vena cava, more efficiently and in larger volumes as compared to other types of catheters. Solutions infused into larger veins,

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diluted faster, allow a more comfortable and safe concentrated solutions, vesicant or irritant, with a decreased risk of damage to blood vessels.<sup>4</sup>

The use of LT-CVC, despite its appropriateness, however, is associated with significant morbidity and mortality and its use, when not properly managed, involves complications related to both the inclusion as its upkeep. Among the complications reported in the literature, is that the infection is greatest, varying depending on the sample, 0-28%.<sup>5</sup>

Most infections related to central venous catheters in hospitalized patients affects hospitalization sectors of high-risk patients, such as inpatient units in clinical oncology, where patients usually remain for prolonged periods, and are highly exposed to multiple microorganisms, being commonly by these colonized.<sup>6</sup> This scenario, patients have an increased susceptibility to infection, due to antineoplastic therapy instituted, particularly chemotherapy, whose activity is immunosuppressive. The immune deficit generated can cause aplastic anemia, resulting in an increased risk of developing related infection LT-CVC.<sup>7</sup>

It has been observed that the morbidity and mortality resulting from catheter-related infections, result in clinical worsening of cancer patients, previously weakened by the treatment, and result in complications, including septic shock is quite common and may result in the interruption of treatment and worsening neoplasia.<sup>6</sup> Attribute up about 35% mortality to these episodes of infection, with an average cost of \$ 25,000 per infection and annual costs ranging from 296 million to 2.3 billion dollars.<sup>8</sup>

In order to achieve improved care and decreased hospital costs, actions must be implemented in order to reduce the incidence of these units infections.<sup>6</sup> Inpatient oncology clinic must be organized so as to minimize the risks to health and some organizational strategies can work accordingly. The evaluation of the assistance through indicators is justified in this context, since the results of these indicators have a reach at all organizational levels, contributing to nurses and care managers to redirect their work.

For nursing, the continuous improvement of quality of care, in order to achieve excellence, has been regarded as a dynamic and thorough permanent identification of the factors involved in the process of team work, which requires the nurse to implement actions and developing tools that will assess systematically the levels of quality of care.<sup>9</sup>

Quality assessment seeks direct or redirect the execution of actions and programs and therefore should be exercised by all those committed to the planning and execution of these actions.<sup>10</sup> The nurse can make use of evaluative instruments, based on theoretical-scientific and practical, for monitoring the quality of care applicable in everyday profession. Among the tools of quality assessment, we highlight the use of indicators.

Can be described as the indicator measuring the performance of functions, systems or processes over time. In health hospital, corresponds to a unit of measure of an activity with which it is related, or even a quantitative measure used as a guide to monitor and evaluate the quality of care provided to the patient important activities and services Support. An indicator is a direct measure of quality, but a call that identifies or directs attention to specific

issues within a healthcare organization, which should be of constant revision.<sup>13</sup>

The model Donabedian, widespread in health evaluation, the study proposes dimensions structure, process and outcome, as described below.<sup>14</sup> The structure refers to relatively stable characteristics of institutions such as physical space, human resources, resource materials, financial resources and organizational model, the process involves the set of activities in the production of goods and services and in the health sector, in relations that are instituted among professionals and customers, from the search for assistance to diagnosis and treatment, and the result is the achievement of the desirable characteristics of products or services, representing the effects of health care customer.<sup>15</sup>

The definition of quality in health covers, among other attributes, a level of professional excellence, efficient use of resources and minimal risk to the patient-client.<sup>16</sup> Due to this proposition, the implementation of strategies to assess these attributes is emerging in the current scenario, increasingly the use of indicators by health professionals, a necessity in the pursuit of efficiency and effectiveness of organizational outcomes.

Given the above, this study aimed to:

- 1) Describe the profile of hospitalized cancer patients with LT-CVC.
- 2) Provide evidence based on scientific evidence, the use of outcome indicator related infection LT-CVC as an indicator of the quality of nursing care in oncology.
- 3) Identify factors of clinical practice (process indicators) that can positively influence the quality of nursing care in handling LT-CVC, with a view to continuous improvement.

**METHODOLOGY**

We conducted a survey at the hospital exploratory clinical Cancer Hospital I, the National Cancer Institute José Alencar Gomes da Silva (INCA). The unit is intended for the care of adult patients Clinical Hematology and Oncology Clinic and assists patients hospitalized for long cycles of chemotherapy and / or who have medical complications resulting from chemotherapy, radiotherapy or arising from the evolution of neoplasia.

For the purposes of this study, which is part of a larger project scope, an instrument was used to collect data in order to support the rationale of indicators for assessing the quality of care in handling LT-CVC. This instrument was built from the review of national and international literature relating to the manipulation of LT-CVC and factors involved in its preservation.

Data were collected from July to September 2009, Monday to Friday. Were verified clinical and therapeutic variables available in printed and electronic medical records. Also recorded were the conditions of the catheter, such as permeability and signs suggestive of possible complications, utilizing the nursing notes in records relating to incidents with the catheter, in addition to its direct observation, visual aspect, the insertion site and its surroundings. The study included all patients with LT-CVC aged over 18 years, hospitalized in the period mentioned.

The data were collected and subsequently analyzed using the program Excel, version 2007. We performed the distribution of patients according to the studied variables: gender, age, clinical, pathology, disease status, neutropenia, insulation, infection distance, type of applied intravenous therapies (chemotherapy, blood

transfusions and antibiotics), type of catheter use and non-infectious complications and related infectious, and compliance with standard operating procedures institutional.

To obtain information that could provide input for improving the performance indicator catheter-related infection, the data were explored using the method of calculation of prevalence ratio (PR).<sup>17</sup> Considering some variables that we consider to be within the scope of attention and actions of nurses, associations were made by comparing the prevalence of risk between the group of patients who had infection and who showed no infection.

The defining criteria for catheter-related infection used in this study are the same as those established by the CDC - Center for Disease Control and Prevention of Illnesses.<sup>18</sup>

This study was approved by the Ethics Committee in Research of INCA, under the registration protocol 133/09, and in line with Resolution 196/96 of the National Health Council (regulates research with humans).

**RESULTS AND DISCUSSION**

Between July 1 and September 30, 2009 were followed 30 adult patients with LT-CVC, some of whom re-hospitalized, making up 36 hospitalizations (cases / patients), which were considered in their entirety, for the purpose of display and analysis of results.

**CHARACTERIZATION EPIDEMIOLOGIC CLINICAL AND THERAPY OF PATIENTS**

As for the overall sample (gender, clinical, cancer type and age): 17 (47.2%) patients were female and 19 (52.8%) males, 26 (72.2%) patients belonged to the hematology clinic and 10 (27.8%) to the Oncology Clinic, 30 (83.3%) patients had hematologic malignancies and 6 (16.7%) patients

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with solid tumors, 13 (36.1%) were in the range of 18 to 29 years, 7 (19.4%) from 30 to 44 years, 13 (36.1%) of 45 to 59 years, and only 3 (8.4%) patients aged to 60 years.

As the underlying pathology, the sample was stratified into two subgroups: patients with hematological malignancies and patients with solid tumors. Of patients with hematological malignancies 18 (50%) had not Hodgkin Lymphoma (NHL), 5 (13.9%) Acute Myeloid Leukemia (AML), 3 (8.3%) Hodgkin lymphoma (HL), 3 (8.3%) Acute Lymphoblastic Leukemia (ALL) and 1 (2.8%) Chronic Myeloid Leukemia (CML). Of patients with solid tumors, 2 (5.5%) had Anal carcinoma, 1 (2.8%) had carcinoma Colon, 1 (2.8%) had Neuroblastoma, 1 (2.8%) Carcinoma Breast enlargement and 1 (2.8%) Lung Carcinoma.

Regarding the extent of disease, 14 (38.8%) patients presented with metastatic disease. Regarding immunosuppression, 10 (27.8%) of patients showed neutropenia. Neutropenia was defined as neutrophil blood count less than 1000 u / ml.

Patients were also screened for colonization with multidrug-resistant bacteria. Showed multiresistant microorganisms and for this reason were isolated 5 patients (13.9%), among which two presented themselves colonized by MRSA, first colonized by MRSA and Fusarium and 1 patient was suspected of carrying H1N1. Furthermore, the total patients, 11 (30.6%) had some focus of infection not related bloodstream infection (distance), of which one showed 2 foci of infection. The focus of these infections were: oral cavity (4 cases), respiratory (3 cases), device-related biliary drainage (1 case), urinary tract infection (2 cases), typhlitis (1 case) and peritonitis (1 case).

Were surveyed intravenous therapies used during the hospitalization period (chemotherapy, antibiotics and blood products). Received chemotherapy only 8 (22.2%) patients and only antimicrobial also 8 (22.2%) patients. While in hospital, made use of antimicrobial agents and chemotherapy also 4 (11.1%) patients. Received antibiotics and blood products 5 (13.9%) patients. The three types of therapies have occurred concomitantly in 6 cases (16.7%). The 5 (13.9%) remaining patients did not use either of the therapies analyzed by making use of other electrolyte solutions or infusion as supportive medications.

The time that the patients were hospitalized in the unit ranged from 3 to 34 days.

**CHARACTERIZATION SAMPLE WITH RESPECT TO CENTRAL VENOUS ACCESS DEVICES:**

The type of LT-CVC was the most common semi-Implanted (CVC-SI) type or Hickman, constituting the sample of 24 (66.7%) patients with this type of catheter in its entirety double lumen. Of the remaining patients enrolled, 10 (27.8%) patients had a Totally Implanted Catheter (CVC-TI) or Port-Cath and 2 (5.5%) patients had Catheter Peripherally Inserted Central (CCIP).

Considering the site of catheter insertion, we obtained: 21 (58.3%) catheters inserted into the right subclavian vein, 7 (19.4%) in the left subclavian vein, 3 (8.3%) in the right jugular vein, 2 (5.5%) cephalic vein 1 (2.1%) in brachial vein, one (2.1%) at right internal jugular vein and one (2.1%) in left internal jugular vein.

The usage time of the catheter varied from 0 to 1095 days, ie more than three years of use of the device. To subdivide patients into classes, the sample consisted of 12 (33.3%) patients whose duration of use was 14 days, 4 (11.1%) patients had time to use up to 29 days, 6 (16.7%) between

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30 and 59 days, eight (22.2%) between 60 and 180 days, 3 (8.3%) between 180 and 720 days, 2 (5.6%) between 720 and 1095 and 1 (2.8%) patients used the same catheter there is a time greater than 1095 days.

COMPLICATIONS RELATED TO CATHETERS

During the observation period of the study, 31 (86.1%) catheters had complications, infectious in nature or not. Of the total of 36 hospitalizations, 5 (13.9%) patients had LT-CVC removed in the period in which they were admitted. Given the universe of 5 removals, in all cases, the reason for withdrawal was due to a complication associated with the catheter, 3 (60%) infection, one (20%) of thrombosis and 1 (20%) by obstruction.

Of catheters removed for infection, two cases occurred in patients with CVC-SI and in one case the patient had CVC-TI. The removal of LT-CVC thrombosis occurred in a CVC-TI and removal of obstruction occurred in a CCIP.

Among the patients who had the catheter removed for noninfectious complications, length of catheter use ranged from 3 days (CCIP removed for obstruction) to three years (CVC-TI removed thrombosis). Among the catheters removed by infection, one was removed at 10 days of use (CVC-SI) due to the tunnel infection, the other at 60 days of use (CVC-SI), and the third catheter was removed with 2 years of residence (CVC-TI). In all cases of early removal, or non-infectious nature, patients undergoing chemotherapy were in progress.

Of the total patients treated, 7 (19.5%) had positive culture of blood drawn through the catheter, and 4 (11.1%) patients had effectively

diagnose catheter-related infection, confirmed by differential time positivity <sup>5</sup>. Of all blood cultures positivated, we observed that in 3 cases (42.8%) was not catheter-related bacteremia in 3 cases (42.8%) occurred infection of catheter-related bloodstream (sepsis), and the same patient (14.4%) presented plus catheter-related sepsis also confirmed infection of the catheter tunnel.

Of the 4 patients with confirmed catheter-related infections, 3 had CVC-SI and 1 patient had a CVC-TI. Of bloodstream infections, two patients harbored CVC-SI and 1 patient had CVC-TI. Tunnel infection was diagnosed in a CVC-SI. Of the other three patients who had cultures positivated from the catheters, they all had CVC-SI.

Made positive during the study, 8 of 10 different microorganisms cultures. There were three positive cultures *Staphiloccocus epidermidis* and a positive culture for each microorganism following: *Staphiloccocus haemolyticus*, *Staphiloccocus capitis*, *Candida guilliermond*, *Ralstonia picketti*, *Enteroccocus gallinarum* *Enteroccocus faecium* and *Escherichia coli*. Confirmed infections related to catheters had as etiologic agents: *Ralstonia picketti* (bloodstream infection in totally implanted catheter), *Staphiloccocus epidermidis* (tunnel infection in semi-implanted catheter) and microorganisms *Candida guilliermond*, *Staphiloccocus capitis* and *Staphiloccocus haemolyticus* as determinants of bloodstream infection.

The frequency of catheters that had non-infectious complication and type of complication is observed in Table 1.

Table 1: Distribution of patients according to type of complication associated with catheter. Rio de Janeiro (RJ), 2009.



COMPLICATIONS	FREQUENCY	PERCENTUAL VALOR
Hyperemia	20	55,6%
Reflux Impaired	17	47,2%
Secretion	11	30,6%
Impaired flow	9	25,0%
Local pain	4	11,1%
Obstruction	3	8,3%
Paresthesia SM	2	5,6%
Bleeding	2	5,6%
Trombosis	1	2,8%
Hematoma	1	2,8%
Peeling	1	2,8%
Induration	1	2,8%
Local heat	1	2,8%
Pruritus	1	2,8%

Note: SM = Superior Member

EVALUATION NURSING CARE FOR THE CATHETERS

Assessed daily in relation to nursing care related to catheters, we obtained a total of 5 (13.9%) patients who did not keep closed infusion system in at least one follow-up days. As the frequency of dressing change, 18 (50%) have not kept up in accordance with the standard operating procedure of the unit being observed that recommended a shorter time (less than three days).

Regarding the material used for dressing the semi-implanted catheter 24 in 8 (33.3%) patients has been observed that the transparent film used in situations in which the catheter had serous or red blood cells. Considering the frequency of exchange of needles for CVC-TI, the total of 10 catheters, 2 (20%) of them had needle exchange in non-compliance with the Manual of Techniques for Handling of Central Venous Catheters INCA being observed change period less than 7 days.

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ANALYSIS DATA AND DESIGN OF INDICATORS

Considering the most prevalent cause of removal of LT-CVC and that only nurses manipulate these devices during hospitalization, it was shown that catheter-related infection consisted of outcome indicator of the quality of nursing care on the handling of LT-CVC.

In order to provide a greater sustainability to the previous finding, we conducted through the method of calculating the prevalence ratio (PR), the comparison with some of the study variables (clinical, therapeutic, health care) in order to identify possible associations, assessing the influence these variables in the establishment of infection and on which nurses could act proactively.

The results, according to figure 1, showed some subgroups vulnerable to catheter-related infection (PR> 1) and highlighted some factors or processes (PR> 1) that can influence the prevention of catheter-related infection.

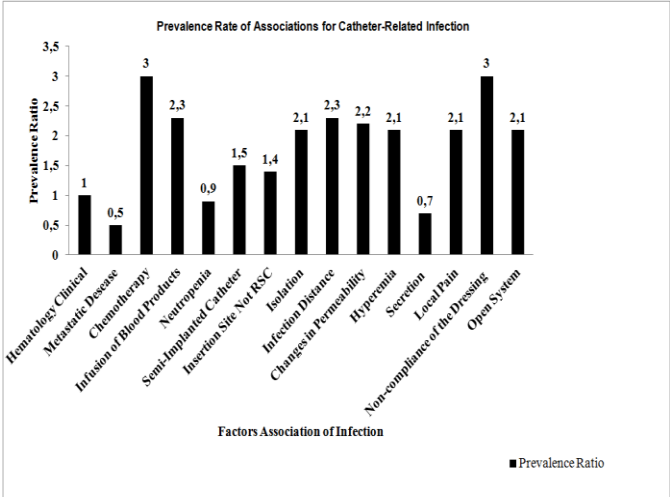


Figure 1: Prevalence Ratio of Associations for Catheter-Related Infection. Rio de Janeiro (RJ), 2009. (Note: RSC = Right Subclavian)

Could be identified the most vulnerable subgroups, namely:

- patients undergoing chemotherapy (PR = 3);
- patients with any infectious focus distance (PR = 2.3);
- patients using blood products (PR = 2.3);



- patients in isolation (PR = 2.1).

Some factors (processes) identified that can help minimize the risk of infection, were:

- standardization of the renewal period of dressings (PR = 3);
- maintenance of catheter patency (PR = 2.2);
- maintenance of closed infusion system (2.1);
- attention to signs such as pain and erythema at the site of catheter insertion (PR = 2.1).

In the present study, the highest prevalence of CVC-SI is justified by most of the patients are with hematologic malignancies, and this type of catheter most appropriate therapeutic approach used in these cases (prolonged treatment, intensive chemotherapy regimens, large volumes infusions). The highest incidence of related infection CVC-SI is also supported in the literature, which states a higher incidence of CVC-related infection SI, compared with CVC-IT, which in turn provide a higher risk of thrombosis.

It was observed that most of the catheters were removed earlier, because the expected service life of a LT-CVC is more than 18 months. The reintroduction of a catheter procedure constitutes a high financial cost and health risk patient (often plaquetopenic), where you need a new invasive procedure, surgical, requiring sedation and imaging.

We must mention that in all the episodes taken from catheters studied, patients had continuity of care via peripheral venous access during that period of hospitalization. The absence of a LT-CVC these cases may result in loss therapy, and may interfere with the therapeutic safety and efficacy, it has being possible for example, to respect the correct appointment time since infusion through peripheral access is more difficult.

According to the description of the microorganisms prevalent, we can identify possible mechanisms of contamination and bloodstream infection in our sample, based on a survey of contamination of catheters performed by documenting the laboratory diagnosis of blood cultures (blood cultures), swab of secretions and the tip of the catheter withdrawn.

*Staphiloccocus epidermidis*, *Staphiloccocus haemolyticus* and *Enteroccocus faecium* are gram-positive microorganisms commonly found in skin microbiota, revealing the care that must be observed in catheter insertion. *Stapholoccocus epidermidis* composes the group *Staphiloccocus coagulase-negative*, responsible for most of catheter-related infections in recent times. Produce an extracellular polysaccharide, known as "slime" or mucus viscous, which enhances its pathogenicity, allowing mechanisms to resist host defense, acting as a barrier to phagocytosis, or making them less susceptible to antimicrobial agents.

Already microorganism *Ralstonia picketti*, is a gram-negative bacillus, less frequently found in cultures of catheter, in the case of a *Pseudomonas* is associated with contamination of solutions infused. *Candida turn* is also included as a microorganism concern since it accounts for about 80% of fungal infections in a hospital environment. When identified in blood culture from the catheter, it should be removed as soon as possible, prior to instituting antimicrobial therapy.

As for intravenous therapies used (chemotherapy, antibiotics and blood products), this study showed a high demand for a venous access permeable. According to data analysis, patients taking chemotherapy (PR = 3) and blood products (PR = 2.3) comprised vulnerable group in

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the development of related infections LT-CVC. This evidence can be justified due to the immunosuppressive effect of chemotherapy and on the amendments of catheter patency as a result of the administration of blood products.

The infusion of blood can cause the adhesion of fibrin intra-luminous LT-CVC, facilitating adherence of microorganisms. This effect can be minimized by a protocol with maintenance measures permeability LT-CVC, and the observation of the principles stated in transfusion medicine.

We also obtained the indication that patients who have some focus of infection not associated with blood stream, ie, focus distance (PR = 2.3) or those colonized by multiresistant microorganisms (PR = 2.1), can also demonstrate vulnerability to development of related infections LT-CVC. In addition to current or previous infection increase the risk of developing infection in immunosuppressed patients, such fact may also occur due to the occurrence of hematogenous dissemination, famously one of the mechanisms of contamination of catheters.

Regarding the main non-infectious complications related to catheters, according to data presented in Table 1, we find that changes in functionality (obstruction, disturbed flow, reflow and impaired thrombosis), constituted the main, focusing on a total of 30 cases. Furthermore, it is noteworthy that the appearance of the upper limb paresthesia constitutes one of the signs of thrombosis, as shown by two cases / patients. From the analysis so in addition to catheter-related infection, an additional indicator was evidenced obstruction, which was present in 3 cases, being also in the grounds of loss of catheter.

The obstruction has its onset to permeability changes and constitutes a known risk factor for development of infection and catheter-related thrombosis, which can be confirmed by this study (PR = 2.2). Considering the reasons for loss of catheter interreagentes, changes of catheter patency should also be prevented by the nurse, through the establishment of a set of appropriate maintenance catheter.

The other prevalent complications, hyperemia (high prevalence), discharge, local pain, induration, local heat and itching, composed a set of signs and symptoms associated with infections also, that should be the object of attention of nurse assistant. Local pain and hyperemia increased risk (PR = 2.1) of catheter-related infection in our study.

Regarding direct nursing care in handling of catheters, observed inadequacy of dressing material in situations where the patient was serous or hematic peri-insertion. This type of dressing is not suitable in this situation, because it is not absorbable, which may result in an environment conducive to bacterial growth.

The frequency of dressing changes and needles were also observed some nonconformities are intricate in the genesis of infections, according to the literature, also correspond to the findings of this work (PR = 3). Observed an excess manipulation of insertions of catheters. The systematization of care in handling LT-CVC is critical because excessive manipulation of the catheter is a predisposing factor for infections and is recommended by the guidelines the frequency trading both dressings and needles, if well adapted, in 7 days.

The absence of closed system (PR = 2.1) also represented a relevant factor intervening in the presentation of LT-CVC related infection. In

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studies on the evaluation LT-CVC of the oncology context, has advocated the use of connectors for maintenance infusion system closed, being found decreasing rates of catheter-related infection after the introduction of this type of system intravenous.<sup>28</sup>

About catheter-related infection, the CDC - Centers for Disease Control and Prevention, to JCAHO - Joint Commission on Accreditation of Healthcare Organizations and the AHRQ - Agency for Healthcare Research and Quality, advocate the use of the indicator Infection Catheter-Related Bloodstream (CLABSI), which should be expressed as follows: = CLABSI infections Catheter-Related Bloodstream x 1000/Dias of Use Catheter / patient.

Whereas assess the quality measure implies an event and make a judgment about this, there is need to establish relevant criteria in terms of quality and standards of the event indicating the limits of acceptable and unacceptable qualidade.<sup>14</sup> Nationally, however, did not find published studies using the indicator proposed for the specific case of long-term catheters in cancer patients. So we can set a standard of acceptability, we consider two scientific application indicator CLABSI, as proposed by the CDC.

In a systematic review study that brought together the results of 200 prospective studies that evaluated the indicator CLABSI, the values were summarized as follows: for peripherally inserted central catheters - CCIP, found the average (2.1) for semi-central venous catheters implanted - CVC-SI, average (1.6) and totally implanted central venous catheters - CVC-TI average (0.1). The average rate found thus was 1,6.

Other published work is the National Healthcare Safety Network (NHSN), the entity that summarizes CDC every two years data on patient safety in several hospitals, assessing risks associated with devices (catheters, ventilators), procedures and medications. In the NHSN report was published that the average value found for the indicator CLABSI was 1.7 for CVC-LP, corresponding to the average American, ICS of inpatient units in clinical oncology. The NHSN requires that values well below this average may indicate undiagnosed cases of infection, and values far above average alert to possible problems to be corrected.

However, we note that studies at the national level should be conducted so that we can establish a pattern based on the features of cancer patients in Brazil.

CONCLUSION

The catheter-related infection consisted of a complication of high-impact nursing care for the reasons listed below:

- 1) The most prevalent complications have some degree of association with infection, which were the change in permeability of the catheter, hyperemia and secretion.
- 2) In relation to direct interventions on nursing care to catheters, such as the maintenance of a closed infusion system, dressing and needles were observed some nonconformities that increase the risk of establishment of infections.
- 3) Catheter-related infection was the leading cause of catheter removal during the period that patients were hospitalized.

In terms of general contributions to the study through data monitoring of patients, it was possible:

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- a) Information for the characterization of this type of clientele;
- b) Highlight the most common types of complications related to manipulation of LT-CVC, which may compromise care outcomes, thus becoming indicators of results (infection and obstruction), and should be continuously monitored for both;
- c) Show the profile of patients who are at higher risk of developing infections related to LT-CVC.
- d) Factors involved in raising performance indicator catheter-related infection, which may target assistance, constituting a process indicators.

We conclude that the performance outcome indicator catheter-related infection can be improved through measures such as continuing education and availability in inpatient units of standardized care protocols, based on good scientific evidence, ie, by improving the organizational structure , the daily monitoring and documentation of the conditions of venous access, identifying possible changes, adoption of standardized care protocols for staff, ie, through improved care processes, periodically review the results of care practices, for better utilization of current scientific evidence.

Given the high cost of long-term central venous catheters, the high cost involved in the therapeutic treatment of infections related to impact on morbidity and quality of life, and considering that the actions of preventing infection related to these devices are contained in the spectrum of actions of the nurse, it is necessary to evaluate these actions, with a view to continuous improvement. The indicator Infection Related to Long-Term Central Venous Catheter (LT-CVC), and indicators related processes in the context of inpatient units in

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clinical oncology, constitute important steps to be taken and managed systematically.

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