

## ORIGINAL ARTICLE

### Nursing management in the maintenance of central venous catheter in hematopoietic stem cell transplant

### Gerenciamento de enfermagem na manutenção do cateter venoso central no transplantado de células-tronco hematopoiéticas

### Manejo de enfermería en el mantenimiento del catéter venoso central en receptores de trasplante de células madre hematopoyéticas

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#### ABSTRACT

**Objective:** To discuss nursing care management actions for the maintenance of the central venous catheter in hematopoietic stem cell transplant patients. **Methodology:** Qualitative, exploratory study carried out in a Bone Marrow Transplant Unit. Data were collected in 2019 through semi-structured interviews with 10 nursing professionals. The data were analyzed using the software *Interface R pour les Analyses Multidimensionnelles de Textes et de Questionnaires* and interpreted using content analysis. **Results:** Six classes emerged, compiled into three categories that discussed the role of the transplant patient in central venous access care, the use of the protocol, communication and the training of nursing professionals in the catheter maintenance and permeability process. **Conclusion:** Actions that promote communication, educational practices and the alignment of nursing professionals with evidence-based practice were shown to be indispensable for guaranteeing patient safety.

**Keywords:** Nursing; Organization and Administration; Central Venous Catheters; Bone Marrow Transplantation; Evidence-Based Nursing.

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## RESUMO

**Objetivo:** Discutir ações do gerenciamento do cuidado de enfermagem para a manutenção do cateter venoso central no transplantado de células-tronco hematopoiéticas. **Metodologia:** Estudo qualitativo, exploratório, realizado em uma Unidade de Transplante de Medula Óssea. Os dados foram coletados em 2019, através de entrevista semiestruturada, com 10 profissionais de enfermagem. Os dados foram analisados com apoio do software *Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires* e interpretados pela análise de conteúdo. **Resultados:** Emergiram seis classes compiladas em três categorias que discutiram o protagonismo do transplantado no cuidado ao acesso venoso central, o uso do protocolo, a comunicação e a capacitação dos profissionais de enfermagem no processo de manutenção e permeabilidade do cateter. **Considerações finais:** Foram evidenciados como indispensáveis para a garantia da segurança do paciente ações que promovam a comunicação, práticas educativas e o alinhamento dos profissionais de enfermagem com a prática baseada em evidências.

**Descritores:** Enfermagem; Organização e Administração; Cateteres Venosos Centrais; Transplante de Medula Óssea; Enfermagem baseada em Evidências.

## RESUMEN

**Objetivo:** Discutir acciones de gestión del cuidado de enfermería para el mantenimiento del catéter venoso central en receptores de trasplante de células madre hematopoyéticas. **Método:** Estudio cualitativo, exploratorio, realizado en una Unidad de Trasplante de Médula Ósea. Los datos fueron recolectados en 2019, a través de entrevistas semiestructuradas, con 10 profesionales de enfermería. Los datos fueron analizados con el apoyo del software *Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaire* e interpretados mediante análisis de contenido. **Resultados:** Surgieron seis clases, agrupadas en tres categorías, que discutieron el papel del receptor de trasplante en el cuidado del acceso venoso central, el uso del protocolo, la comunicación y la capacitación de los profesionales de enfermería en el proceso de mantenimiento y permeabilidad del catéter. **Consideraciones finales:** Se destacaron como esenciales para garantizar la seguridad del paciente acciones que promuevan la comunicación, las prácticas educativas y el alineamiento de los profesionales de enfermería con la práctica basada en evidencia.

**Descriptorios:** Enfermería; Organización y Administración; Catéteres Venosos Centrales; Transplante de Médula Ósea; Enfermería basada en Evidencia.

## INTRODUCTION

The Hematopoietic Stem Cell Transplantation (HSCT), also called Bone Marrow Transplantation (BMT), is a therapeutic procedure indicated to treat several types of hematological neoplasms, which include leukemia, lymphoma, or multiple myeloma and other autoimmune hematological diseases and immunodeficiencies<sup>(1)</sup>. The transplant is considered effective if the grafted marrow with donor cells multiply and produce sufficiently functional and healthy blood cells, however, for being a complex procedure, HSCT presents a high risk of morbidity and mortality due to the immune mechanisms, drug toxicity, risks associated with long periods of hospitalization, and the use of different medical devices<sup>(2,3)</sup>.

The Central Venous Catheter (CVC) is a venous access device widely used in procedures performed in critical patients and indispensable to enable HSCT. Among the possible complications

associated with HSCT, risks related to the use of CVC include Central Catheter-Related Bloodstream Infections (CCRBI), sepsis and death<sup>3</sup>. The scientific evidence indicates that such complications are related to the type of catheter, time of stay and factors related to manipulation and patient. Considering the complexity of HSCT, such as the imminent risks associated with the use of CVC, this procedure requires the attention of a multidisciplinary team composed of qualified professionals who offer specialized and safe assistance<sup>4</sup>.

The nurse, in the scope of the nursing work process, is the professional who manages the care to the patient with CVC by developing several activities directed to the device, highlighting the prescriptions and evaluation of care provided in the handling of CVC, administration of solutions, maintenance and change of the dressing, notifications, among other activities<sup>5</sup>.

Care management is understood as the main activity of nurses in the hospital context, by combining the dimensions of care in the managerial, assistance, teaching, research and political participation, aligning technical expertise, social skills and evidence-based practice in favor of the quality of care provided<sup>6</sup>. Therefore, the nurse needs training and permanent education to apply all these valences and thus meet conditions to provide safety to the transplanted patient and avoid possible complications related to CVC<sup>7</sup>.

This study was motivated by the need to seek continuous improvements in the nursing work process to subsidize the care of patients submitted to HSCT. The nurse, as responsible for managing care, requires developing an enlarged vision and systematic observation throughout the CVC's stay, aiming to mitigate complications and adverse events. In this perspective, the following question arose: what are the nursing actions for the maintenance of CVC in people with hematopoietic stem cell transplantation? To answer this question, the objective of the study was to discuss actions of nursing care management for CVC maintenance in the hematopoietic stem cell transplanted.

## **METHODOLOGY**

Exploratory, descriptive study with qualitative approach. This research was developed following the Consolidated Criteria for Reporting Qualitative Research-COREQ.

### **Study scenario**

This is a study conducted in a Bone Marrow Transplant Unit of a private hospital, located in a municipality of the Mata Mineira Zone. The mentioned institution is a hospital reference in high complexity, being the first private hospital in the interior of Minas Gerais to receive accreditation from the Ministry of Health for performing BMT of the autologous type, and later accredited the allogeneic and haploidentical types.

## **Data source**

The study participants composed a non-probabilistic sample. From a population of 12 nursing professionals, the sample was composed by ten participants, later coded with acronyms and numbers, namely: part 01 to part 10. The inclusion criteria were: to be a nurse and/or nursing technician of the BMT unit, and to have been working at least one year in the service. The participation occurred voluntarily and conditioned to the signature of the Informed Consent Form. Nursing professionals who were on vacation or away from work activities during the data collection period were excluded from the study.

## **Data collection and organization**

The production of data occurred through individual, semi-structured interview, previously scheduled according to the availability and preferences of place and time of each participant, conducted by the main researcher, who received training during the academic master's course.

The interviews took place between April and May 2019, recorded in digital media (audio), with an average duration of 25 minutes. The data were obtained from semi-structured interviews in an individual form with the purpose of capturing vision of the nursing team on the maintenance of CVC. The questions were written in a language that was understandable to participants, considering answering the study's guide question. During the interview, only the researcher and the participant were present, and this meeting took place in a reserved space within the Bone Marrow Transplant unit.

## **Data analysis**

The interviews were transcribed in the Word for Windows® program and operationalized by the software *Interface de R pour les Analyses Multidimensionales de Textes et de Questionnaires* (IRaMuTeQ)®. Therefore, the analyses and interpretations of the qualitative data extracted from IRaMuTeQ were made adopting content analysis.

## **Ethical aspects**

It is noteworthy that the field collection phase only began after the approval of the study by the Human Research Ethics Committee (HREC) of the Federal University of Juiz de Fora (UFJF), under the Consubstantiated Opinion number 3.205.698 and CAAE number 06396818.0.0000.5147.

## **RESULTS**

The participants were ten nursing professionals, four nurses and six nursing technicians. Regarding sex, six were female and four male. The age group was between 31 and 40 years. Regarding the time of work with HSCT, there was a variable from one to five years for all ten professionals who participated in the study.

From the corpus of analysis, six classes emerged as a product, through similarity and

dissimilarity of words. From the central ideas of the classes, three categories of analysis were defined through the categorization process, as shown in (Chart 1).

Chart 1. Categories formed from interviews with the ten participants. Juiz de Fora, MG, Brazil, 2021.

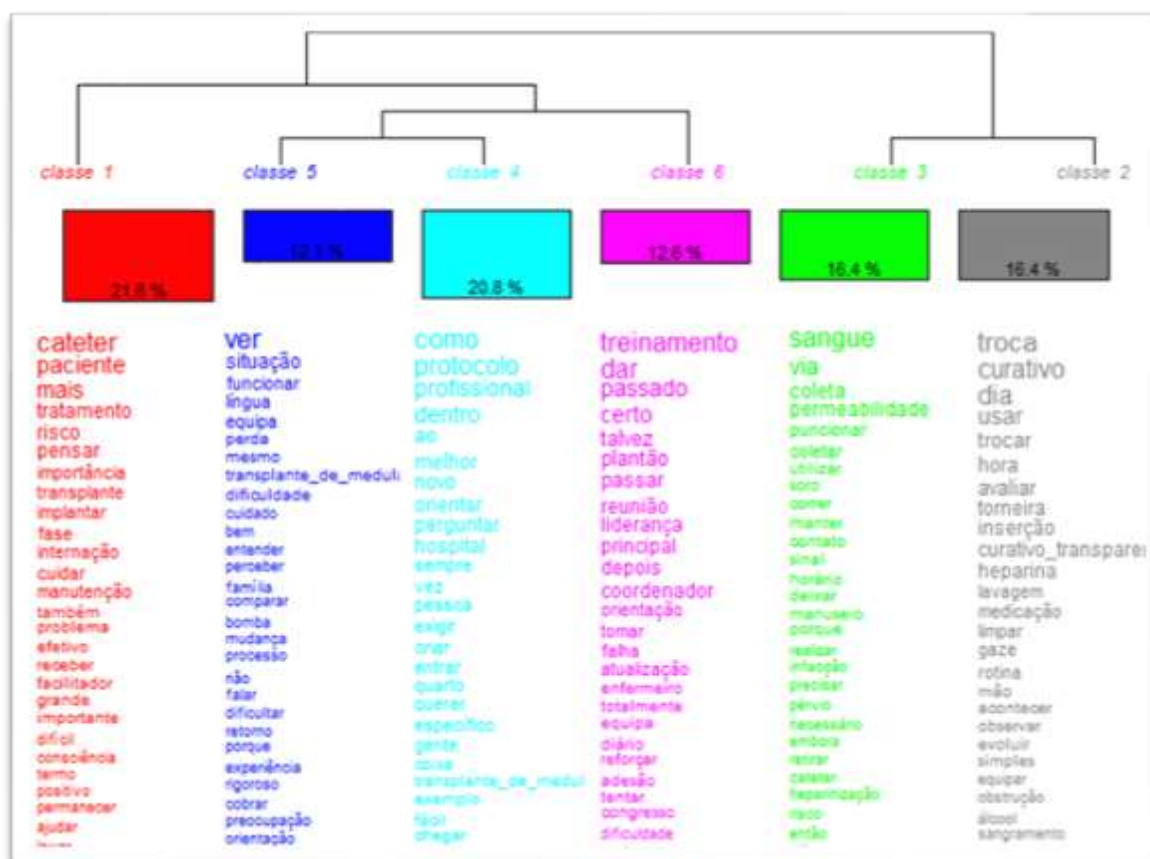
Categories	Classes	Class Names
The central venous catheter in hematopoietic stem cell transplantation	Class 1	The CVC in HSCT: importance for the nursing team and patient-family.
Nursing care management in the CVC maintenance process	Class 4	Bringing nursing professionals closer to the CVC maintenance protocol.
	Class 5	The importance of communication for teamwork in CVC maintenance.
	Class 6	Actions to educate nursing professionals in the CVC maintenance process
Factors involved in the CVC maintenance process	Class 2	The daily routine of the nursing professional in CVC maintenance
	Class 3	The importance of CVC permeability in HSCT.

Source: Created by the authors, 2021.

In the textual analysis, the general corpus was constituted by ten texts that were separated into 411 text segments (TS), with use of 365 TS (88.81%). After the data processing, three categories and six classes emerged. The first category was composed by class 1 (21.64% - 79 ST), the second, composed by classes 4 (20.82% - 76 ST), 5 (12.05% - 44 ST) and 6 (12.6% - 46 ST), while the third category was composed by classes 2 (16.44% - 60 ST) and 3 (16.44% - 60 ST) (Chart 1).

The presentation of results was performed according to the approximation of the speeches of participants configured by the software. The Descending Hierarchical Classification (DHC) Dendrogram (Figure 1) highlights the most frequent and significant words contained in each class.

Figure 1. DHC dendrogram performed by the *Software IRaMuTeQ*®



Source: Software *IRaMuTeQ*®7.2 (2021).

Category 1: The central venous catheter in hematopoietic stem cell transplantation. Class 1 includes the words "catheter", "patient", "treatment" and "risk".

[...] This central venous catheter is used at the most important moment of the transplant, which is the infusion of stem cells; It is through the catheter that the patient receives the cells (PART\_03).

[...] when the transplant is indicated and we talk to the patient and explain the importance of the catheter from the first phases to the hospitalization phase and the maintenance of post-transplant treatment, I think it really puts the patient in a positive position so that he can also take care of the catheter effectively, understand the risks that the catheter brings if care is not taken at home [...] (PART\_04).

Category 2: Management of nursing care in the CVC maintenance process. In class 4, the words "protocol" and "professional" appeared more frequently. While in class 5, they were: "to see", "situation", "language" and "team". In class 6, the main words were "training", "to give", "past" and "right", as can be observed in the following statements.

I think there should be a meeting, to emphasize, ask each professional what the manipulation is like, for example: how do you do it? Always show what is right, I think that would improve (PART\_01).

I don't see any difficulty with that. There may even be other types of care in other situations, but in relation to the catheter, I don't see any difficulty here as in the inpatient units because there is a larger team, a greater flow of patients, so it would be more difficult, not impossible. (PART\_03).

The main thing we have here is the leadership that guides us, all nurses have the same behavior. Leaders also listen a lot to the technical team. There is no way to implement anything without guidance, training (PART\_08).

Category 3: Factors involved in the CVC maintenance process. In class 2, the most frequent words were: "exchange", "dressing", "day" and "use". In class 3, the words that stood out most were: "blood", "way", "collection" and "permeability", according to respective testimonies.

[...] We change the transparent dressing every seven days or if necessary when there is low platelet secretion and blood extravasation, then we change it. If you have a simple dressing, the team knows that they change it every day to visualize the catheter insertion, so we follow the routine [...]. We check if the patient is hyperemic, if there is secretion, if anything could be contaminating the catheter. And washing the catheter is also very important, right? To avoid obstruction, flushing every six hours, with two ampoules and check the prescription. There are usually two routes, one we leave for medication and the other remains heparinized at this time. There are cases where the other route can be used exclusively for parenteral nutrition. [...] (PART\_03).

Handling the catheter is very frequent, there are many medications, blood collections, the catheter is used for practically everything that goes to the patient and sometimes it can make maintenance a little difficult because the risk is greater, so maintenance has to be so often (PART\_05).

The nurse performs heparinization, if no serum is going to be administered to the patient and every time they need to handle this route to collect blood, start a diet or run hemoconcentrate or some component on the patient, the catheter is washed and heparinized. (PART\_06).

## **DISCUSSION**

The proposal of a study to discuss nursing care management actions for CVC maintenance in hematopoietic stem cell transplants highlights the relevance of health education in this context. Through the constant actions of health education, the nurse trains the patient to participate in decision-making and behaviors for the protection of the individual with CVC and prevention of injuries, with reflections on health literacy. This responsibility of the nursing care management reflects the legal and social responsibility of

the profession, because the nursing team assumes responsibilities in the recovery of the patient, setting care goals and promoting the individual's understanding of his/her health condition and ability to actively collaborate in his/her care process<sup>(8)</sup>.

Therefore, the data suggest that the nurse's approach in the care process should emphasize the participation of patients and their families, thus requiring bringing them to the center of care management, sharing knowledge from the individual needs of each patient and his/her family.

Long-term care in the chronic condition related to HSCT, including pre, trans and post-transplant, and in the course of this treatment to the indication of long-term stay of CVC, without signs of complications, are longitudinal characteristics that may confer greater exposure to risks. Each situation should be managed in a particular way, since the individual characteristics of patients may be associated with a higher or lower risk of complications, especially during hospital admission<sup>(8)</sup>.

In this period, for the transplant to be possible, a long hospitalization is necessary so that the patient is submitted to the insertion of CVC and other conditionings such as conditioning regime, multiple blood collections for tests, toxicity related to chemotherapy, neutropenia and thrombocytopenia <sup>(8,9)</sup>.

Among the prevalence of risks, CCRBI stands out as a potentially present condition in patients submitted to HSCT due to the immune frailty induced by treatment and the underlying disease. In addition, factors such as intense immunosuppression, prolonged neutropenia time, broken skin integrity and impaired healing due to the effects of chemotherapy contribute to the increase in the occurrence of infectious complications<sup>(10)</sup>.

In this sense, it is important to highlight that HSCT involves multiple stages and requires that the nurse and his/her team are prepared to care for these patients with such specific needs, ensuring, despite the importance of care protocols, the ability to critical thinking and decision making for personalized care. The knowledge of the risks and consequences of treatments directs the care plan for certain aspects, such as those related to the association between the occurrence of neutropenia and infection, being essential measures regarding the prevention of infection for a positive outcome to the treatment and maintenance of CVC safety<sup>(10)</sup>.

The participants of this study reinforced the importance of the elaboration and use of protocols to enable safe procedures and assign reliability to care, being configured as management tools for prevention of risks and damage in health services, always requiring the critical reasoning and professional expertise for decision making. However, there is evidence about the difficulties and barriers to implement this type of strategy in practice, from the development or update of existing protocols, aiming at the incorporation of new safe scientific evidence<sup>(11)</sup>.

It is important to note that, in addition to the elaboration of protocols, it is indispensable to promote strategies involving actions of permanent education and organizational meetings for strategic



planning that enable the implementation and adherence of these instruments by the professional team, considering the resources available in each scenario. Such strategies are able to align information and ensure that professionals have the same behaviors in nursing care for patients with CVC. In addition to the periodic meetings, feedback, training, discussions on protocol follow-up and institutional routines are also essential, as well as the constant need for updates<sup>(12)</sup>.

Regarding the concern of health professionals about the maintenance of CVC permeability, it is observed from the testimonies that they associate the maintenance of CVC permeability with six-hour flushing with saline solution and the use of heparin solution when the CVC is not being used.

Heparinization of CVC has been considered over the years a traditional and useful practice to maintain the permeability of these devices, however, only the heparin solution does not have thrombolytic properties and presents a very short lifetime, usually between 60 and 90 minutes<sup>13</sup>. In addition, there is no data or evidence to confirm the validity of perfect dilution and therapy of the components of a CVC, so as to ensure the therapeutic effect without aggravating its undesirable side effects, such as thrombocytopenia<sup>(13)</sup>.

In this context, it is necessary to highlight that studies show that there is no effective difference between the use of heparin and saline solution in the maintenance and permeability of CVC, thus, it is suggested that the use of saline solution is sufficient to maintain the permeability of CVC when compared with heparin solutions<sup>11</sup> to avoid the patient's exposure to heparin and its potential complications, and also because it is an economically less expensive solution<sup>(12-14)</sup>.

The participants of this study reinforce communication among health professionals as an important strategy for permeating all activities involving patient care. In a specialized service such as the HSCT unit, information is numerous, specific and continuous. Given the importance of communication in health, effective communication between health professionals stands out for promoting the effectiveness of care, ensuring that information is transmitted clearly among health professionals, minimizing doubts and misinterpretations in clinical procedures<sup>(15)</sup>.

Another relevant aspect about effective communication refers to the formation of the link between the transplanted and professionals, with the actions of guidance, information provision and clarification of doubts about the maintenance of the CVC. In this scenario, communication among the transplanted patient, his/her family and health professionals is a foundation for coping with comorbidities and correct management of possible complications that may arise<sup>(16)</sup>.

The participants of this study reiterated the importance of CVC in HSCT, and the active participation of patients in the maintenance of this device. In this perspective, the results showed that the care process transcends the performance of nursing professionals, and it is important that the nurse considers the patient as a protagonist of this process in the management of care, from the moment he/she

becomes aware of the complexity of the treatment and the risks that CVC may pose.

In this context, the importance of effective communication between nursing professionals and patients as a strategy to prevent incidents and ensure qualified care for individuals with CVC is highlighted, considering the need for long-term use of this device, the complexity that involves transplantation and the risks to which patients are exposed during hospital admission<sup>(7)</sup>.

### **Study Limitations**

As limitations, it was necessary to redirect the initial objectives and methodological path of this research, given the scenario of the COVID-19 pandemic, because of the impossibility of holding the discussion group with nursing professionals.

### **Contributions for Nursing, Health or Public Policy**

Considering the scenario of the study, it is expected that nurses act in nursing care management with skills, abilities and attitudes that enable them to articulate the managerial and care spheres, as well as education and research. It is expected, above all, the nurse's transposition of scientific evidence into the daily practice of the nursing team, consolidating institutional protocols based on the expertise of professionals, available resources and patients' needs.

### **FINAL THOUGHTS**

The HSCT unit is considered a high-complex unit and transplanted patients require specialized care, surrounded by careful care. CVC is an indispensable device for the transplantation, but for being an invasive procedure, it can increase the risk of infections and complications during the neutropenia period.

Based on the research proposed by the study, it was possible to discuss that the quality of post-insertion care for CVC, maintenance and daily supervision of all vascular access systems are essential to prevent risks and ensure patient safety. One of the main pillars of this study highlighted the relevance of the patient's role in CVC care, which, within the scope of care management, highlights the activity of nurses for health education and its reflections on health literacy, effective communication, implementation of protocols and permanent education of professionals, including the nursing technical team.

Participants reported using heparin solution to maintain CVC permeability. However, the risks related to the use of this solution in onco-hematological patients are known, thus suggesting the reassessment of which solution to use, based on the risk-benefit of the solutions used.

Faced with the need to strengthen the management of nursing care to the transplanted patient, new investigations should be carried out supporting the development of new actions for the management of nursing care, articulated with professional practice and scientific evidence about this subject, as well

as strengthening the active participation of the patient in the center of care.

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