

CUIDADO É FUNDAMENTAL

UNIVERSIDADE FEDERAL DO ESTADO DO RIO DE JANEIRO • ESCOLA DE ENFERMAGEM ALFREDO PINTO

RESEARCH

DOI: 10.9789/2175-5361.2018.v10i4.964-970

Research contributions for the Nursing care in pediatric transplantation of hematopoietic stem cells

Contribuições da pesquisa para os cuidados de Enfermagem em transplante pediátrico de células-tronco hematopoiéticas

Contribuciones del estudio para los cuidados de Enfermería en el trasplante de células madre hematopoyéticas pediátrico

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How to quote this article:

Rodrigues JAP, Lacerda MR, Gomes IM, Paes MR, Ribeiro RP, Mercês NNA. Research contributions for the Nursing care in pediatric transplantation of hematopoietic stem cells. *Rev Fun Care Online*. 2018 oct/dec; 10(4):964-970. DOI: <http://dx.doi.org/10.9789/2175-5361.2018.v10i4.964-970>

ABSTRACT

Objective: This paper aims to propose ambulatory nursing care that helps the children's treatment after hematopoietic stem cell transplantation by using data from the research on sociodemographic and clinical profiles. **Methods:** It is a repercussive assay about the nursing care proposition based on both the research results and the nursing diagnoses in accordance with the Taxonomy from the North American Nursing Diagnosis Association. **Results:** The main diagnoses were the following: infection risk, impaired liver function risk, and impaired cardiovascular function. The nursing care included, as follows: vital signs control, food intake evaluation, catheter care, control of laboratory tests, evaluation of the body systems functioning, administration of medications and transfusions, microorganisms transmission control measurements, health/service education, and integrated communication with the interdisciplinary team. **Conclusions:** The nursing care actions were supported by evidences. Moreover, it was sought assisting the child and looking after their needs.

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DOI: 10.9789/2175-5361.2018.v10i4.964-970 | Rodrigues JAP; Lacerda MR; Gomes IM; et al. | Research contributions for the Nursing care...

Descriptors: Professional practicing, nursing care, hematopoietic stem cell transplantation, research in nursing.

RESUMO

Objetivo: Propor cuidados de Enfermagem ambulatoriais que subsidiem o tratamento de crianças em pós-transplante de células-tronco hematopoiéticas a partir dos dados advindos de pesquisa sobre perfil sociodemográfico e clínico. **Método:** Ensaio repercussivo sobre proposição de cuidados de Enfermagem baseados em resultados de pesquisa e por diagnósticos de Enfermagem segundo a taxonomia da North American Nursing Diagnosis Association. **Resultados:** Os principais diagnósticos foram risco de infecção, risco de função hepática prejudicada e risco de função cardiovascular prejudicada. Os cuidados de Enfermagem incluíram controle de sinais vitais, avaliação da ingesta alimentar, cuidados com cateteres, controle de exames laboratoriais, avaliação do funcionamento dos sistemas corporais, administração de medicamentos e transfusões, medidas de controle de transmissão de micro-organismos, educação em saúde/serviço e comunicação integrada com a equipe interdisciplinar. **Conclusão:** Os cuidados de Enfermagem foram sustentados por evidências e buscou-se o atendimento da criança em todas as suas necessidades.

Descritores: Prática profissional, Cuidados de Enfermagem, Transplante de células-tronco hematopoiéticas, Pesquisa em Enfermagem.

RESUMEN

Objetivo: Proponer cuidados de Enfermería ambulatoria que subsidiem el tratamiento de niños en el post trasplante de células madre hematopoyéticas a partir de los datos provenientes de estudios sobre el perfil sociodemográfico y clínico. **Método:** Ensayo repercusivo sobre proposición de cuidados de Enfermería basados en resultados de estudios y diagnósticos de Enfermería según la taxonomía de la North American Nursing Diagnosis Association. **Resultados:** los principales diagnósticos fueron el riesgo de infección, el riesgo de función hepática perjudicada y el riesgo de función cardiovascular perjudicada. Los cuidados de Enfermería incluyeron el control de señales vitales, evaluación de la ingesta alimentaria, cuidados con catéteres, control de exámenes de laboratorios, evaluación del funcionamiento de los sistemas corporales, administración de medicamentos y trasfusiones, medidas de control de transmisión de microorganismos, educación en salud/servicio y comunicación integrada con el equipo interdisciplinar. **Conclusiones:** Los cuidados de Enfermería se sostuvieron por las evidencias y se buscó el atendimento del niño en todas sus necesidades.

Descriptor: Práctica profesional, Atención de Enfermería, Transplante de células madre hematopoyéticas, Investigación en Enfermería.

INTRODUCTION

The conduct of research corroborates the development of science and professions, as it stimulates the improvement of professional practice by identifying the effectiveness and scope of the interventions, which contributes to the formation of a body of knowledge of its own. Research in the nursing field seeks to improve care and new knowledge, in which the professional surpasses the conception of simple doing, demonstrating competence to care.¹⁻² Researches aimed at professional practice propose actions in order to fill knowledge gaps toward the care quality enhancement.²⁻³

In the context of hematopoietic stem cell transplantation (HSCT), complex therapy that has an impact on the

personal, professional, family and social life of the individual in the face of the long period of treatment and the need to follow certain care guidelines, the search for evidence for nursing practice can contribute to achieving better results.

From this point of view, a cohort and retrospective study with quantitative approach was carried out with children undergoing HSCT, in which the sociodemographic and clinical profile of hospital discharge was identified up to 100 days of HSCT, i.e., during ambulatory care (about 70 days attendance). This is the average period of time of high home and return activities of daily life. The knowledge of this profile makes it possible to plan health care, subsidizing actions in addition to a mechanistic and protocol. Furthermore, it contributes to the dimensioning of nursing human resources, the implementation of Nursing Care Systematization and the reduction of hospitalization time.⁴

From the aforementioned research, it was possible to elaborate indicators for ambulatory nursing care in HSCT, highlighting the need for a differentiated care regarding the specificities of these patients. The small number of studies about HSCT in the perspective of nursing care, specifically in children, and the contribution that such indications can bring to nursing practice in HSCT, points out the need for performing them. Therefore, this research aims to propose ambulatory nursing care that helps the treatment of children in THCS.

METHODS

It is a repercussive assay about the nursing care proposition based on both the research results and the nursing diagnoses in accordance with the taxonomy from the North American Nursing Diagnosis Association.

It is a repercussive assay about the nursing care needed for children in HSCT in ambulatory care, based on the identification of the sociodemographic and clinical profiles between hospital discharge and the 100 days after transplantation. These data were obtained from a retrospective and cohort study with quantitative approach, which was carried out at a referral university hospital in HSCT located in the Southern region of Brazil. Data were collected from the children's record within the age group from 0 to 11 years old, also 11 months and 29 days at the transplantation time and that underwent the HSCT procedure from January 2009 to December 2013.

The data collection was performed through an active search in medical records from January to July 2015 and the analysis was by simple descriptive statistics with the help of the SPSS' Software 19.0 Statistical Package for Social Sciences. These were data collected for a Master Thesis.

The research is in accordance with the ethical precepts of Resolution No. 466/12 of the National Health Council and the project was approved by the Research Ethics Committee of the Health Sciences Sector from the *Universidade Federal do Paraná (CEP/SCS-UFPR)*, under the Legal Opinion No. 742.621 and CAAE: 19772813.8.0000.0102.

Some nursing diagnoses, present in the Taxonomy from the North American Nursing Diagnosis Association (NANDA), 2015-2017,⁵ were established in order to support the arranged care plan.

RESULTS AND DISCUSSION

Research data, nursing diagnoses and care

The research data related to nursing diagnoses and care are showed below.

- 1) *Research data*: age – 41.3% up to 5 years old
Nursing diagnoses: ineffective protection
Nursing care: involving the caregiver in the care service; monitoring child growth and development; Evaluate food pattern (acceptance, type of food, interval), considering the age of the child; communicating medical staff if they detect any abnormality (e.g., growing deficit);
- 2) *Research data*: origin – 63.8% from other States (31.8% from Northeastern)
Nursing diagnoses: impaired home maintenance
Nursing care: considering the home context in the planning and care guidelines to be performed at home; assessing available resources in the home; requesting social service support; recognizing the possibility of buying inputs and medicines; guiding the existence of support networks;
- 3) *Research data*: weight – less than the ideal considering the age
Nursing diagnoses: unbalanced nutrition: less than the bodily needs
Nursing care: recording and evaluate food intake (acceptance, quantity); performing body weighing once a day; investigating the types of feed offered/ingested by the child; requesting evaluation and follow-up of nutritionist; evaluating physiological elimination systems; evaluating/discussing the need of establishing more complex nutrition therapies;
- 4) *Research data*: the HSCT type – 51.4% HSCT not related and 12.3% of HSCT incompatible related
Nursing diagnoses: infection risk; risk of impaired skin integrity; impaired liver function risk; diarrhea; Risk of electrolyte imbalance; nausea
Nursing care: knowing the type of transplant to which the patient was submitted and of the donor; knowing the possible complications after the HSCT (GVHD, infections, cystitis, among others); performing anamnesis and physical examination for signs and symptoms associated with possible complications or toxicity; following the treatment and evolution of these events; evaluating the functioning of body systems through clinical evaluation and laboratory tests;
- 5) *Research data*: conditioning – 48.6% from myeloablative
Nursing diagnoses: risk of impaired cardiovascular function; risk of impaired liver function
Nursing care: evaluating the proper functioning of the body systems through clinical evaluation and laboratory tests; performing anamnesis and physical examination daily in search of signs and symptoms associated with the toxicity of the conditioning;
- 6) *Research data*: stem cells source – 19.6% from umbilical cord blood
Nursing diagnoses: infection risk; bleeding risk
Nursing care: controlling complete blood count results, especially leukocyte, neutrophil, and platelet levels; monitoring vital signs, watching for elevations in temperature;
- 7) *Research data*: mucositis – happened in 92.8% of the cases
Nursing diagnoses: swallowing impaired; impaired oral mucosa; infection risk; acute pain
Nursing care: evaluating the presence, evolution and resolution of mucositis; controlling food intake; performing body weighing; guiding, together with nutritionists, about the foods that may cause less discomfort; evaluating, together with nutritionists and physicians, the need for either nasoenteral probing or total parenteral nutrition;
- 8) *Research data*: colonization by multiresistant microorganisms – present in 26.1%
Nursing diagnoses: infection risk
Nursing care: keeping infected patients isolated; guiding preventive measures in a hospital environment; acting together with infection control commission to control the spread of microorganisms; conducting education of teams regarding infection control measures (isolation, hand washing, among others);
- 9) *Research data*: central catheter – present in 98.6%
Nursing diagnoses: infection risk
Nursing care: testing and maintaining the catheter output and input (double lumen); performing curative insertion, according to the routine of the service, looking for signs of infection; guiding care to the child and his caregiver about the catheter handling at home, then avoiding unnecessary manipulations;
- 10) *Research data*: granulocyte colony-forming stimulators – use in 52.2%
Nursing diagnoses: infection risk
Nursing care: giving medication as prescribed; controlling complete blood count values, especially the white cell lineage; strengthen infection prevention care (adequate food with cooked food, mask use, social isolation, hand washing); monitoring vital signs; performing hand hygiene before and after patient care and procedures;
- 11) *Research data*: antibiotics – use in 68.1%
Nursing diagnoses: infection risk; hyperthermia
Nursing care: collecting cultures (catheter and peripheral) immediately at the beginning and at the

time of fever; initiating antibiotic early; following the interval between doses; collecting and monitoring the values of the complete blood count; confirming and controlling vital signs, with special attention to fever; maintaining venous access (central or peripheral);

12) *Research data*: antiviral drugs – use in 51.4%

Nursing diagnoses: infection risk

Nursing care: early start the antiviral therapy; following the interval between doses; controlling laboratory tests; keeping suspected or confirmed cases of respiratory infections in isolation; guiding the patient to avoid contact with people with respiratory symptoms; advising mask use; performing and guiding hand washing, hygiene and environmental maintenance;

13) *Research data*: transfusions – 55.8% use of blood components and blood products

Nursing diagnoses: risk of unbalanced volume of liquids; risk of impaired cardiovascular function; hyperthermia

Nursing care: redirecting a blood request to the Blood Bank together with a blood sample; controlling vital signs before, during and at the end of the transfusion; monitoring the appearance of signs and symptoms of transfusion reaction; administering drugs, collecting culture and biological sample in case of transfusion reactions and according to the protocol of the institution.

Regarding the age, it can be highlighted that children are more vulnerable to diseases because they are at an extreme age.⁴ In this way, they demand greater nursing care, since in addition to the care after the HSCT procedure, also care is necessary in child development, such as feeding and need for permanent caregiver, referring to nursing diagnosis ineffective protection. Furthermore, the nursing team may experience greater physical and psychological distress when dealing with these patients, associated with the fact that the caregiver of this child needs to be involved in care.⁶⁻⁷ Thus, the nursing professionals should consider the specificities of this population in the planning and implementation of the care plan.

Another aspect that deserves to be highlighted and interferes with care is the high percentage of children from other States, where the Northeastern region of Brazil represented the majority showing 31.8%. The HSCT is highlighted as a process impacting the child and his family in face of the diversity of physical, social and alimentary restrictions, among others,⁷ and also it is necessary readapting in the life process. The demand for care is enhanced when the family is forced to move from their home city to follow treatment at a distant referral center. In this sense, the nursing professional, when guiding and caring, needs to consider the home context, even if temporary, in which the child and his caregiver reside, evaluating the resources available in the home to perform the care.

It becomes necessary the combined action between nurse and social worker in order to evaluate the suitability of the home to receive the child after the HSCT. Additionally, it is necessary to recognize the possibility of buying clothes,

supplies and medicines, necessary after the HSCT, by the family so that the care can be fully developed or considered as donations. The caregiver should be oriented to the availability of social support networks, whether in obtaining physical resources, social rights or support services.

Regarding the children's weight, they generally showed low weight-for-age at admission to undergo HSCT, with six-year-old weighing 6 kg, seven-year-old weighing 15 kg, and nine-year-old weighing 13 Kg. After the HSCT, there may be weight loss due to adverse reactions of the treatment, increasing the risks since these children were already underweight in the first days of hospitalization. Thus, the diagnosis of nursing unbalanced nutrition: less than the bodily needs were present. This is one of the nursing diagnoses most evidenced in a previous study, in patients submitted to HSCT with graft disease,⁸ which does reinforce the risk of transplanted patients.

Therefore, nursing care for these underweight children involves monitoring the child's weight development, performing the body weighing and acting together with nutritionists, when necessary; Intervene in a preventive way regarding the risk of malnutrition and hydroelectrolytic imbalances that permeate the HSCT process by evaluating and recording food and water intake, both in terms of quantity and quality of food; and evaluate the functionality of physiological elimination systems. When necessary, it is important to discuss with nutritionists and physicians the need to establish more complex food support therapies if weight loss is significant and leads to bodily functions.

Regarding the HSCT type, the unrelated allogeneic showed a higher number (51.4%); Allogeneic transplantation is associated with a higher risk of complications, such as Graft-Versus-Host Disease (GVHD).⁹ Therefore, nursing diagnoses are related to the impairment of organs functions that may be affected by HSCT complications, such as risk of infection (use of corticosteroids to treat GVHD may lead to immunosuppression), risk of impaired skin integrity, impaired liver function risk, and diarrhea.

This data requires nursing to have prior knowledge of the patient's type of transplantation and donor, adequate anamnesis and physical examination of the child in search of signs and symptoms mainly associated with GVHD, such as cutaneous rash, diarrhea, jaundice, among others. It is important to evaluate and record the evolution of signs and symptoms indicative of GVHD, reporting aggravations to the medical team.

The HSCT with incompatible donor, which added 12.3%, including haploid individuals, which has been growing in the service where this research was performed, represents an important modality of transplantation, as it presents a percentage of 50% incompatibilities in the Human Leukocyte Antigen (HLA). In this type of transplantation conditioning and immunological prophylaxis are differentiated and may be more aggressive, with extensive prevention of GVHD.¹⁰ Recalling that HLA incompatibilities are related to delayed immune reconstitution and increased risk of GVHD and rejection of grafted cells.¹¹ Hence, by receiving a more aggressive

pre-HSCT preparation to prevent rejection, the adverse effects of treatment may be potentiated, compromising the recovery after the HSCT.

Some nursing diagnoses for these situations, with risk for the development of GVHD, are risk of impaired liver function, risk of electrolyte imbalance, diarrhea, nausea and impaired cardiovascular function. Nursing care, in this context, should prioritize the identification of signs and symptoms indicative of adverse effects of conditioning or even toxicity, such as nausea, vomiting, diarrhea, weight loss and deficits in the functioning of body systems, in addition to those also related, such as skin rash, diarrhea and liver changes, as well as after the HSCT rejection. The treatment follow-up and the evolution of these events must be taken care by the nursing care.

The percentage of children who received more aggressive (myeloablative) conditioning (48.6%), with a higher risk of toxicity is highlighted.¹² In the meantime, nursing diagnoses also refer to the involvement of the organs, which were risk of impaired cardiovascular function and impaired liver function risk.

The nursing care is also related to the control of the proper functioning of the various systems, as follows: cardiac, respiratory, digestive, renal, hepatic, since there may be impairment to the functioning of the same according to the type of conditioning performed. Anamnesis and daily physical examination by the nurse are instruments for the evaluation of these systems.

The source of stem cells used for HSCT is also an element that interferes with the recovery and evolution of the patient, therefore, in nursing care. When cord blood is used, as was the case with 19.6% of the children evaluated, the spinal cord is more time consuming, with persistence of neutropenia.¹³ In this way, the patient may be more susceptible to complications, especially infectious ones, such as the spinal function is not satisfactory. The nursing diagnoses evidenced both infection risk and bleeding risk. This fact demands of the nurse the control of the laboratory tests, especially the complete blood count, and monitoring of vital signs, situations in which it is possible to identify possible failure or delay in the spinal cord.

The presence of mucositis, a complication related to conditioning, was present in 92.8% of the children. In some situations, this complication may remain even after the patient is discharged, nursing the impaired swallowing diagnosis, as well as impaired oral mucosa, risk of infection and acute pain. This result evidences the need of the nurse to monitor the presence, evolution and resolution of mucositis, besides evaluating the control of food intake and body weight, as well as guiding, together with nutritionist, foods that may cause less discomfort.

The need for nasoenteral catheterization for feeding or other more complex therapies, such as total parenteral nutrition, should also be evaluated, along with nutritionist and physician. It should be remembered that the presence of mucositis makes the gastrointestinal mucosa vulnerable to complications, especially the infectious ones,¹⁴ and the child should have the vital signs monitored.

The colonization by multiresistant microorganisms was detected in the mentioned research (26.1%), then being a risk factor for infections,¹⁵ characterizing the nursing diagnosis of infection risk. The action between the multidisciplinary team and the infection control commission is necessary for measures to control the spread of microorganisms, such as the isolation of colonized patients and hand hygiene. The effectiveness of these measures is also a nursing care, remembering that the nurse can act in the permanent education of the teams and evaluation of the adoption of such measures by all members of the health team for being present at all times in the care of patients. This professional should intervene when necessary and propose adjustments.

The presence of the central venous catheter was identified in almost all children (98.6%). The use of the central catheter is essential in the treatment of HSCT for the collection of biological samples for the necessary laboratory tests and administration of medications and transfusions of blood components and/or blood products.¹⁶ The catheter allows the optimization of nursing time since the peripheral venous puncture is not necessary, however, nurses should prevent and evaluate the development of complications such as bleeding, pneumothorax, cardiac arrhythmia, air embolism, malposition, thrombosis, infection and inadequate functioning.¹⁶ The main associated nursing diagnosis is a risk of infection and conduct should be daily assessment of the patient and testing and maintenance of catheter pathways.

The maintenance of the central catheter is a nurse private activity, it is up to this professional to manipulate the device and perform curative insertion, paying attention to signs of infection or displacement. In the case of immunosuppressed patients, the risks associated with manipulation of the catheter must be known by the nursing professional.

Infection and obstruction are some of the major risks that can lead to catheter loss, which are preventable. In terms of catheter loss, 8% of events were found, the main ones being infection and displacement or traction. Nursing care for the device should pay dearly for as few avoidable events as possible. The adequate lavage of the catheter routes using aseptic technique and following the protocol of the institution are the main nursing care, in addition to guiding care with the catheter in the home to the child and his caregiver, avoiding unnecessary manipulations.

Sometimes the patient's immunity, even after hospital discharge, may not be satisfactory, requiring the use of granulocyte colony-stimulating stimuli to prevent infections, as was the case with 52.2% of the children in the study. Such a situation also characterizes the nursing diagnosis risk of infection, since these children had low immunity.

Nursing care refers not only to the administration of the medication, but also to the control of the blood count values, especially the white blood cell line, before and after the administration of the drug. Some care guidelines should also be reinforced by the nurse in order to prevent the incidence of infections and other complications, such as proper eating

(eating only cooked food), mask use, social isolation, hand washing, among other care. Monitoring of vital signs, control of laboratory tests and hand hygiene are some precautions reinforced by study in order to prevent infection.⁸

Because it is an immunocompromised patient, the HSCT patient may present some signs and symptoms that point to the use of antibiotics in a therapeutic and not only prophylactic way, such as fever. In all, 68.1% of the children used antibiotics therapeutically, referring to nursing diagnoses hyperthermia and risk of infection. Nursing care related to antibiotic therapy should focus especially on the collection of cultures immediately at the beginning and at the time of fever, early onset of medication, as soon as it is prescribed, in order to institute early the dose of attack, in addition to the interval follow-up of the therapy so that the serum level and its effectiveness are maintained.

Moreover, some laboratory tests must be collected and monitored, such as the following: getting a complete blood count; verifying and controlling the vital signs; paying special attention to the presence of fever in the child and to maintain care for an effective antibiotic therapy, such as maintenance of patent venous access and follow-up of the evolution of the signs and symptoms of the infection.

In addition to antibiotics, antivirals were also present in 51.4% of a therapeutic form, being the most common cause the positive antigen test for cytomegalovirus. This finding highlights the importance not only of identifying signs and symptoms indicative of viral infections, as they are important causes of morbidity and mortality,¹⁷ as well as the collection and monitoring of the results of the antigen tests. In addition to cytomegalovirus, respiratory virus infections have also been found, which points to the nursing diagnosis of infection risk and the nurse's need to guide care that minimizes exposure to respiratory viruses by patients, such as avoiding contact with people with respiratory symptoms, isolation of suspected or confirmed cases of these infections, mask use, hand washing, hygiene and maintenance of the environment.

After the HSCT period it may also be necessary to use blood components and blood products, which was proven in the mentioned research (55.8%). Transfusions are procedures that involve risk of reactions, as evidenced in 8.6% of children. Some nursing care, in addition to the referral of the transfusion request, sample collection and administration of blood components and blood products, refer to the strict control of vital signs before, during and at the end of the transfusion, as well as the monitoring of the appearance of signs and reaction symptoms.

Some reactions can be extremely serious, requiring the patient to stay with the patient throughout the transfusion period, as well as symptomatology-based care, such as medication administration, culture and biological sample collection, oxygen therapy and other care.

Some care includes establishing the need for guidance to the child and his/her caregiver, as well as an understanding of the recommendations provided, facilitating the transition between hospital and home,¹⁸ stimulating the combined participation of the child care provider during ambulatory

care after the HSCT, providing opportunities for teaching and clarifications; and evaluation of the need of psychological support to the companion and recognition of emotional and physical factors that interfere in the nursing care provided.

The limitations for this study are due to its realization in only one transplant center, in this way, it is not possible to generalize the results to the other populations that underwent the HSCT procedure. Furthermore, the use of secondary data is dependent on the information described in medical records, which may not be complete.

CONCLUSIONS

The research of identification of sociodemographic and clinical profile made possible appointments for the nursing care to children after the HSCT and under ambulatory care, interrelating with nursing diagnoses. Although some of the aforementioned care practices make up the daily nursing practice, the specificities presented by children, immunocompromised and submitted to HSCT are highlighted, and these care needs to be adapted to this population.

One factor that stands out is the need to understand that the work of the nurse, as well as any professional is not done by itself. It is important to recognize the urgency of an interdisciplinary work so that the patient can be attended to in all their needs. In this way, it can be seen that in the proposals of cared for care, it is pointed out to this action and cooperative discussion of how best to proceed for the recovery of the patient and their environment.

It is believed that the care relationship presented here is not over, however, it is recognized that this is an awakening to the need to organize and discuss scientifically and in a directed way the nurse's care practice in the service performed in the HSCT.

In practice, the implications refer to the standardization of care for children undergoing HSCT in the service where the study was conducted, as well as the support of such evidence care, with the strengthening of professional practice. In this way, we highlight the follow-up of patient evolution and contribution to its recovery.

Herein, we aim to encourage the discussion about nursing care in HSCT and to reaffirm the need to know the profile of the clientele to whom the care is intended, thus, the nurse's actions can be based and supported by evidences.

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Received from: 02/10/2017

Reviews required: No

Approved on: 03/09/2017

Published on: 10/05/2018

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