

Nurses' attitudes in the administration of chemotherapy in pediatric oncology

Atitudes de enfermeiros na administração de quimioterápicos em oncologia pediátrica

Actitudes de enfermeros en la administración de quimioterápicos en oncología pediátrica

*Fernanda Machado Silva-Rodrigues^I; Jennifer Kamila da Silva^{II}; Michelle Darezzo Rodrigues Nunes^{III};
Luciana Gonzaga dos Santos Cardoso^{IV}; Lucila Castanheira Nascimento^V*

ABSTRACT

Objective: to examine nurses' attitudes to the administration of antineoplastics in pediatric oncology. **Method:** this descriptive study used statistical data analysis. The participants were twenty nurses, who administered chemotherapy to children and adolescents at a teaching hospital in São Paulo City. In 2016, data were collected using a self-report questionnaire on the participants' characteristics and their experience with chemotherapy administration, which included the main chemotherapy-related fears, concerns and potential adverse events. **Results:** few participants were specialists in the field of oncology or pediatrics; most sought knowledge and capacity-building on their own initiative; and the nurses classified the activity as complex and specific to those with an interest in the field. **Conclusion:** all the nurses considered chemotherapy the main treatment for childhood cancer. The factors that most concerned the participants were the risk of extravasation and the lack of appropriate devices for drug administration.

Descriptors: Antineoplastic agents; health knowledge, attitudes and practice; medical oncology; pediatric nursing.

RESUMO

Objetivo: analisar as atitudes de enfermeiros acerca da administração de antineoplásicos em oncologia pediátrica. **Método:** estudo descritivo, com análise estatística dos dados. Participaram 20 enfermeiros de um hospital de ensino, localizado na capital paulista, que administravam quimioterapia (QT) a crianças e adolescentes. Em 2016, mediante questionário autoaplicável, foram coletados dados de caracterização dos participantes e sobre suas atividades profissionais na administração de QT, que incluíam principais receios e preocupações, além dos potenciais eventos adversos associados à quimioterapia. **Resultados:** poucos participantes eram especialistas na área de oncologia ou pediatria; a maioria dos profissionais buscou conhecimento e capacitação por iniciativa própria; os enfermeiros classificaram a atividade como complexa e específica para quem possui interesse na área. **Conclusão:** todos os enfermeiros consideraram a QT o principal tratamento para o câncer infanto-juvenil. O risco de extravasamento e a falta de dispositivos adequados para administração das drogas foram os fatores que mais preocuparam os participantes.

Descritores: Antineoplásicos; Conhecimentos, Atitudes e Prática em Saúde; Oncologia; Enfermagem pediátrica.

RESUMEN

Objetivo: analizar las actitudes de enfermeros acerca de la administración de antineoplásicos en oncología pediátrica. **Método:** estudio descriptivo, con análisis estadística de los datos. Participaron 20 enfermeros de un hospital de enseñanza, ubicado en la capital de São Paulo, que administraban quimioterapia (QT) a niños y adolescentes. En 2016, a través de cuestionario autoaplicable, se recopilaron datos sobre la caracterización de los participantes y sobre sus actividades profesionales en la administración de quimioterapia que incluían los principales temores, preocupaciones y potenciales eventos adversos asociados a la quimioterapia. **Resultados:** pocos participantes eran especialistas en el área de oncología o pediatria; la mayoría de los profesionales buscó conocimiento y capacitación por iniciativa propia; los enfermeros clasificaron la actividad como compleja y específica para quien tiene interés en el área. **Conclusión:** todos los enfermeros consideraron la quimioterapia como el tratamiento principal para el cáncer infantil. El riesgo de extravasación y la falta de dispositivos adecuados para la administración de las drogas fueron los factores que más preocuparon a los participantes.

Descritores: Antineoplásicos; conocimientos, actitudes y práctica en salud; oncología médica; enfermería pediátrica.

INTRODUCTION

Cancer in children and in young people is a group of various diseases that have the disordered proliferation of abnormal cells¹ in common. In Brazil, it is the second leading cause of death in children and adolescents, between one and nineteen years old, the first cause being related to violence and accidents^{1,2}. In addition, it is an overwhelming event that causes unexpected changes and reactions, not only in the child's life, but also in the lives of his/her family members².

^INurse. PhD in Sciences. School of Medical Sciences of Santa Casa de São Paulo. SP, Brazil. E-mail: fernanda.rodrigues@fcmssantacasasp.edu.br

^{II}Nurse. Resident of the Pediatric Oncology Multi-professional Residency Program. Institute of Pediatric Oncology. São Paulo, Brazil. E-mail: jennifer-kamila@live.com

^{III}Nurse. PhD in Sciences. Nursing Faculty of Rio de Janeiro State University, Brazil. E-mail: mid13@hotmail.com

^{IV}Nurse. Master of Science. School of Medical Sciences of Santa Casa de São Paulo. Brazil. E-mail: lucianagcardoso@uol.com.br

^VNurse. PhD in Sciences. Ribeirão Preto College of Nursing, University of São Paulo. Brazil. E-mail: lucila@eerp.usp.br

Currently, several treatment modalities are employed for the treatment of cancer in children and in young people; among the main ones are chemotherapy, surgery and radiotherapy, depending on the type of tumor and the extent of the disease³. Chemotherapy is the most commonly used treatment modality and may be associated or not with other types of treatment^{3,4}.

Although the use of cytotoxic drugs increases the success in the therapeutic response against child cancer, these drugs act by destroying or inhibiting the growth of rapidly multiplying cells without differentiating the cancer cells from healthy ones, leading to adverse effects like myelosuppression, nausea, vomiting, diarrhea and alopecia⁵.

The administration of cytotoxic drugs, especially to young children, is considered a complex task that requires specific knowledge, besides presenting a greater potential for errors and transgressions of the pediatric patient safety principles^{2,3}. Additionally, the administration of such drugs is part of a complex process that also includes occupational precautions due to the risks associated with the exposure to such agents³.

Nurses are primarily responsible for ensuring that the chemotherapy administration procedure is safe for all involved, providing the necessary support and enabling the patient and family to cope with the complications of this treatment modality². Given the above, this study aimed to analyze the nurses' attitudes regarding antineoplastic administration in pediatric oncology.

LITERATURE REVIEW

Since nurses play an extremely important role in the administration of chemotherapy, it is essential that these professionals have sufficient knowledge and skills to plan their actions and fully assess the pediatric cancer patient¹⁻³.

A British study conducted with nurses working in pediatric oncology found that the professionals felt anxious and worried about the errors during chemotherapy administration⁶. Another study⁷ indicated that administering chemotherapy was a stressful activity for some nurses, contrary to the rewarding side of caring for these patients and their families. Among the main factors causing stress were the following: adverse effects caused by the drugs, the low level of information of the patients and their families, and the professionals' own limited knowledge of the therapy⁷.

Some studies show the depth of knowledge the professionals providing care to pediatric cancer patients must have of the drug action mechanisms and that they must be updated on the new technologies, not only to perform the procedure of administering chemotherapy with expertise, but also to provide appropriate care to the needs of these clients, especially those related to the recognition and management of the adverse effects of the therapy^{4,5,7}. However, there is little evidence on the educational strategies that contribute to the training of nurses in this field of knowledge^{7,8}.

The United States of America (USA) is among the few countries that have courses for the development of skills for the administration of chemotherapy to pediatric patients⁷. Most European countries do not offer standardized training to their nurses, since the hospitals adopt their own educational protocols and programs⁶.

Nevertheless, the role of the nurses in the administration of antineoplastic therapy in pediatric oncology, their attitudes, knowledge and ability to perform such procedure are still insufficiently described in the literature, especially in the national context.

METHODOLOGY

A descriptive study with statistical analysis of the data, performed in 2016 at the Pediatric Oncology Service of a teaching hospital, located in the city of São Paulo. The research was approved by the Human Research Ethics Committee, under the protocol No. 1,396,366.

Of the 21 nurses who administered antineoplastic therapy as part of their care activities for children and adolescents with cancer, only one did not participate in the study because she was on vacation at the time of data collection.

For data collection, a self-completed questionnaire was elaborated, whose content was based on the published literature on the theme^{4,6}. The instrument included items related to the professional characterization data (time since graduation, time of experience in antineoplastic administration and level of training); questions regarding the administration of such drugs; main worries and concerns when administering them in the pediatric population; circumstances that caused insecurity in managing them; feelings experienced in the first administration of antineoplastic drugs; knowledge about adverse events or common toxicities in children undergoing treatment with

cytotoxic drugs and the purpose of chemotherapy in the treatment of cancer in children and young people according to the professionals.

The data was entered in a *Microsoft Office Excel* (2014 version) spreadsheet and submitted to consistency analysis by double typing. The spreadsheets were compared for identification and correction of possible divergences. Descriptive statistics was used for data analysis.

RESULTS

Of the 20 nurses included in the study, eight (40%) had graduated over 10 years ago, had experience in administering cytotoxic drugs from one to five years and most had neither pediatric nor oncology expertise (11, 55%) as shown in Table 1.

TABLE 1: Characterization of the participants. São Paulo, 2016.

Variables	f (%)
Gender	
Female	19(95)
Male	1(5)
Time of training	
> 10 years	8(40)
6 to 10 years	7(35)
1 to 5 years	5(25)
Cytotoxic drug administration time	
> 10 years	3(15)
6 to 10 years	5(25)
1 to 5 years	8(40)
< 1 year	4(20)
Training (Specialization)	
In Pediatrics	7(35)
In Oncology	2(10)
Others ^(*)	6(30)
Did not have any specialization	5(25)

^(*)Other specializations included the following: hospital management/administration, urgency and emergency, public health, neonatology and nursing teaching

The nurses were asked about the feelings experienced during the first administrations of chemotherapy. Fear, apprehension and insecurity were the most frequent answers (11, 38.0%), as described in Table 2.

Although most of the nurses did not have any specialized training in pediatrics or oncology, only three (6.7%) stated that they were not prepared for the first CT administration. The search for knowledge on their own initiative was the strategy used by most professionals (12, 75.0%) to minimize their insecurity when performing the technique, as described in Table 2.

For most of the nurses, the administration of antineoplastic drugs was considered complex and specific for those interested in pediatric oncology (16, 84.2%). However, for 2 (10.5%) professionals CT administration is similar to the administration of other pediatric medications, which can be seen in Table 3.

The risk of extravasation was considered the main fear in the first administrations of chemotherapy for 17 (37.9%) nurses, and also the main concern reported in the administration of antineoplastic drugs for 17 (37.9%) professionals, making up 45.9% of the codes.

TABLE 2: Feelings, fears and seeking help in the first administrations of chemotherapy to children. São Paulo, 2016.

Variables	f (%)
Feelings	
Fear of possible adverse drug reactions in the pediatric patient	6(20.7)
Fear and insecurity	5(17.3)
Concern regarding the emotional aspects of the pediatric patient and his/her family	5(17.3)
Security and peace of mind	5(17.2)
Moved for being a child	3(10.3)
Can't remember or couldn't describe	3(10.3)
Responsibility to restore the health of the child	2(6.9)
Total of feelings	29(100.0)
Fears	
Extravasation	17(38.6)
Adverse reactions in the child	14(31.8)
Lack of knowledge of the chemotherapy drugs	4(9.1)
Occupational risk fears (self-exposure to antineoplastics)	4(9.1)
Perception of not being prepared to perform the activity	3(6.8)
Lack of knowledge of recommended administration precautions	2(4.6)
Total of fears	44(100.0)
How to handle fears	
Search for knowledge on own initiative	12(75.0)
Practical learning	4(25.0)
Total of how to handle fears	16(100)

Only 1 (2.8%) professional reported feeling insecure when administering chemotherapy. When specifically asked about when they feel most insecure to administer antineoplastic drugs, 8 (44.4%) nurses reported insecurity when the sector has a high number of patients, according to Table 3.

Considering each participant's experience, they wondered what they thought about chemotherapy drugs as a treatment for cancer in children and young people, and all 20 (100%) participants mentioned that chemotherapy is the main treatment for most cancers in children and young people.

The adverse effects were the second main fear of the professionals, cited by 14 (70%) nurses, and making up 31.3% of the codes found. Specifically in relation to the adverse effects experienced in the administration of antineoplastic drugs, gastrointestinal alterations, such as nausea and vomiting, were reported by all the professionals (20, 100%), composing 37% of the identified codes, followed by hypersensitivity and anaphylaxis, cited by 8 (40%) nurses (14.8% of codes) and extravasation or infiltration of vesicant drugs, cited by 5 nurses (8.6% of codes), according to Table 3.

DISCUSSION

The present study aimed to describe the nurses' attitudes towards the administration of antineoplastic drugs in pediatric oncology. The literature on the theme, both in terms of specific manuals and guidelines, as well as scientific articles, is still quite incipient, especially in the Portuguese language.

The sociodemographic characteristics of the sample investigated were the following: nursing professionals of both genders, adults, with time after graduation between one year and more than ten years. Female professionals predominated, a historical characteristic in the nursing practice up to the present day⁸.

Although the training time of the nurses ranged from one year to over 10 years, none of the participants worked exclusively in the care of pediatric cancer patients. Although most had the title of specialist, it was observed that none of the nurses specialized in the area of pediatric oncology, something that is justified by the small offer of *lato sensu* postgraduate courses in this area, usually offered in the big capitals.

Only two professionals were specialists in oncology, a training that potentially better qualifies them for the administration of chemotherapy drugs, which is different from the study conducted in the United Kingdom, where the majority (64%) of the nurses participating in the research were experts in this area⁶. In the same study, regarding cytotoxic drug administration, nurses presented, above all, concerns regarding the emotional aspects of the pediatric patient and his/her family⁶, this is in agreement with the findings of this research, in which it was observed that the professionals with a specialization in pediatrics or oncology showed a greater concern with the emotional aspects of their patients and families.

TABLE 3: Classification of the activity, concerns, insecurity and adverse effects experienced in the administration of chemotherapy drugs. São Paulo, 2016.

Variables	f (%)
Classification of the activity	
Specific for those interested in the area of pediatric oncology	9 (47.4)
Complex	7 (36.8)
Similar to the administration of other pediatric medications	2 (10.5)
Challenging	1 (5.3)
Total of classification of the activity	19 (100)
Concerns	
Risks of extravasation of the drugs involved	17 (45.9)
Lack of appropriate venous devices and accesses	10 (27.0)
Unaware of the care measures and particularities of the administered drugs	6 (16.2)
Unaware of the possible adverse drug events	3 (8.1)
Insecurity when administering chemotherapy drugs	1 (2.8)
Total of concerns	37 (100)
Insecurity	
When the sector has a high number of patients	8 (44.4)
When staffing is reduced	6 (33.3)
During the night shifts	2 (11.1)
I do not feel insecure when administering chemotherapy	2 (11.1)
Total of insecurity	18 (100)
Adverse effects	
Gastrointestinal disorders	20 (39.2)
Hypersensitivity or anaphylaxis	8 (15.7)
Vesicant drug extravasation or infiltration	5 (9.8)
Hematological changes	3 (5.9)
Metabolic changes	3 (5.9)
Indisposition	2 (3.9)
Anorexia	2 (3.9)
Fever	2 (3.9)
Emotional changes	2 (3.9)
Events never or rarely associated with antineoplastic therapy	2 (3.9)
Alopecia	1 (2.0)
Hypotension	1 (2.0)
Total of adverse effects	51 (100)

It is believed that specializing in a particular area of practice may favor the nurses' understanding of the peculiarities inherent to caring in certain specializations. In other words, attention to the emotional aspects of both children and their families is shown as an aspect that transcends the technical knowledge related to the administration of chemotherapy^{2,6}.

The fear of extravasations and the occurrence of adverse reactions were highlighted. Unlike other studies published in the literature^{3,4,6}, few nurses showed lack of preparation for the administration of chemotherapy drugs, and most reported seeking knowledge on their own initiative.

The risk of extravasation and the lack of adequate venous devices and access for the administration of chemotherapy drugs were some of the most worrying factors for the participants. It is noteworthy that these two factors deserve attention, since the absence of a preserved venous network and adequate venous access devices increase the risks of extravasation, which represent serious consequences for the pediatric patients, including tissue necrosis^{4,6}.

In seeking help to address their fears and insecurities, the professionals tried to acquire knowledge on their own initiative, which expresses concern and a movement to improve care that, consequently, may reduce the chances of

errors in the administration of cytotoxic drugs. Corroborating with this finding, a recent study on the continuing education of oncology nurses identified that the education strategies provided by the hospital institutions are based on admission training, courses and scientific events on various subjects, without any specific training in chemotherapy, which leads the professionals to seek this competence in specialized institutions⁹. Contrary to what was found in other international studies, in which nurses received updated and regular knowledge, besides the opportunity to live in the workplace with professionals more experienced in the administration of chemotherapy, which indicates that the competence for this activity results not only from clinical experience, but also from educational activities and updating of practices^{3,4,6}.

It is essential that institutions provide means for the constant training of these professionals, as well as specific training and guidance, especially related to the management of adverse effects and complications in antineoplastic treatment^{10,11}.

Pointing out the moments when they felt most insecure to administer cytotoxic drugs, the participants mentioned situations in which the sector had a high number of patients or reduced staffing. These findings corroborate the results of another study, in which the professionals stated that the large workload, the lack of staff and the high number of patients are factors that compromise the safe administration of the chemotherapy drugs³. Additionally, other studies indicate greater insecurity of the nurses in the administration of chemotherapy during night shifts^{6,7,9,10}.

The employees of a public and general hospital often do not perform some care activities by choice, but by institutional need, given the shortage of staff in certain sectors, for example. Therefore, it is understandable that some participants have classified antineoplastic drug administration as complex and specific for those of special interest in pediatric oncology, which shows that they recognize the specificities of administering such drugs to this population.

The study showed that the attempt to train non-specialist nurses with no interest in the field of pediatric oncology is challenging because it is an especially complex practice with great potential for errors⁶. The administration of chemotherapy drugs to children and adolescents, especially young children, is considered even more difficult for nurses, due to the particularities of this age group and the different stages of child development¹². The nurse must be sure of their attitudes, their competences and technical skills while performing this procedure^{4,6}. Included in this process is the use of their judgment, energy, experience and motivation to respond to the demands required in the pursuit of complex professional activities^{9,13}.

The literature also recommends that the cytotoxic drugs be administered exclusively by specialized nurses, considering that these, besides having specific knowledge about antineoplastic treatment, have greater mastery of the aspects related to caring for pediatric patients and their families^{2,7}. Another study pointed out that the knowledge of a nurse without specialization about the use and importance of antineoplastic drugs may be limited, which increases the chances of errors and lack of control in adverse situations³.

Thus, specialized training is essential for the nurses working in this area, which requires a broad understanding of the procedures, as well as advanced skills based on scientific principles^{10,13,14}.

All the professionals considered chemotherapy as the main treatment for cancer in children and young people, in agreement with other studies that highlighted the important role played by antineoplastic agents in the treatment of pediatric cancer diseases^{7,9,14,15}.

The nurses' knowledge is extremely important for the direction of care because, if these professionals are not competent enough to administer chemotherapy, the safety of the procedure may be compromised, the chances of medication errors can be increased and the harm to the patient may be greater, as well as increasing the sources of stress for the children and their families^{4,6,16}.

The study participants were restricted to the most common toxicities and adverse effects, such as gastrointestinal (nausea and vomiting), which are not considered to be the most serious or require specialist nurse assistance^{10,13,17}. This result converges with other studies that addressed the educational needs of nurses working in pediatric oncology in countries with similar profiles to Brazil's¹⁴⁻¹⁶. For the participants in two of these studies, CT administration and knowledge of the possible adverse reactions associated with antineoplastic drugs were identified as a priority for training and updating^{14,16}.

The adverse effects related to chemotherapy drugs are known to go far beyond the gastrointestinal ones, including fatigue, pain, sleep disorders, mucositis, weight loss and alopecia, all of which deserve the attention of the nurses, since they greatly compromise the quality of life of the pediatric patient^{18,19}.

It is important to highlight that, according to the literature, hypersensitivity reactions and anaphylaxis, cited as relevant by the participants of the present study, are not common events and are restricted to only some chemotherapeutic agents, for example, L-Asparaginase¹⁷, a chemotherapy drug widely used in the treatment of childhood leukemia.

The main findings of this research meet the constant need for investments in the qualification and updating of the professionals by the health institutions. The use of operational protocols and the promotion of training and continuing education activities are examples of essential strategies to qualify the care provided to pediatric cancer patients^{9,20,21}.

It is known that childhood cancer is a rare disease, but the complexity and specificity of care in this specialty are unquestionable; apart from the need for training and/or updating in relation to the administration of chemotherapy drugs^{10,22}. The small sample size is not considered a limiting factor of the present study because, even in hospitals specializing in the treatment of childhood cancer, not all the nurses act directly in the administration of antineoplastic therapy to children and adolescent.

Aspects such as professional safety in the administration of pediatric CT may be the object of future investigations, but were not part of the scope of this study, which aimed to describe, essentially, the attitudes of nurses towards an important procedure that integrates the care activities in pediatric oncology.

CONCLUSION

This is the first study about this topic in Brazil and one of the few available in the literature. Therefore, it consists of the initial approach of an extremely relevant theme for nurses working in this area.

In pediatric oncology, both the specific care involved in the administration of cytotoxic drugs and the interventions performed in the event of possible adverse events need to be supported by scientific knowledge. The knowledge of antineoplastic therapy in childhood must be added to the knowledge of the clinical, growth and development peculiarities of the pediatric public.

Regarding the nurses' attitudes towards CT administration in pediatric oncology, the following aspects were highlighted: few were oncology or pediatric specialists; the search for knowledge on their own initiative was the strategy adopted by the majority for better training; the nurses classified the procedure as complex and specific for those who have a special interest in the area of pediatric oncology; the risk of extravasation and the lack of adequate drug delivery devices were the factors that most concerned the participants, and all the nurses considered chemotherapy as the main treatment for cancer in children and young people.

Given the complexity and specificity of this activity, it is concluded that investment in professional training is indispensable, as well as future research studies that address the educational needs of nurses regarding the administration of chemotherapy to these patients.

REFERENCES

1. INCA. Protocolo de diagnóstico precoce do câncer pediátrico. Brasília, DF, Brasil. [Internet]. 2017 [cited 2019 Oct 04]. Available from: <https://www.inca.gov.br/publicacoes/livros/protocolo-de-diagnostico-precoce-do-cancer-pediatico>
2. Cruz EF, Silva LF, Goes FGB, Aguiar RSB, Moraes JRMM. Nursing orientation given to children in antineoplastic chemotherapy treatment. *Rev. Eletr. Enf.* [Internet]. 2014 [cited 2019 Sep 15]; 16(2):378-85. Available from: <http://dx.doi.org/10.5216/ree.v16i2.27009>. DOI: <http://dx.doi.org/10.5216/ree.v16i2.27009>
3. Belderson K, Billett, AL. Chemotherapy safety standards: a pediatric perspective. *J. Pediatr. Oncol. Nurs.* [Internet]. 2017 [cited 2019 Sep 15]; 34(3):156-9. DOI: <https://dx.doi.org/10.1177/1043454217697670>
4. Kapucu S, Özkaraman AÖ, Uysal N, Bağcivan G, Şeref FÇ, Elöz A. Knowledge level on administration of chemotherapy through peripheral and central venous catheter among oncology nurses. *Asia Pac. J. Oncol. Nurs.* [Internet]. 2017 [cited 2019 Oct 05]; 4(1):61-8. DOI: <http://dx.doi.org/10.4103/2347-5625.199081>
5. Samantarath P, Pongthavornkamol K, Olson K, Sriyuktasuth A, Sanpakit K. Multiple symptoms and their influences on health-related quality of life in adolescents with hematologic malignancies undergoing chemotherapy. *Pac. Rim. Intern. J. Nurs. Res.* [Internet]. 2018 [cited 2019 Oct 05]; 22(4): 319-31. Available from: <https://www.tci-thaijo.org/index.php/PRIJNR/article/view/88211/109033>

6. Gibson F, Shipway L, Aldiss S, Hawkins J, King W, Parr M, et al. Exploring the work of nurses who administer chemotherapy to children and young people. *Eur. J. Oncol.Nurs.* [Internet]. 2013 [cited 2018 Ago 20]; 17(1):59-69. DOI: <https://doi.org/10.1016/j.ejon.2012.01.006>
7. Andam R, Silva M. A journey to pediatric chemotherapy competence. *J. Pediatr. Nurs.* [Internet]. 2008 [cited 2018 Ago 15]; 23(4):257-68. DOI: <https://doi.org/10.1016/j.pedn.2006.12.005>
8. Fundação Oswaldo Cruz. Perfil da Enfermagem no Brasil [Internet]. 2016 [cited 2018 Jun 12]. Available from: <http://portal.fiocruz.br/pt-br/content/pesquisa-inedita-traca-perfil-da-enfermagem-no-brasil>
9. Santos, FC; Laus, AM; Bernardes, A; Camelo, SHH. Educación Continua: construcción del conocimiento y estrategias educativas para las enfermeras de oncología. *Cultura De Los Cuidados* [Internet]. 2018 [cited 2019 Oct 02]; (51): 22-30. Available from: <http://ciberindex.com/c/cc/51022cc>
10. Souza NR, Bushatsky M, Figueiredo EG, Melo JT, Freire DA, Santos ICRV. Oncological emergency: the work of nurses in the extravasation of antineoplastic chemotherapeutic drugs. *Esc. Anna Nery Rev. Enferm.* [Internet]. 2017 [cited 2018 Jun 10]; 21(1): e20170009. Available form: <http://www.scielo.br/pdf/ean/v21n1/1414-8145-ean-21-01-e20170009.pdf>
11. Jomar RT, Santos LS, Conteiro MF, Matsumoto KS, Gallasch CH, Taets GGC. Intraoperative hyperthermic intraperitoneal chemotherapy: what nurses should know. *Rev. enferm. UERJ.* [Internet]. 2017 [cited 2019 Sep 12]; 25: e29326. DOI: <http://dx.doi.org/10.12957/reuerj.2017.29326>
12. Boyle DA, Bush NJ. Reflections on the emotional hazards of pediatric oncology nursing: Four decades of perspectives and potential. *J. Pediatr. Nurs.* [Internet]. 2018 [cited 2018 Jun 15]; 40:63-73. DOI: <https://doi.org/10.1016/j.pedn.2018.03.007>
13. McCulloch R, Hemsley J, Kelly P. Symptom management during chemotherapy. *J. Paediatr. Child Health.* [Internet]. 2014 [cited 2018 Jul 13]; 24(4):166-71. DOI: <https://doi.org/10.1016/j.paed.2013.10.007>
14. Challinor JM, Hollis R, Freidank C, Verhoeven C. Educational needs and strategies of pediatric oncology nurses in low- and middle-income countries. An International Society of Pediatric Oncology- Pediatric Oncology in Developing Countries Nursing Working Group Initiative. *Cancer Nurs.* [Internet]. 2014 [cited 2018 Ago 10]; 374:36-47. DOI: <https://doi.org/10.1097/NCC.000000000000100>
15. Day SW, Garcia J, Antillon F, Wilimas JA, McKeon LM, Carty RM et al. A sustainable model for pediatric oncology nursing education in low-income countries. *Pediatr. Blood & Cancer.* [Internet]. 2012 [cited 2018 Ago 15]; 58(2):163-6. DOI: <https://doi.org/10.1002/psc.24007>
16. Day S, Challinor J, Hollis R, Abramovitz L, Hanaratri Y, Punjwani R. Paediatric oncology nursing care in low-and middle-income countries: a need for baseline standards. *Cancer Control.* [Internet]. 2015 [cited 2018 Ago 15]; 111-116. Available from: http://www.cancercontrol.info/wp-content/uploads/2015/07/111-116-Day_cc2015.pdf
17. Shinnick SE, Browning ML, Koontz SE. Managing hypersensitivity to Asparaginase in pediatrics, adolescents, and young adults. *J.Pediatr. Oncol.Nurs.* [Internet]. 2013 [cited 2018 Ago 3]; 30(2):63-77. DOI: <https://doi.org/10.1177/1043454212471728>
18. Torres V, Nunes MDR, Silva-Rodrigues FM, Bravo L, Adlard K, Secola, R et al. (2019) Frequency, Severity, and Distress Associated with Physical and Psychosocial Symptoms at Home in Children and Adolescents with Cancer. *Journal of Pediatric Health Care* [Internet]. 2019 [cited 2019 Oct 02]; 33(4):404-14. DOI: <https://doi.org/10.1016/j.pedhc.2018.11.007>
19. Nunes MDR, Jacob E, Bomfim EO, Lopes-Junior LC, Lima LAG, Flória-Santos M, et al. Pain, Sleep Patterns, and HRQOL In Pediatric Patients With Cancer. *European Journal of Cancer Care* [Internet]. 2019 [cited 2019 Oct 02]; 29: 39-46. DOI: <https://doi.org/10.1016/j.ejon.2017.05.001>
20. Enskär, K. Being an expert nurse in pediatric oncology care: nurses' descriptions in narratives. *J. Pediatr. Oncol. Nurs.* [Internet]. 2012 [cited 2018 Ago 5]; 29(3):151-60. DOI: <https://doi.org/10.1177/1043454212446344>
21. Toruner EK, Altay N. New Trends and Recent Care Approaches in Pediatric Oncology Nursing Asia-Pac. *J. Oncol. Nurs.* [Internet]. 2018 [cited 2018 Jun 13]; 5(2):156. DOI: https://doi.org/10.4103/apjon.apjon_3_18