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ORIGINAL ARTICLE

TRANSFUSION REACTIONS PROFILE IN ONCOLOGY PEDIATRICS PATIENTS PERFIL DAS REAÇÕES TRANSFUSIONAIS EM PACIENTES PEDIÁTRICOS ONCOLÓGICOS PERFIL DE LA REACCIONES TRANSFUSIONALES EN PACIENTES PEDIÁTRICOS ONCOLÓGICOS

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ABSTRACT

Objective: to analyze the transfusion reactions profile of the oncology pediatrics patients. **Method:** retrospective documentary study, with quantitative approach, with data collection of 162 records about transfusion incidents of oncology patients attended in a tertiary pediatric hospital in Fortaleza/CE during September 2010 to September 2013. Data process was through SPSS version 20.0. The Committee of Ethic in Research, CAAE 24694113.3.0000.5042 approved the study project. **Results:** The patients with transfusion reactions were 55.5% in the age group of 10 to 18 years old, 94.4% polytransfused, 62.3% without history about transfusion incident. The profile found was immediate allergic associated to platelet transfusion and the nurse was the main notifier, but the health team care was deficient. **Conclusion:** the study allowed a bigger evaluation and comprehension of the oncology pediatric incidents, giving foundation for the preventive measures implementation. **Descriptors:** Nursing; Hemotherapy Service; Blood Transfusion; Neoplasia.

RESUMO

Objetivo: analisar o perfil das reações transfusionais dos pacientes pediátricos oncológicos. **Método:** estudo documental retrospectivo, com abordagem quantitativa, com a coleta de dados de 162 fichas de notificação de incidentes transfusionais de pacientes oncológicos atendidos em hospital pediátrico terciário de Fortaleza/CE no período de setembro de 2010 a setembro de 2013. Os dados foram processados no SPSS versão 20.0. O estudo teve o projeto aprovado pelo Comitê de Ética em Pesquisa, CAAE 24694113.3.0000.5042. **Resultados:** os pacientes com reações transfusionais foram: 55,5% na faixa etária dos 10 aos 18 anos, 94,4% politransfundidos, 62,3% sem história prévia de incidente transfusional. O perfil encontrado foi de eventos imediatos do tipo alérgico associado à transfusão de plaquetas e o enfermeiro foi o principal notificador, porém a conduta assistencial da equipe de saúde apresentou-se deficitária. **Conclusão:** o estudo permitiu uma melhor avaliação e compreensão dos incidentes na oncologia pediátrica, fornecendo embasamento para o estabelecimento de medidas preventivas. **Descritores:** Enfermagem; Serviço de Hemoterapia; Transfusão de Sangue; Neoplasias.

RESUMEN

Objetivo: analizar el perfil de las reacciones transfusionales de los pacientes pediátricos oncológicos. **Método:** estudio documental retrospectivo, con enfoque cuantitativo, con la recolección de datos de 162 fichas de notificación de incidentes transfusionales de pacientes oncológicos atendidos en hospital pediátrico terciario de Fortaleza/CE en el período de septiembre de 2010 a septiembre de 2013. Los datos fueron procesados en el SPSS versión 20.0. El estudio tuvo el proyecto aprobado por el Comité de Ética en Investigación, CAAE 24694113.3.0000.5042. **Resultados:** los pacientes con reacciones transfusionales fueron: 55,5% en el grupo de edad de los 10 a los 18 años, 94,4% poli-transfundidos, 62,3% sin historia previa de incidente transfusional. El perfil encontrado fue de eventos inmediatos del tipo alérgico asociado a la transfusión de plaquetas y el enfermero fue el principal notificador, sin embargo la conducta asistencial del equipo de salud se presentó deficitaria. **Conclusión:** el estudio permitió una mejor evaluación y comprensión de los incidentes en la oncología pediátrica, dando embasamiento para el establecimiento de medidas preventivas. **Descriptores:** Enfermería; Servicio de Hemoterapia; Transfusión de Sangre; Neoplasias.

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INTRODUCTION

The transfusion is a therapeutic practice very used in the health area, since although the advanced medicine technology, there is nothing substituting blood yet. Any blood transfer or blood components from one person to another is through a blood transfusion by component's administration as red blood cells, platelet and plasma derivate according to the patient's needs.¹

The blood transfusion is an irresistible event, having benefits and potential risks to the receptor. Although having correct indication and administration, there is the possibility of risks and complications, as the transfusion reaction.

The transfusion reaction is a complication happening as consequence of blood transfusion or blood component, during or after its administration. Their classification is immediate (within 24 hours) or delayed (after 24 hours), immunologic or not immunologic.

The blood transfusions are one of the main tem problems presented in the health area according to the World Health Organization (WHO), being a big concern among professionals, specialists and health authorities.

The transfusion reactions happen by different causes: 1- factors of hospital team responsibility, as failures in patient identification, samples or products; 2- inadequate input use; 3- receptor and/or donor factors as irregular antibody not detected in pre transfusion routine tests, intrinsic receptor's factors; and 4- bag contamination by infectious agentes.¹

The most frequent signals and symptoms of the transfusion are fever, shiver, tremors, pain, acute blood pressure changes, respiratory changes, skin changes, nauseas, vomits, jaundice, hemoglobin, shock, among others.⁴

The transfusion therapy is inevitable to keep some therapeutics, present in the support treatment to patients with cancer submitted to chemotherapy, radiotherapy or surgery, since the treatment of the oncologic diseases causes hematologic toxicity in patients.

The myelotoxicity has the most important collateral effect in the chemotherapy treatment for being fatal. The anemia and the thrombocytopenia are the most frequent complications in oncology patients.⁵

Researches in Brazil showed that most of the transfusion reactions happen in oncology patients.^{6,7} This is because of the

immunologic-hematologic state of the patient with cancer, being necessary many blood transfusions during the treatment.

In other study developed with 35 school pediatric hospitals of USA, about 0.95% of pediatric patients with transfusions showed allergic reactions more frequently than adults, especially in children over 2 years old and with a light level reaction.⁸

With all this and the lack of literature about transfusion reactions in the oncology and pediatric population, there is the following question: What is the transfusion reaction profile of oncology pediatric patients? Thus, the objective of the study is:

- To analyze the transfusion reactions profile on oncology pediatric patients.

METHOD

Retrospective documentary study with quantitative approach, performed in a public hospital with tertiary pediatric care level in the municipality of Fortaleza-CE, in November 2013.

The institution registration is in the Brazilian guard hospital area and by the Risk Management Health Hospital (RMHH) coordination performing activities of Technical surveillance, Pharmacy-vigilance, Sanitary Surveillance of Hospital Use and Blood-vigilance collecting and evaluating information about undesirable and unexpected effects in the blood components use to prevent its appearance and recurrence.

The population consists of oncologic patients until 18 years old in the period between September 2010 and September 2013, according to their records with transfusion incidents notifications. Within the 260 notifications, the sample was 162 records with the next inclusion criteria: completely filled out and the patient having an oncology clinical diagnosis. The exclusion criteria were the erased records and difficult to read their data.

The data collection was through a form with closed questions to know the necessary information for the study about the following variables: age, gender, clinical diagnosis, occurrence unit, previous transfusions, previous history of transfusions incidents, incident type, blood component type related to the notification, clinical/laboratory signs of the transfusion incident, suspected incident type, immediate professional behavior and professional notifier of the incident.

The data organization was in the Excel database, processed in SPSS software version 20.0 and analyzed through descriptive

statistic. The results are in tables and interpreted according to the updated national literature and documents of the Health Ministry.

The research had all the guidelines and recommendations of the National Health Council in the Resolution nº 466/2012. The Committee of Ethics of the Infant Hospital Albert Sabin approved the project by the process nº 459.074 and CAAE 24694113.3.0000.5042.

RESULTS

During the period of this study, the institution had 29185 transfusions. 14304 transfusions (49.01%) were from oncology treatment in the specialized unit and 14881 (50.9%) were in the other hospital units, being four intensive care units, reanimation, observation, surgical center and nursing in the areas neonatology, general pediatric, surgery, neurology, pneumology, cardiology, nephrology and gastroenterology.

In this period, 162 transfusion reactions occurred in the Blood vigilance service, in oncology patients and 165 blood components. Therefore, the incidence rate of transfusion reaction was 11.3 per 1,000 transfused blood components.

According to the table 1, the events happened in 86 (53.1%) of male patients and in 76 (46.9%) of female patients. Regarding to the age, the predominant age group was from 10 to 18 years old with 90 (55.5%), then from 5 to 9 years old with 40 (24.7%) and from 0 to 4 years old with 32 (19.8%).

As the clinical diagnosis presented in the patients, there were the Acute Lymphoblastic Leukemia (ALL) with 63 (38.9%), the Acute Myeloid Leukemia (AML) with 39 (24.1%), the Non-Hodgkin Lymphoma with 11 (6.8%), the Osteosarcoma with 10 (6.2%), the Neuroblastoma with 8 (4.9%), the Wilms Tumor with 7 (4.3%) and then others with 24 (14.8%).

Table 1. Distribution of patients according to sociodemographic characteristics and diagnosis, Fortaleza-CE, 2013.

Characteristics	n	%
Gender		
Male	86	53,1
Female	76	46,9
Age		
0-4	32	19,8
5-9	40	24,7
10-18	90	55,5
Diagnosis		
ALL	63	38,9
AML	39	24,1
NHL	11	6,8
Osteosarcoma	10	6,2
Neuroblastoma	8	4,9
Wilms Tumor	7	4,3
Others	24	14,8

The most frequent place where the reactions occurred was in the oncology nursing with 96 (59.2%), the Chemotherapy with 50 (30.9%), the Oncology Intensive Care Unit with 11 (6.8%) and other units with 5 (3.1%).

According to table 2, 153 (84.4%) of the transfusion incidents were with polytransfused patients. From them 60 (37%) had 5

transfusions, 35 (21.6%) had between 5 and 10 transfusions, 37 (22.8%) had between 10 and 20 transfusions and 21 (13%) had more than 20 transfusions. Only 6 (5.6%) patients had their first transfusion.

However, 101 (62.3%) were in oncology patients without previous reaction and only 61 (37.7%) had a previous reaction.

Table 2. Distribution of patients according to previous transfusion and history of previous reaction, Fortaleza-CE, 2013.

Characteristics	n	%
Previous Transfusion		
Until 4	63	37
5 to 9	39	21,6
10 to 20	11	22,8
More than 20	10	13
None	8	5,6
Previous History of Reaction		
Yes	101	62,3
No	61	37,7

The transfusion reactions notified, table 3 showed 160 (98.9%) were immediate and 113 of them (69.8%) were allergic reactions. The second reaction was non-hemolytic febrile

with 44 (27.2%), followed by 2 (1.2%) overload and 1 (0.6%) TRALLI. Only 2 (1.2%) were delated type, distinguished by viral infection, but it is on investigation.

When investigated the blood components of the reactions, the concentrated platelets was the most related to the reactions, with 107 (64.9%), and then the packed red cells, with

51 (30.9%), and the fresh frozen plasma, with 7 (4.2%). Most of the incidents 160 (98.8%) occurred with only one blood component.

Table 3. Distribution of patients according to the reaction type and blood component, Fortaleza-CE, 2013.

Variables	n	%
Type of Reaction		
Immediate		
Allergic	113	69,8
Non-hemolytic Febrile	44	27,2
Overload	2	1,2
TRALLI	1	0,6
Delayed		
Viral Infection	2	1,2
Blood component		
Packed Red Cells	51	30,9
Concentrated Platelets	107	64,9
Fresh Frozen Plasma	7	4,2

Related to clinical manifestation, the most present were urticarial 83 (51.2%), eritema 50 (30.9%), fever 50 (30.9%), cough 15 (9.3%), shiver 14 (8.6%), vomits 12 (7.4%), dyspnea 11 (6.8%), tachycardia 7 (4.3%), tremors 5 (3.1%), nauseas 4 (2.5%), anxiety 3 (1.9%), cyanosis 3 (1.9%), abdominal pain 2 (1.2%), acute pulmonary lesion 2 (1.2%), seroconversion 2 (1.2%), lumbar pain 1 (0.6%), hypotension 1 (0.6%), and other 22 (13.6%).

According to the incident notifier, 99 (61.1%) were nurses, 41 (25.3%) RMHH trainees and technician nurses and only 22 (13.6%) doctors.

The behavior during the transfusion reaction were 92 (56.8%) administered anti-histaminic, 48 (29,6%) stopped the transfusion, 45 (27.8%) administered antipyretic, 21 (13 %) take the bag to the transfusion agency, 20 (12,3%) infused saline to 0.9%, 20 (12,3%) take a sample for study in the transfusion agency, 15 (9,3%) checked the labels and documents, 40 (24,7%) performed other actions and 12 (7.4%) did not registered any procedure in the transfusion incident record.

DISCUSSION

In compliance with the literature, cancer patients are the receptors of the most quantity of blood of developed countries as USA, of Europe and Japan due to the necessity of transfusion caused by bleeding and/or myelosuppression.⁹

The incidence of transfusion reactions in our service was of 11.3 per 1,000 transfused blood components, being superior of the studies performed in the University Hospital of Manaus having an incidence of 1.0 and in the hemotherapy service of São José dos Campos with 5.5 per 1,000 transfused blood components.^{6,10} However, the age group was

not only with pediatric patients causing a bias.

In Italy, the incidence found was 0.8 adverse reactions per 1,000 transfused blood components and the average the hemovigilance French system was of 3 reactions per 1,000 transfused blood components. The National Health Surveillance Agency (ANVISA) follows the French assessment, although based on the Hemovigilance System of the 90's, when there were not molecular biological tests for the donor classification and there were not the required use of the universal filter for blood components.¹¹⁻²

Not only oncology patients were in the reality of the studies, influencing the quantity of transfusion reactions, since in a research of a University Hospital in Natal, the oncology patients were presenting the most quantity of transfusion reactions with 58.0% of the cases.¹³ Regardless the number of transfusions, the most quantity of reactions occurred in this area, even in the studies developed in pediatric.^{6,7,14-5}

The research showed that the transfusion reactions happened in similar quantities between male and female patients and the patients between 10 and 18 years old had more reactions. The literature also showed that the older children are more vulnerable to have an incident related to transfusion.⁸

According to ANVISA data, the reactions are a little bit bigger in female patients, however only from 20 years old, differing from the present study. But, in the age group of the research between 10 and 19 years old, we found a big number of reactions.¹⁶

Regarding the clinical diagnosis, ALL and AML were the most present in the patients studied, agreeing with the literature, since pediatric cancer represent 0.5% to 3% of tumors in most of the population. In Brazil,

the most common pediatric tumors are leukemia, lymphoma and central nervous system tumors.¹⁷ The authors confirm this, revealing the lymphoblastic leukemia and Myeloid as the most common diagnosis in the patients incidents.^{8,18}

The oncology nursing, unit attending children and adolescent with cancer, was the place where occurred the biggest number of notifications. This is because of the profile of patients when compared to chemotherapy. However, they are less unstable compared to those in the ICU that the signs and symptoms can be confused.

In this study, most of the patients has other transfusions before the reaction, highlighted those with up to 5 transfusions. About 1 to 3% of the transfusions give reaction and in polytransfused patients goes to 10%.^{13,19} This is approved by the literature, that the studies show a significant statistic and consequently an elevated association between previous transfusions and transfusion reactions.¹³⁻⁵

Studies show that polytransfused patients are more susceptible, due to previous exposure to antigen blood group and the presence of anti-leukocyte antibodies, in which the transfusion could be from a donor with these cells.² Most of the oncology patients did not have previous reactions, not having relevant association with the reaction, confirming never having a transfusion.¹⁴

In our study, the immediate transfusion reactions were the main reaction in patients, highlighting the allergy. This result was similar to another found in a pediatric hospital in USA and in Brazil.^{8,14}

The international literature also shows the immediate reactions as the main one; however, the proportion is very different from our reality. Data from 1997 about the French hemovigilance system show 85% for the immediate and 15% for the delayed reactions. The low proportion of notification of delayed reaction in Brazil may reflect the greater difficulty of detection.²⁰

In Brazil, in the period 2007-2011, the immediate reactions predominate in more than 96%. In addition, non-hemolytic febrile reaction and allergic reaction are the most prevalent, with average rates of 50.1% and 36%, respectively. However, in 2011 the age group between 5-19 years old has the allergic as the main reaction.¹⁶

In the literature, non-hemolytic febrile reaction (NHFR) is the most commonly reported among immediate transfusion reactions.^{6,7,13,15,21} The NHFR is very frequent in the country because it is not a universal leukodepletion routine unlike developed

countries such as Europe and North America.²² In Brazil, there is a difficulty of financial resources for the acquisition of leukocyte filter for all blood banks, since most of these inputs are imported and expensive.

However, according to the protocol established by the blood bank responsible for the study hospital, all blood components for all oncology patients are filtered to reduce the amount of leukocytes to prevent complications in the exposure of the receptor to the donor and in some irradiated situations, preventing the host disease associated with transfusion.

The blood components most related to the recorded incidents was the concentrated platelets. More recent data from hemovigilance systems of the UK and France show that the incidence of adverse events for the concentrated platelet is about two to three times higher when compared to other blood components.²³⁻⁴

Most blood components associated to reactions were packed red cells.^{6,7,13,15,21} In our country we observe that the packed red cells is the blood component more related to the occurrence of events, followed by concentrated platelets.²⁰

In countries where the packed red cells is always filtered, the concentrated platelets was the blood component most implicated in transfusion incidents, that is the situation that it was found in our study.²⁵

The most obvious signs and symptoms were urticaria (51.2%), erythema (30.9%) and fever (30.9%). In one study, urticarial occurred in the patients,⁶ but in other studies, the authors emphasized the presence of fever and shiver.^{7,13,15,21}

It is important to emphasize that nursing was the professional reporting more transfusion reactions. This is because of the nurses have the competence of the administration of blood components, ensuring that their actions give confidence to the patients.²⁶ Moreover, they have knowledge about the signals, symptoms and the protocol to be held in incidents.²⁷ In this context, the nursing actions are important for having direct patient care in transfusion, specifically, the nurse must have knowledge of both the benefits, as the probable risks that the transfusion may cause.²⁶

According to ANVISA, suspecting of a transfusion reaction, they should immediately stop the transfusion; maintain permeable venous access with 0.9% saline; check at the bedside, the identification of blood components, checking if it was properly administered to the patient with proper

medical prescription; measure vital signs; notify the physician responsible for transfusion; provide the puncture of a second venous access on suspicion of a serious reaction; report the reaction to the transfusion service; collect and submit patient sample to the transfusion service, along with the blood bag and the equipment; collect and submit samples of blood and/or urine for the clinical laboratory as indicated by the doctor.²

The health care behaviors of health professionals in the transfusion reactions were not always adequate, revealing the prevalence of only 56.8% administration of antihistamines, 29.6% interruption of transfusion, 27.8% administration of antipyretics, may be not having idea of the protocol established by the Ministry of Health/ANVISA, which reinforces the need for training among professionals. However, such behavior demonstrated an association with clinical manifestations presented with recurrence in the study.

In the literature used, the behavior in nursing were: they interrupted the transfusion (44%), they informed the doctor (40%) they administered medicine (40%), they sent the bag to the transfusion service (24%).¹³

It is important monitoring transfusions by nurses and other members of the team, being always very alert to intervene under any circumstances.²⁷ However, the adoption of a protocol of actions to follow and the training of professionals responsible for this process, as well as the intensification of actions to notifications in transfusion hemovigilance service actions are fundamental to increase transfusion safety and thereby improving the quality of care.¹³

CONCLUSION

Transfusion reactions occurred mainly in children and adolescents between 10 to 18 years old with leukemia, polytransfusions and no history of transfusion incident. The profile was of immediate allergic-type events, associated with platelet transfusion and predominant presence of urticaria, erythema and fever. The nurse was the main notifier, but the care behavior of the health team was poor, requiring better compliance with the protocol established by ANVISA.

There are few studies of transfusion incidents with children and adolescents in cancer treatment, especially in Brazil. However these variables are important to start the construction of prophylactic measures for these patients. Although transfusion is an effective therapy, there is always the risk of adverse effects, so the

health care team needs to act in a targeted manner to prevent complications and promptly start measures to control any complications.

The knowledge of patients and factors that lead to transfusion reactions provide the basis for establishing preventive measures, contributing to the improvement of the transfusion services and care offered to patients. Thus, the study of the profile of transfusion reactions of oncological pediatric patients was appropriate to allow a better assessment and understanding of these events in pediatric oncology, which plays a fundamental role in transfusion safety. However, further studies are essential to consolidate the findings of our environment.

We concluded that the development of skills among professionals responsible for the transfusion process is crucial to improve the actions taken across an adverse reaction and intensify notifications hemovigilance service, promoting quality of care of patients who need this therapy.

REFERENCES

1. Brasil. Ministério da Saúde. Guia para o uso de hemocomponentes. Brasília [Internet]. 2010 [cited 2013 Dec 15]. Available from: http://bvsmis.saude.gov.br/bvs/publicacoes/guia_uso_hemocomponentes.pdf
2. Brasil. Agência Nacional de Vigilância Sanitária. Hemovigilância: manual técnico para investigação das reações transfusionais imediatas e tardias não infecciosas. Brasília; 2007 [cited 2013 Dec 15]. Available from: http://portal.anvisa.gov.br/wps/wcm/connect/17386000474581698db3dd3fbc4c6735/manual_tecnico_hemovigilancia_08112007.pdf?MOD=AJPERES
3. Oknaian S, Remesar M, Ferraro L, Pozo AE. Evaluación externa del desempeño en el tamizaje de bancos de sangre em Argentina: resultados y estrategias para mejorarlo. Rev Panam Salud Publica [Internet]. 2003 [cited 2013 Dec 16];13(2/3):149-53. Available from: http://www.erevistas.csic.es/ficha_articulo.php?url=oai:publications.paho.org:5101&oai_id=en=oai_revista107
4. Wendel, S. Guia de condutas hemoterápicas. 2. ed. São Paulo: Sociedade Beneficente de Senhoras: Hospital Sírio e Libanês [Internet]. 2010 [cited 2013 Dec 13]. Available from: <http://www.hospitalsiriolibanes.org.br/hospital/banco-desangue/PublishingImages/guia-de-conduta.pdf>
5. Oliveira SC, Cruz SCGR, Matsui T. Curso de Especialização Profissional de Nível

Técnico em Enfermagem- Livro do Aluno: oncologia. São Paulo: FUNDAP; 2011.

6. Callera F, Silva ACO, Moura AF, Melo DB, Melo CMT. Descriptions of acute transfusion reactions in a Brazilian Transfusion Service. Rev Bras Hematol Hemoter [Internet]. 2004 [cited 2013 Dec 16];26(2):78-83. Available from:

http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-84842004000200003&lng=en.

<http://dx.doi.org/10.1590/S1516-84842004000200003>

7. Belém, LDF, Nogueira, RG, Leite, TR, Costa, LC, Alves, LDFP, Carneiro, IS. Descrição de reações transfusionais imediatas na fundação assistencial da Paraíba, Brasil. Rev Baiana Saúde Pública [Internet]. 2011 Oct/Dec [cited 2013 Dec 16];34(4):810-7. Available from: <http://files.bvs.br/upload/S/0100-0233/2010/v34n4/a2170.pdf>

8. Slonim AD, Joseph JG, Turene WM, Sharangpani A, Luban NL. Blood transfusions in children: a multi-institutional analysis of practices and complications. Transfusion [Internet]. 2008 [cited 2013 Nov 18];48:73-80. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/17894792>

9. Herve P, Floris M-FL, Rebibo D, Morei P, Andreu G. Hemovigilância na França. Rev bras Hematol Hemoter. 2000 [cited 2013 Dec 16];22(3):368-73. Available from: <http://www.scielo.br/pdf/rbhh/v22n3/13411.pdf>

10. Matos MMM, Vilar RC, Ferreira Y, Almeida RP, Araújo MEA. Caracterização das reações transfusionais ocorridas no Hospital Universitário Getúlio Vargas, Amazonas, Brasil, no período de 2001 a 2003. Revista HUGV. 2006; 5(1-2):11-16.

11. Giampaolo A, Piccinini V, Catalano L, Abbonizio F, Hassan HJ. The first data from the haemovigilance system in Italy. Blood Transfusion [Internet]. 2007 [cited 2013 Dec 16];5(2):66-74. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2535888/>

12. Brasil. Agência Nacional de Vigilância Sanitária. Boletim de Hemovigilância nº 5. Brasília [Internet]. 2012 [cited 2013 Nov 18]. Available from: http://portal.anvisa.gov.br/wps/wcm/connect/b38ebb004dc642d7861dbed6059e5711/boletim_5_atualizado.pdf?MOD=AJPERES

13. Silva MA, Torres GV, Costa IKF, Pessoa RVS, Medeiros RKS, Oliveira AKA. Assistência dos Profissionais de saúde frente as reações transfusionais em um hospital universitário. J

Nurs UFPE on line [Internet]. 2010 Jan/Mar [cited 2013 Dec 16];4(1):28-33. Available from:

http://www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/view/694/pdf_309

14. Pedrosa AKKV, Pinto FJM, Lins LDB, Deus GM. Reações transfusionais em crianças: fatores associados. J Pediatr [Internet]. 2013 Aug [cited 2014 Jan 19];89(4):400-6. Available from:

http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0021-75572013000400013&lng=en.

<http://dx.doi.org/10.1016/j.jped.2012.12.009>

15. Gauvin F, Lacroix J, Robillard P, Lapointe H, Hume H. Acute transfusion reactions in pediatric intensive care unit. Transfusion [Internet]. 2006 [cited 15 Dec 2013];46:1899-908. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/17076844>

16. Brasil. Agência Nacional de Vigilância Sanitária. Boletim de Hemovigilância nº 4. Brasília [Internet]. 2011 [cited 15 Dec 2013]. Available from: http://portal.anvisa.gov.br/wps/wcm/connect/c27a098048c62f36ae09afa3f2835ae8/Boletim_de_Hemovigilancia_n_4_2011.pdf?MOD=AJPERES

17. Reis RS, Santos MO, Thuler LCS. Incidência de tumores pediátricos no Brasil. Rev bras cancerol [Internet]. 2007 Jan/Mar [cited 2013 Nov 18];53(1):5-15. Available from: http://www.inca.gov.br/rbc/n_53/v01/pdf/artigo1.pdf

18. Torney CA, Sweeney JD, Champion MH, Pisciotto PT, Snyder EL, Wu YY. Analysis of transfusion reactions associated with prestorage-pooled platelet components. Transfusion [Internet]. 2009 [cited 2013 Nov 18];49:1242-7. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/19389029>

19. AABB-American Association of Blood Banks. Technical Manual. 14th ed. Bethesda (MD); 2002.

20. Brasil. Agência Nacional de Vigilância Sanitária. Relatório de Hemovigilância: dados consolidados 2007-2011. Brasília [Internet]. 2012 [cited 2013 Nov 18]. Available from: http://portal.anvisa.gov.br/wps/wcm/connect/aadf89804ec474dd925f928a610f4177/relatorio_2007-2011_baixa.pdf?MOD=AJPERES

21. Khalid S, Usman M, Khurshid M. Acute transfusion reactions encountered in patients at a tertiary care center. J Pak Med Assoc. 2010;60(10):832-6.

22. Andreu G, Morel, , Forestier F, Debeir J, Rebibo D, Javier G, Hervé P. Hemovigilance network in France: organization and analysis of immediate transfusions incident reports from 1994 to 1998. *Transfusion* [Internet]. 2002 [cited 2013 Nov 18];42(10):1356-64. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/12423521>
23. Taylor C. SHOT Serious Hazards of Transfusion - the 2008 Annual SHOT Report. Manchester: Steering Group [Internet]. 2009 [cited 2013 Nov 18]. Available from: <http://www.shotuk.org/wp-content/uploads/2010/03/SHOT-Report-2008.pdf>
24. AFSSAPS. Rapport Annuel Hémovigilance 2007. Paris: AFSSAPS Agence Française de Sécurité Sanitaire des Produits de Santé [Internet]. 2007 [cited 2013 Nov 18]. Available from: http://www.afssaps.fr/var/afssaps_site/storage/original/application/e92822f8ff7cb27d5f2009c9ac27bf1c.pdf
25. Silvergleid AJ. Immunologic blood transfusion reactions. Up to date; 2011 [cited 2013 Nov 18]. Available from: http://www.uptodate.com/contents/immunologic-bloodtransfusionreactions?source=search_result&search=Immunologic+blood+transfusion+reactions&selectedTitle=1~150
26. Costa JE, Mendonça AEO, Simpson CA et al. Transfusão de hemocomponentes em pacientes idosos: cuidados de enfermagem. *J Nurs UFPE on line* [Internet]. 2013 Sept [cited 2013 Nov 18];7(esp):5774-9. Available from: http://www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/view/4807/pdf_3521
27. Torezan G, Souza E. Transfusion of blood products: are the nurses prepared to care for peritransfusion? *J Nurs UFPE on line* [Internet]. 2010 Apr/June [cited 2013 Nov 18];4(2):658-65. Available from: <http://www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/view/845>

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