Artigo / Article

Descriptions of acute transfusion reactions in a Brazilian Transfusion Service

Descrições de Reações Transfusionais Agudas em um Serviço Brasileiro de Transfusão

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*Acute transfusion reactions have been found to occur during or within 24 hours of transfusion. The aim of this work is to describe the main characteristics of acute reactions reported in a Brazilian transfusion service. A preprinted report form was used to evaluate the age and sex of the transfusion recipients, blood component requested, medical specialty involved and transfusion-related signs and symptoms, transfusionists performed a direct observation during the transfusion and in a period of four hours following transfusion. Data were prospectively collected for 90 days from 30 hospitals and health facilities supplied by the the Service of Hematology and Hemotherapy of São José dos Campos. Acute reactions were recognized as febrile nonhemolytic, allergic, fluid overload, transfusion-related acute lung injury (TRALI), anaphylatic and metabolic reactions. In a total of 8,378 transfusions, 46 acute reactions were recorded (5.5 per 1000 units transfused, 28 febrile nonhemolytic, 12 allergic, 5 anaphylatic and 1 fluid overload). TRALI and metabolic reactions were not detected. The majority (27) was associated with RBCs followed by PLTs 11, FFP 6 and partial units 2. The median age of the recipients was 43 years (3 months to 83 years, 23 males and 23 females). Overall, 12 (26.1%) events were recorded in oncology, 12 (26.1%) in medicine and 7 in intensive care unit departments. This study provides baseline acute transfusion reaction information for a specific period of time in a Brazilian transfusion service. Rev. bras. hematol. hemoter 2004; **26**(2):78-83.*

Key words: *Transfusion reactions, febrile nonhemolytic, anaphylatic reactions, TRALI*

Introduction

The transfusion of blood components is usually a temporarily effective means of correcting red cell, platelet and coagulation factor deficits. Unfortunately, blood components are occasionally unsafe, which results in a spectrum of adverse reactions following transfusion. Acute noninfectious transfusion reactions represent a kind of untoward effect of blood transfusion. Acute reactions have been found to occur during or within 24 hours of transfusion and include acute hemolytic, allergic, febrile nonhemolytic, fluid overload, transfusion-related acute lung injury (TRALI), anaphylatic and metabolic reactions.[1,2] These types of reactions may vary in severity from mild to fatal justifying the creation of systems of surveillance and alarm from blood collection to follow-up of the recipients.

Efforts have been made by different transfusion services in order to analyze the distribution of the acute transfusion reactions, their frequency and the types of blood products involved.[3]

The Service of Hematology and Hemotherapy of São José dos Campos (SHHSJC), São Paulo, is a blood center that issues over 35,000 units of blood components annually and supplies 30 hospitals and health facilities. An estimated population of 1,000,000 people is served by

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the SHHSJC. In this region, the hospitals are non-teaching and deliver a full range of medical and surgical services including emergency, autologous bone marrow transplantation, hematological malignancy treatment and cardiothoracic surgery. In general, over 2,900 units of blood components are transfused per month by the SHHSJC.

The aim of the present study was to describe the main characteristics of acute transfusion reactions reported in the SHHSJC.

Materials and Methods

Data were obtained from all hospital blood banks served by the SHHSJC. Acute transfusion reactions were defined as those occurring at any time up to 24 hours following a transfusion of blood components excluding cases of acute reactions due to incorrect blood component transfusion. A preprinted report form was designed to collect the following information: age and sex of the transfusion recipient, blood component requested, medical specialty involved and transfusion-related signs and symptoms. According to these signs and symptoms transfusions reactions were recognized as febrile nonhemolytic, allergic, fluid overload, transfusion-related acute lung injury (TRALI), anaphylatic and metabolic reactions. Allergic reactions were defined as rashes, dyspnea or angioedema without hypotension and anaphylatic reactions were defined as hypotension with one or more of the following: rash, dyspnea or angioedema[1]. Data such as date and time of the transfusion, date and time of the recipient monitoring and blood bank personnel name were collected for controlling deviations related to record documentation. The SHHSJC transfusionists were oriented to perform a direct observation during the transfusion and in a period of four hours from the end of the transfusion and to fill the preprinted report form independent of the presence or absence of any adverse event. Data were prospectively collected from August 1st to October 30th, 2003. All the adverse signs and symptoms were promptly investigated by a hematologist of the SHHSJC. We performed a descriptive statistical analysis in order to obtain values of mean, median and standard deviation.

Table 1
Use of blood components according to specialties.

	Number of units transfused (%)	Number of requests	Units transfused per request
Intensive Care Unit (adult)	2663 (31.7)	976	2.73
Surgery (including cardiac and coronary artery bypass)	1229 (14.6)	394	3.11
Emergency	972 (11.6)	347	2.80
Oncology (including hematological malignancies)	833 (10.0)	299	2.78
Medicine	831 (9.9)	473	1.75
Regional clinics	459 (5.5)	213	2.15
ICU (pediatric)	339 (4.0)	281	1.20
ICU (neonatal)	327 (3.9)	316	1.03
Surgery (pre and postoperative)	250 (2.9)	152	1.64
Obstetric (pre and postpartum)	156 (1.9)	97	1.60
Clinic	139 (1.7)	65	2.13
Pediatric	76 (1.0)	50	1.52
Medicine (Infectious diseases)	57 (0.7)	28	2.03
Obstetric	47 (0.6)	22	2.13
Total	8,378	3,713	2.25

Results

Over the study period the SHHSJC issued 8,528 units. 3,713 blood component requests were analysed and a total of 8,378 units were recorded as transfused (2.25 units per request, 98.2% of the units issued). According to specialties, a great use of blood components was observed in adult intensive care unit (2663 units), surgery (1229 units), emergency (972 units), oncology (833 units) and medicine (831 units) departments. These five specialties accounted for 77.8% of all the units of blood components transfused. Besides, adult intensive care unit, surgery, emergency and oncology showed a high rate of units transfused per request, 2.73, 3.11, 2.80 and 2.78 respectively (Table 1).

Overall, 56.7% of the recipients were males and 43.3% females. The number of recipients aged from 50 to 60 years old was higher in both female (13.7%) and male (15.9%) recipients (Table 2).

A total of 46 transfusion reactions were recorded. Febrile nonhemolytic reactions were the most frequent (28) followed by allergic reactions (12). TRALI and metabolic reactions were not detected during the period study. Red blood cells (RBCs) accounted for 48.3% (4,048) of all transfused units, fresh frozen plasma (FFP) for 24.2% and platelets (PLTs) for 19%. The majority of the transfusion reactions were associated with RBCs transfusion (27) followed by PLTs transfusion (11). The

rate of transfusion reactions per units transfused was 0.0055 (5.5 reactions per 1000 units transfused). Table 3 shows the different kind of transfusion reactions according to blood components.

The characteristics of the recipients with recognized transfusion reactions are shown in Table 4. The median age of these recipients was 43 years old ranging from 3 months to 83 years. 50% of the transfusion reactions were observed in male and 50% in female recipients. According to specialties 12 (26.1%) events were recorded in oncology and 12 (26.1%) in medicine departments. Intensive care unit accounted for 7 (15.2%) of the 46 transfusion reactions.

Table 2
Number and percentage of the recipients according to age and sex

Age (range)	Female	Male
months		
0 to 4	137 (8.5)	239 (11.4)
4 to 12	63 (3.9)	76 (3.6)
years		
1 to 10	101 (6.3)	71 (3.3)
10 to 20	84 (5.2)	87 (4.1)
20 to 30	112 (6.9)	128 (6.1)
30 to 40	144 (8.9)	240 (11.4)
40 to 50	197 (12.3)	318 (15.1)
50 to 60	220 (13.7)	334 (15.9)
60 to 70	216 (13.5)	317 (15.1)
70 to 80	200 (12.5)	200 (12.5)
80 to 90	120(7.4)	52 (2.4)
90 to 100	15 (0.9)	16 (0.8)
Total	1,608 (100)	2,105 (100)
Percent	43.3	56.7

Table 3
Acute transfusion reactions according to blood components

	Number of units transfused	Febrile nonhemolytic reactions	Allergic reactions	Fluid overload	Anaphylatic	Total	Transfusion reaction per blood component type
RBCs	4,048	18	6	1	2	27	0.0066
FFP	2,028	2	4	0	0	6	0.0029
PLTs	1,594	7	2	0	2	11	0.0069
Cryoprecipitate	435	0	0	0	0	0	0
Partial units	214	1	0	0	1	2	0.0093
Apheresis PLTs	59	0	0	0	0	0	0
Total	8,378	28	12	1	5	46	
Rate						0.005-5	

Discussion

According to specialties (Table 1), 77.8 percent of the blood components were transfused in patients from the adult ICU, surgery, emergency, oncology and medicine departments. The use of blood components in critically ill patients vary and this has been object of discussion. Vincent JL and coworkers [4] demonstrated, in a prospective multicenter observational study which included 3,534 patients from 146 western European ICUs, the common occurrence of anemia and the great use of blood transfusions (rate of transfusion during the ICU period of 37%). On the other hand, Rao MP et al. [5], conducted a prospective observational study in order to assess the transfusion practice in 1,247 critically ill patients and showed that 666 (53%) were administered red cells, 202 (16%) platelets and 281 (22%) fresh frozen plasma. The authors considered appropriate use of blood components in these patients and concluded both that transfusion practice was consistent and that, in general, there was not an excessive use of blood components. We demonstrated that the adult ICU accounted for 31.7% of the units transfused. Our results were similar but it is important to consider the methods we used to collect such data. In our region, emergency, neurologic, cardiothoracic and oncology surgical patients are placed and evaluated in the ICU during the postoperative period increasing the ICU's proportion of blood components transfused when reported by specialties. Further analysis according to procedures or diagnosis instead of specialties might result in different values.

The use of blood components in surgery, emergency and oncology departments was also similar with the current literature. Chiavetta et al[6] carried out a cross-sectional survey of the transfusion of blood components in teaching and non-teaching hospitals in central Ontario – Canada and demonstrated a high

Table 4
Characteristics of recipients with recognized transfusion reaction

Age (years)	
Median (min. and max. values)	43 (3 months - 83 years)
Sex	
Female	23 (50%)
Male	23 (50%)
Number and percentage of transfusion reactions according to specialties.	
Medicine	12 (26.1)
Oncology	12 (26.1)
ICU (adult)	7 (15.2)
Clinic	7 (15.2)
Emergency	3 (6.6)
Surgery (pre and postoperative)	2 (4.3)
Pediatric	2 (4.3)
ICU (pediatric)	1 (2.2)
Number and percentage of blood components involved	
RBCs	27 (58.7)
PLTs	11 (24)
FFP	6 (13)
Partial units	2 (4.3)

transfusion use in operations and procedures of the digestive and cardiovascular systems. Among the hospitals supplied by the SHHSJC, three provide a range of surgical services including emergency, neurologic, oncology and cardiothoracic surgery. Additionally, two hospitals have oncology services including chemotherapy for hematological diseases and autologous bone marrow transplantation. These local characteristics may explain our results regarding the use of blood components in these specialties. Moreover, the use of blood components in Medicine department has been described. Marti-Carvajal and coworkers[7] designed a cross-sectional study to audit appropriate use of blood products in the main public tertiary-care hospital in Valencia, Venezuela. The authors demonstrated that the average number of transfusions per subject was 3.41 for medicine, 2.81 for emergency, 2.09 for obstetrics and 1.75 for surgery. We also demonstrated a frequent use of blood components in the Medicine department although, as described above, the highest use of transfusions was observed in the adult ICU and surgery departments. It is logical to assume that these differences depend on the kind of services provided by each hospital.

According to age and sex the number of requests were similar in both male and female recipients with ages ranging from 50 to 60 years old. Overall, there is a prevalence of requests of blood components for males (Table 2). Among the recipients with recognized acute transfusion reactions the median age was 43 years (3 months to 83 years) and we did not observe any prevalence between male or female recipients (Table 4). In comparison, the Serious Hazard Of Transfusion (SHOT) Report [1] described 42 reports of acute transfusion reactions from 1998 to 1999 (24 males and 18 females); 38 reports described the age of the recipients (median 56 years, range 17 months to 92 years). SHOT data from 1999 to 2000[2] showed 32 reports of acute transfusion reactions as follows: 19 males, 13 females, median age of 52 years and range 1 month to 88 years. In this condition, it is important to consider that age and sex depends on the local characteristics of the population.

As demonstrated in Table 4, the majority of the acute transfusions reactions were recorded in patients from oncology and medicine departments. Despite the number of transfusions of blood components in the ICU and Surgery the prevalence of acute transfusion reactions did not follow this trend. Since the patients with transfusion reactions were evaluated by a hematologist of the SHHSC it is reasonable to assume that our results are consistent. On the other hand, it is possible that in the operating room or in the ICU some acute reactions were not recognized as such perhaps because signs and symptoms mimic other clinical conditions. Oncology recipients showed a high proportion of acute transfusion reactions. A possible explanation is based on the inclusion of the hematological malignances in the group of oncology patients. These patients (acute leukemia and autologous bone marrow transplantation for example) undergo a temporary inability to produce blood cells and may use considerable amounts of blood components increasing their susceptibility to transfusion reaction. The association between the use of blood components in medicine and the proportion of acute transfusion reactions in this department seems to be consistent. In our region, the admission of patients to the medicine department is highly variable including cases in which the patients are severely ill and patients who suffer minor morbidities. We believe that this wide range of diagnoses and treatments in association with the lack of appropriate guidelines regarding blood component transfusions may increase the probability of using blood components in this specialty.

In our study RBCs were linked to the majority of the acute transfusion reactions followed by PLTs. The most common reactions were febrile nonhemolytic reactions and the observed rate of acute transfusion reactions was 5.5

reactions per 1000 units transfused. In comparison, Sunita Saxena & Ira Shulman[8] described the experiences of Los Angeles County and the University of Southern California Medical Center. Approximately 35,000 units of blood components are transfused at this facility annually. 4,967 RBCs were transfused in the last three months of 2002 and the majority of the reactions were linked to RBCs. In this period the rate was 3.4 reactions per 1000 units transfused. Based on the Hemovigilance system, Waller C et al[9] analysed 1,694 transfusion incident reports from 15 blood transfusions centers and health facilities and found that the majority of reactions were febrile (47%) or allergic (24%) and most of the reactions were linked to PLTs. The Serious Hazard of Transfusion (SHOT) Report[1] described 34 reports of acute transfusion reactions from 1998 to 1999 (17 linked to RBCs and 7 to PLTs) and in 33 reports from 1999 to 2000[2] (11 linked to RBCs and 13 to PLTs) over more than 2,500,000 units were transfused per year. The differences we have found in our study may be explained by the shorter period of investigation. Another point is that the reactions were recorded using a method based on the direct observation of the recipients during a period of time instead of the traditional incident report system. It is possible that using direct observation more adverse events were recorded increasing the rate of reactions per unit transfused. Moreover, excluding the SHOT reports, Sunita Saxena & Ira Shulman and Waller C et al. analysed other types of transfusion reactions also and we focused only on acute transfusion reactions.

In the present study, we did not register any case of TRALI. Jonathan P. Wallis et al[10] carried out an observational study from 1991 to 2002 in the Freeman Hospital, UK. This facility has 787 beds and includes a regional cardiothoracic surgical unit and the regional liver and liver transplant units. Over 12 years, eleven cases of TRALI were recognized. On the other hand, Silliman CC et al[11] reported a series of 90 TRALI reactions in 81 patients and in order to examine the epidemiology of TRALI a nested case-control study was performed of the first 46 patients with TRALI compared with 226 controls who had received transfusion. The authors suggested that TRALI may be more frequent than previously recognized and demonstrated an overall prevalence of 1 case in 1120 cellular components transfused. Data from Sunita Saxena & Ira Shulman [8] did not demonstrate any case of TRALI too. Based on these studies, our findings seem to be consistent but it is important to consider that many clinicians and transfusionists remain unaware of TRALI reactions.

In summary, the present study provides baseline acute transfusion reaction information for a specific period of time in a Brazilian transfusion service. To the best of our knowledge, there are few studies describing the main characteristics of acute transfusion reactions in our country. We therefore believe that reports from blood transfusion centers and health facilities regarding transfusions reactions should be stimulated in order to create rules and regulations pertaining to the practice of blood transfusion. Collection of such data is relevant and will assist in blood transfusion program planning based on the implementation of corrective and preventive measures in accordance with accepted international standards and local guidelines.

Resumo

*As reações transfusionais agudas ocorrem durante ou em um período de até 24 horas após a transfusão de hemocomponentes. O objetivo deste estudo foi descrever as principais reações transfusionais agudas em um serviço de hemoterapia brasileiro. Através de um formulário próprio contendo a idade e o sexo dos receptores, os hemocomponentes solicitados, as especialidades médicas envolvidas e os sinais e sintomas relacionados, os transfusionistas registraram os eventos durante a transfusão e até quatro horas após seu término. Colheram-se dados de 30 hospitais e clínicas atendidos pelo Serviço de Hematologia e Hemoterapia de São José dos Campos em um período de 90 dias. As reações agudas foram definidas como febril não hemolítica, alérgica, sobrecarga volêmica, TRALI, anafilática e metabólica. Em um total de 8378 transfusões, 46 reações foram registradas (5,5 por 1000 unidades transfundidas) sendo 28 do tipo febril não hemolítica, 12 do tipo alérgica, 5 do tipo anafilática 1 do tipo sobrecarga volêmica. Reações do tipo TRALI não foram observadas. 27 reações foram associadas com a transfusão de concentrado de hemácias, 11 com a transfusão de concentrado de plaquetas, 6 com a transfusão de plasma fresco congelado e 2 com a transfusão de concentrado de hemácias para recém-nascidos. Dentre os receptores com reações, a mediana das idades foi de 43 anos (3 meses a 83 anos) sendo 23 do sexo masculino e 23 do sexo feminino. 12 reações (26,1%) foram provenientes do setor de Oncologia, 12 (26,1%) do setor Clínica Médica e 7 do setor Unidade de Terapia Intensiva. Este estudo descreve as reações transfusionais agudas registradas em um período de tempo específico provenientes de um serviço de hemoterapia brasileiro. Rev. bras. hematol. hemoter. 2004; **26**(2):78-83.*

Palavras-chave: *Reações transfusionais, reação febril não hemolítica, reação anafilática, TRALI*

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