Practices for rational use of blood components in a universitary hospital

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Summary

Objective: to produce improvements in transfusion practices through the implementation of an educational program for health professionals in a university hospital.
Methods: this is an interventional and prospective study, with pre- and post-analysis of an educational intervention. The research was developed at the University Hospital of the Universidade Federal de Sergipe, involving participation of health professionals in the stage of training, during the month of February 2011, in addition to the monitoring of blood transfusions performed in the pre- and post-intervention periods. Transfusion practices were investigated upon request for transfusion or devolution of unused blood components. Knowledge of health professionals was assessed based on the responses to a questionnaire about transfusion practices.
Results: during the educative campaign, 63 professionals were trained, including 33 nurses or nursing technicians and 30 physicians. Among the doctors, there was a statistically significant gain of 20.1% in theoretical knowledge (p=0.037). Gain in the nursing group was even higher: 30.4% (p=0.016). The comparative analysis of transfusion request forms showed a non-significant decrease from 26.7 to 19.5% (p=0.31) in all forms with incomplete information. We also observed a statistically significant improvement in relation to the filling of four items of transfusion request.
Conclusion: there was a significant improvement of the entire process related to blood transfusions after interventional project conducted in February 2011.

Keywords: erythrocyte transfusion, scientific exhibitions, platelet transfusion, comparative study.

Study conducted at the Hospital Universitário, Universidade Federal de Sergipe, Aracaju, SE, Brazil

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Introduction

Despite the importance of blood for life being known since the times before Christ, the key step towards the realization of the first transfusion was given by William Harvey, in 1628, when he described blood circulation. Exactly 200 years had passed until the first successful blood transfusion was made in humans.[1] Since then, the therapeutic possibilities of blood and its components have been growing continually, with 75 million units of blood being collected each year worldwide, making the transfusion practice one of the most important medical acts of our days.[2,3]

Despite being a common and widespread practice, the use of blood products is associated with an increased risk of infections, renal dysfunction and mortality, as already demonstrated.[4-7] In addition, normal hemoglobin levels are not necessarily related to better outcomes post-operatively, and in some cases, may be advantageous to tolerate lower HB levels, avoiding unnecessary blood transfusions.[8]

Safety of blood transfusion can be defined as a series of processes implemented to eliminate or reduce inherent risks of transfusions. The safe availability of blood components and by-products requires the collaboration of volunteer blood donors, well-organized and distributed producers, quality control in serologic and immunohematological testing, rational use of blood and blood components and surveillance of adverse events.[9]

The increasing complexity of therapy related to blood components, associated with increasing blood shortages and the inherent risks of its use, indicate the need for new approaches, aiming at a more rational prescription of blood products. With this objective, several protocols for use have been developed to guide the appropriate indication of blood components.[10] From the launch of the Collegiate Board Resolution (RDC) 153, in 2004, there was a standardization of procedures in relation to collection, storage, transport and use of blood products.[11] In this resolution, guidelines for the correct completion of transfusion requests were also established.

Knowing the indications, contraindications and complications of infusion of blood products is crucial for accurate decisions and the promotion of advantageous cost/benefit and risk/benefit relationships. It is also essential to determine the clinical, laboratory and monitoring signs that should guide the start of blood transfusion, avoiding risks and waste of resources.[12-14]

The aim of this study was to produce improvements in transfusion practices through the implementation of an educational program for health professionals in a university hospital.

Methods

Study type, location, population and objectives

This is an interventional, analytical, comparative and prospective study, with pre- and post-analysis of an educational intervention for improving transfusion practices in a public university hospital.

The study was developed at the University Hospital of the Universidade Federal de Sergipe. The hospital has about 100 medical and surgical beds, an intensive care unit with five beds, a surgical center with five rooms and a small transfusion agency, class IV, operating full-time and temporarily storing requests for blood components from the hospital through the blood center of the state of Sergipe (Hemose).

The work involved the participation of health professionals from different categories in the stage of training and capacitation, through an educational intervention during the month of February 2011, and the monitoring of blood transfusions performed in the pre-intervention (September to November 2010), and post-intervention periods (March to August 2011). The months of December 2010 and January 2011 were not evaluated because they were atypical due to academic recess, holidays and long weekends.

Characteristics of the study and statistical analysis

The transfusion practices and knowledge of health professionals about blood transfusions were evaluated by comparing the differences between the proportion of correct responses in a questionnaire before and after the training intervention by Fisher's exact test, with significance level of 0.05.

Transfusion practices were assessed prospectively based on monitoring of procedures from the filling of a request form to transfusion itself and devolution of unused blood components. The authors checked the requesting sectors, sex, patient diagnosis, indication of the transfusion, and the amount and type of blood components that were ordered, received, transfused and returned.

The filling of transfusion requests was evaluated by observing the quality and compliance for all items: date of request, date of birth, diagnosis, registration, the hospital sector, bed, weight, age, hemoglobin, history of transfusion reaction, request type, font legibility, time of request, sex, platelet value and readability of carbon copy. Knowledge of health professionals, including doctors, nurses and lab technicians, was assessed based on the responses to a differentiated questionnaire for evaluation of theoretical knowledge with 10 multiple choice questions about transfusion practice. Physicians and residents responded about indications of blood components, management and conduct in case of transfusion reactions; nurses and technicians about procedures related to installation, recognition of transfusion reactions, segregation, packaging and disposal of the waste generated. The evaluation was delivered to professionals for immediate response half hour before the start of training and soon after its completion.

The program was implemented in one month, through an educational campaign throughout the hospital, that led to the implementation of the following elements:

- Technical guide for blood transfusions, developed by the researchers based on guides of other institutions and available on all computers in the hospital;
- Poster indications of blood components and acute transfusion reactions printed on A3 paper size, prepared by the researchers and fixed in all areas of the hospital, including the surgical center;
- Risk management newsletter in a special issue entirely dedicated to disseminating the rational use of blood products. These newsletters were distributed to health professionals, and fixed in all areas of patient care;
- Training service for physicians, residents, nurses and technicians, performed in a format of interactive classes prepared and submitted by the researchers, using the audiovisual resource of computers in each sector, following a program previously scheduled and dis-

closed to guarantee the presence and participation of professionals.

Ethical aspects

The study was approved by the Research Ethics Committee of the Universidade Federal de Sergipe, under protocol number 0300.0.107.000-11. All health professionals who participated answered questionnaires to evaluate their specific knowledge on the use of blood and signed an informed consent form. This research was performed according to the Declaration of Helsinki, revised in 2008.

Results

Comparative analysis of knowledge of health professionals

During the educative campaign, 63 health professionals, including 33 nurses and nursing technicians and 30 physicians from all sectors of the hospital (28.6% of clinical areas, 25.4% of surgical areas, 20.6% of ICU, 23.8% of pediatrics and 1.6% of blood bank) received training.

Among the doctors, there was a statistically significant gain of 20.1% on theoretical knowledge (p=0.037). The gain in the nursing group was even higher: 30.4% (p=0.016) (Figure 1). In the medical group, the professionals working in the ICU had the greatest improvement in correct answers to the questionnaire. In the nursing group, pediatrics was the sector with higher gains: 26.4% (p<0.0001). The authors also observed statistically significant gain in the group of doctors working in the pediatrics (13.9%; p=0.02) service and in the groups of nurses from the medical clinic (24%; p=0.0001) and the ICU (13.6%; p=0.04) (Table 1).

TABLE 1 Differences in improvement of theoretical knowledge in different sectors of the hospital, before and after training about blood transfusions. University Hospital: September/2010 to August/2011.

Hospital sectors	Doctors (n=30) % of improvement (p)	Nurses (n=33) % of improvement (p)
ICU (n=13)	21.2 (p=0.001)	13.6 (p=0.04)
Pediatrics (n=16)	13.92 (p=0.02)	26.4 (p<0.0001)
Medical clinics (n= 18)	7.81 (p=0.25)	24 (p=0.001)
Surgical clinics (n= 15)	10.06 (p=0.14)	5 (p=0.77)
Lab (n=1)	-	5 (p=0.56)

Regarding doctors and nurses, the question with higher percentage of correct responses was that related to acute transfusion reaction (98 and 100%, respectively), on the post-intervention questionnaire. On the other hand, the questions with higher percentage of wrong responses were those related to the indication of concentrate of platelets, with only 5% of correct answers on the questionnaire after intervention for the doctors, and the question related to

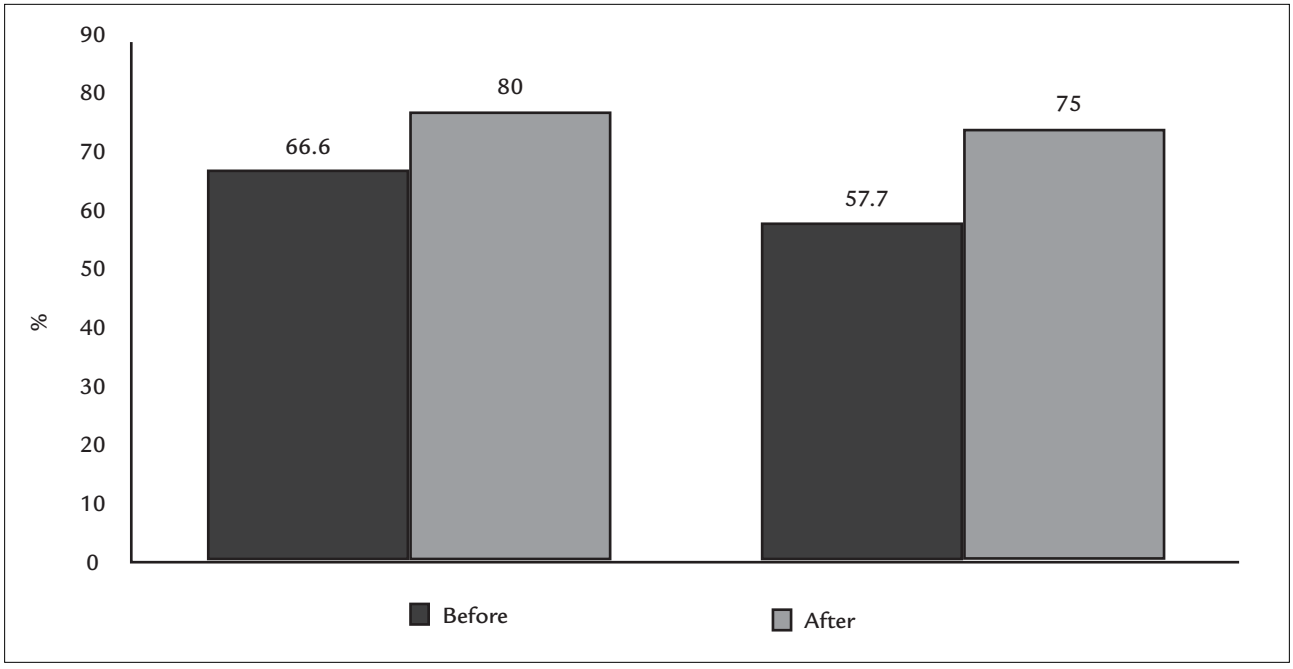

FIGURE 1 Differences in percentage of correct answers in the questionnaire of theoretical knowledge among groups of professionals, before and after training on blood transfusions.

management of blood components, with 39% of correct responses on the post-intervention questionnaire for nurses.

Comparative analysis for blood transfusions accompanied

The authors compared 247 blood transfusions during the pre-intervention period, with 565 during post-intervention period. The surgical clinic was the sector which most prescribed blood products, both in the pre- and post-intervention periods: 48.9 and 52.9%, respectively. In medical clinic, there was a significant increase in consumption between the two periods, from 6.9 to 23.2% (p=0.002); while in pediatrics there was no significant reduction from 24.4 to 13.6% (p=0.10). Among transfused patients, females prevailed in the pre-intervention period, accounting for 58.8% of transfusions, falling to 48.9% in the post-intervention period (p=0.20). Comparison of types of blood components listed in both periods revealed non-significant differences: packed red cells before (85.8%) and after (76.5%) (p=0.15); fresh frozen plasma before (11.3%) and after (18.8%) (p=0.22); concentrated of platelets before (2.9%) and after (3.7%) (p=1.00) (Table 2).

TABLE 2 Comparative analysis of blood transfusions accompanied before and after an educational intervention. University Hospital: September/2010 to August/2011.

	Pre-intervention (n=247)	Post-intervention (n=565)	p-value
Sex			
Female	77 (58.8%)	133 (48.9%)	0.06
Sector			
Medical clinic	25 (19.1%)	63 (23.2%)	<0.05
Surgical clinic	64 (48.9%)	144 (52.9%)	<0.05
Pediatrics	32 (24.4%)	37(13.6%)	<0.05
Type of blood component			
Packed red cells	212 (85.8%)	437 (77.3%)	0.06
Fresh frozen plasma	28 (11.3%)	107 (18.9%)	0.06
Platelets concentrated	7 (2.9%)	15 (2.7%)	0.06
Diagnosis			
Neoplasia	28 (21.4%)	71 (26.2%)	0.01
Visceral leishmaniasis	18 (13.7%)	16 (5.8%)	0.01
Sickle cell anemia	15 (11.5%)	16 (5.9%)	0.01
Indications			
Surgical reservation	57 (43.5%)	119 (43.8%)	
Conformity	33 (25.2%)	91 (33.5%)	0.21
Nonconformity	6 (4.6%)	9 (3.3%)	0.36
Incomplete filling	35 (26.7%)	53 (19.5%)	0.17

The three most common diagnoses of patients were not significantly different when comparing the two periods: neoplasia increased from 21.4 to 26.2% (p=0.50), visceral leishmaniasis decreased from 13.7 to 5.8% (p=0.09) and sickle cell anemia from 11.5 to 5.9% (p=0.21). Regarding indications of blood products, the percentage of requests for surgical reservation remained stable: from 43.5 to 43.8% (p=1.00). There was no significant improvement in compliance indication of blood products evaluated by the hematologist of the transfusion agency after the educational campaign (which increased from 25.2 to 33.5%) (p=0.21), and a slight decrease in nonconformity, from 4.6 to 3.3% (p=0.72). The rate of return of blood products experienced a statistically nonsignificant decrease from 55.8 to 49.5% (p=0.47) (Table 2).

Comparative analysis of compliance in filling requests for transfusion

The comparative analysis of transfusion request forms from 848 blood transfusions that that have performed before and after the intervention showed a non-significant decrease from 26.7 to 19.5% (p=0.31) in all forms with incomplete filling. The authors observed a statistically significant improvement in relation to the filling of various items of requests: registration 15.2% (p=0.02), sector 10.4% (p=0.03), hemoglobin 24.1% (p=0.04), history of transfusion reactions by 24.8% (p=0.02) (Figure 2). In contrast, there was a statistically significant decrease in relation to the filling of the hour of request of blood (20.3%) (p=0.002). In other items, there was improvement without statistical significance (Table 3).

Discussion

The amount of transfused blood products has increased in recent years. In Great Britain, for example, it was observed a 10% increase in transfusions of fresh frozen plasma for a period of 15 years.[15] However, the increase in transfusions is not a phenomenon without side effects. Multiple organ failure after injury, transmission of bacterial, viral and other microorganisms, increased mortality and immunosuppression, and febrile reactions are some of the most damaging consequences of blood transfusions.[16-19]

With the increase of complexity of therapy related to blood components, there is a need to reduce inadequate transfusion, through reliable educational programs.[20-23] These programs are based on multiple strategies, such as teaching, development of protocols, creation of new transfusion requests, among others.[21,23] Currently, a meta-analysis revealed that there is an increase in relative risk of inappropriate transfusions in the absence of an organizational intervention program.[24]

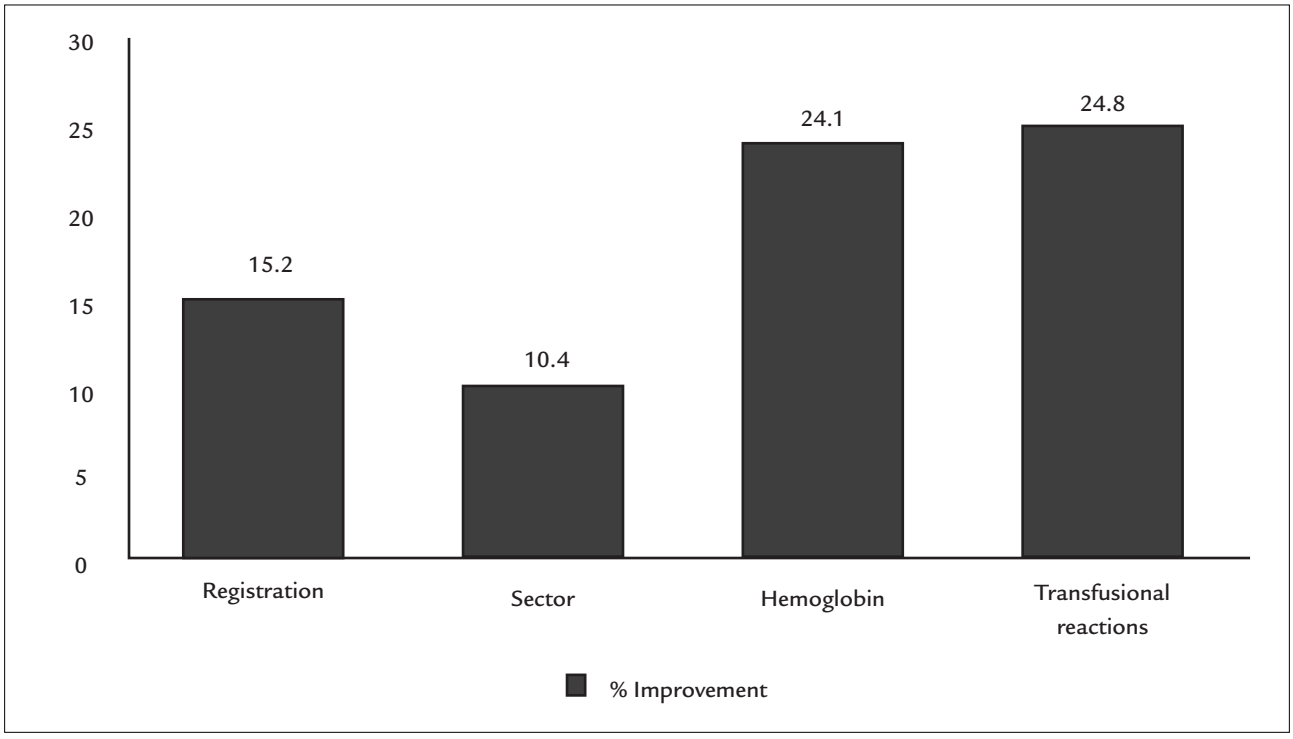

FIGURE 2 Percentage of significant improvement in request parameters for blood components after the interventional project.

TABLE 3 Comparative analysis of records of request forms for blood components before and after an educational intervention program. University Hospital: September, 2010 to August, 2011.

Request item	Pre	Post	Improvement	p-value
Registration	62.6%	77.8%	15.20%	0.02
Sector	79.4%	89.8%	10.40%	0.03
Hemoglobin	35.1%	59.2%	24.10%	0.04
History of transfusion reaction	34.4%	59.2%	24.80%	0.02
Time of request	75.6%	55.3%	-20.30%	0.002
Day of request	96.2%	98.5%	2.30%	
Date of birth	92.4%	95.6%	3.20%	
Diagnosis	87.8%	93.8%	6%	
Bed	64.1%	67.3%	3.20%	
Weight	43.5%	60%	16.50%	
Age	90.1%	96.4%	6.30%	
Type of request	72.5%	78.9%	6.40%	
Legibility of handwriting	93.9%	96.4%	2.50%	
Sex	95.4%	92%	-3.40%	
Platelets	8.4%	8%	-0.40%	
Legibility of carbon copy	52.7%	32%	-20.70%	

In the present study, a statistically significant increase in the number of correct answers for the questions indicates the importance of educational programs to present new knowledge regarding the correct use of blood products. Educational programs, in addition to improve the knowledge and increase efficiency in the use of blood products, also lead to a better filling of transfusion requests forms, which was evidenced in our work, with statistically significant improvement in filling of four items and significant worsening in just one item.[21,22,25,26]

Interestingly, when comparing different sectors of the hospital, Pediatrics showed a statistically significant increase in correct answers and a statistically significant reduction in transfusions. In the medical clinic sector, we observed a non-significant increase in correct answers and a significant increase in the amount of blood components ordered. This fact can be explained by the high turnover of doctors in the medical clinic, due to a large amount of secondary specialists who work in that sector; the intervention program did not cover all professionals in that area.

The predominance of requests for blood components in the surgical clinic during the pre- and post-intervention periods is justified by the absence of blood reserves in the hematology unit of the referred hospital. This also explains the high prevalence rate of blood components returned (around 50%). The increase in the relative proportion of requests for blood components in the post-intervention period indicates the need for a separate approach with surgeons, emphasizing appropriate indications and risks of blood transfusion, such as the program developed by Soumerai et al.[25] This program was effective in reducing the proportion of transfusions in surgical patients that did not conform to the transfusion protocol.[25,26]

Establishing protocols for transfusion of blood components has led to a significant reduction in the use of packed red blood cells, as observed by Brandt et al.[16] But in this study, proportionally, there was a non-significant reduction in requests for red blood cells, with an increased proportion of requests for fresh frozen plasma. Since the main diagnoses did not differ in the pre-and post-interventional periods, the relative increase in requests for fresh plasma was due to a reduction in requests of packed red cells.

Conclusion

The authors observed significant improvement in the entire process related to blood transfusions after an interventional project conducted in February 2011. Development of a continuing education program is clearly necessary, so that the gains from this project are not lost.

Resumo

Práticas para uso racional de hemocomponentes em um hospital universitário

Objetivo: produzir melhorias em práticas transfusionais a partir da implementação de um programa educacional para profissionais de saúde em um hospital universitário.

Métodos: este é um estudo intervencional e prospectivo, com análises pré e pós-intervenção educacional. A pesquisa foi desenvolvida no Hospital Universitário da Universidade Federal de Sergipe, envolvendo a participação de profissionais de saúde no estágio de capacitação, durante o mês de fevereiro de 2011, além da monitorização de transfusões sanguíneas feitas nos períodos pré e pós-intervencionais. A busca por práticas transfusionais foi checada via requerimentos de transfusão e devolução de hemocomponentes não utilizados. O conhecimento dos profissionais de saúde foi medido por meio de questionário relacionado a práticas transfusionais.
Resultados: durante a campanha educativa, foram capacitados 63 profissionais de saúde, sendo 33 enfermeiros e técnicos de enfermagem e 30 médicos. Entre os médicos, houve um ganho estatisticamente significante de 20,1% nos conhecimentos teóricos (p=0,037). O ganho no grupo da enfermagem foi ainda maior, de 30,4% (p=0,016). A análise comparativa dos formulários de requisição transfusional mostrou uma diminuição não significativa de 26,7 para 19,5% (p=0,31) em todas as formas de preenchimento incompleto. Observou-se uma melhoria estatisticamente significativa no preenchimento de quatro itens da requisição transfusional.
Conclusão: houve melhorias significativas em todo o processo relacionado às transfusões sanguíneas após intervenção conduzida em fevereiro de 2011.

Palavras-chave: transfusão de eritrócitos, exposições educativas, transfusão de plaquetas, estudo comparativo.

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