Rational use of blood: how to do it?

Helio Moraes-Souza[1,2]

[1]Universidade Federal do Triângulo Mineiro – UFTM, Uberaba, MG, Brazil
[2]Fundação Centro de Hematologia e Hemoterapia de Minas Gerais – HEMOMINAS, Belo Horizonte, MG, Brazil

Transfusion medicine is a complex process that depends on several professionals. To do it safely, each professional depends not only on their own knowledge and skills, but also the knowledge and skills of the entire team and the efficiency of the system.

There is growing recognition of adverse events associated with blood transfusions and several factors may contribute to increase the chances of a patient suffering transfusion-related complications. These factors include the type of component being transfused, the characteristics and clinical conditions of the patient, the use of inadequate equipment, inconsistent intravenous solutions, inadequate procedures and errors or omissions on the part of the team that provides care to the patient (clerical errors), in particular, in the identification of the patient and blood samples[1].

With the goal of increasing the safety of blood transfusions, the majority of countries have specific legislation regulating transfusion medicine in their countries and regions covered. The RDC 57/ANVISA[2] and Ordinance 1353/MS[3] in Brazil, the British red blood cell transfusion guidelines in the United Kingdom[4], the Council of Europe Resolutions, recommendations and Convention in the Common Market[5] and the Blood Transfusion Safety of the World Health Organization (WHO) [6] are all examples of recommendations and guidelines aimed at improving blood transfusion safety.

Additionally, especially since the 1990s, transfusion committees and hemovigilance programs began to be regulated and deployed, initially in France in 1993 and thereafter in England with the Serious Hazards of Transfusion (SHOT) initiative in 1996[7], which was extended to the Common Market with the institution of the European Hemovigilance Network. In Brazil, the National Hemovigilance scheme was implemented in 2002 with the objectives of collecting and processing information or unexpected adverse effects resulting from the transfusion of blood and also of preventing administrative errors (clerical errors such as typing, recording, conference mistakes, etc.). The latter, surprisingly, is more common than viral transmissions and often omitted by the services in Brazil and is not reported in the statistics[8].

While the system of notification of transfusion reactions in the UK (SHOT) revealed that approximately 66.7% of transfusion reactions reported are related to errors in the identification of recipients[7], a study conducted at the Department of Health of the State of New York determined that the risk management of wrong red blood cell (RBC) transfusions is one in every 14,000 transfusions performed and misclassification of ABO is 1 for every 38,000 transfusions[9]. Moreover, data from Bulletin No. 5 (2012) of the national agency of Sanitary surveillance in Brazil, ANVISA, reported 5340 transfusion reactions in the previous year with an estimated underreporting of 50.1%, and only 24 acute immune hemolytic reactions. This number represents only 1 per 148,655 of the 3.57 million transfusions performed, demonstrating the high degree of underreporting[10].

On the other hand, in recent years, much has been published about the cost-effectiveness of blood transfusions, especially in studies that have shown the close association between blood transfusions and poor clinical outcomes, including a prolonged stay in the intensive care and increased rates of nosocomial infections, multiorgan failure, and death[11].

These studies have mainly addressed the inappropriate indications and few have examined excessively high transfusion rates. But where over-transfusion has been studied, levels of the order of 24 to 75% have been reported[12]. It has also been shown that blood transfusion rates between hospitals for similar surgical procedures, such as coronary artery bypass grafting, ranged from 7.8% to 92.8%[11].

A study conducted in Northern Ireland draws attention to the fact that in considering whether the use of a RBC transfusion is appropriate or not, consideration should be given not only to the issue of "whether" to transfuse, but also to "how much" to transfuse. The authors demonstrated that in this study 23% of transfusions were considered inappropriate and that 19% of patients were over-transfused[5].

An observational study of transfused obstetric patients in two Dutch hospitals noted that of 311 RBC units transfused to 90 patients, 143 units (46%) were possibly inappropriate partly due to over-transfusion[13].

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Corresponding author
Helio Moraes de Souza
Fundação Centro de Hematologia e Hemoterapia de Minas Gerais – Fundação Hemominas
Alameda Ezequiel Dias, 321 - Bairro Santa Efigênia
30.130-110 Belo Horizonte, MG, Brazil
helio.moraes@dcm.uftm.edu.br

www.rbhh.org or www.scielo.br/rbhh

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A North American study that assessed hemoglobin (Hb) levels after transfusion found that the rate of over-transfusion, that is a Hb level at discharge greater than 10 g/dL in patients after elective transfusions, was 27.8%[6].

A multicenter retrospective observational French study that evaluated the appropriateness of RBC transfusions showed that 93% percent of pre-transfusions and 79% of hemoglobin concentrations at discharge were in agreement with the French national guidelines. The study concluded that the rate of inadequate indications of RBC was satisfactory, however, its use was excessive and the authors proposed that the maxim employed in transfusion medicine "transfuse the right product, to the right patient, at the right time" should be extended to include "at the right dose using the right skills[14].

In Spain, when investigating the impact of three national blood transfusion indicators (NBTIs) specifically designed for critical care regarding the appropriate blood transfusion indications, researchers observed that the inappropriate use of concentrated hemoglobin (CH), platelet concentrate and fresh frozen plasma was approximately 13%, 48% and 67%, respectively. They then concluded that the introduction of NBTI guidelines demonstrated a variable impact on the appropriateness of blood component transfusions in critically ill patients[15].

In contrast, other authors have demonstrated that the implementation of an evidence-based transfusion protocol in a surgical intensive care unit, together with continued reinforcement on the rationale for transfusion, led to a significant reduction in the number of infused RBC units and the number of patients transfused without an increase in mortality[16,17].

A study performed at the Hospital de Clinicas de Porto Alegre (Brazil) to assess the appropriateness of requests for blood products in three sectors of the hospital based on its protocol on care routines for blood component transfusions, found that the clinical sector was the most efficient by requesting 85.57% of its transfusions satisfactorily, followed by the intensive care unit (81.4%) and finally the surgical sector (71.42%). Only 2.96% requests could not be assessed for not having enough information to decide on the conformity or otherwise of transfusion requests[18].

In a study conducted in 226 blood centers of the nucleus of hemotherapy and transfusional agencies in 178 municipalities in the state of Minas Gerais, Brazil found that transfusion committees were present in 63.4% of the services visited. Transfusion incidents were reported by 53 (36.8%) transfusion services with transfusion committees and by only eight (9.6%) without transfusion committees with 543 (97.5%) and 14 (2.5%) notifications, respectively. The authors of this study concluded that, the incidence of notification and investigation of the causes of transfusion reactions was higher in transfusion services where a transfusion committee was present. However, despite these results, the performance of transfusion committees was found to be incipient and better organization and effectiveness are required[19].

In the work of Souza et al.[20] analyzing the justifications for transfusion of red blood cells, the authors noted that of 334 randomized transfused RBC units, for which just 77 (23.05%) were in conditions to be evaluated, only 47 (61.04%) units were correctly indicated. The authors concluded by emphasizing the importance of adopting a protocol to rigorously analyze transfusions, the application of blood bank awareness campaigns on the rational use of blood, and the implementation of strategies to use blood products more effectively. To the strategies proposed, we add the deployment and/or activeness of transfusion committees, that have been mandatory in Brazil since 2004[21], which would act in the monitoring and prevention of adverse effects of transfused blood products.

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