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Original article

The most common inadequacies in red blood cell requests at a reference center in Western Paraná state

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ABSTRACT

Introduction: In the current scenario, in which evidence-based medicine is almost obligatory, therapeutic approaches are increasingly being restricted to measures that are proven to bring benefits to the patient. Transfusion therapy follows the same concept. Even though it can be an essential support procedure in some situations, it must be carefully used, exclusively in situations in which the literature assures scientific support for its usage. Transfusion exposes patients to risks and complications, so it is necessary that we, as doctors, continue working to reduce possible mistakes involving the practice of this type of therapy.
Objective: To analyze if the red blood cell requests are properly made, analyzing the indication written on them (by the doctor, comparing them to the references in the actual literature.
Method: In this research, we have analyzed and reviewed the requests for red blood cell concentrates between August and September of 2018 received at the Hematology and Hemotherapy Center studied to find the most common mistakes made by requesters/doctors.
Results: A total of 397 of the 754 analyzed requests were evaluated as inadequate. Therefore, 1 out of every 2 transfusions performed did not have their requests properly completed in the city of Cascavel, Paraná.
Conclusions: The number of inappropriate requests was high during the studied period, especially when compared to studies available in the literature. The number of inadequacies suggests that the blood component requests and the subsequent evaluation by the transfusion agency needs to be better addressed in clinical practice.

Introduction

The quality of transfusion medicine has improved substantially in Brazil in recent decades. The technical standards used and the collective effort to implement them in relation to transfusion components stimulated investments in the services responsible for them, increasing the quality and

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availability of blood components for greater safety of the population that depends on it. However, transfusion practice still involves considerable risks, despite advances, and even lacks precise indications. For this reason, the indication and use of the blood components should be made in a safe and rational manner.[1]

The Center for Hematology and Hemotherapy, in which the study took place, is a non-profit entity of the State Department of Health, which is responsible for all the activities involving screening, collection, storage and distribution of blood to public, private, and philanthropic hospitals operating in all the regions of Paraná.[2]

The regulation of the blood donation process in Brazil follows the norms defined in Law No. 10,205 of March 21, 2001, complemented by technical standards of the Ministry of Health. Obtaining the blood components depends on the structuring of a service network capable of performing all the stages of blood processing, which are based on the usage of an advanced technology by highly skilled professionals. Such particularities permeate the thinking behind the use of these resources in patient therapy.[3]

Although it can be important in the treatment of various diseases, red blood cell concentrate (RBCC) transfusion is not risk-free, so the approach is not just about the hemoglobin level, but a broad approach to the real need and adequate prescription, in conjunction with the clinical indication. [4,5]

Thus, it is necessary that the request for blood components be properly completed, including name, age, gender, clinical indication, history of other transfusions, clinical conditions of the patient and laboratory tests. Therefore, the technical competence of the responsible professionals, the knowledge of the current reference literature and the understanding of possible damages, guarantee better results in transfusion therapy.[1,6]

The RBCC is obtained from the first centrifuge of whole blood. Its volume varies between 250 and 350ml and the hematocrit (HT) ranges from 65 to 80%. It should be maintained between 2°C and 6°C, valid for 35 to 42 days. Red blood cell concentrates can still be filtered, washed, irradiated and frozen, so they can minimize and even prevent many of the adverse effects of transfusion. This processing has specific recommendations for its use.[7]

Adverse reactions associated with blood transfusion may occur despite correct indication and administration of the concentrate. It is estimated that 1 to 3% of blood transfusions results in transfusion reactions that can vary in severity from mild to fatal, which justifies the urgent need to identify reactions, as well as to start the treatment and prevention of new episodes. Early intervention can determine the patient prognosis.[1]

Transfusion reactions are classified as immediate or late and divided into immune and non-immune. The main reactions among the immediate ones are febrile non-hemolytic reaction, acute hemolytic reaction, allergic reaction, transfusion-related circulatory congestion, transfusion-related acute lung injury and bacterial contamination.1 In late reactions, the patient can present with erythrocyte alloimmunization, late hemolytic reaction, graft-versus-host disease and post-transfusion purpura.[1]

Faced with a transfusion reaction, the medical approach is essential to assess, classify and adapt the specific clinical approach. Each of the reactions will not be addressed individually, so as not to lose the focus of the study.

Modern transfusion therapy is based on the idea of the rational use of blood components, transfusing only the component and quantity that the patient needs.

Most institutions rely on the use of restrictive protocols, which consider the transfusion adequate if the hemoglobin is below 7g/dl. The restrictive transfusion proved to be more reliable, more capable of not aggravating the condition of patients, as well as aiding in reaching greater control of component stocks and reducing costs.[3,8]

Transfusion of RBCC in a hemodynamically stable adult patient (70kg) elevates the hemoglobin level by 1g/dl (and hematocrit by 3%). Thus, it is commonly recommended to prescribe 1 unit and sequential reassessments of the patient conditions before considering the need for more units.[9]

In relation to chronic and normovolemic anemias, the therapy considered should be the specific treatment of the cause (deficiencies of B12, folates, iron and erythropoietin), rather than making use of transfusion therapy with the objective of correcting anemia. With hemoglobin between 7 and 10g/dL, the indication should be individualized, since patients with a hemoglobin level below 8g/dL presenting with cardiovascular disease, hematological neoplasms or solid tumors may benefit from transfusion.[8,10]

Transfusion indications in mild anemias (hemoglobin above 10g/dL) are basically restricted to patients with chronic lung diseases and hypoxemia. In patients with active cancer, a pattern has not yet been determined. Clinical signals and symptoms should be taken in consideration in oncologic patients (dyspnea, tachycardia, pain, quality of life and others), not only the hemoglobin level itself, making the transfusion acceptable if the hemoglobin is between 7 and 10g/dL in several situations.[8]

Severe trauma and massive bleeding require a rapid and individual approach, as in these cases hemorrhage accounts for more than 50% of deaths.

The development of massive transfusion protocols reduced mortality in trauma units by 15%, and these should justify the empirical use of the requested blood component. In these cases, the approach should not be guided by hematocrit and hemoglobin values, and the transfusion is usually indicated in estimated losses of 30% and used in an emergency, when facing losses of 40% or more in volume.

The goal is to maintain the hemoglobin value between 7 and 9g/dL (between 8 and 9g/dL in patients with cardiorespiratory morbidity).[8]

The objective of this study was to find the most frequent inadequacies in the RBCC transfusion requests (TR) by analyzing those documents according to the scientific basis and reference protocols.

The blood bank in this study provides within its system the identification of two sources of requests: one that comes from a hospital specialized in the care of cancer patients and the other, from hospital care units throughout the region.

Among these other hospitals, there are two university hospitals and another oncology service.

Methods

This is a cross-sectional, retrospective, descriptive and qualitative study performed in 2020 using the analysis of TRs at the regional blood bank studied. The study evaluated the RBCC TRs in the period of 2 months (August and September of 2018). In these requests, the justifications for requesting RBCC were addressed using the diagnosis and clinical aspects (vital signs and general conditions) of the patients and the personal data of the patients were not considered in the research. The data were incorporated and analyzed on spreadsheets in the Microsoft Excel 2016 and Microsoft Word 2016 programs. Inclusion criteria were all requests for patients with over 4 months of life. Exclusion criteria were requests for surgical reserve purposes and for children under 4 months of age. During the period from August to September 2018, 920 RBCC TRs were sent to the blood bank.

Of the 920 requests, 97 were intended for surgical reserve and 69 for children under 4 months of age and 18% of all requests were excluded from the analysis.

The evaluation of the indications for transfusion were based on a protocol developed by the Ministry of Health and transfusion protocols of the main hemotherapy centers in Brazil.

Results

The results reflect the analysis of the 754 TRs (754/920 = 82% of transfusion requests in the cited period). To organize the research results, the requests were classified as adequate or inadequate. Requests not thoroughly completed (precluding the analysis of the proposed indication), as well as those with indications not advised by protocols or by restrictive recommendations were classified as inadequate.

Of the total transfusion requests referred to the blood bank in the period studied, 357 TRs (47.3%) had correct information with indications provided based on the reference transfusion protocols. A total of 397 TRs (52.7%) were classified as inadequate (Table 1).

The lack of data did not allow for 207 requests (207/397 = 52.1%) to be considered adequate. The indications which were not foreseen nor recommended in protocols was another reason to consider 138 requests as inadequate (138/397 = 34.8% of the inadequacies).

Diagnosis and/or indication were not written in 41 requests (41/397 = 10.3%) and the hemoglobin value was not reported in 11 TRs (11/397 = 2.8%). Among inadequate requests, 66 (66/397 = 16.6%) contained, in addition to the errors already mentioned, the number of red blood cell concentrates requested was higher than recommended or that did not match the clinical indication presented in the TR.

A large number of red blood cell transfusion requests (431/754 = 57.2%) were made for patients treated at a hospital specialized in cancer treatment. Of these requests, 222 (222/431 = 51.5%) had all the necessary information and correct indications and 209 requests were considered inappropriate (48.5%).

The alterations that led to the consideration of inadequacy in this oncology center were essentially similar to those observed in the analysis of the total number of inadequate requests sent to the blood bank (Table 1). The indication for transfusion was not mentioned in 134 requests (134/209 = 64.1%), the indication was not based on recommendations in 69 requests (69/209 = 33%), hemoglobina was not described in 4 (4/209 = 1.9%) and the indication was not mentioned in 2 requests (2/209 = 1%).

The table below shows the frequency of inadequacies, separating the total of requests from those referred to the tertiary oncology hospital and the other hospitals also serviced by the blood bank (Table 1).

Discussion

The transfusion medical practice has undergone great advances and rearrangements of medical knowledge. The prescription of blood components is no longer merely complementary to a therapeutic plan, in which experiences or personal opinions defined RBCC transfusions or indications and has become an evidence-based activity.

The development and use of restrictive transfusion protocols allowed for a more efficient management of blood component stocks, the reduction in costs and the more appropriate and safer use of transfusion to patients.

The analysis based on a fraction of the material available at the blood bank is not intended to definitively clarify the blood transfusion situation in the region, but many concerns surfaced due to the study.

The first problem observed in the analyzed material was the very large number of requests considered inadequate, either due to lack of information that should have been completed in the request as technical standards require, or because the information in the request did not meet the current criteria of transfusion recommendations. A simple and

Table 1 – Comparison of the errors among the institutions analyzed.

Errors	Tertiary oncological hospital	Other hospitals	Total
Lack of data to justify the transfusion	134	73	207
Cited indication not recommended	69	69	138
Absence of diagnosis and / or indication	2	39	41
No cited hemoglobin value	4	7	11
Total of inadequate requests	**209**	**188**	**397**

Source: Own author.

functional way to remediate this "lack of information problem" would be to create a computerized system that would not enable TRs with relevant missing information to be accepted, in this manner forcing the prescriber to complete all the important blank gaps. This system would assist the blood bank in evaluating the incoming requisitions. Unfortunately, at the center where this study was performed, the TRs were written by hand, not on a computer.

The frequency of inadequacies observed was very high and, although it was impossible for us to find many studies with the same intentions as ours, we noticed a contrast with the current literature on the percentage of inadequacies at other services. In an article published in 2014 on screening for transfusion errors in hospitals in Canada, the authors identified that the inadequate request for blood components was responsible for 6.5% of the errors (*vs*. 52.6% in the current study). Transfusions were considered inadequate due to errors in the completion, as well as in the transfusion indications, resulting in unwanted events in patients receiving unnecessary transfusions (due to adverse reactions).[10] In another study that took place at the Syrian Lebanese Hospital in São Paulo, only 3% (a severe discrepancy compared to that which we observed) of transfusion indications were not foreseen in the transfusion guidelines of the hospital and many of those considered inadequate were based on controversial indications, once again exposing the contrast with the percentage of inadequacies found in this study.[11]

The same reasons for inadequacy were much more frequent in the present study, which identified them in 52.7% of the requests. In more than 80% of the requests missing data, the request justification was the absent information. The other 20% were requests in which the hemoglobin value alone did not justify or complement the described indication, such as "acute anemia", for example.

Many are the variables that should be taken into consideration when transfusion therapy is to be applied, such as intravascular volume, dyspnea, exercise tolerance, chest pain, hypotension or tachycardia that does not respond to fluid replacement. These situations would be considered proper justifications (to complete TR with) and would undoubtedly clarify the understanding of a patient's clinical condition by the person evaluating the document, for example. [4,5]

The unforeseen or not recommended indication in protocols was another significant inadequacy. Among the erroneously cited indications were liver cirrhosis, vaginal bleeding, febrile neutropenia, thrombocytopenia, coagulation disorders, liver failure, melena, and respiratory symptoms, with no other data to support the transfusion decision.

Blood transfusion due to the loss of labile coagulation factors, loss of the functional properties of platelets and preservation of the functional properties of red blood cells has already been considered a disused practice and does not justify the use of HC in these cases alone.8 Most of the main indications mentioned in the current protocols were addressed in the introduction of this study, making it unnecessary to present them again.

The absence of the diagnosis and/or indication, as well as the hemoglobin value, despite representing a smaller percentage of the inadequacies in the TRs we evaluated, is still frightening due to its relevance in the assisting physician's decision to transfuse a patient. The non-specification of such data hinders the understanding of the chosen therapy, not only in clinical terms, but also in legal and statistical issues. It is extremely important that such data be present in a TR.

All of the services covered by the blood bank in which this study took place submits handwritten TRs. As cited before, a computerized system that would automatically force the prescriber to complete the mandatory gaps, as in bigger centers, would certainly contribute towards solving the missing information problem, which was the most frequent error we observed.

As for the number of bags requested, in more than 90% of the inappropriate TRs the document asked for 2 to 3 bags, even with hemoglobin values very close (between 6 - 7 mg/l) to the limit recommended in the restrictive approach. None of the requests had data on any previous transfusion attempt and the patient's clinical response. The protocols recommend that only 1 unit of HC should be administered at a time (in the vast majority of the situations) and that sequential reassessments of the assisted patient's conditions should be made to decide on further transfusions.[9]

Taking that into consideration, it may be possible to identify some reasons capable of explaining the expressive number of inadequacies observed in the material studied.

Although the support protocols are widely disseminated by all the physical and electronic means available today, many medical professionals responsible for the request may not be updated on the transfusion recommendations. Most of the services affiliated with the blood bank studied do not have their own agency and transfusion committee, meaning these institutions should follow the protocols and participate in the transfusion committee of the coordinating or responsible blood bank.[3]

A considerable fraction of inadequate transfusion requests was originated at a cancer specialized hospital. The profile of care and volume of procedures at this institution makes it necessary to maintain an agency and a transfusion committee, responsible for the institution of protocols, supervision and control of transfusion procedures.[3]

It is one of the interests of the transfusion committee to make a critical review of the hemotherapy practice at the institution and its final objective is to ensure the use of blood in a rational way, as well as the improvement of transfusion safety, reduction of errors and the promoting of continuing education and updating in hemotherapy.[6]

Therefore, it is possible to infer that doctors have not been updated in relation to protocols that employ restrictive transfusion or definitively there is no structure that coordinates or controls requests at these institutions. Although it is not possible to evaluate more in detail the requests made at the various services related to this blood bank, the large number of inadequacies observed, both at the specialized service and at the others, suggests that failures in medical education are independent of the structure of hospital care.

The proportion of requests considered inadequate was apparently not lower at the institution that has an agency and transfusion committee, in addition to specialized professionals (hematologists and oncologists), who should be familiar with the norms related to the use of blood components and who frequently prescribe blood components.

Another reason that should be considered is the blood bank's apparent failure to control and deny transfusion requests.

The blood bank should analyze and define conducts to avoid unnecessary and inappropriate use of blood components. The technical responsibility of the hemotherapy service lies with a specialist or a physician (qualified by a competent body), that verifies compliance with technical standards and determines the adequacy of blood transfusion indications.[12]

The hemocenter has the prerogative not to proceed with the providing of a component for incomplete requisitions or with failures in the information.[6]

The institution studied itself emphasizes in its transfusion manual the need for all transfusions to be carefully indicated, declares the transfusion an act of medical responsibility and informs that requests that do not meet the standards expressed in the manual, or are incomplete or illegible should be refused.[12]

The Ministry of Health recommends a prospective review, in other words, an analysis of blood component requests for release prior to use.3 In the Canadian study on blood transfusion error screening, this method was mentioned as a manner to ensure compliance with the hospital's transfusion guidelines for indication and dose.[10]

The elaboration of current guidelines should help prescribing doctors to choose the most appropriate time and blood component for a transfusion.3 The purpose of this study is to encourage the medical team to discuss the use of transfusion therapy critically, safely and with scientific basis, taking into account the risks inherent to blood use and ensure that it comes from the solidarity and voluntary act of the Brazilian population.

Conclusion

The data showed that more than 50% of the TRs referred to the hemocenter had some error in their formulation, that is, the number of inadequate RBCC transfusion requests was high during the analyzed period and when compared to the available literature.

The inadequacies suggest that there is a difficulty in the prescription of RBCC by the medical professional, as well as an inefficiency of the hemotherapy service in its evaluation since none of these requests were rejected.

There is a need for guidance, review and instruction of the medical staff, the only professionals allowed to request blood components in Brazil, to incorporate the best scientific evidence into their daily practice.

It is necessary to be better supervised and more responsible while controlling transfusion activity because these staff members have the prerogative to restrict and even not to authorize the dispatch of the blood component when the request is inadequate.

The adequacy of the entire transfusion process will certainly reduce system costs and risks associated with the use of a biological product that can cause serious and possibly fatal adverse effects, in addition to ensuring better patient care and greater consideration by the donor.

Conflicts of interest

The authors declare no conflicts of interest.

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