

# Profile of hemotherapy care and the safety of the transfusion process

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## SUMMARY

**OBJECTIVE:** This study aimed to evaluate the safety of the transfusion process in a public teaching hospital and to outline the profile of the hemotherapy care provided.

**METHODS:** This was an exploratory, descriptive, and prospective study with a quantitative approach and grounded in field research. Data were obtained from medical and nursing records and active search.

**RESULTS:** Concentrated red blood cells were the most transfused blood component. Inadequate indications of blood components were detected in 15% of Concentrated red blood cells transfusions, 20% of fresh plasma, 29.2% of platelet concentrates, and 36.4% of cryoprecipitates. Filling out the blood component request forms, the nursing checklist and the entry book were inadequate in 88.3, 92.8, and 69.5% of the procedures, respectively.

**CONCLUSIONS:** Faults were identified throughout the transfusion process, revealing inadequate compliance with current standards and legislation, essential in minimizing the occurrence of errors and maximizing the safety of transfusion. Studies of this nature reinforce the need for continued research in this field.

**KEYWORDS:** Patient safety. Blood component transfusion. Hospitals. Blood safety.

## INTRODUCTION

Blood transfusion is an effective therapeutic method, universally used, with a specific indication and guideline for each blood component (BC). However, even if all procedures for the safety of the transfusion process are adopted, risks remain. It is a high-cost practice for public health systems, due to the need for advanced technologies and specialized human resources. However, the rational use of blood is a universally defended approach in that it guarantees greater safety for both donor and recipient, is easily accessed by patients, and results, ultimately, in treatment cost reduction<sup>1,2</sup>.

Given the risks inherent in the transfusion act, professionals need to be trained and aware of the importance of following protocols and current laws, enabling greater safety throughout the process. Disregarding one of the steps may lead to potentially fatal damage.

This study focused on analyzing the transfusion process in surgical patients at a university hospital, verifying the adequacy of the indication of BCs as well as the request of BCs, to assess the profile of assistance provided to these blood recipients.

The goal was to obtain support for the implementation of strategies that might contribute to the improvement of prescriptions, their careful use, and the administration of BCs, in order to increase transfusion safety.

## METHODS

### Type of study

This was an exploratory, descriptive, and prospective study with a quantitative approach, based on field research and grounded in field research.

### Participants

Surgery patients from the HC/UFTM, who had received transfusions of BCs during hospitalization in the adult emergency department (PSA), orthopedics, surgical clinic, adult intensive care unit (AICU), coronary intensive care unit (CICU), surgical center, and postanesthesia care unit (PACU) participated in the research, from October 2018 to August 2019.

Inclusion criteria were as follows: surgical patients,  $\geq 18$  years old, transfused (conscious or unconscious), and those who received BCs and agreed (patient or family member) to participate in the study by signing the free informed consent form (FICF). Exclusion criteria were as follows: neurological and gynecological surgery patients and cases of death within the first 24 h.

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## Data collection

In an active search 24 h after the transfusion, demographic and clinical–epidemiological data (e.g., sector, surgical specialty, type of BC, indication for transfusion, and quantity of BC, as well as information regarding the presence and filling out of forms and the book used in the registration of transfusion care) were noted on a spreadsheet designed for the study.

## Data analysis/Statistics

A database was created using the Microsoft Office Excel 2010 application to implement the double-entry validation process. The database was imported into the SPSS (Statistical Package for the Social Sciences) program, version 2.1, which was used for a descriptive analysis by means of the analyses of absolute and relative frequencies, measures of central tendency (mean), and dispersion (standard deviation).

## Ethical aspects

The study was approved by the Research Ethics Committee (REC) of the Hospital das Clínicas of the Federal University of Triângulo Mineiro (HC/UFTM), opinion no. 2.894.473.

## RESULTS

A total of 393 transfusion procedures were evaluated in 184 patients who received 1042 BCs. Of these, 54.0% were male, 53.0% white, 38.0% brown, and 9.0% black; 19.5% were between the ages of 18 and 39 years, 26.5% were between 40 and 59 years, and 54.0% were 60 years or older. Hence, ages ranged from 18 to 94 years, and the average age was 57.74 (SD=19.21).

The most transfused BC was packed red blood cells (PRBCs) at (61.6%), followed by 16.0% of platelet concentrates (PCs), 14.0% of fresh plasma (FP), and 8.4% of cryoprecipitate (Cryo). Regarding the blood type, group O represented 44.3%, followed by A (40.0%), B (13.0%), and AB (2.7%), of which

90.6% were Rh positive. Regarding the indications for transfused BCs, based on the Protocol for the Rational Use of Blood of the HC/UFTM/2017, the inadequacy percentages for the PRBCs, PC, FP, and Cryo were 15.0%, 20.0%, 29.1%, and 36.4%, respectively. Furthermore, 4.2% of the FP, 15.0% of the PC, and 36.4% of the Cryo had their assessment impaired due to a lack of previous examination (Table 1).

Regarding the completion of the BC request forms, of the 377 evaluated, 4.1% were not located, 88.3% had some level of inadequacy, and 86.7% of the fields referring to clinical and epidemiological data had a higher level of noncompliance.

Regarding the nursing checklist, 387 transfusion events were evaluated (1.5% not found), and of these, 359 (92.8%) had some inadequacy. The main noncompliances were related to monitoring at 10 and 30 min after transfusion, with no record in 67.4% and 77%, respectively (Table 2).

The analysis of the records in the BC entry book, an instrument used to facilitate traceability, was carried out in 76.8% of the transfusion acts; however, 23.2% did not locate the sector. Of the 302 evaluated, completion inadequacy was 69.5%,

**Table 2.** Assessment of the adequacy of filling out the blood transfusion checklist by the nursing staff of the 359 transfusion acts analyzed. Uberaba (MG), 2019.

Aspects analyzed	Adequate n (%)	Inadequate n (%)
Patient's identification data	222 (61.8)	137 (38.2)
Sample identification data	276 (76.9)	83 (23.1)
VS–beginning of transfusion	283 (78.8)	76 (21.2)
VS–end of transfusion	243 (67.7)	116 (32.3)
Information about transfusion reaction	217 (60.4)	142 (39.6)
Checklist: VS evolution 10 min	98 (27.3)	261 (72.7)
Checklist: VS evolution 30 min	61 (17.0)	298 (83.0)

VS: vital signs.

**Table 1.** Inadequacy in the indication of blood components in the 393 transfusion procedures evaluated, Uberaba, MG, 2019.

Type of blood component	Transfusion act			
	Adequate n (%)	Inadequate n (%)	No assessment* n (%)	Total n (%)
Packed red blood cells	320 (85.0)	55 (15.0)	0 (0)	375 (100)
Fresh plasma	26 (65.0)	8 (20.0)	6 (15.0)	40 (100)
Platelet concentrate	16 (66.7)	7 (29.1)	1 (4.2)	24 (100)
Cryoprecipitate	3 (27.2)	4 (36.4)	4 (36.4)	11 (100)

\*No assessment: Unable to assess.

with the main area of noncompliance relating to the transfusion reaction field, of which 66.9% were not filled in.

The term of acknowledgment and authorization of the transfusion was not found in almost all of the evaluated medical records (94.9%). As for the medical prescriptions, we observed that in most of these, dripping was not specified, and checking and double checking by the nursing staff was identified in, respectively, 84.4% and 40.9% of the 393 transfusion procedures evaluated. In 20.1% of these, BC was not prescribed (only the request for BCs was identified), and the vast majority of these nonprescriptions were provided during the surgical procedure.

## DISCUSSION

Of the patients evaluated, most were male and aged over 60 years, coinciding with findings in the national literature<sup>3,4</sup>. However, a multicenter study carried out recently in Turkey recorded a higher percentage of women<sup>5</sup>. Blood type O was the most transfused, which is in line with findings in the literature<sup>4</sup> and with the profile of the Brazilian population. Data from the Seventh Hemotherapy Production Bulletin (Hemoprod 2018) indicated that 47.86% of donations made in the country that year were from the O group<sup>6</sup>.

Regarding the distribution of transfusions by specialty, the BCs were the most frequently used in orthopedic surgery, followed by general surgery. As for the sectors, they were most used in the AICU and CICU, which is in agreement with the literature<sup>4,7</sup>. The most transfused BC was the PRBC, coinciding with national and international data<sup>3,4,8,9</sup>.

A high index of inadequacy of indications for BCs was observed, especially for cryoprecipitate and PC, as is the case with other hospitals in the country<sup>10,11</sup>. However, a study<sup>5</sup> points out even higher rates of inadequacy in the indications for PRBC, corresponding to 99% preoperatively, 23% intraoperatively, and 43% postoperatively.

In a previous study conducted between 2007 and 2008 across 226 blood transfusion services located in 178 municipalities in Minas Gerais (Brazil), the presence and performance of the Transfusion Committees (TCs) was evaluated. These committees were implemented in 63.4% of the services visited. Nonconformities were recorded in the requests for BCs, identification of blood samples, and records of transfusions and observed to be significantly higher in services that did not have these committees. However, it was also found that the performance of these committees was still in the developmental phase<sup>12</sup>.

These results demonstrate low compliance with protocols for the use of BCs, low performance of the TC and of the

blood therapy service. TC became mandatory in the country in 2004<sup>13</sup>; however, its results are still limited<sup>14</sup>.

The aforementioned legislation emphasizes the need to implement permanent training for medical and nursing staff, to increase the efficiency of the TC by implementing mechanisms for verifying and evaluating HC requests in the service and complying with the legislation. Such measures are essential to reverse the situation found in this study and to provide the rational use of this important therapeutic resource and increase transfusion safety.

As for the availability and use of the forms, it was observed in the units that they were frequently absent. Furthermore, there were numerous examples of noncompliance in their completion. The biggest instance of noncompliance found in the BC application form was in relation to clinical and epidemiological data and in the field referring to clinical indication and diagnosis. Very often, only the diagnosis was registered. Similar results were observed in a study carried out in 2015 in Tunisia<sup>15</sup>.

Regarding the blood transfusion checklist, the very high percentage of nonconformities was noteworthy, especially in the item "Verification of Vital Signs at 30 min of transfusion," followed by "Record of Observation in the initial 10 min." Monitoring within the first 10 min of transfusion is essential for early detection of changes in vital signs in relation to pre-transfusion data and may be an opportunity to detect a possible serious reaction, such as hemolytic ABO incompatibility. Literature data corroborate our findings<sup>4,16</sup>, demonstrating that the inadequate completion of the checklist is also a constant in different services, which can be attributed to the lack of awareness about the relevance of these records and also to a deficiency in monitoring these actions, reinforcing the importance of active TCs.

The entry book was the document revealing the greatest completion, which may be explained as due to its greater simplicity and lack of information. In particular, the registration of the BC bag number, which is of great importance for enabling its tracking, obtained a good adequacy index, demonstrating greater awareness by professionals of its importance, a factor not observed by Santos et al, at another large general hospital in 2013<sup>16</sup>.

The Letter of Science and Authorization was not implemented by the vast majority of professionals. Similar results were observed in a reference hospital in England, in which a consent form was obtained for only 9% of transfusions<sup>17</sup>. Despite being a mandatory procedure in medical practice, as provided for in Article 6 of the Universal Declaration on Bioethics and Human Rights of UNESCO in 2005<sup>18</sup> and also in the codes of medical ethics of most countries, such as Brazil

in Article 22<sup>19</sup>, it is noted that less importance has been given to this requirement.

The lack of BC prescription in the medical records was a frequent finding in transfusions performed intraoperatively. Similarly, the prescription of dripping was not identified in most procedures. Both inadequacies were also identified in the literature<sup>16</sup>, demonstrating that such procedures, which are important for transfusion safety, are also not properly observed by teams involved in surgical procedures.

Another recurrent inadequacy was related to the checking of the bag and prescription data by the nursing staff. Despite the need for double-checking, this was observed in less than half of the procedures, and a single check was registered in just over 80% of cases. Similar results were observed in another study<sup>16</sup>. Such procedure, essential in confirming the execution of medical prescriptions, is another barrier in the prevention of adverse events by minimizing the chance of errors<sup>20</sup>.

Our findings reinforce the need for a more careful assessment regarding the indication of BC in surgical patients, with a focus on restrictive hemotherapy and on patient blood management (PBM). The indications for PRBC deserve special attention, since iron deficiency anemia, the most common cause of chronic anemia, present in more than 50% of these patients, is a condition that can often be resolved before the surgical procedure<sup>21</sup>. Failures in the indication and prescription of BCs have been frequent, reflecting a gap in the knowledge of transfusion therapy. One study argues that *incremental levels of training in transfusion medicine during graduation may narrow the gaps between specialist and blood prescribers and possibly even encourage transfusion research*<sup>22</sup>. Furthermore, the high levels of inadequacy detected in confirming the execution of prescriptions, and in the nursing records, denote deficient training and/or noncompliance with legislation governing transfusion. Although the sample size was limited, the 184 patients and almost 400 transfusion events evaluated were considered sufficient for

an adequate analysis of the hemotherapy practiced in the service and that the nonconformities, which compromise transfusion safety, are not just a local problem.

Thus, it is necessary that TCs start acting in the same way as the hospital infection committees (established in the country in 1997) by monitoring the hemotherapy practice. This can be done through an active search, with verification and evaluation of the transfusion requests and effects of adverse events, and strict compliance with the protocols and legislation related to hemotherapy, as well as the continuing education of the staff. Such measures are essential to reverse the situation found, promote the standard use of this important therapeutic resource, and increase transfusion safety.

## CONCLUSIONS

We found that the risk management of the transfusion process in surgical patients at the HC/UFTM, as well as the attention to BCs, are not being performed properly, compromising patient safety. The results presented in this research point to the need for educational activities, by means of training at all stages of the transfusion process, directed at the entire team involved in this activity (doctors, nurses, and biomedical doctors), under the responsibility of the institution TC and the hemotherapy service. Studies of this nature reinforce the need for continued research in this field.

## AUTHORS' CONTRIBUTION

**JG:** Conceptualization, Data curation, Formal Analysis, Writing – original draft, Writing – review & editing. **SSS:** Conceptualization, Formal Analysis, Writing – review & editing. **HMZ:** Conceptualization, Formal Analysis, Writing – review & editing. **JM:** Data curation, Formal Analysis, Writing – review & editing.

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