

# IMPLEMENTATION OF THE RULES OF GOOD PRACTICE IN TRANSFUSION ACTIVITY AT THE LEVEL OF THE BLOOD TRANSFUSION UNIT OF SCJU CONSTANTA

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## ABSTRACT

*Introduction.* Blood is a vital resource, and its use is growing worldwide. Although the demand for blood is high, there are cases in which blood products are rejected. The number of rejected blood components in hospitals is reported to be between 0.1% and 6.7%. (1-5)

*Objectives.* Quality management includes good practices in transfusion activity, an important part of which is limiting the rejection of labile blood products. The objective of this study is to analyze the use and rejection of blood products in the Constanza County Emergency Clinical Hospital between 2012-2021, including 2 years of the Covid-19 pandemic.

*Material and method.* The work presents a retrospective study of transfusion activity over a period of 10 years, with the analysis of units of labile blood products rejected compared to the number of units transfused to hospitalized patients.

*Results and discussions.* In our institution, with a large number of transfused patients and a very large volume of administered blood products, the rejection was on average 1.82% (3,887 rejected products out of the 213,869 received products). Most rejected products were erythrocyte concentrates (1491 units). The good practice measures implemented have led to a decrease of the number of rejected products, with a reduction of the number of rejected units in the last 3 years by an average of 142 units per year.

*Conclusions.* Quality assurance is a legal obligation in the transfusion sector. The implementation of the norms of good practice according to the Order M.S. no.329 / 2018 led to the decrease of the number of rejected products from 2.81% in 2018 to 1.16% in 2021. An increasingly restrictive blood test is used.

*Keywords:* transfusion, scrap, blood products

## Introduction

Blood is a vital resource, and its use is growing worldwide, and the waste of blood is a global challenge that must be strictly controlled. (6) Most blood resources are used during surgery, trauma, obstetrics-gynecology (pregnancy complications), severe childhood anemia (beta thalassemia major), haematological diseases and other cancers, as well as other chronic diseases. Although the demand for blood is high, there are cases in which blood products are rejected. The main reasons for the rejection are: expired units, broken bags, requests for blood components

canceled late by the departments. Lack of awareness that many scraps could be avoided may reduce the waste of blood products. The number of rejected blood components in hospitals is reported to be between 0.1% and 6.7%. (1-5)

Quality management includes good practices in transfusion activity, an important part of this being the limitation of the disposal of labile blood products. (7) The objective of this study is to analyze the use and rejection of labile blood products in the Constanza County Emergency Clinical Hospital for a period of 10 years, including the 2 years of the Covid-19 pandemic. The products considered are: resuspended

erythrocyte concentrate (CER), leukocyte erythrocyte concentrate (CER-DEL), leukocyte depleted erythrocyte concentrate (CER SL), fresh frozen plasma (PPC), fresh decryoprecipitated plasma (PDC), cryoprecipitate standard (CTS) and apheresis unit platelet concentrate (CTU).

## Material and Method

The work presents the results of a retrospective study of the transfusion activity in the Blood Transfusion Unit (STU) of the Constanza County Emergency Clinical Hospital, for a period of 10 years, with the analysis of units of labile blood products rejected compared to the number of units received and transfused to hospitalized patients. The study period was January 2012-December 2021.

Study design and methods: The hospital's STU team implemented good practice rules in transfusion activity as a tool to reduce waste of blood products. We also analyzed which of the rejected products were the most numerous, with the greatest impact on transfusion activity..

Using Lean Six Sigma: Define, Measure, Analyze, Improve, and Control scrap. - we collected reference data on waste, identified the major factors that led to the rejection of blood products and proposed the implementation of good practice rules to reduce the amount of waste.

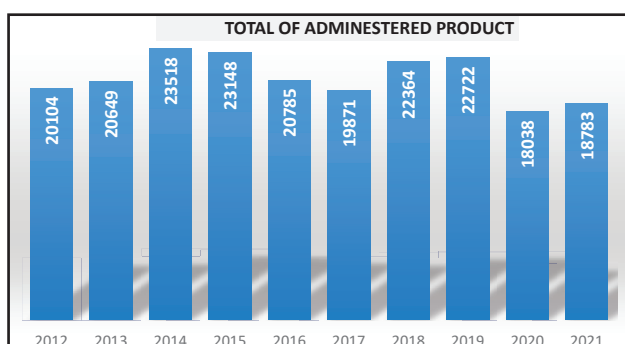


Fig.1 Distribution of the number of blood products administered during 2012-2021 in SCJUC

## Results and Discussions

In the analysis of the last 10 years, a total of 213,869 blood products were received, 209,982 products were administered and a number of

3,887 products were rejected, representing 1.82%. The annual consumption of blood products has evolved (Figure 1)

Regarding the number of patients transfused annually, including polytransfused patients (Figure 2), their number has grown steadily, from 4359 patients in 2012 to 6185 patients in 2019, then a sharp decrease in 2020 with the COVID pandemic (5255 / year) and the limitation of hospital admissions, and then in 2021 to increase slightly (5979 / year).

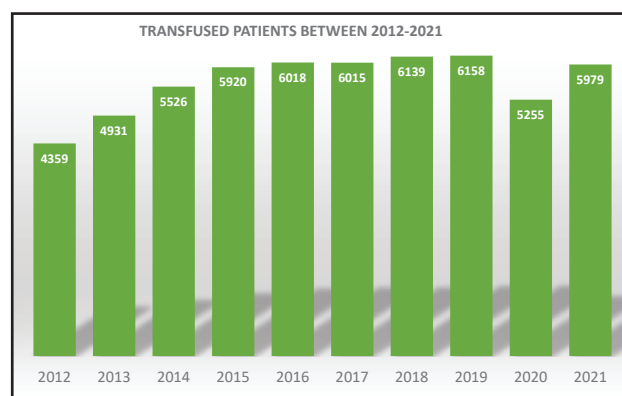


Figure 2 The evolution of the number of transfused patients in the period 2012-2021 in SCJU Constanza

Of the total blood products administered, there is a steady increase, especially in the need for erythrocyte concentrate and platelet concentrate, with the same evolution during the 2 years of the COVID 19 pandemic (a sharp decrease in 2020 followed by a slight increase in 2021 (Figure 3). Regarding the cryoprecipitate of coagulation factors (CRIO) and the apheresis platelet concentrate (CTU) we observe a constant evolution of the number of administered units, with a very slight decrease in cryoprecipitate in 2020. Consumption of fresh frozen plasma and decryption (PPC + PPD) increased slightly between 2012 and 2014, then steadily decreased until 2021.

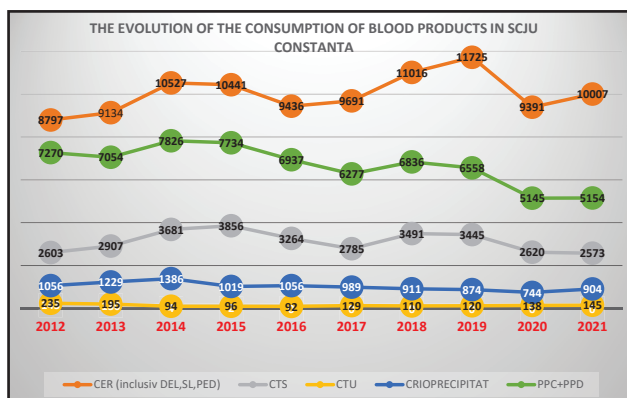


Figure 3 The evolution of the consumption of blood products in SCJU Constanța

The average number of blood products administered per patient during the 10-year period analyzed was as follows (Figure 4):

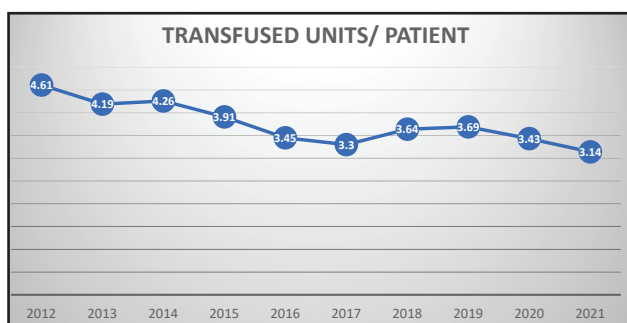


Figure 4 Average transfused units/ patient

There is a decrease of the number of units of blood administered to a patient, both in total and for each of the types of products administered.

We faced a particular situation in 2019-2020, that related to the COVID pandemic. Due to the early intervention of the government, through measures such as the isolation period and strategies to reduce mass gatherings, amid the outbreak of COVID-19, the organization of voluntary blood donation campaigns has been suspended. This has led to a dramatic drop in the number of blood donors and blood collection.

As a result, our blood stock has also dropped. At the same time, all elective surgeries and non-emergency hospitalizations were postponed.

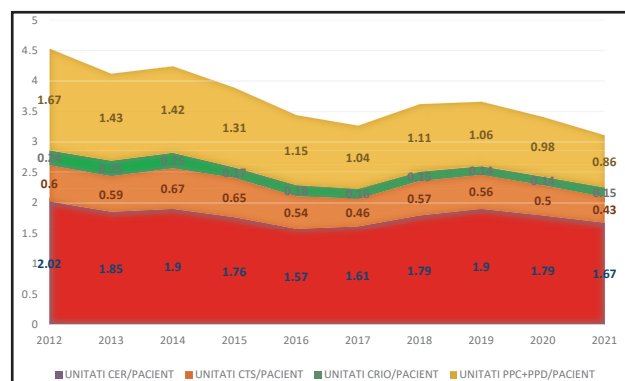


Figure 5 Evolution of the type of blood / patient component

Scraps. Analyzing, in this general context, the situation of scraps in the period 2012-2021, we notice that in our institution, the scrap for the period under study was on average 1.82% (3,887 discarded products out of the 213,869 products received). The most rejected products were erythrocyte concentrate-CER (1491 units) and Plasma- (PPC and PPD (1363 units), and a smaller number of CTS (827 units). (Figure 6)

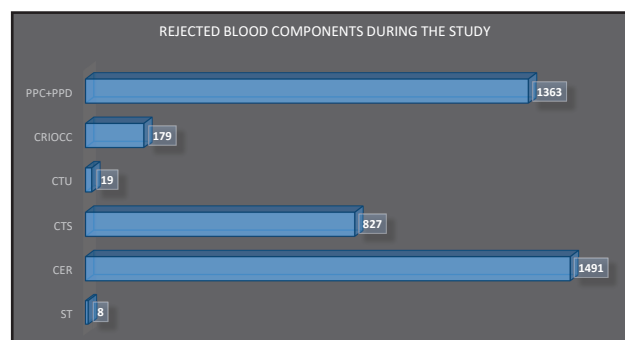


Figure 6 Total number of rejected blood components during the study

Table 1 Percentage evolution of rejected blood components during the study period

| Rejected blood components | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | MEDIA |
|---------------------------|------|------|------|------|------|------|------|------|------|------|-------|
| ST                        | 0%   | 2%   | 1%   | 0%   | 0%   | 0%   | 0%   | 0%   | 0%   | 0%   | 0%    |
| CER                       | 27%  | 37%  | 56%  | 31%  | 27%  | 23%  | 52%  | 40%  | 54%  | 28%  | 38%   |
| CTS                       | 40%  | 2%   | 4%   | 21%  | 16%  | 45%  | 15%  | 26%  | 16%  | 23%  | 21%   |
| CTU                       | 1%   | 1%   | 0%   | 0%   | 1%   | 0%   | 0%   | 1%   | 0%   | 0%   | 0%    |
| CRIQCC                    | 4%   | 5%   | 4%   | 5%   | 5%   | 6%   | 7%   | 3%   | 1%   | 4%   | 5%    |
| PPC+PPD                   | 28%  | 54%  | 35%  | 43%  | 51%  | 25%  | 26%  | 31%  | 29%  | 45%  | 35%   |

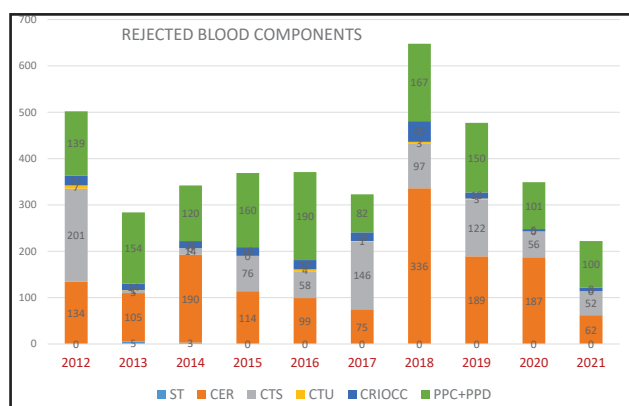


Figure 7 Rejected blood components

The year 2018 was the year with the most rejections. (Figure 7)

In some cases the rejection could not be anticipated and / or avoided, but there are also situations when it could have been avoided, which can be considered a waste of resources (Table 1).

In specialized studies, the number of rejected blood components has been reported to be between 0.1% and 6.7%. (1, 5)

In the present study, the total loss of blood components (scrap) increased at the beginning of the study from 2.43% in 2012, with a peak in 2018 of 2.81% to a sustained decrease of 1.16% today . (Figure 8)

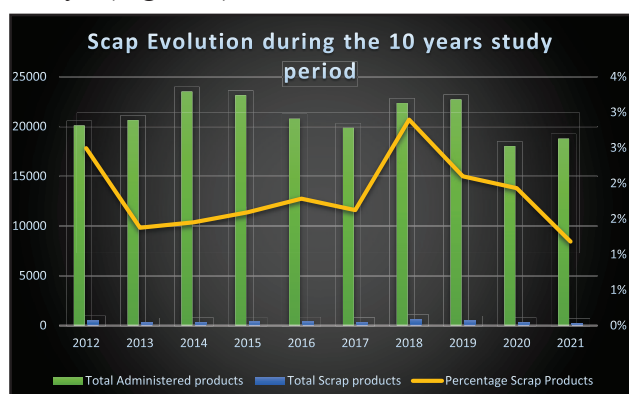


Figure 8. Evolution of scrap during the 10-year study period

The factors identified in international specialized studies (1,5) which contribute to the waste of labile blood products most likely to be improved were: lack of awareness and training of staff in ordering and handling blood products, training and education of nurses in all hospital wards and responsibility when they order blood

products.

The most common causes of rejection in our study were: expired products (in the period close to the expiration date of blood products there were no requests for transfusion of products with the blood group of the rejected product), broken products (mishandled at blood donation, delivery, or reception), patients unavailable per section at the time of delivery (discharged, gone to investigation, death). Other causes: canceled request by the section (increased hemoglobin or death) others (patient refusal, unsigned informed consent, misidentification of the patient). (Table 2)

From the results, we noticed that when the demand and supply is increased, the “supply chain” has increased by several units with the term close to the limit and the units held in stock in STUs are sometimes unused due to fluctuations in supply and demand.

According to Order M.S. No. 329 of 13.03.2018 regarding the approval of the Norms and Requirements of good practice regarding the standards and specifications for the implementation of the quality system in the sanitary units that carry out activities in the field of blood transfusion, the hospital adopted measures to reduce the number of rejections (8)

Some of the measures start from the analysis of the causes of waste. Based on the results from our hospital, it was necessary to implement good practices and an optimal ordering policy and the rational use of blood. In order to improve the standards of the blood transfusion unit of SCJU Constanța, the procedures are constantly reviewed to ensure better quality control in order to order blood products according to the requests of the hospital departments, reception, testing and distribution of blood and its components for identified major factors affecting blood product waste.

The measures implemented led to a decrease in the number of discarded products, which began to decrease in the year preceding Covid (2018) and decreased continuously in the 2 years of the pandemic. (Figure 9). This decrease in the percentage of scrap translates into reducing the number of scrapped units in the last 3 years by an average of 142 units per year.

Table 2 Causes of rejection of labile blood products in SCJU Constanza

| Causes of rejected blood components                      | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|----------------------------------------------------------|------|------|------|------|------|------|------|------|------|------|
| Canceled Request By The Section                          | 51   | 36   | 20   | 42   | 36   | 29   | 46   | 57   | 16   | 7    |
| Patient Not Available On Section At The Time Of Delivery | 0    | 2    | 33   | 66   | 71   | 40   | 75   | 36   | 14   | 8    |
| Expiry                                                   | 326  | 87   | 171  | 129  | 102  | 185  | 382  | 252  | 211  | 98   |
| Broken Plasma                                            | 124  | 149  | 109  | 116  | 143  | 57   | 119  | 113  | 67   | 79   |
| Non-Corresponding Macroscopic Appearance                 | 1    | 10   | 7    | 16   | 19   | 5    | 15   | 16   | 13   | 7    |
| Crts Non-Conforming Labeling                             | 0    | 0    | 2    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Others                                                   | 0    | 0    | 0    | 0    | 0    | 7    | 11   | 3    | 28   | 23   |
| Total Rejected Products                                  | 502  | 284  | 342  | 369  | 371  | 323  | 648  | 477  | 349  | 222  |

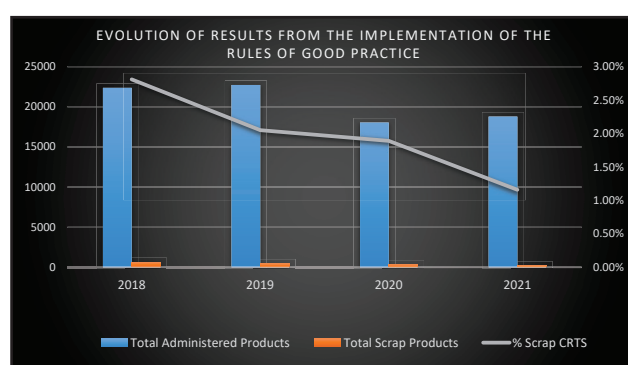


Figure 9 Evolution of rejections from the implementation of Order No. 329 of 13.03.2018 on good practice in transfusion activity.

Good practices in the field of blood transfusion are implemented by the Blood Transfusion Unit of the Constanza County Emergency Clinical Hospital according to the requirements of the order (qualified staff, adequate space, provision of materials, appropriate containers and labels, approved procedures and instructions). Adverse reactions, incidents and non-compliances were immediately reported and recorded. Permanent training of staff for the correct execution of procedures, regular analysis of the quality system, storage and transport is carried out properly to ensure the safety of blood and blood components.

The forecast of periods of higher consumption serves to assess the volume of the blood stock (avoiding the rejections of blood by expiring products from the stock) and the emergency preparing plans of the hospital. (9)but can also be applied to the field of transfusion to characterize the nature and timing of peak days in hospital blood utilization. This information can be used to forecast future peak days or to inform hospital emergency preparedness plans.

The aims of this study are to characterize peak days in red blood cell (RBC

The communication with the departments/ sections, with the attending physicians and with the nurses involved in the collection, registration and delivery of the samples to STU has been continuously improved by recording the date and time in the records of samples/ transfusion requests. Quality assurance is a legal obligation in the blood transfusion sector, and requires the implementation of good practice procedures for transfusion activity.

## Conclusions

Medical prescriptions must follow similar rules and meet the requirements of good practice defined by members of the medical and scientific community. A transfusion should not be prescribed unless absolutely necessary. Awareness of those involved in the transfusion act, the activity of the hemovigilance commission, is an effective tool for reducing the waste of blood components in the Constanța County Emergency Hospital.

Our study showed not only the increasing pattern of blood consumption, but also the pattern of decreasing blood rejection due to the performance of hemovigilance and additional training of health care. I found that the main reason for the rejection of blood products in this hospital is the high demand for blood units and the expiration of the units in stock, when at the reception they have a short expiration date and in certain periods there are no requests for certain blood groups.

Implementing good practice rules can help hospital managers, coordinators, and prescribers determine the most effective inventory (stock)

policy based on uncertainty of blood supply and demand. These „good practice” rules also serve as a decision support system to help healthcare professionals manage and control their blood inventory more effectively in the face of uncertainty about blood supply and demand, thereby reducing blood deficiency and waste of expired and unused blood components.

The demand for blood components has decreased in the last 2 years, due to the COVID-19 epidemic, elective surgical procedures have been postponed to create spaces for hospitalization of patients with COVID-19,

The hospital has had a continuous improvement of the “good practice” program, consolidated even in difficult health situations due to the Covid 19 pandemic, which has been observed in the reduction of waste in the last 3 years.

Transfusion continued to use an increasingly restrictive blood test.

The forecast of periods with higher consumption, serves to assess the volume of blood stock (avoid scrap by expiration of products in stock) and emergency plans for hospital emergencies

Good Transfusion Practices are periodically reviewed in the light of scientific and technical developments.

Hemovigilance contributes to the safety of the transfusion. It makes it possible to recognize already known risks, to be alert to emerging risks, to take preventive action during the critical stages of the transfusion chain and to ensure the effectiveness of the follow-up of safety measures.

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