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Research Article

Assessment of Transfusion Needs in Pediatric Hematology-oncology

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Abstract

Introduction: The Rabat regional blood transfusion center (TBC) delivers LBPs to the various healthcare establishments (HE). The pediatric oncology and hematology service (SHOP) represents the most important hematology and oncology service in Morocco.

The objective of this study is to assess the transfusion needs of the SHOP, the management of urgent requests and assess the feedback.

Materials and Methods: This is a three-month descriptive study, from December 1, 2018 to February 28, 2019, consists of collecting the data noted on medical prescriptions, verifying the compliance of blood requests, evaluating the feedback and the declaration adverse transfusion reactions (ATR). The sample of our study concerns polytransfused patients from SHOP.

Results and Discussion: During the period from December 1, 2018 to February 28, 2019, the Rabat TBC received 1174 applications with a total of 3834 LBPs requested.

The quantitative and qualitative satisfaction of blood requests reached 83.54%.

11.5% of the requests were urgent, mainly concern leukocyte-depleted platelets (75%).

As for the conformity of requests, 27% are non-compliant and hinder the smooth running of the service.

We also find that The Irregular Agglutinin Test (RAI) was positive in 1, 40%; the search time for compatible LBPs may exceed three days.

The traceability of delivered LBPs is weak and does not exceed 10.33%, the declaration of transfusion reactions is 1, 31/1000 LBPs delivered; this rate does not reflect the reality.

Conclusion: The management of polytransfused patients is a delicate mission, which requires close collaboration between the blood transfusion centre and health establishments. The availability of LBPs is the responsibility of the blood transfusion centre; the feedback and reporting of adverse reactions are the responsibility of the healthcare establishments.

Keywords: Pediatric; Hematology; Oncology; Blood Management; LBPs; Adverse Transfusion Reactions; Haemovigilance

Introduction

Blood transfusion is a key element in the management of patients with blood diseases [1].

In Morocco, 33% of new cancers are treated in the pediatric oncology hematology service (SHOP) [2].The SHOP is a department of the Children's Hospital of the Rabat University Hospital. It is the

most important structure in Morocco in terms of hospital infrastructure and capacity. It supports children with blood diseases, malignant haemopathies (leukemia, lymphomas, etc.), benign hemopathies (thalassemia, sickle cell disease, hemophilia, etc.) and solid tumors (neuroblastoma, rhabdomysarcoma, etc). The SHOP is the number1 consumer of labile blood products (LBPs) compared to the overall needs of the children's hospital. The Rabat (TBC) provides these LBPs in accordance with current regulations and good transfusion practices [3]. The transfusion treatment of patients at SHOP depends on the availability and qualification of labile blood products (LBPs). These patients have specific and long-term transfusion needs.

The objective of this study to assess the transfusion needs of the SHOP, the management of urgent requests and evaluate feedback.

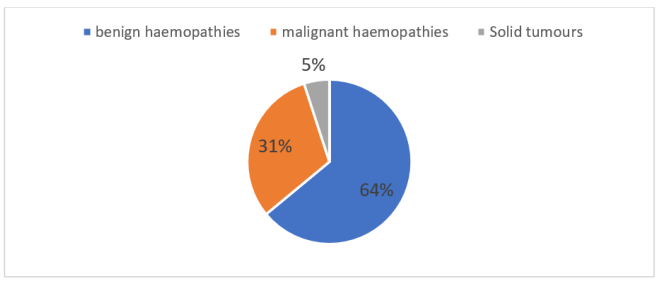
Materials and Methods

This study consists of collecting the data noted on the medical prescription, checking the conformity of blood requests, assessing the availability of LBPs for urgent requests.

Assess feedback on the LBPs used and the reporting of transfusion reactions.

Results

During the study period, the Rabat blood Transfusion center (BTC) received 1174 requests for blood from polytransfused SHOP patients. The information collected from medical prescriptions showed us that 64% of the diagnoses were benign haemopathies, mainly thalassemia and sickle cell disease, and 31% were malignant haemopathies consisting of acute leukemia and lymphomas. Solid tumors represent 5% (Histogram 1). The male sex is the more affected: 53.23% against 46.16% for the females.



Histogram 1: Diagnosis of blood requests.

During the study period, the immun hematology and distribution service of the Rabat (BTC) delivered 3203 LBPs to meet the needs of 3834 LBPs requested, with a satisfaction rate of 83.54%.

Leukocyte-depleted Red Blood Cells and Platelets are the most in demand with satisfaction rate of 90% and 80% respectively, while leukocyte-depleted platelets are the least satisfied, reaching only 50%. We also note that (11.15%) of the requests are urgent, concern leukocyte-depleted platelets.

LBPs	LBPs requested	LBPs delivered	% of satisfaction
Red Blood cells (RBCs)	383	329	86%
RBCs Leukodepleted	1200	1080	90%
Platelets	2147	1718	80 %
Platelets Leukodepleted	46	23	50%
Plasma (FFP)	59	53	90%
Total	3834	3203	83,54%

Table 1: LBPs delivered.

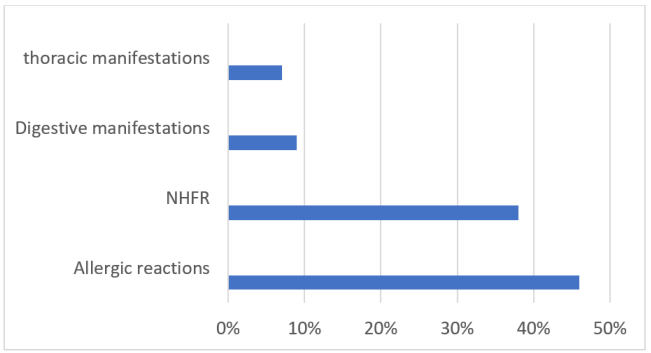
A study of the compliance of blood applications shows that 27% are non-compliant. This non-compliance mainly concerns the discordance between request and the collection tube, the lack of age information, lack of information on the last transfusion and the biological proof justifying the transfusion indication.

The search for irregular agglutinins (RAI) is positive in 14% of cases. the search for compatible blood for some patients exceeds 03 days.

For haemovigilance indicators, the feedback is 10.33% and the Reporting of adverse Transfusion reaction (ATR) is 0.013/1000 LBPs delivered. These rates are significantly low.

The adverse reactions reported are mainly non-hemolytic febrile reactions and allergic reactions, together accounting for 84%.

Isolated digestive manifestations such as nausea, vomiting and minimal chest manifestations such as dyspnea or chest pain represented 16% of all transfusion reactions (Histogram 2).



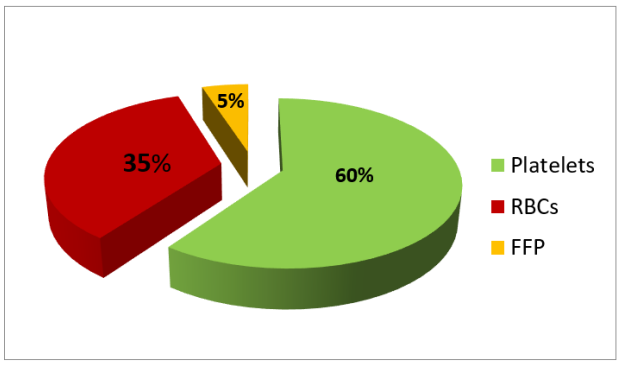
Histogram 2: Adverse transfusion reactions Reported.

The clinical signs of allergic reactions dominated by typical skin signs of urticarial.

The clinical signs of non-hemolytic febrile reactions were an increase in temperature of 1°c, digestive signs such as nausea and vomiting.

All reactions reported are immediate, grade 1, disappeared spontaneously as soon as the transfusion was stopped or after symptomatic treatment.

The study of blood products in question shows that these reactions occurred after transfusion of platelets in 60%, RBCs in 35% and FFP in 5% (Histogram 3).



Histogram 3: Incriminated Blood Products.

Discussion

Patients in the Pediatric Hemato-Oncology Department present various pathologies that that require the quantity and qualification of LBPs [3].

This is why the management of polytransfused patients is a constraining task, requiring close collaboration between BTC and HE in respect of good transfusion practice [4].

We discuss our results in four parts

Verifying the compliance of blood requests

Analysis of 1174 requests for blood shows that 27% of requests are non-compliant. This high rate has a direct impact on the transfusion decision and causes delays in the transfusion management of patients.

These non-conformities are due, on the one hand, to the lack of information that is often missing on the prescription: patient data: date of birth, reason and biological proof of the transfusion, date of the last transfusion and result of the last irregular agglutinin test. On the other hand, there are some blocking abnormalities due principally to the discordance between the request and the patient's blood sample. This abnormalities forces the rejection of the sample and requires a new prescription and a new sample correctly labelled according to the regulations in force [3].

A Maghreb study [5] assessing the non-compliance of blood requests chowed that the date of birth is absent in 67.18%, the request for phenotype LBPs for girls and women of childbearing age is absent in 41.40% of cases.

The indication of pre-transfusion hemoglobin rate is absent in 57.93%, the date and the result of the last irregular agglutinins test is absent in 99% of the requests.

Another study assessing the compliance of LBPs requests conducted by the haemovigilance unit of the Havre group [6] showed that only 30% of the requests included a transfusion history and the date of the last Irregular agglutinin test just in 44% of cases.

Niger., *et al.* [7] analyzed the causes of these medical and paramedical dysfunctions. They concluded that the knowledge of the various actors in the transfusion system was insufficient or outdated due to a lack of updating.

In our study, the rate of non-compliance of blood requests is reduced compared to the Above-mentioned data.

This could be due to the positive effect of the training and education program set up by the haemovigilance unit Rabat (TBC) for the medical and paramedical staff of the ES in general and the SHOP in particular.

The SHOP has also assigned resource persons who deal with the prescription of blood requests.

Satisfaction of blood requests

For the satisfaction aspect, the analysis of the diagnostic component of our sample shows that these are polytransfused patients, often immunocompromised, who require multiple transfusions or permanent transfusions [8].

International recommendations [8,9] recommend the use of leukocyte-depleted products in for patients with multiple transfusions. However, in our case, standard RBCs are still in demand and the SHOP often prescribes standard platelets, particularly for patients suffering from malignant haemopathies.

For patients suffering from hemoglobinopathies, the recommendations of the national plan to combat hereditary hemoglobin diseases launched in 2012 [10] are respected in terms of phenotype and leukocyte-depleted products.

In Morocco, the leukocyte-depleted of LBP depend on the request of clinicians. An action plan for 2020-2025 issued by the national Centre for blood transfusion and hematology (CNTSH) provides for the systematic leukocyte-depleted of LBPs and the development of germ inactivation [11].

The management of urgent requests

The management of urgent requests mainly concerns the need for platelets.

A security stock of platelets can only be established if there is a regular supply from whole blood donations, but this is not always the case (holiday period for example), therefore there is a need to develop apheresis platelet donations [8].

At BTC Rabat, the search for irregular agglutinins (RAI) is an analysis carried out systematically for all requests for LBPs.

In our study, the RAI was positive in 1.4% of requests, which necessitated the search for compatible blood.

Red blood cells immunization is a serious problem in polytransfused patients and can lead to delays in blood transfusion or even blood transfusion impasses.

The risk of allo-immunization increases with the volume transfused the frequency of transfusions and the immunogenicity of the different blood groups [12].

A study carried out by S. Achergui., *et al.* at the Rabat Blood transfusion center [12] has shown that the blood group system most involved in the alloantibodies identified is mainly the RH system. This system is the most immunogenic among the 36 blood group systems listed. The Kell system comes second in terms of the most immunogenic antigens and the most frequent alloantibody combinations. These are similar to the results for literature [12].

The transfusion management of patients immunized against RH Kell system antigens or other antigens represents a significant workload. The search for compatible extended phenotype RBCs can require a few days and the difficulty is all the greater as these patients are frequently transfused [12].

Evaluation of haemovigilance indicators

During the study period, 3203 LBPs were delivered, only 10.33% are traced, this rate is low due to a low involvement of the HE.

The traceability of LBPs is a key part of transfusion safety. The objective is to be able to trace the history of the donor and recipient(s) from a donation number, while preserving the anonymity of the donor and the medical confidentiality of the recipient [13].

A study conducted by S.oudghiri and al suggests that health care staff are not involved and consider traceability to be a workload, an administrative constraint rather than a tool for improving transfusion quality [14].

For adverse reaction reports, the incidence recorded in our study is unsatisfactory, not exceeding 1.31/1000LBPs, compared to the incidence reported in France [15]. This is certainly due to under-reporting and not to a decrease in ATRs.

Febrile non-hemolytic and allergic reactions are the most common immediate ATRs, grade 1, of the order of 84%.

FNHTR defined as an increase in body temperature of at least 1.8° F (1° C) above 98.6° F (37° C) within 24 hours of transfusion; it can cause nausea, vomiting, chills and discomfort. Fever occurs more often in patients who have been transfused repeatedly.

The Leukoreduction, which is the removal or filtration of white blood cells from donor blood, has decreased FNHTR rates.

FNHTRs are caused by platelet transfusions more often than RBCs transfusions and have an incidence that ranges from less than 1 percent to more than 35 percent [16].

Urticarial allergic reactions are characterized by hives or pruritus. Patient is experiencing allergic transfusion reactions have been sensitized to the antigens in the donor unit. These antigens are soluble, and the associated reaction is dose-dependent. Allergic transfusion reactions occurring 1 to 3 percent of transfusions [16].

The allergic reactions reported in our study were mainly urticarial following transfusion of non-leukocyte-depleted platelets.

In Morocco, the introduction of systematic leukodepletion of LBPs would certainly allow a significant drop in FNHTRs.

In France, since the introduction of compulsory leukodepletion, these reactions have decreased considerably [14].

Finally, awareness-raising and continuous training of medical and paramedical staff is a key part for transfusion safety in order to achieve good feedback and better reporting of adverse transfusion reactions.

Conclusion

The treatment of certain pathologies is based on a safe and adequate transfusion supply throughout life. The transfusion management of a patient who has been polytransfused essentially concerns: Improving responsiveness in delivery of urgent requests, systematic leukodepletion of LBPs, developing donations of apheresis platelets, improving transfusion advice and sharing the patient's transfusion record between Blood transfusion center and healthcare establishments.

The implementation of a continuous training schedule for the SHOP's human resources would certainly improve the rate of traceability and the reporting of post-transfusion adverse events.

These actions could contribute to better patient care.

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