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RESEARCH ARTICLE

Assessment of Clinical Blood Transfusion Practice in a Pediatric Tertiary Hospital in Cameroon

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Abstract

Introduction: Yearly, 112.5 million blood donations are collected globally with half of these done in the high income countries. In Cameroon, 400,000 bags of blood are needed every year for the treatment of patients in hospitals. The World Health Organisation (WHO) placed pertinent recommendations for blood safety and clinical practice. Yet documentation is scarce on a complete assessment of blood transfusion clinical practice in Cameroon especially in children, who have the greatest prevalence of these blood transfusions.

Objectives: We had as aim to describe and assess the pattern of blood transfusion practice in children with international recommendations.

Materials and Method: We carried out a descriptive cross sectional study in a paediatric tertiary hospital. The transfusions were observed by the investigator up to the end of transfusions and records taken. Data was also collected from medical records, blood request forms, blood tubes and monitoring sheets.

Results: During the study, 197 transfusions were observed with a predominance of males at 67%. A total of 102 (51.7%) of transfusions had a total score of appropriateness of at least 4 and were thus classified as having a good score. Transfusion indications were appropriate in 70.1% of patients though they were hardly ever clearly stated on blood request forms. The monitoring was never done appropriately and medical record was appropriately filled for just 1 (0.5%) transfusion. There were 52.8% of transfusions which exceeded 4 hours. The volume of blood discarded was 32903ml.

Conclusion and Recommendations: There are still low levels of appropriateness in many aspects of our blood transfusion practice. Blood wastage is very high. We thus recommend that the national guidelines be revised to meet up with international recommendations. Health personnel should be trained regularly to meet up with the standards set.

Keywords: Blood; Transfusion; Paediatric; Assessment

Introduction

Every year, there are 112.5 million blood donations collected globally and half of these, are in the high income countries where only 19% of the world's population lives [1]. It thus leaves the remaining 81% composed of low and middle income countries with just half of these donations despite their great demand for blood transfusions. This confirms the fact that blood is a scarce and as well costly resource. Inappropriate usage of blood worsens this scarcity [2]. Unavailability of blood is mainly a due to limited voluntary blood donation which on its part is still very timidly practiced in many African countries owing to personal beliefs, cultural and religious values and limited access to right information [3]. Research suggests that 20-25% of patients receive treatments that are unnecessary or potentially harmful [4].

The World Health Organization (WHO) recommends that all patients requiring blood transfusion should have reliable access to safe blood and blood products appropriate to patients' clinical needs, provided in time and correctly administered [5]. It also recommends carrying out programmes of regular internal and external audits of quality systems [6]. This has as intention to drive improvements in the quality of patient care. To ensure the execution of quality practice, a tool with guidelines on clinical transfusion practice was published by WHO [5]. There is evidence to show that assessment of practice and feedback generally leads to small but very important improvements in professional practice [6,7].

Notwithstanding, blood transfusion practice still has many loopholes in developing countries. In Cameroon, blood transfusion guidelines were published in 1996 [8] but have not been updated.

There are 400,000 bags of blood needed every year for the treatment of patients in hospitals within the country, the deficit with respect to voluntary blood donations, being in the neighborhood of about 350,000 bags [9]. In Cameroon, we count several studies on assessment of appropriateness of blood indications showing 63.7% appropriateness of transfusion indications [10]. Yet documentation is scarce on an elaborate assessment of blood transfusion clinical practice in Cameroon.

We therefore sought to find out what were the pattern of blood transfusion at the Mother and Child Centre-Chantal Biya Foundation Yaoundé and its level of conformity to WHO recommendations.

Materials and Method

We carried out a descriptive cross sectional study in a pediatric tertiary hospital. A pretested designed data collection tool was used and every child less than 20 years of age prescribed a transfusion at the hospital was recruited. Our reference pattern for transfusion was WHO recommendations stated in the published guidelines [5,11].

The transfusions were observed by the investigator up to the end of transfusions and records taken. We checked the transfusion indications, type of blood product requested, volume of blood requested, completion of elements filled in blood request forms, labeling of pre-transfusion blood samples, conformity of blood product delivered, filled monitoring sheets, filled medical records and management in case of adverse transfusion reactions.

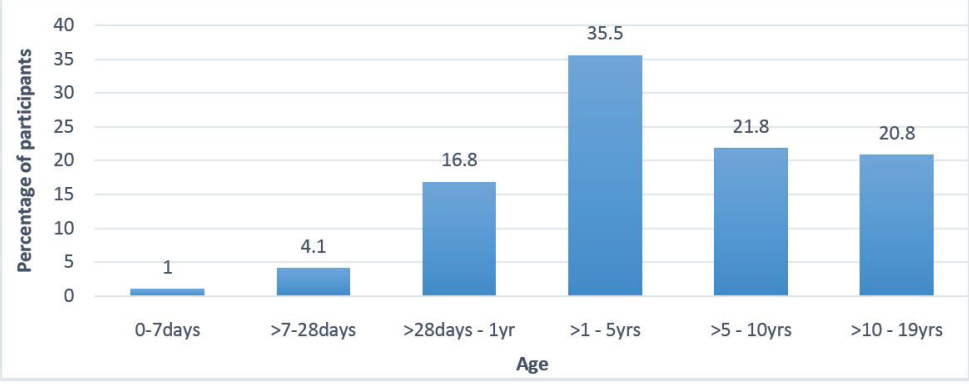
To compare with WHO recommendations, we called a criterion 'appropriate' if it was done as said in WHO recommendation guidelines and 'inappropriate' when done otherwise. 'Appropriate' was attributed a score of 1 and 'Inappropriate', a score of 0 for each of the nine criteria. The scores of criteria for a given transfusion were then summed up to have a final score called score of appropriateness which could be maximum 8 or 9 depending on the occurrence of an adverse transfusion reaction or not. A Score of Appropriateness of 4 and above was considered as a good score. Additional information was collected such as delay and duration of transfusion, presence of transfusion transmissible infections.

Sample size was calculated using the Cochrane's formula and cut off statistical significance was set at 0.1. The data collected was entered on CS-Pro 7.1 which helped limit errors and then analyzed on SPSS version 20.0. Means and standard deviations were calculated for quantitative variables and percentages were calculated for qualitative variables.

Results

Sociodemographic findings

During the study, 197 transfusions were observed with a predominance of males at 67% and of age group >1year-5years at 35.5%. We had a transfusion to prescription rate of 95% (Graph 1). The average number of transfusions per patient was 1.2 (SD=0.90). Mortality rate was at 5 per thousand before transfusion and went up to 15 per thousand few hours after transfusion.



Graph 1: Age distribution of 197 transfusions in study population

Main findings

A total of 102(51.7%) of transfusions had a total score of appropriateness of at least 4. Transfusion indications were appropriate in 70.1% of patients though they were hardly ever clearly stated on blood request forms. The type of blood product demanded was always appropriate and the volume demanded appropriate in 69.5% of patients. Blood request forms was never filled appropriately and pre-transfusion blood sample was appropriately labelled in 2.1% of cases. The conformity check at hospital was done appropriately in 98% of transfusions. The monitoring was never done appropriately and medical record was appropriately filled for just one (0.5%) transfusion. For the cases where there was an adverse transfusion reaction (ATR), there was 80% appropriateness in management (Table 1 and 2).

Criterion of appropriateness	Frequency (n)	Percent (%)
Transfusion Indication	138	70.1
Type of Blood product	197	100
Volume	137	9.5
Blood request form filled	0	0
Pre transfusion blood sample	3	2.1
Conformity of requested blood with transfused	193	98
Medical record filled	1	0.5
Monitoring done	0	0
Management in case of ATR	12	6.1

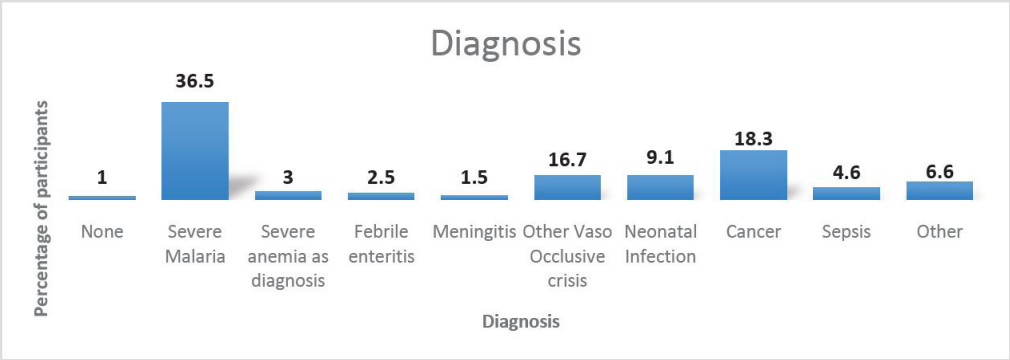
Table 1: Distribution of Indicators of Appropriateness in 197 transfused cases

Score of appropriateness	Frequency (n)	Percent (%)
2	22	11.2
3	73	37.1
4	95	48.2
5	6	3
6	1	0.5

Table 2: Distribution of score of appropriateness in 197 transfused patients

Secondary Findings

Severe malaria and cancer were the main diagnosis among those transfused at 36.5% and 18.3% respectively. Whole blood was the most requested product (86.8%). Cardiac failure was assessed in 77.2% of medical records. At least two vital signs were taken before transfusion in 81.7% of patients. Post-transfusion evaluation was hardly ever done immediately transfusion ended (5.1%). Delay of initiation of transfusion from indication time was at an average of 9.8 hours (Graph 2).



Graph 2: Distribution of diagnoses among 197 transfusions in study population

The mean duration of transfusion was 4.2 hours. There were 52.8% of transfusions which exceeded 4 hours. Transfusion Transmissible Infections (TTIs) were found in 1% of blood bags retested at hospital- syphilis (0.5%), Hepatitis B (0.5%). The volume of blood discarded after transfusion was 32903ml which represents 1/3rd of quantity delivered (Table 3).

Blood product requested	Frequency(n)	Percent (%)
Whole Blood	171	86.8
Red cell concentrate	2	1
Platelet Concentrate	4	2
Fresh Whole Blood	20	10.2

Table 3: Distribution of blood product requested in 197 transfused patients

Discussion

In total, only half of transfusions had a good score of appropriateness. Specifically, a greater number of transfusion indications were appropriate. The volume demanded was appropriate in just about half of patients. The conformity check at hospital was nearly always done appropriately but the monitoring and filling of medical record were hardly ever done appropriately.

Most clinicians aware of the unavailability of pediatric packs generally did not precise the specific volume of blood that was required. The exact quantity to transfuse when less than 500ml were generally by estimation using the administering health personnel's judgment or a meter tape. The hospital for over 2 years now has the practice of retesting for TTIs and redoing cross match for all blood bags collected from out of hospital. This helped to improve the conformity check.

The blood bags found positive for TTIs were immediately returned to the lab source with a note showing results. Considering the benefit of this practice in the hospital, as one can say there was at least 1 child saved amongst 100 children transfused, it might be necessary to continue the practice and study its benefit on a larger scale. About one third of blood collected was discarded which is equivalent to 65.8 blood bags of 500ml. This would cost over 987,000 FCFA and represents a large amount of money which could have been further optimised by using paediatric packs and thus, also reducing the impact of the deficit of voluntary blood donors. The main reasons for not transfusing in the hospital were unavailability of platelet concentrates, refusal of parents of a patient with suspicion of a cancer on the basis of religion, and limited finances.

In the study population, there was a male predominance which is different from most studies where females were rather more transfused than males [12,13]. The reason for the difference might be the inclusion of cancer patients who are predominantly male with many repeat transfusions. Age group >1-5years was the most represented age group, being similar to the report by WHO database [14]. The high frequency of blood transfusion specifically between 1 and 5 years might need some more focused intervention. The most frequent diagnosis was severe malaria and this is consistent with several studies done in sub-Saharan Africa [10,15]. Whole blood was the most requested product which is similar to results obtained by most studies in Africa [12]. It should be noted that the red cell concentrate when prescribed was not found and still, whole blood was delivered. Most clinicians knowing the product was usually unavailable avoided prescribing it. Platelet concentrate was scarcely available and such prescriptions were often changed to fresh whole blood. These fresh whole blood transfusions increase the load on the heart and could increase risk for pulmonary edema [16]. A family member or remunerated individual collected the blood or blood product. This remunerated person is known informally to assist or directly handle the collection of blood for remuneration. The absence of direct communication by doctor with blood banks before giving out the blood request form and the difficulty encountered by patients' families in finding right blood type led to the use of such remunerated individuals. This goes further to portray uncertainty of the safety of blood gotten, as a stranger choosing where to collect blood might not have the same cautiousness as a close relative. All these people do not even fulfil the international recommendations where blood is to be collected by health personnel. We must acknowledge the limits in applying this in our context where the ratio of doctor to patient is 0.1 per 1000 and for nurses 0.5 per 1000 [17]. The blood was always transported with inappropriate means altering the blood cold chain and this could lead to hemolysis in the blood pack. The highest supplying lab was the Central Hospital which is closely located to this hospital. Yet, even when blood was collected from there, there was still an important delay to initiate transfusion. Most patients had to wait long after indication, before the transfusion was initiated. The main reasons advanced were lack of finances and no, not enough or yet rejected blood donors especially as the patient carer at that moment was usually rejected as a potential donor. An additional reason was waiting for blood to get warm which is not necessary if transfusions are not very rapid, that is <15ml/kg/hour, and there are no cold agglutinins [5]. Another stated reason was the presence of fever before transfusion, even after antipyretics. This was not found in documents as a reason to withhold transfusion especially as most of these patients had severe malaria. More than half of the transfusions lasted longer than the 4 hours recommended by WHO. One of the main reasons for extension beyond 4 hours was slower rates which needed the child's hand to be splinted or intravenous (IV) line to be changed but these were not always done [11]. Recommendations hold it that, transfusions can be done in 3-4 hours but they are known to always be programmed for 4 hours in our context. Not with standing reducing transfusion time requires close monitoring from personnel which was generally lacking during this study.

Our main limitation was the fact that the presence of an observer at the site of practice could clearly influence the attitudes of clinicians. However the hospital being a busy one, many clinicians did not seek to know details of the work. Also the extensive nature of the hospital made it difficult for the investigator to accurately record exact time of indication and the values gotten were more of a minimum. Our study was focused only on the pediatric population. Yet, given the greater prevalence of blood transfusions in children in our context [13], our results should still be very helpful and applicable.

Conclusion

Our blood transfusion clinical practice still leaves much to be done as there is still low appropriateness in many aspects. Though transfusion indications seem to have improved, there are still suboptimal. We recommend that the national guidelines be revised according to international recommendations. These international recommendations clearly help avoid most of the weaknesses observed in our practice. The use of pediatric blood packs would help to avoid blood wastage. Health personnel should then be trained regularly to meet up with these international standards. We recommend, given the presence of TTIs in blood bags retested, that studies be carried out on a larger scale to better explore this finding.

Appendices

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