

Original Research Article

Audit of transfusion practices in pediatrics in a tertiary care hospital

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ABSTRACT

Background: Audit of transfusion practices in pediatric patients was performed to study indications, clinical profile and whether transfusions were in accordance to guidelines.

Methods: Retrospective analysis of all episodes of transfusions from a tertiary care centre was done. The study period was from January 2018 to December 2018. Patients in the age group of 4 months to 12 years were enrolled in the study. The data was reviewed according to the British Committee for Standards in Haematology guidelines for transfusion.

Results: During the study period of 12 months, 168 units of hemocomponents were transfused to children, 66.07% (111/168) of the total products transfused were packed red cell units, followed by 36 units (21.42%) of fresh frozen plasma and 21 units (12.5%) platelets. Overall usage of blood components was found to be appropriate in 58.33% (98/111). Red blood cells were the most appropriately transfused (64.86%) (72 units out of 111) blood product as compared to 42.85% of platelets (9/21) and 47.22% of FFP (17/36).

Conclusions: Most frequently transfused blood components are red blood cells in pediatrics. Inappropriate transfusion of blood components hinders the utility of this valuable resource. Thus it becomes necessary to conduct regular audit of blood component transfusion for optimum utilization.

Keywords: Blood component therapy, Critically ill children, Fresh frozen plasma, Packed cell transfusion, Platelet transfusion

INTRODUCTION

Blood transfusion is a life-saving therapy and is a key component of many modern surgical and medical interventions. Up to 50% of children who are hospitalized in an intensive care unit (ICU) receive red-cell transfusions, yet children whose condition is stable may tolerate the decreased oxygen delivery associated with a moderate degree of anemia.^{1,2}

Randomized Control Trials (RCTs) of different red cell transfusion policies have mostly been conducted in adults and systematic reviews indicate that liberal transfusion thresholds are not associated with benefit and may be associated with harm.³⁻⁵ Transfusion Requirements in the Pediatric Intensive Care Unit (TRIPICU) study of red cell transfusions in stable critically ill children in PICU

compared a restrictive Hb transfusion threshold (70g/L) vs. a liberal (95g/L).⁶ The restrictive transfusion practice was associated with reduced blood use and no significant increase in adverse outcomes.

Fresh frozen plasma and cryoprecipitate may be administered either therapeutically for the management of bleeding or prophylactically. There is very little evidence of benefit from FFP administration in many settings where it is currently used and significant variation in practice is seen.^{7,8} As a result, it appears that there is frequent inappropriate use of FFP.⁹

Hence, to assess the current transfusion practices in this centre and to see whether transfusions were in accordance with British Committee for Standards in Haematology guidelines for transfusion, this audit was conducted.¹⁰

METHODS

The retrospective study was conducted after getting permission from institutional ethics committee. The study period was 12 months, from January 2018 to December 2018, and admitted patients between 4 months to 12 years of age were included in the study. Case records of all children who received transfusion of blood products during their hospital stay were studied. Patient's demographic details (age, sex, blood group), diagnosis, clinical presentations, laboratory findings, duration of hospitalization, reason for transfusion, details of component therapy (type, blood group, indication) were noted from the case records. The appropriateness of the indications for transfusions given to the patients was assessed according to the British Committee for Standards in Haematology guidelines for transfusion and was divided into appropriate and inappropriate. Each transfusion was regarded as a separate episode. Authors included transfusions of packed cells, fresh frozen plasma and platelets as these were the commonly transfused blood products in this center. Exclusion criteria for this study were patients of with hemolytic anemia, patients of aplastic anemia, patients with leukemia and/ or patients on chemotherapy.

Qualitative data are represented in the form of frequency and percentage tables.

RESULTS

During the study period of 12 months, there were 168 units of hemocomponents transfused to children, 111/168 units (66.07%) of the total products transfused were packed red cell units, followed by 36/168 (21.42%) units of fresh frozen plasma and 21/168 (12.5%) units of platelets (Table 1).

Table 1: Distribution of study group as per frequency of blood component therapy.

Name of the blood component	Frequency	Percent (%)
Red blood cells	111	66.07
Fresh frozen plasma	36	21.42
Platelets	21	12.5
Total	168	100

As seen in table 2 overall usage of blood components was found to be appropriate in 98 (58.33%) transfusions. Red blood cells were the most appropriately transfused 72/111 (64.86%) blood product as compared to 42.85% (9/21) of platelets and 47.22% (17/36) of FFP.

The most common indication of for red cell transfusion was anemia (68.06%) followed by bleeding with coagulopathies (11.11%) and surgery (12.50%). See (Table 3) of the patients who received red cell transfusion, 16.21% were on ventilator, 27.92% had Spo₂

<92% on admission and 20.72% required inotropic support. The most common reasons for inappropriate red cell transfusion were anemia in critically ill patients (79.48%) and bleeding with hemodynamic stability (5.12%).

Table 2: Distribution of each component in accordance with the British committee of standards of hematology guidelines for transfusion.

Blood component	In accordance with British committee of standards of hematology guidelines for transfusion
Red blood cells (n=111)	72 (64.86 %)
Fresh frozen plasma (n=36)	17 (47.22%)
Platelets (n=21)	9 (42.85%)
Total	98 (58.33%)

Table 3: Indications of the transfusion of red blood cells.

Appropriate use of red blood transfusion in various conditions	PCV Units	Percent (%)
Anemia	49	68.06
Bleeding	8	11.11
Posted for surgery with anemia	9	12.5
Critically ill	6	8.33
Inappropriate use of red blood transfusion in various conditions	PCV Units	Percent (%)
Anemia in critically ill but not in accordance with guidelines	33	79.48
\Bleeding	2	5.12
Other	4	10.26

Table 4: Indications of the transfusion of platelets.

Appropriate use of platelet transfusion in various conditions	Platelets	Percent (%)
Platelets less than 50,000 and bleeding	2	22.22
Less than 20000/dl and marrow failure with risk of hemorrhage	3	33.33
Less than 10000/dl and marrow failure without risk of hemorrhage	4	44.44
Inappropriate use of platelet transfusion in various conditions	Platelets	Percent (%)
ITP	6	50
No clinical bleeding and platelet count >10,000	3	25
Platelet count not done	2	16.67
Others	1	8.33

Platelet count less than 10000/dl and marrow failure without hemorrhagic risk factors (44.44%) was the most appropriate indication for platelet transfusion. Transfusions not in accordance with guidelines were seen in cases of idiopathic thrombocytopenia without bleeding 6 (50%) (Table 4).

Most common indication for appropriate FFP transfusion was coagulopathy (76.46%), while FFP was inappropriately transfused for indications like altered Gastric Ryle tube aspirate with no coagulopathy 7 (36.84%), no evidence of coagulopathy 9 (47.37%) and liver disease without bleeding 3 (15.79%) (Table 5).

Table 5: Indications of the transfusion of fresh frozen plasma.

Appropriate use of FFP in various conditions	FFP units	Percent (%)
Liver failure and bleeding	3	17.64
Coagulopathy with bleeding	7	41.17
Coagulopathy with invasive procedure	6	35.29
DIC with bleeding	1	5.88
Inappropriate use of FFP in various conditions	FFP units	Percent (%)
Altered Ryles tube aspirate with no evidence of coagulopathy	7	36.84
No evidence of coagulopathy	9	
Liver disease without bleeding	3	15.79

DISCUSSION

Appropriate use of blood and its components is very essential in many medical conditions. However, they may be related to some severe adverse reactions. Appropriate use of blood component is required for better outcome and avoidance of adverse reactions.

In this study red cell transfusions were most frequently transfused followed by fresh frozen plasma and platelets. Similar findings were found in the study by Slonim et al, Bahadur et al.^{11,12}

Overall all, blood component therapy in accordance with the British Committee for Standards in Haematology guidelines for transfusion, was given in 58.33% (98/168). Bahadur et al, found appropriate use of blood components in 59.65%.¹² Maaz Ahmed et al, found that 74.16% of transfused blood components appropriate.¹³

Red blood cells were the most appropriately transfused 72/111 (64.86 %) of all blood components. This was lower as compared to Hamoudi et al, (89%), and Hume et al, (80%).^{14,15} Bahadur et al, found 61.35% of red blood cell component usage appropriate.¹² The possible explanation for the low rate of appropriate transfusion of red cell component in the present study is that transfusions were given in critically ill children even

when they had Hb levels above the threshold, indicating physicians liberal approach in treating critically ill children.

Platelet transfusions were performed for the recommended indications in only 42.85% in this study. Wade et al, study showed 92.86% of appropriate platelet transfusion. Marti-Carvazal et al, showed 52.6% of appropriate platelet transfusion.^{16,17} Inappropriate platelet transfusions were in patients with idiopathic thrombocytopenia (ITP) without bleeding (50%). Routine use of platelet transfusion is not indicated in children with autoimmune thrombocytopenia and/or ITP on the basis of platelet count alone because autoantibodies present will most likely destroy the transfused platelets. Some studies have even found that these patients have normal bleeding time with adequate hemostasis in presence of the thrombocytopenia.^{18,19}

This study reveals that 47.22% fresh frozen plasma transfusions were in accordance to the British Committee For Standards In Haematology guidelines for transfusion. This was low as compared to Marti-Carvazal et al, (61.7%) and Hume et al, (57.7%).^{15,17} W. M. Wan Haslindawani et al, found 47.47% of FFP transfusions to be appropriate.¹⁷ Inappropriate FFP transfusions in this study were given in patients with altered Ryle tube aspirate without abnormal coagulation results, liver disease without bleeding, and prophylactic administration of FFP with no evidence of coagulopathy. FFP should not be used for intravascular volume expansion, correction/prevention of protein malnutrition, and when specific factor concentrates are available; alternative products that have undergone viral inactivation through complex manufacturing processes are preferable.¹⁹ Coagulation studies should be performed prior to FFP transfusions to demonstrate their utility to avoid volume overload.²⁰ No episodes of adverse reactions following blood transfusions in this patients.

The limitations of this study is its, small sample size and heterogeneous sample.

CONCLUSION

The study indicates that a thorough understanding of various blood components and indications for each is essential while making decision for transfusion in pediatric patients. Regular audit help in evaluating and improving transfusion practices. Regular education and interaction with clinicians can increase the appropriateness of transfusions, leading to better utilization of limited blood components.

To assure a safe and cost-effective practice of blood component transfusion, there is a need to monitor and review all requests for blood component therapy.

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