

A Clinical Audit of blood component transfusion practices in the Paediatric intensive care unit of a Tertiary Care Hospital, Rawalpindi

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Abstract

Objective: To audit the practices involved in blood component transfusion in the management of patients in the paediatric intensive care unit of our hospital and to determine the appropriateness of transfusion after comparing them with clinical practice guidelines recommended by Royal Children's Hospital (RCH).

Materials and Methods: All patients admitted to pediatric intensive care who were managed with blood component transfusions were retrospectively audited for 8 weeks. Management details including indications of transfusion and its appropriateness were recorded. Clinical practice guidelines recommended by Royal Children's Hospital (RCH) were used as standards.

Results: One hundred and ninety-two transfusions were done during the study period out of which 58 percent were done to males and 41 percent to females. Most transfusions were done in infants (44%) and O Positive blood group was found rampant among blood groups of all recipients (33.3%). Red cell concentrates were predominantly (55.7%) and appropriately (72%) for transfusion among all blood components. Platelet concentrates were most inappropriately transfused (57%) followed by fresh frozen plasma (54%) and red cell concentrates (27%). There was a significant percentage of inappropriate transfusion of all blood components ($p=0.00$).

Conclusion: All blood components were significantly found inappropriately transfused, the commonest component being platelet concentrates.

Keywords: Paediatrics, blood transfusion, intensive care unit, appropriate.

Introduction

Blood transfusions are frequently prescribed in managing critically ill patients. However, there is still uncertainty regarding their effectiveness in all clinical conditions.¹ Evidence has shown that red cell concentrate (RCC) transfusions may cause more harm than benefit but they could not change recent transfusion practices and most red blood cell transfusions are being done at hemoglobin levels higher than the values proposed in guidelines.² Some studies support a restrictive transfusion approach in critically ill children and the same strategy is found superior in hemodynamically stable children to reduce the risk of potential complications.³ Study done by Ali et al⁴ concluded that clinical status has a pivotal role in decision making about blood transfusions rather than single hemoglobin level. As the majority of critically ill children tolerate acute illness, the effect of RCC transfusion on long-term outcomes has yet to be determined, highlighting the need for a clear strategy for transfusions.⁵ Transfusing fresh frozen plasma (FFP) is very effective in the management of many coagulation deficiencies but it can lead to many adverse reactions and it has been done frequently without supporting evidence in underdeveloped countries.⁶ FFPs are commonly used as volume expanders and to replace protein loss in burn patients. Both of these conditions are unwarranted leading to a significant proportion of inappropriate transfusions.⁷ There has been limited data about evidence-based guidelines regarding platelet transfusion in the paediatric age group and this may end up in transfusing at a wide range of thresholds with reference to studies conducted on the adult population.^{1,8} Blood transfusions should be done judiciously keeping in view their scarcity and significance in health care facilities and minimizing the risks associated with transfusions.

Although several countries have developed guidelines for effective blood transfusion practices, there is still a significant rate of inappropriate transfusions being done globally. Limited audits are available from Pakistan regarding the appropriate usage of blood component transfusions. Continuous monitoring of blood transfusion practices in the form of audits is the need of time to ensure effective patient management in hospitals.⁹

Materials and Methods

The research protocol was approved by the Paediatric department of Holy Family Hospital, Rawalpindi, and conducted in a paediatric intensive care unit setting. All the patients ranging from one month to 12 years, managed with blood component transfusions in two months-period between 1st March and 30th April 2021 were enrolled in this study. Data were collected from patient files and blood requisition forms. Patients with incomplete clinical notes and blood forms were excluded from the study. Data were analyzed for factors including, age, gender, clinical diagnosis, and an indication of transfusion. Blood component type, blood group transfused, and the number of transfusions was also recorded. Blood components included in the study were red cell concentrates (RCC), fresh frozen plasma (FFP) and platelet concentrates. Patients' clinical notes and laboratory investigations were reviewed from files and blood requisition forms were also analyzed to obtain relevant information. The appropriate usage of blood component transfusions was assessed according to clinical practice guidelines recommended by Royal Children's Hospital (RCH) as there are no local guidelines about blood component transfusions in children. The appropriate usage of each blood component was determined by assessing the laboratory parameters (hemoglobin, platelet count, and PT/ aPTT) along with the clinical condition of the patient. Transfusions were considered inappropriate when the patient's laboratory parameters were not falling in the transfusion range according to the guidelines and clinical status did not support blood component transfusion.

Results obtained were analyzed with IBM SPSS Statistics 24. Descriptive and cross-tabulation analyses were done for patient demographic and blood transfusion details. Each blood component was divided into two groups as appropriate and inappropriate transfusions after assessing indications for transfusion and was displayed as frequencies and percentages. The Chi-square test was applied to analyze the relationship between categorical data and a p-value of ≤ 0.05 was considered significant.

Results

In total, 192 blood component transfusions were done out of which 112 were done in male patients (58%) and 80 were done in females (41%). The age group of less than one year received most transfusions (44%) followed by 1-5 years (33%) and more than 5 years (21%). Infants received most red cell concentrates (44.9%) and FFPs (47.4%) as compared to other age groups whereas a similar percentage of platelet concentrate transfusions was seen among infants and children aged 1-5 years (39.3%). The distribution of different blood group components among various age groups is shown in Figure 1. Red cell concentrates were predominantly transfused components in our study population (55.7%), followed by FFPs (29%) and the least requested component was platelet concentrates (19%). Most of the transfusions consisted of multiple components (58%) whereas single component transfusions were comparatively less (41%). Most of the patients had a single episode of one of the blood component transfusions (74%). O positive blood group was found most predominant in the study group at 33.3% whereas O negative and A negative were least frequently (1 %) seen in our study population.

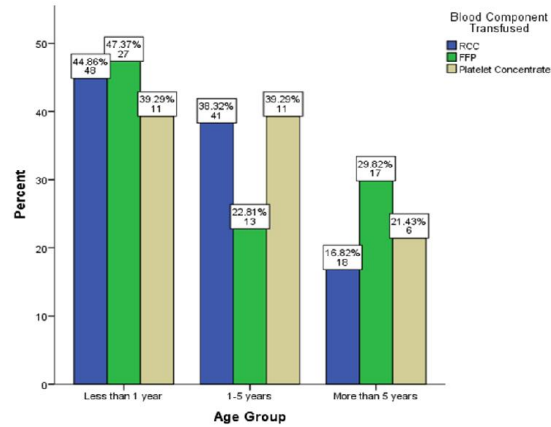


Figure 1: Distribution of Blood Component Transfusions among Different Age Groups

Our results showed red cell concentrates being the most appropriately transfused component (72%) but fresh frozen plasma and platelet concentrate transfusion were found only 45% and 42% appropriate respectively. All blood components were found inappropriately transfused. Platelet concentrates were most inappropriately transfused (57%) followed by fresh frozen plasma (54%) and red cell concentrates (27%). So there is a significant percentage of inappropriate transfusions of all blood components (p=0.000) as shown in Table 1.

Table 1: Appropriate vs Inappropriate Transfusions of all blood components

	Appropriate (n)	Inappropriate (n)	Total (n)	P-value
Red Cell Concentrate	72.9% (78)	27.1% (29)	100.0% (107)	0.001
Fresh Frozen Plasma	45.6% (26)	54.4% (31)	100.0% (57)	0.001
Platelet Concentrate	42.9% (12)	57.1% (16)	100.0% (28)	0.001
Total	60.4% (116)	39.6% (76)	100.0% (192)	0.001

Discussion

Many advances have been seen in the past years to encourage safe blood transfusions as non-judicious transfusions can predispose the patients to transfusion hazards and also cause wastage of health resources.¹⁰ Hence this audit was conducted to review transfusion practices in our setup and enhance efforts in making judicious transfusions.

A present audit showed 60.4% of all component transfusions to be appropriate and our results are consistent with the audit conducted in a tertiary care hospital in India, conducted by Bahadur et al.(59.65%).⁷ However similar study done by Mumtaz et al.¹⁰ showed a comparatively higher percentage of

appropriate transfusions (72.6%). An audit done by Kapse et al.¹¹ showed maximum demands of FFP and platelet concentrates are being done by the paediatric department as compared to other departments. However, our study represents only paediatric intensive care transfusions and red cell concentrates are predominantly transfused components. All components were transfused predominantly in children below one year in our study, similar results were seen in a study done about red cell concentrates transfusion in children (60.2%).¹² Present study also concluded that the most common blood group of recipients is O Positive and least being AB negative, reported similarly by Okoroiwu et al.¹³ in their study about blood component transfusions as 62% and zero respectively.

Red cell concentrates are the most frequently transfused component in our study (55.7%), narrated similarly by Vaishnavi et al.¹⁴ in their study (66%) which also concluded red cell concentrates to be the most appropriately transfused component as well (64.8%). Our study highlighted a significant percent of fresh frozen plasma transfused inappropriately (54%) due to its use as a volume expander and also in the settings of normal coagulation tests, seen similarly in an audit conducted by Wade et al.¹⁵ Present study showed platelets to be the most inappropriately transfused component (57%). Widespread platelets as prophylaxis in absence of bleeding attribute to a significant percentage of inappropriate transfusion as concluded by Hill-Strathy et al.¹⁶

There is limited data about blood component transfusions audit in children as compared to adults and scarce data is available at the national level. This audit has been conducted only in the paediatric intensive care setting of a tertiary care hospital in a time frame of two months; a larger study population and duration are required to infer better study results.

Conclusion

Blood transfusion is an important component of patient management, particularly in critically ill patients and its judicious use can optimize patient care. Our study highlighted that a significant percentage of component transfusions are being done inappropriately and platelets concentrates are the most common among them. Regular auditing and emphasizing guidelines among health professionals will encourage judicious transfusions and help in reducing inappropriate transfusions.

References

- Nellis ME, Karam O, Mauer E, et al. Platelet Transfusion Practices in Critically Ill Children. *Crit Care Med.* 2018;46(8):1309-1317. DOI: 10.1097/CCM.0000000000003192
- Hanson SJ, Owen EB, McDonald MJ, Woods KJ, Montgomery VL. Standardized Implementation of Evidence-based Guidelines to Decrease Blood Transfusions in Pediatric Intensive Care Units. *Pediatr Qual Saf.* 2019;4(3):e165-e165. DOI: 10.1097/pq9.000000000000165
- Valentine SL, Bembea MM, Muszynski JA, et al. Consensus Recommendations for RBC Transfusion Practice in Critically Ill Children From the Pediatric Critical Care Transfusion and Anemia Expertise Initiative. *Pediatr Crit Care Med.* 2018;19(9):884-898. DOI: 10.1097/PCC.0000000000001613
- Ali N. Red blood cell transfusion in infants and children – Current perspectives. *Pediatr Neonatol.* 2018;59(3):227-230. DOI: <https://doi.org/10.1016/j.pedneo.2017.10.002>
- Muszynski JA, Guzzetta NA, Hall MW, et al. Recommendations on RBC Transfusions for Critically Ill Children With Nonhemorrhagic Shock From the Pediatric Critical Care Transfusion and Anemia Expertise Initiative. *Pediatr Crit Care Med.* 2018;19(9S Suppl 1):S121-S126. DOI: 10.1097/PCC.0000000000001620
- Aslam HM, Saleem S, Afzal R, et al. “Risk factors of birth asphyxia.” *Ital J Pediatr.* 2014;40:94. DOI: 10.1186/s13052-014-0094-2
- Bahadur S, Sethi N, Pahuja S, Pathak C, Jain M. Audit of pediatric transfusion practices in a tertiary care hospital. *Indian J Pediatr.* 2015;82(4):333-339. DOI:10.1007/s12098-014-1370-2
- Alsheikh B, Chegondi M, Totapally B. Platelet Transfusion Thresholds Among Children Admitted to a Pediatric Intensive Care Unit. *Cureus.* 2017;9(10):e1797-e1797. DOI: 10.7759/cureus.1797
- Sharma A, Parveen H, Ranga S, Arora R. Assessment of Appropriate Use of Blood Products in a Tertiary Care Center in India- An Audit Study. *J Evid Based Med Healthc.* 2020;7:1239-1244. DOI: 10.18410/jebmh/2020/264
- Sharif M, Saxena A, Singh S, Manchala S, Jafri N. Blood Component Transfusion in a Tertiary Care Hospital. *Indian J Pediatr.* 2020;87(5):339-344. DOI: 10.1007/s12098-020-03186-2
- Kapse DV. An Audit of Pattern of Transfusion in Tertiary Care Hospital. *J Med Sci Clin Res.* 2018;6(7):413-417. DOI: 10.18535/jmscr/v6i7.70
- Faria JCP, Victorino CA, De Souza FIS, Do Sarni ROS. Assessment of the prescription of red blood cell concentrates in the pediatric age group. *Rev Assoc Med Bras.* 2018;64(2):181-186. DOI: 10.1590/1806-9282.64.02.181
- Okoroiwu HU, Okafor IM. Demographic characteristics of blood and blood components transfusion recipients and pattern of blood utilization in a tertiary health institution in southern Nigeria. *BMC Hematol.* 2018;18:16. DOI: 10.1186/s12878-018-0112-5
- Iyengar V, Parekh A, Natu S. Audit of transfusion practices in pediatrics in a tertiary care hospital. *Int J Contemp Pediatr Vol 7, No 6 June 2020* DOI: 10.18203/2349-3291.ijcp20202159. Published online May 22, 2020. <https://www.ijpediatrics.com/index.php/ijcp/article/view/3417>
- Wade M, Sharma R, Manglani M. Rational use of blood components - an audit. *Indian J Hematol Blood Transfus.* 2009;25(2):66-69. DOI: 10.1007/s12288-009-0016-4
- Hill-Strathy M, Pinkerton PH, Thompson TA, et al. Evaluating the appropriateness of platelet transfusions compared with evidence-based platelet transfusion guidelines: An audit of platelet transfusions at 57 hospitals. *Transfusion.* 2021;61(1):57-71. DOI: 10.1111/trf.16134