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Platelet Transfusion Practices in Critically ill Children

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Abstract
Background-The primary objective of the study was to describe patterns of platelet transfusions among critically ill children.
Methods-This was cross-sectional study. A child was considered eligible if admitted to the PICU during one of the screening days and between 3 days and 16 years old. A potential subject was enrolled if he/she received a platelet transfusion prescribed by the intensive care team during one of the screening days.
Results- The majority 18 patients of transfusions were prophylactic; major or minor bleeding was the indication in only 9 patients of transfusions. Of the 18 patients who received prophylactic transfusions while on mechanical circulatory devices, 14 patients were supported by ECMO, and 4 patients were supported with CRRT.
Conclusion-In conclusion, the majority of platelet transfusions prescribed in the PICU are given prophylactically to nonbleeding children.
Keywords- *PICU, Transfusion, Children*

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I. Introduction

Evidence-based guidelines for pediatric platelet transfusions are generally lacking and based primarily on expert opinion. Recommendations published by the AABB state that pediatric platelet transfusions are indicated for
1) total platelet count (TPC) less than 10×109 cells/L due to hypoproliferative thrombocytopenia,
2) active bleeding in association with qualitative platelet defects,
3) unexplained excessive bleeding when undergoing cardiopulmonary bypass, or
4) patients undergoing extracorporeal membrane oxygenation (ECMO) with TPC less than 100×109 cells/L. [1]

Little is known about the practice of platelet transfusion in pediatric critical illness. In order to evaluate platelet transfusion strategies in critically ill children and guide platelet transfusion practices, it is important to understand the epidemiology. [2]
The primary objective of the study was to describe patterns of platelet transfusions among critically ill children.

II. Material And Methods

This was cross-sectional study. A child was considered eligible if admitted to the PICU during one of the screening days and between 3 days and 16 years old. A potential subject was enrolled if he/she received a platelet transfusion prescribed by the intensive care team during one of the screening days. Patients were excluded if life expectancy was less than 24 hours, gestational age was less than 37 weeks, or the patient was previously enrolled.
For each enrolled subject, the site chose from the following indications for the transfusion (more than one could be selected):
1) TPC less than 10×10^9 cells/L with failure of platelet production;
2) TPC less than 30×10^9 cells/L in neonate with failure of platelet production;
3) major bleeding as defined by
a) bleeding requiring massive transfusion;

b) intracranial, intraocular, retroperitoneal, intraspinal, or nontraumatic intra-articular bleeding; or
c) bleeding requiring surgical intervention (i.e., hemothorax requiring drainage);
4) minor bleeding (surgical or nonsurgical) as defined by any bleeding not meeting criteria for major bleeding;
5) preparation for surgery;
6) preparation for invasive procedure;
7) known qualitative platelet defect with risk of bleeding; or
8) at risk of bleeding from device.
The record was reviewed. Data collected included patient demographics, reason for admission, any prior platelet transfusions, attributes of the platelet product (dose, source, and processing), any adverse reactions to the transfusion, and laboratory assays assessed before and after transfusion.

III. Results

During the 6 weeks of screening, 1000 patients were eligible. Of those, 32 received platelet transfusions and were enrolled yielding a platelet transfusion prevalence of 3.2% per patient.

Table 1. Base line characteristics

Mean age	4.21±1.32 yrs
Male : Female	602 : 398
Need platelet transfusion	32/1000= 3.2 per thousand

The majority 18 patients of transfusions were prophylactic; major or minor bleeding was the indication in only 9 patients of transfusions. Of the 18 patients who received prophylactic transfusions while on mechanical circulatory devices, 14 patients were supported by ECMO, and 4 patients were supported with CRRT.

IV. Discussion

Pediatric data from a single-center prospective study reported the prevalence of critically ill children receiving at least one platelet transfusion to be 7.2% [3]. The average TPC was 49±34×109 cells/L prior to transfusion, similar to thresholds reported here. They reported a wide range of incremental changes in TPC following transfusion (from 30 to nearly 100×109 cells/L), based on indication for transfusion. The variation in TPC noted in our study is likely not only due to differences in the indication for transfusion but also due to differences in patient characteristics or etiology of thrombocytopenia. For example, change in TPC is expected to be different between patients transfused prophylactically in preparation for neurosurgery compared with a bleeding patient with an oncologic disorder. Of note, the incremental change in TPC we report did not vary with the presence or absence of an underlying oncologic diagnosis. The incremental change in TPC in critically ill children following platelet transfusion may be higher than that observed in critically ill adults because of better ABO compatibility, which was implicated in improved posttransfusion platelet increment in adults with hematologic malignancies.[4] The incremental change in TPC we report also varied by indication for transfusion. The smallest incremental change was seen in those at risk of bleeding from a device, which may be theoretically explained by alloimmunization and consumption related to the device itself. Children with major bleeding had a greater median rise in TPC than those with minor or no bleeding. Variations in platelet products, including storage solution, age, and temperature, may have impacted the median change in TPC post transfusion. Differences in storage solution affect posttransfusion platelet count at 1 and 24 hours and may have played a role. [5,6]

V. Conclusion

In conclusion, the majority of platelet transfusions prescribed in the PICU are given prophylactically to nonbleeding children. Studies are needed to clarify appropriate indications for platelet transfusion and subsequent responses in critically ill children according to their illness, with particular focus on prophylactic transfusions. Further work should investigate the association between administered platelet dose and mortality.

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