Canadian Blood Services BLOOD PLASMA STEM CELLS ORGANS & TISSUES
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Platelet Transfusion in Children with Cancer

What is this research about?

Platelet transfusion is an essential and very common aspect of supportive care for children with cancer. Previous literature suggests that 52% of all children with cancer will receive a platelet transfusion during treatment. Much of platelet transfusion practice for children is based on adult studies, although children may have a higher risk of bleeding and increased harm compared to adults. Data on children are lacking on the frequency of transfusions, how low the platelet count would have to be before a doctor orders a transfusion (pre-transfusion thresholds), what a normal response to transfusion is, as measured by the change in platelet count (post-transfusion increments), and the rate of platelet transfusion refractoriness (PTR). PTR, generally defined as repeated failure to achieve satisfactory responses to platelet transfusions, can be due to immune (e.g., presence of antibodies to platelet antigens that are not found on the child's platelets) or nonimmune (e.g., infection) causes and can be associated with harmful outcomes like increased bleeding risk.

The objectives of this study were to: (1) Describe platelet transfusion practice for children with malignancy; (2) Determine the normal platelet increment following platelet transfusion and, (3) assess the rate of PTR (platelet increments ≤ 10 $x10^9$/L following two or more consecutive platelet transfusions).

IN BRIEF: Children with cancer usually respond well to platelet transfusions, as measured by a satisfactory increase in their post-transfusion platelet count.

What did the researchers do?

Cancer patients staying in the hospital <18 years of age who received at least one platelet transfusion between 2009 and 2013 at an academic children's hospital were identified. Data collected retrospectively on patient demographics, clinical information, laboratory values and transfusion details were extracted from the Transfusion Research Utilization Surveillance and Tracking (TRUST) database. Data was collected on nonimmune causes of poor platelet increment, such as evidence of infection, splenomegaly (enlarged spleen), and medication uses (e.g., antibiotics, antifungals, heparin).

What did the researchers find?

During the study period, a total of 367 children with cancer were eligible and 144 (39%) received at least one platelet transfusion. Platelets were transfused during 27% of all inpatient admissions. Key findings include:

- The median number of platelet transfusions for any given child admitted to hospital was two (interquartile range:1-3).
- Most (79%) of the time, the pre-transfusion platelet count was >10 x 10^9/L; the median count was 16 x 10^9/L.
- The median post-transfusion increment (x 10^9/L) within 30 hours was 25 (Interquartile range: Q1:13; Q3:53); an increment ≤ 10 was considered a poor platelet response.
- Risk factors for poor platelet increment of ≤ 10 x10^9/L were identified and included older patient age, a higher pre-transfusion platelet count and ABO incompatible platelet with a longer storage duration.
- Only one child was tested for human leukocyte antigen (HLA) and/or human platelet antigen (HPA) antibodies and received HLA-matched platelets.
- PTR was rare, particularly immune-mediated refractoriness.

How can you use this research?

This study provides practical data for both parents and clinicians of newly diagnosed cancer patients under 18 years old about likelihood and frequency of platelet transfusions during treatment. It also provides treating clinicians with new insight on normal platelet count increments following platelet transfusion in children.

The research team stressed that developing a clear definition for pediatric PTR can help identify pediatric patients who experience PTR, better assess how often PTR occurs, and improve our understanding of the role of human leukocyte antigen (HLA) and human platelet antigen (HPA) typing and matching in immune-mediated PTR.

This Research Unit is derived from the following publication:
[1] Lieberman L, Liu Y, Barty R, Heddle NM. Platelet transfusion practice and platelet refractoriness for a cohort of pediatric oncology patients: A single-center study. Pediatric Blood & Cancer. 2020 Dec;67(12):e28734.

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