

A NOVEL APPROACH TO REDUCE RED BLOOD CELL UNIT EXPOSURES TO PEDIATRIC PATIENTS UNDERGOING HEART SURGERY WITH CARDIOPULMONARY BYPASS IN AN EFFORT TO MINIMIZE RISK OF TRANSFUSION-RELATED MORBIDITY AND ALLOSENSITIZATION.

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Category: Patient Safety

Background

A cardiopulmonary bypass (CPB) machine is often used in cardiovascular surgery cases. The CPB machine uses a disposable circuit that is primed with fluid before it is connected to the patient for surgery. A 650 mL circuit is used when the patient's weight is between 7-25 kilograms (kg). The circuits are primed with red blood cells (RBC) and fresh frozen plasma (FFP) to reduce hemodilution and coagulopathy. On bypass, one or more RBC units are required to maintain an acceptable hematocrit.

Objectives

Our primary aim was to reduce the number of RBC exposures in patients between 7 and 25 kilograms by improving blood product ordering procedures.

Methods

A retrospective review of the 228 patients weighing 7-25 kg who underwent CPB in 2016 was performed. Based on these results, blood ordering protocols were amended to include special instructions for patients weighing between 7 and 25 kg with planned CPB procedures. This protocol directed the blood bank not only meet the patients' transfusion criteria, but also to select one RBC unit >380 mL, if available in inventory. These units were identified and sent to the operating room for the perfusionist to use in the CPB circuit.

Results

Thirty-seven patients weighing 7-25 kg have been evaluated to date. The blood bank successfully met the >380 mL criteria two thirds of the time when the protocol was requested.

	2016 n=228	Post Intervention n=37
Average Patient Weight	12.81 kg	12.18 kg
Average Unit	321 mL	411 mL
Hematocrit Prime	21%	25%
Hematocrit on Pump	28.88%	29.92%
Hematocrit off Pump	35.49%	36.73%
1 Unit RBC	n=94 41% (35-48%)	n=22 60% (42-75%)
2 Unit RBC	n= 95 42% (35-48%)	n=12 32% (18-50%)
3+ Unit RBC	n=39 17% (13-22%)	n=3 8% (2-22%)

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Discussion

The new blood ordering protocol has substantially decreased the amount of patients who received multiple units of RBC. The retrospective evaluation indicated that 59% (53-66%) of patients required 2 or more RBC units. The significantly larger units helped achieve a more clinically favorable hematocrit during cardiopulmonary bypass. After the change in ordering, 41% (25-58%) of patients required 2 or more RBC units, and 60% (42-75%) of patients received only 1 unit of RBC. By decreasing the number of RBC exposures, we theoretically minimized the risk of transfusion-related events such as fever, infection, acute lung injury, and allosensitization.