Blood Primes for Babies: Safety First

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Purpose: The purpose of this evidenced-based practice project was to identify the best practice for priming the extracorporeal circuit of the apheresis and hemodialysis system for patients less than 20 Kilograms. The guiding question was: What is the optimum priming solution to use, packed red blood cells (PRBC), diluted PRBC, or “conditioned” blood, to maintain cardiovascular and hematological stability in this patient population?

Background: The physicians ordering the blood primes for our pediatric hemodialysis patients lacked consistency in their orders for the priming procedures. This caused confusion amongst the nursing staff. The recommended prime for our apheresis procedures changed from using diluted PRBC to undiluted. The safety of replacing a large percentage of our patient’s total blood volume with PRBC’s at a high rate of infusion was in question. Developing a standard of practice (SOP) and training physicians and nurses in adhering to this standard was of utmost importance for patient safety. The use of PRBC prime in apheresis procedures was shown to increase the hematocrit and is most significant in patients who have a low hematocrit and a small total blood volume (TBV). This was found to be therapeutic and technically superior to a diluted PRBC prime.

Blood-banked blood is hyperkalemic, hypocalcemic, and acidemic. It can be “conditioned” quickly by dialyzing (through recirculation) for 7.5 minutes before initiating continuous renal replacement therapy.

Method: The gap between current practice and what the evidence suggested resulted in several practice changes. For apheresis we continued using PRBC’s and added electrolyte monitoring. For hemodialysis: we limited use of diluted PRBC’s for prime to patients less than 10 kilograms; diluted the PRBC’s with Normal Saline only; eliminated the use of blood primes for transfusion purposes; and “conditioned” the blood by recirculating the prime for 3 minutes. A revise SOP was developed and implemented in collaboration with the unit nursing staff, pediatric nephrologists, pediatric hematologist, and the attending physician of the blood bank. The nursing staff was in-serviced on the new procedure and on the use of blood products for extracorporeal circuit primes. A quick reference poster was developed for use by the nursing staff performing the procedure. Changes were made to the printed procedural order sheet. The results of this practice change will be determined by monitoring these things: cardiovascular stability (defined as intra, post, and 24 hour post procedural vital signs within 10% of pre-procedural VS); hematological stability (defined as post and 24 hour post procedural electrolytes and hematocrit/hemoglobin within 10% of pre-procedural values); results of a nursing staff survey about the clarity and simplicity of the written procedure and quick reference poster; fiber clotting rating scale to determine if there is increased clotting in the hemodialysis circuit due to the added recirculation; and monitoring of the physiologic compatibility of the diluted PRBC prime after a 3 minute recirculation in the hemodialysis procedure and physiologic compatibility of the PRBC prime in the apheresis blood prime.
Results: Data has been collected on 1 hemodilaysis patient and 4 apheresis patients. The effectiveness of this practice change will be evaluated after data has been collected from a total of 3 hemodialysis and 7 apheresis patients.

Discussion: This is a low volume/high risk procedure. We have 1-2 hemodialysis patients and 6-10 apheresis patients requiring a blood prime per year.

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