

Developing Evidence-Based Practice Guidelines for Neonatal Blood Transfusions In the Neonatal Intensive Care Unit (NICU): A Quality Improvement Project

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Problem

- Premature infants are among the most frequently transfused population of patients due to lab losses, anemia, and critical clinical conditions.
- There is no clinical parameter to determine when to transfuse PRBCs in a neonate. The decision to transfuse PRBCs is ultimately done by provider discretion, which results in a wide variation of neonatal transfusion practices.
- Neonates managed without transfusion guidelines are twice as likely to receive blood transfusions compared to neonates who are managed with a transfusion guideline
- The current practice for PRBC transfusions at Mayo Clinic-Rochester lacks guidance and suggests that there is a need to standardize the practice and set consistent lower hemoglobin levels to decrease PRBC transfusions among this population.

Purpose

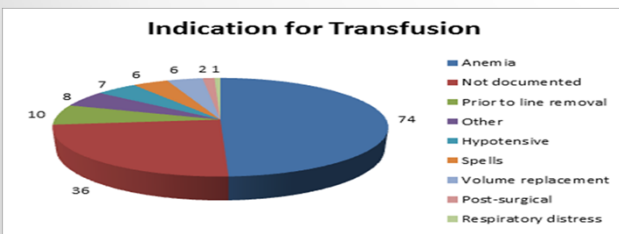
- The purpose of this project was to develop an evidence-based practice Hemoglobin Threshold Transfusion Guideline. Criteria was based on the level of respiratory support, day of life, hemoglobin level, and indication for the PRBC transfusion that would set consistent, lower hemoglobin levels at which PRBCs would be transfused in neonates.

Literature Review

- Premature Infants in Need of Transfusions (PINT) Study; Bell et al Study (Iowa Trial); Bifano et al. Study; Chen et al. Study; Valieva et al. Study

Sample

- Blood transfusion data was reviewed on 23 patients with a birth weight of less than 1,000 grams admitted to the NICU at Mayo Clinic-Rochester during the year of 2012. One patient was excluded for congenital anomalies.



Methods

- Non-experimental design that used a retrospective chart review of all patients with a birth weight of less than 1,000 grams who received PRBC transfusions in 2012.
- The Institutional Review Board (IRB) found this project to be exempt since the research involved the collection or study of existing data, documents and records. The HIPPA Privacy Rule applied to all subjects and data was collected in a manner that the subjects could not be identified.

Data was collected prior to PRBC transfusion on:

- Current hemoglobin
- Level of respiratory support
- FiO2 requirement
- Indication for the PRBC transfusion
- Day of life
- Number of PRBC transfusions received during NICU stay

Results

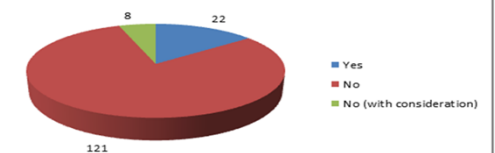
- Mean hemoglobin for PRBC transfusions =10.3mg/dL (Range = 6.9 mg/dL - 12.3 mg/dL)
- Mean FiO2 = 37% (Range = Room air-100%)
- Mean day of life for PRBC transfusion = 6.5 days (Range = 0-115)
- Mean number of PRBC transfusions = 6.9 (Range = 1-15)
- The level of respiratory support:
 - room air
 - incubator O2
 - low -flow nasal cannula
 - high-flow nasal cannula
 - CPAP
 - mechanical ventilation
 - high frequency oscillation
- The indications for PRBC transfusions were anemia, hypotension, apneic and bradycardic spells, volume replacement, post-surgical, and respiratory distress. Other indications listed was "prior to line removal" and other. Some were not documented in the record.
- A majority (49.3%) of the PRBC transfusions were given for anemia. There was no indication documented for 24% of the PRBC transfusions and about 7% of the infants received PRBC transfusions prior to line removals.
- Only 15% of these PRBC transfusions would have qualified for PRBC transfusions according to the Hemoglobin Threshold Transfusion Guideline.

Hemoglobin Threshold Transfusion Guidelines

<=7 days of life	Respiratory Status	>7 days of life
11	<ul style="list-style-type: none"> • FiO2 >40% AND mechanically ventilated OR CPAPaB 	10
9	<ul style="list-style-type: none"> • FiO2 <40% IF mechanically ventilated OR CPAPaB • CPAP <8, HFNC, LFNC (any FiO2) 	8
8	<ul style="list-style-type: none"> • No respiratory support 	7

- Guidelines should NOT apply to infants with CCHD, acute blood loss/shock, hemolytic disease, or are planning for surgery
- Transfuse 13 cc/kg of PRBCs over 2 hours
- Make infant NPO for duration of PRBC transfusion
- Removal of a central line is NOT an indication for PRBC transfusion

Met Criteria for Transfusion?



Conclusions

- The establishment of an evidence-based practice guideline for neonatal PRBC transfusions required an extensive literature review and data analysis to determine the appropriate threshold for PRBC transfusions.
- Restrictive versus liberal transfusion criteria with short and long term outcomes associated with neonatal PRBC transfusions were identified and considered in the development on an evidence-based practice guideline for neonatal PRBC transfusions.
- This evidence-based practice guideline is intended to set consistent, lower hemoglobin thresholds at which neonates will receive PRBC transfusions and decrease the number of transfusions for this population.
- The Hemoglobin Threshold Transfusion Guideline was implemented on January 1, 2014 at Mayo Clinic-Rochester.
- The findings of this study demonstrate a need for future research in regards to neonatal PRBC transfusions.
- A retrospective chart review will be performed in 2015 to evaluate the effectiveness of this guideline.