A CNS-Led Initiative to Reduce Red Blood Cell Transfusions in Adult Critical Care Patients

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DISCLOSURE

Dr. Sutton reports no actual or potential conflict of interest in relation to the research that was conducted to prepare and present this presentation at the:

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The purpose of this quality improvement (QI) initiative was to:

“Develop, Implement, and Evaluate the Effectiveness of an Evidence-Based Algorithm designed to reduce the number of RBC transfusions by re-evaluating the standard of care in adult critical care patients, while maintaining a stable hematological status while maintaining or reducing current length of stay outcomes.”
• Priorities in the management of the adult critical care client are to ensure adequate ventilation and oxygenation and restore or maintain tissue perfusion at the cellular level.

• To meet this physiological requirement the hematological status of the client must be adequate to support cellular respiration needs.

• Transfusion is rarely indicated when the hemoglobin (hgb) is greater than 10 gm/dl and is typically indicated when it is less than 6 gm/dl.

• For intermediate hgb concentrations between 6-10 gm/dl evaluation of PRBC transfusion should include a relative risk assessment based on the client’s needs.

• Generally, hematocrit (hct) levels between 25-30% are adequate for optimal tissue oxygenation.
This QI project utilized a pre-post evaluation design.

The project included an educational component to assess physician/nurse knowledge of current transfusion protocols that currently exist at the initiation of this project.

A scoping review of adult transfusion practices and outcomes literature was completed and best practices that were identified as congruent with organizational culture were identified.

A transfusion algorithm was then developed and implemented that focused exclusively on the client with an intermediate hgb level between 6-10 gm/dl. The transfusion algorithm was developed and implemented to redefine the standard of care for PRBC transfusion for adult clients in the ICU setting.
• Prior to the implementation of this QI project, current practice in our facility was based on the “10/30 rule,” where transfusion was considered routine when hgb levels were below 10 gm/dl and hct was less than 30%.

• The medical director of the adult critical care units, working with a CNS-led team of interprofessional clinicians, were recruited to review and revise the current transfusion algorithm using a systematic approach that provided evidence for the development and implementation of a PRBC transfusion protocol with guidelines utilizing various professional society guidelines published since 2012.
• A 90-day retrospective systematic review of 214 charts in persons with an intermediate hgb level finding and who had received at least one PRBC transfusion was conducted to examine pre-transfusion blood pressure, heart rate, respiratory rate, O2 saturation, level of orientation (if warranted), and diagnosis or procedure-related condition.

• A risk-based, stratified, decision outcome algorithm was designed in which both objective and subjective findings were included, as was the reason for hospitalization and procedural interventions related to potential hematological factors.
Implementation

• Use of the revised transfusion algorithm began the first day of the month following the necessary educational interventions aimed at “improving clinician knowledge specific to KEY changes in PRBC transfusion in the revised transfusion protocol.

• The CNS Project Lead was charged with collecting data beginning one month following implementation of the revised algorithm.

• The primary unit of measure was a comparison of pre / post transfused units, using clinically consistent measures, to group and compare outcomes based on actual clinical record documentation.
Data Analysis and Results

• The statistical software package SPSS (V25.0) was used for data analysis, with a statistical significance established at .05.

• Continuous variables were reported using mean and SD. The mean difference between pre-intervention and post-intervention transfusions was compared using a 2-sample independent *t*-test. Categorical variables were reported using frequency distribution and percentages.

• The sample was primarily male (78%), with a mean age of 68, admitted for either a surgical procedure, or who has undergone a surgical procedure and was admitted to the critical care units.

• Changes related to pre/post data revealed that clients with hgb levels between 6-7 g/dl were likely to receive a transfusion (*p*<.04), whereas persons with hgb levels between 7-9 g/dl were less likely to receive a transfusion (*p*< .02).
• Procedural variances were noted related to orthopedic and cardiac surgical procedures with those populations more likely to receive a transfusion ($p\leq .02$).

• When the decision to transfuse was compared to pre-post objective clinical findings, i.e., heart and respiratory rate and level of orientation, persons with an intermediate hgb were less likely to receive a transfusion, but not significantly ($p\leq .09$).

• When clients were categorized by DRG differences in length of stay (LOS) no significant change was found ($p\leq .04$), and the total number of pre-intervention transfusion units (n=253) compared to post-intervention (n=197) was significantly less ($p=\leq .04$).
Limitations of Project

- Two limitations were identified in this project.

1. Nursing staff turnover between the pre and post-project period was 17.6%.

2. Physician variation practices were noted with regards to attending physician background.

   - physicians employed as critical care hospitalist were less likely than surgeons to order a PRBC transfusion

   - A further issue was identified when anesthesia orders related to a specific procedure were compared with the revised algorithm and were found to be more consistent with hgb/hct parameters versus physiological findings related to actual patient status
• The evidence from this project demonstrates that a risk-based, stratified, decision outcome algorithm reduced the number of transfusion events in the critical care setting, while not adversely impacting patient status or LOS.

• By reducing the number of transfusion events the likelihood of a transfusion complication is decreased.

• The implications of this evidence for patient care guidelines and the education of healthcare providers demonstrates similar outcomes with fewer transfusion events than in the pre-intervention phase.

• Additionally, this project demonstrates the need to conduct additional translational research projects to reduce risk and achieve similar or improved outcomes related to transfusion practices in the critically ill adult population.
DISCUSSION

Using LEAN methodology this project identified a significant opportunity to reduce patient risk to adverse outcomes, decrease treatment of care expense, maintain circulatory hemostatic measures, maintain or reduce ICU LOS and therefore improve “Value-Based” care outcomes in Adult Critical Care Clients.
References


