Improving Blood Stewardship in a Level 1 Trauma Intensive Care Unit (TICU)

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Disclosure Information

- This study was presented at the Society for the Advancement of Blood Management, September 19-21, 2013 in Los Angeles, CA.

- The study team has no conflicts of interest, financial or otherwise, to report for this research.
The Problem

- Hemoglobin drops an average of 0.5 grams/deciliter/day for each of the first 3 days in ICU

- Diagnostic blood loss averages 41.5 mL/day in U.S. ICUs

- One third of ICU admissions receive transfusions

- 80,000 units of blood components transfused daily in the U.S.


The Problem

- Reducing transfusions by 1 unit/day in a single ICU could save $328,000/year

- CMS, AMA, Joint Commission and Choosing Wisely Campaign consider red blood cell transfusions, “one of the top five overused procedures in medicine.”


Proposed Solutions

- Restrictive diagnostic phlebotomy (small volume tubes)
- Point-of-care testing
- Minimization of waste (closed systems)
- Removal of non-essential catheters
- Institution of threshold-based transfusion policies
- Professional education
Our Study

- **Hypothesis**: Blood stewardship education can reduce ICU blood draw volume

- **Primary outcome**: Volume of blood drawn per patient per day

- **Secondary outcomes**: Rate/frequency of transfusions, mortality, ICU length of stay (LOS)
Methods

- TICU patients over a 9-week period
- Pre- and Post- Education cohorts (4 weeks each)
- Intensive Blood Stewardship Education (1 week)
  - Nursing/provider education performed daily
  - Highlighted add-on labs, less frequent blood draws
- All blood draw volumes, including waste, recorded prospectively in patient rooms
- Pre- and post- education groups compared for blood volumes drawn, transfusions required, demographics, mortality, ICU LOS
- Statistical analysis used Fisher’s exact and t-tests to compare categorical and continuous variables
**Please consider the use of ADD-ON labs to previously drawn samples. Please call ext. 3542 if questions about add-on labs.**

<table>
<thead>
<tr>
<th>Chemistry/Battery</th>
<th>PRIMARY GREINER Tube type</th>
<th>ACCEPTABLE ALTERNATE GREINER TUBE TYPES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensive (CMP)</td>
<td>GRN YEL</td>
<td>WHITE</td>
</tr>
<tr>
<td>Basic metabolic (BMP)</td>
<td>GRN YEL</td>
<td>WHITE</td>
</tr>
<tr>
<td>Liver Panel (LFT)</td>
<td>GRN YEL</td>
<td>WHITE</td>
</tr>
<tr>
<td>Lytes (LYT)</td>
<td>GRN YEL</td>
<td>WHITE</td>
</tr>
</tbody>
</table>

15. Phosphorous: GRN YEL | WHITE | RED-BLK | RED-YEL | LAV
16. Magnesium: GRN YEL | WHITE | RED-BLK | RED-YEL
17. Osmolality: GRN YEL | WHITE | RED-BLK | RED-YEL
18. Vancomycin: GRN YEL | WHITE | RED-BLK | RED-YEL
19. Phenytoin (Dilantin): RED-BLK | WHITE | RED-YEL | GRN YEL
20. Calcium: GRN YEL | WHITE | RED-BLK | RED-YEL
### Results: Pre-Education (Group A) and Post-Education (Group B)

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Group A (n=92)</th>
<th>Group B (n=57)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, yrs (SD)</td>
<td>60.8 (20.74)</td>
<td>63.0 (19.94)</td>
<td>0.52</td>
</tr>
<tr>
<td>Female, % (n)</td>
<td>32.6 (30)</td>
<td>57.9 (33)</td>
<td>0.004*</td>
</tr>
<tr>
<td>Average ICU LOS, days (SD)</td>
<td>4.5 (4.7)</td>
<td>5 (6.0)</td>
<td>0.57</td>
</tr>
<tr>
<td>Mortality, % (n)</td>
<td>16.3 (15)</td>
<td>5.3 (3)</td>
<td>0.07</td>
</tr>
<tr>
<td>Average DBL, mL/day (SD)</td>
<td>14.4 (8.4)</td>
<td>11.9 (5.5)</td>
<td>0.05*</td>
</tr>
<tr>
<td>Transfusion- PRBCs, % (n)</td>
<td>31.5 (29)</td>
<td>22.8 (13)</td>
<td>0.27</td>
</tr>
<tr>
<td>Transfusion- FFP, % (n)</td>
<td>15.2 (14)</td>
<td>17.5 (10)</td>
<td>0.82</td>
</tr>
<tr>
<td>Transfusion- Platelets, % (n)</td>
<td>7.6 (7)</td>
<td>7.0 (4)</td>
<td>1.00</td>
</tr>
<tr>
<td>Number of patients receiving any blood products, % (n)</td>
<td>38.0 (35)</td>
<td>35.1 (20)</td>
<td>0.73</td>
</tr>
</tbody>
</table>

* denotes statistical significance at p ≤ 0.05

(LOS= length of stay, DBL= diagnostic blood loss, PRBC= packed red blood cells, FFP= fresh frozen plasma)
Results: Pre-Education (Group A) and Post-Education (Group B) Transfusion Requirements
Results Summary

- 17% decrease in daily average blood drawn per patient after education
- Hospital mortality and ICU LOS not negatively impacted
- Fewer patients transfused after education
- Compared to historical data, less blood drawn in the TICU than in Med/Surg ICUs
Conclusions

- Education resulted in a significant decrease in blood loss from ICU patients
- Drawing less blood did not significantly worsen ICU LOS
- Decrease in in-hospital mortality noted (did not reach significance)
- Reinforces recommendations to include education in blood conservation measures
Ongoing Areas of Study

- Determine number of labs drawn pre- and post-education for additional analysis
- Examine trauma registry data for a specific sub-study
- Expand to include other institutional ICUs
- Continue to promote blood stewardship through regular education campaigns
- Combine educational efforts with other blood conservation practices to increase efficacy
Limitations

- Small sample size
- Observational
- Statistically significant difference in the gender comparison of our 2 groups
- Lack of data regarding illness severity in the general surgery population
References


Questions ?