Does Transfusion Practice in Prairie Mountain Health Meet AABB Guidelines?

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Disclosure

• I declare that I have no conflicts of interest.
Introduction and Background

- The AABB clinical practice guidelines on packed RBCs are considered best practice guidelines.
- This guideline aims to limit transfusions in order to improve patient safety by reducing exposure to unnecessary blood products.
- Additionally, this guideline aims to reduce unnecessary costs associated with blood transfusions.

*Red Blood Cell Transfusion: A Clinical Practice Guideline From the AABB*

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Description: Although approximately 85 million units of red blood cells (RBCs) are transfused annually worldwide, transfusion practices vary widely. The AABB (formerly, the American Association of Blood Banks) developed this guideline to provide clinical recommendations about hemoglobin concentration thresholds and other clinical variables that

Recommendation 2: The AABB suggests adhering to a restrictive strategy in hospitalized patients with preexisting cardiovascular disease and considering transfusion for patients with symptoms or a hemoglobin level of ≤8 g/dL, or less (Grade: weak recommendation; moderate-quality evidence).
Introduction and Background II

- Intent of study: to evaluate whether small and medium sized community health care centres within the Prairie Mountain Health Region (PMH) are currently following AABB transfusion guidelines.

- Retrospective Study: Performed via chart review of adult population (ages 18-100) who were hospital inpatients within study sites between January 2013 and March 2014.
  - Patients must have received at least one unit of packed RBCs during hospitalization
  - Actively bleeding patients and intraoperative transfusion patients were excluded
Study Locations
Materials and Methods

• 400 charts reviewed:
  – Brandon: 250
  – Dauphin: 100
  – Rural sites: 50

• Patients were categorized into the following categories:
  – Chronic anemia,
  – Postoperative anemia
  – Anemia with symptoms
  – Cardiovascular Disease (CVD) – chronic anemia,
  – CVD – postoperative anemia
  – CVD – anemia with symptoms
Materials and Methods II

- Hemoglobin transfusion thresholds utilized in study:
  - 80 g/L in postoperative patients
  - 80 g/L in patients with previous cardiovascular disease (CVD)
  - 100 g/L in patients with active symptoms of anemia
  - AABB guidelines are vague regarding chronic anemia threshold (state 70-80 g/L is appropriate).

- We used two sets of transfusion thresholds for chronic anemia patients as a result: lower guidelines of 70 g/L and higher guidelines of 80 g/L.
Materials and Methods III

• Charts were evaluated by the researcher and appropriateness of transfusion determined by examining clinical documentation, physician order sheets and transfusion records.

• Cardiovascular Disease (CVD): definition utilized included patients with past medical history of coronary artery disease, heart failure, cardiac arrhythmia, cerebrovascular disease, peripheral vascular disease, deep vein thrombosis and/or pulmonary embolism.
  – Patients who actively experienced any of these conditions while hospital inpatients were also considered CVD patients.\textsuperscript{9,13}

• Data stored within password protected research lap top.

• Pre-transfusion hemoglobin levels were obtained to determine if the hemoglobin fit within the AABB threshold criteria.
## Results

**Table 1. Patient Demographics and Average Pre-Transfusion Hemoglobin (g/L)**

<table>
<thead>
<tr>
<th></th>
<th>Brandon</th>
<th>Dauphin</th>
<th>Rural Sites</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean Patient Age</strong></td>
<td>75.3 ± 58.9</td>
<td>71.8 ± 20.0</td>
<td>78.2 ± 15.0</td>
<td>74.8 ± 47.9</td>
</tr>
<tr>
<td><strong>Male</strong></td>
<td>100</td>
<td>48</td>
<td>27</td>
<td>175</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td>150</td>
<td>52</td>
<td>23</td>
<td>225</td>
</tr>
<tr>
<td><strong>Proportion of Males/Females (Percentage)</strong></td>
<td>40:60</td>
<td>48:52</td>
<td>54:46</td>
<td>45:55</td>
</tr>
<tr>
<td><strong>Mean Pre-Transfusion Hemoglobin (g/L)</strong></td>
<td>79.8 ± 10.5</td>
<td>77.1 ± 10.3</td>
<td>75.8 ± 11.5</td>
<td>78.6 ± 10.7</td>
</tr>
</tbody>
</table>

*1 Patient ages in all locations by unifactorial ANOVA (p-value 0.682).

*2 Chi-square test applied to gender of patients within each location (p-value 0.117).

*3 Average pre-transfusion hemoglobin between locations by unifactorial ANOVA (p-value 0.013). Tukey Post-test results (critical value 3.327) indicate a statistically significant difference between Brandon and Rural Sites (3.992).
Results II

Figure 1. Patient Category Type and Appropriateness of Transfusions Based on Liberal Guidelines

- Chronic Anemia
- CVD - Chronic Anemia
- Postoperative CVD - Chronic Anemia
- Anemia with Symptoms
- CVD with Anemia

Number of Patients

<table>
<thead>
<tr>
<th>Patient Category</th>
<th>Appropriate Transfusion</th>
<th>Inappropriate Transfusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic Anemia</td>
<td>33</td>
<td>11</td>
</tr>
<tr>
<td>CVD - Chronic Anemia</td>
<td>104</td>
<td>18</td>
</tr>
<tr>
<td>Postoperative CVD - Chronic Anemia</td>
<td>16</td>
<td>55</td>
</tr>
<tr>
<td>Anemia with Symptoms</td>
<td>32</td>
<td>18</td>
</tr>
<tr>
<td>CVD with Anemia</td>
<td>50</td>
<td>1</td>
</tr>
</tbody>
</table>
## Results III

Table 2. Overview of Patient Category Type and Appropriateness of Transfusions Based on Guidelines

<table>
<thead>
<tr>
<th>Patient Category</th>
<th>Patients Transfused Under Strict Guidelines and Percentage Compared to Total in Category</th>
<th>Total Patients Transfused Appropriately in Category with Liberal Guidelines</th>
<th>Patients Transfused Inappropriately in Category</th>
<th>Total Patients Within Particular Category and Percentage Compared to Total Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic Anemia (80g/L)</td>
<td>27 (61.3%)</td>
<td>33</td>
<td>11</td>
<td>44 (11.0%)</td>
</tr>
<tr>
<td>CVD – Chronic Anemia</td>
<td>94 (77.1%)</td>
<td>104</td>
<td>18</td>
<td>122 (30.5%)</td>
</tr>
<tr>
<td>Postoperative</td>
<td>43 (60.6%)</td>
<td>55</td>
<td>16</td>
<td>71 (17.8%)</td>
</tr>
<tr>
<td>CVD – Postoperative</td>
<td>53 (67.1%)</td>
<td>61</td>
<td>18</td>
<td>79 (19.8%)</td>
</tr>
<tr>
<td>Anemia with Symptoms</td>
<td>30 (90.9%)</td>
<td>32</td>
<td>1</td>
<td>33 (8.25%)</td>
</tr>
<tr>
<td>CVD – Anemia with Symptoms</td>
<td>49 (96.1%)</td>
<td>50</td>
<td>1</td>
<td>51 (12.8%)</td>
</tr>
<tr>
<td>Total</td>
<td>296</td>
<td>335</td>
<td>65</td>
<td>400</td>
</tr>
</tbody>
</table>
Figure 2. Health Care Providers Ordering Packed RBC Transfusions by Location

<table>
<thead>
<tr>
<th>Type of Health Care Provider/Specialist</th>
<th>Brandon</th>
<th>Dauphin</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anesthesia</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERMD</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FPMD</td>
<td>20</td>
<td>17</td>
<td>14</td>
</tr>
<tr>
<td>Obs/Gyne</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgeon</td>
<td>10</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Other Specialists</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resident</td>
<td>6</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Physician Assistant</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Results IV
Figure 3. Number of Units Ordered in Each Location and Average Pre-Transfusion Hemoglobin

Pre-Transfusion Hemoglobin (g/L)

Brandon
Dauphin
Rural
Total

Number of Units Packed RBCs Ordered

Results V
Results VI

Figure 4. Frequency of Orders for Specific Numbers of Packed RBC Units by Location

- Brandon
- Dauphin
- Rural

<table>
<thead>
<tr>
<th>Units of Packed RBCs Ordered</th>
<th>Brandon</th>
<th>Dauphin</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>83</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>151</td>
<td>68</td>
<td>27</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>
Discussion

• The majority of the transfusions assessed in this study, **83.75%**, were considered appropriate using a *liberal* guideline.

• If the *strict* guideline was followed, the percentage of appropriate transfusions decreased to **74%**.

• If a transfusion **threshold of 70g/L** was used for stable chronic anemia patients, then the percentage of appropriate transfusions falls further to **69.8%**.

• This finding of 16.25 – 30.2% inappropriate transfusions fits within the middle range of inappropriate transfusions reported in the literature between 4 - 66%.\(^{15}\)
Discussion II

• At all sites, the majority of transfusions involved 2 or more units of packed RBCs.
  – This is an area for potential improvement, as current guidelines support the transfusion of a single unit of packed RBCs when patients are not actively bleeding. \(^1,^2,^10,^{12}\)

• An analysis of our data suggests up to 246 units of packed RBCs may not have needed to be transfused, or a possible overall transfusion reduction of 32%.
Study Limitations

• Observation of a single time period
  – Not able to determine whether inappropriate transfusion practices have been increasing or decreasing over time within PMH.

• AABB guidelines are vague regarding transfusion thresholds for chronic anemia patients, leading us to perform our data collection using two transfusion thresholds for this population.
Study Limitations II

- A judgement call was required by the researcher to determine if there was sufficient information in the chart to make decisions regarding patient categorization and the appropriateness of transfusion.

- Lastly, this is the first retrospective study observing transfusion practices within PMH, so it is not possible to make predictions regarding current or future transfusion practices within the region.
Conclusion and Future Direction

• This study provided a baseline level of knowledge regarding packed RBC transfusion practices within PMH.
• This knowledge indicates that PMH is currently following AABB guidelines the majority of the time, but there is significant opportunity to reduce transfusion of packed RBCs.
  – This can be done through encouraging an increase in the number of single unit transfusions.
• This information will be shared with prescribing health care providers within PMH.
• Future studies in this area could be instituted to track or monitor transfusion practices following dissemination of this information.
References


• Personal communication from the chairperson of the Manitoba Transfusion Practice Advisory Committee. Penner C. 2015 [cited 2015 Aug 06].


References II


• Yerrabothala S, Desrosiers KP, Szczepiorkowski ZM, Dunbar NM. Significant reduction in red blood cell transfusions in a general hospital after successful implementation of a restrictive transfusion policy supported by prospective computerized order auditing. Transfusion 2014;54:2640-2645. doi:10.1111/trf.12627


Questions?

Thank you!