Increased Perioperative Complications Among Spine Surgery Patients Receiving Older Blood

Taylor E. Purvis BA¹; C. Rory Goodwin MD PhD²; Camilo A Molina MD¹; Steven M Frank MD ³; Daniel Sciubba MD¹

¹Department of Neurosurgery, Johns Hopkins University School of Medicine, Baltimore, Maryland, USA
²Department of Neurosurgery, Duke University Medical Center, Durham, North Carolina, USA
³Department of Anesthesiology and Critical Care Medicine, Interdisciplinary Blood Management Program, Johns Hopkins University School of Medicine, Baltimore, Maryland, USA

Poster #42120
Disclosures

- C. Rory Goodwin has received grants from the Burroughs Wellcome Fund, North Carolina Spine Society, and NIH/NINDS K12 NRCDP Physician Scientist Award.
- Camilo A. Molina has a consulting relationship with Augmedics.
- Steven M. Frank has consulting relationships with Haemonetics and Medtronic.
- Daniel M. Sciubba has consulting relationships with DePuy Synthes, K2M, Medtronic, NuVasive, Stryker Spine.
Introduction

• *Retrospective* studies have shown that longer packed red blood cell (PRBC) storage duration worsens patient outcomes.

• Yet *randomized clinical trials* have found no difference in outcomes.
  – These studies have not examined the impact of giving the *oldest blood* (28 days old or more) on morbidity within spine surgery.

• **Objective:** Describe the association between *storage duration of PRBCs* and *perioperative adverse events* in patients undergoing spine surgery at a tertiary care center.
Methods

- Institutional surgical administrative database was queried for patients who:
  - Underwent spine surgery between December 4, 2008 and June 26, 2015
  - Were transfused with PRBCs
  - Underwent spinal fusion, tumor related surgeries, and other identified spine surgeries
- Patients were divided into two groups based on storage duration of blood transfused:
  - exclusively \( \leq 28 \) days’ storage or
  - exclusively \( >28 \) days’ storage
- Primary outcome: composite in-hospital morbidity including infection, thrombotic event, renal injury, respiratory event, ischemic event
Results

• 1141 patients identified
  – 710 transfused exclusively with PRBCs ≤28 days’ storage
  – 431 transfused exclusively with PRBCs >28 days’ storage
Results

• Perioperative complications occurred in 119 patients (10.4%)
• On univariate analysis:
  – the proportion experiencing any morbidity or mortality was significantly higher for those who received exclusively PRBCs >28 days’ storage \( (P = 0.016) \).
  – No differences in other clinical outcomes were observed between PRBC age groups (infection, ischemic complication, etc.).
Results

• After adjusting for competing perioperative risk factors, patients who received blood stored for >28 days had higher odds of developing any one complication [OR 1.82; 95% CI 1.20–2.74; P=0.005]
Results

- Units of PRBCs transfused ($P = 0.002$) and weighted Medicare severity diagnosis-related group ($P < 0.0001$) also remained independently associated with the development of a complication.

**Predictors of Any Morbidity or Death for the Entire Cohort (Multivariate Analysis)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Odds Ratio (95% CI)</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of blood (&gt;28 vs. ≤28 days)</td>
<td>1.817 (1.203–2.743)</td>
<td>0.005</td>
</tr>
<tr>
<td>Units of PRBCs transfused</td>
<td>1.084 (1.029–1.141)</td>
<td>0.002</td>
</tr>
<tr>
<td>MSDRGWt</td>
<td>1.287 (1.183–1.400)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
Discussion

• Results support the findings of a number of retrospective studies that have shown increased morbidity and mortality when using older blood.

• Several previous randomized control trials (RCTs) have found no difference in clinical outcomes.
  – However, these studies did not routinely transfuse the oldest blood in the bank, particularly blood older than 28 days.
  – Instead used more conservative definitions of “old” blood.
Summary Points

• Blood stored for >28 days is independently associated with higher odds of developing any one morbidity or mortality.
• Blood storage duration may be an appropriate parameter to consider when developing institutional transfusion guidelines that seek to optimize patient outcomes.