Pragmatic, Randomized Optimal Platelet and Plasma Ratios (PROPPPR)

LAC+USC Medical Center Community consultation

Site PI: Kenji Inaba, MD, FRCSC, FACS
University of Southern California
Division of Trauma & Critical Care
Department of Surgery
Keck School of Medicine of USC

LAC+USC Medical Center
1200 N. State Street
Los Angeles, CA 90033

Sponsored by National Heart Lung and Blood Institute (NHLBI), National Institutes for Health (NIH)
Background

- Nearly 50% of trauma deaths occur before the patient reaches the hospital and few of these deaths are preventable.

- For those that reach the hospital, about 40% experience bleeding complications and require a MT (massive transfusion of at least 10 units of blood)

- Bleeding complications are the leading cause of early death in trauma patients.
Background

- Current military transfusion guidelines for massively transfused casualties are based on the U.S. Army Surgeons General recommendation of a 1:1:1 ratio.

- Studies in both the public and military populations have shown that seriously injured patients who received a massive transfusion (MT) with higher plasma ratios had lower mortality than those who received more traditional ratios of plasma.

- **Question remains:** What is the best ratio group to use for trauma patients who require a large amount of blood?
What Are Red Blood Cells, Platelets, Plasma

- Red Blood Cells are cells that carry oxygen.
- Platelets are the smallest structures in the blood and are important for blood clotting and plugging damaged blood vessels.
- Plasma is the liquid portion of the blood; represents approximately 50% of the total volume of blood and contains coagulation proteins.
What was the PROPPR study?

- 12 North American Level 1 trauma center sites participated

- Purpose: Determine what the best ratio of products is to provide the best outcomes for the patients.

- Enrolled patients who were PREDICTED to receive significant amounts of blood products into 1 of 2 groups: 1:1:1 ratios of plasma to platelets to red blood cells (RBCs), compared to 1:1:2 (338 patients in 1:1:1, 342 in 1:1:2)
Enrollment

• 15 month enrollment period  (8/3/12 – 12/3/13)
• 11,185 patients screened
• 680 enrolled  (338 in 1:1:1, 342 in 1:1:2)
• 10,505 excluded - main reasons for exclusions are:
  didn’t get blood in 1st hour,
  transfer from another hospital,
  not predicted to need a massive transfusion,
  age <15,
  patient improved,
  expected to die within 1 hour of ED admission
Outcomes

No difference between groups for:
Death at 24 hours and 30 days

Complications associated with trauma

Age, race, type of injury

Differences seen:
Death related to uncontrolled bleeding was decreased in the 1:1:1 group
Outcomes (continued)

<table>
<thead>
<tr>
<th>Blood Products within 1st 24 hours plus pre-hospital</th>
<th>Group 1:1:1 (N = 338)</th>
<th>Group 1:1:2 (N = 342)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasma (units)</td>
<td>Median (range)</td>
<td>7 (3,13)</td>
</tr>
<tr>
<td></td>
<td># who got ≥ 1 unit (%)</td>
<td>325 (96.2)</td>
</tr>
<tr>
<td>Platelets (units)</td>
<td>Median (range)</td>
<td>12 (6,18)</td>
</tr>
<tr>
<td></td>
<td># who got ≥ 1 unit (%)</td>
<td>333 (98.5)</td>
</tr>
<tr>
<td>RBC (units)</td>
<td>Median (range)</td>
<td>9 (5,15)</td>
</tr>
<tr>
<td></td>
<td># who got ≥ 1 unit (%)</td>
<td>338 (100)</td>
</tr>
</tbody>
</table>
Conclusion

• More people who received 1:1:1 lived long enough for the physicians to stop the bleeding (291 in 1:1:1 vs. 267 in 1:1:2)

• Future studies will look at outcomes earlier in the resuscitation process (i.e. survival at 3 hours or time to bleeding stopped instead of 24 hours & 30 days)