Study compares effectiveness of different transfusion strategies for severe trauma

February 3 2015

Among patients with severe trauma and major bleeding, those who received a transfusion of a balanced ratio of plasma, platelets, and red blood cells (RBCs) were more likely to have their bleeding stopped and less likely to die due to loss of blood by 24 hours compared to patients who received a transfusion with a higher ratio of RBCs, according to a study in the February 3 issue of *JAMA*. There was no significant difference in overall death at 24 hours or at 30 days between the two transfusion strategies.

Approximately 20 percent to 40 percent of trauma deaths occurring after hospital admission involve massive hemorrhage from an injury to the trunk of the body and are potentially preventable with rapid hemorrhage control and improved resuscitation techniques. These patients often require massive transfusion. Earlier transfusion with balanced blood product ratios (1:1:1 ratios for plasma, platelets, and red blood cells), defined as "damage control resuscitation", has been associated with improved outcomes; however, there have been no large multicenter clinical trials, according to background information in the article.

John B. Holcomb, M.D., of the University of Texas Health Science Center at Houston, and colleagues conducted a study in which 680 severely injured patients who arrived at 1 of 12 level I trauma centers and were predicted to require massive transfusion were randomly assigned to receive blood product ratios of 1:1:1 for units of plasma to platelets to red blood cells (a ratio that is the closest approximation to reconstituted whole blood), or 1:1:2, during active resuscitation in

addition to all local standard-of-care interventions. Patients were assigned to one these component ratios within 8 minutes of calling the blood bank, allowing the rapid delivery and infusion of the predetermined ratios.

The researchers found no significant differences for the primary outcomes of the study: mortality at 24 hours (12.7 percent in 1:1:1group vs 17.0 percent in 1:1:2 group) or at 30 days (22.4 percent vs 26.1 percent, respectively). Exsanguination (extensive loss of blood), which was the predominant cause of death within the first 24 hours, was significantly decreased in the 1:1:1group (9.2 percent vs 14.6 percent in 1:1:2 group). More patients in the 1:1:1 group achieved hemostasis (the stoppage of bleeding) than in the 1:1:2 group (86 percent vs 78 percent, respectively).

Despite concerns that the 1:1:1 group would experience higher rates of multiple inflammatory-mediated complications such as acute respiratory distress syndrome, multiple organ failure, infection, blood clots, and sepsis, no differences were detected between the two treatment groups.

"Given the lower percentage of deaths from exsanguination and our failure to find differences in safety, clinicians should consider using a 1:1:1 transfusion protocol, starting with the initial units transfused while patients are actively bleeding, and then transitioning to laboratory-guided treatment once hemorrhage control is achieved. Future studies of hemorrhage control products, devices, and interventions should concentrate on the physiologically relevant period of active bleeding after injury and use acute complications and later deaths (24 hours and 30 days) as safety end points," the authors write.

More information: *JAMA*, DOI: 10.1001/jama.2015.12