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New rapid-deployment plasma protocol for trauma care effectively treats patients quicker in the emergency room

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Traumatic injury is the leading cause of death among people under age 45, but if trauma physicians could deliver plasma to these injury victims within minutes of their arrival in the emergency room, more of them would stand a better chance of survival.

When they arrive at the hospital, trauma victims can often wait 30 minutes or longer to receive plasma because the traditional way of giving them plasma involves two time-consuming steps: testing for blood type and then thawing frozen plasma. "There's a golden hour after trauma where you need to be able to stabilize the patient," explained Deborah Novak, MD, of the University of Arizona, Tucson, lead author of a new study on a rapid-deployment plasma protocol.

The study was conducted at 12 urban trauma centers. Researchers found that trauma teams could consistently deliver plasma to trauma patients three times faster than the traditional delivery method. The latest results from the Pragmatic, Randomized Optimal Platelets and Plasma Ratios (PROPPR) clinical trial determined that the participating trauma centers were able to utilize a new clinical guideline to have thawed plasma delivered to the trauma patient's bedside within 10 minutes of arrival. The most recent report was published online in the journal *Transfusion*, a publication of the American Association of Blood Banks, in advance of print publication in June.

The investigators evaluated the utility of guidelines for massive transfusion developed by the American College of Surgeons (ACS) Trauma Quality Improvement Program (TQIP). Approximately 4,700 units of plasma were given to the 680 patients enrolled in the trial.

Whole blood, used for transfusion when patients lose excessive amounts of blood, is divided into its three key components that makes it easier to store and keep fresh: plasma, platelets, and red blood cells. "Plasma contains the critical proteins necessary for the human body to control, and stop, bleeding," Dr. Novak said. Platelets are essential for clotting, and red blood cells transport oxygen throughout the body.

Traditional trauma resuscitation involves giving the patient non-blood fluids, called crystalloid fluids, and red blood cells early on, and then administering plasma and platelets later. Plasma is typically stored frozen and thawed only when trauma staff request it. While this method successfully treats most trauma victims with mild or moderate injuries, military and civilian researchers have found that individuals with massive bleeding benefit when they received plasma at the same ratio as red blood cells. "A renewed look at the process resulted in the concept of transfusing plasma earlier, with red blood cells and plasma in ratios that approximate the reconstitution of the original unit of whole blood," Dr. Novak said.

PROPPR focuses on the use of universal-donor plasma—that is, plasma that can be given to all blood types—but because thawed, universal-donor plasma can be scarce at times, three trial sites used blood type A plasma instead without complications. This approach was an important side note of the trial, according to Dr. Novak. "What we found out and what other places have found is that trauma teams can safely use AB or limited amounts of A plasma for that small window when the patient's blood type is not yet known," Dr. Novak said. That finding could be significant in sustaining supplies of unthawed plasma for trauma use.

But the challenge is to have plasma thawed and ready when the patient arrives at the emergency room. Thawed plasma must be discarded after five days whereas frozen plasma can last up to a year. "So any hospital endeavoring to maintain a pre-thawed plasma inventory could experience additional wastage," Dr. Novak said. "The key to controlling the amount of wastage depends on balancing the amount of plasma pre-thawed, and the amount of plasma used daily in the facility." Eleven sites reported thawed plasma wastage of less than 10 percent of units. Only one of 12 sites reported having to discard about 25 percent of the thawed plasma. The other sites reported no increase, illustrating that with careful inventory management, wasted plasma need not increase, while clinical outcomes can improve.

Overcoming the challenge of getting thawed plasma rapidly into the trauma unit was an essential component of the PROPPR trial. Eleven of the 12 sites were able to consistently delivery six units of thawed plasma to the patient's bedside within 10 minutes of arrival. The twelfth site, which had only two trauma patients a month, was able to do so within 15 minutes.

The blood bank guidelines spelled out by ACS TQIP enabled these centers to achieve the goal of delivering thawed plasma within 10 minutes, noted PROPPR trial coauthor Bryan Cotton, MD, MPH, FACS, professor of surgery at University of Texas Health Sciences Center in Houston. "That step really brought those centers' the ability to deliver and pull off the massive transfusion protocol and meet those TQIP guidelines in such a dramatic fashion," said Dr. Cotton, who is also a member of the expert committee that drafted the TQIP guidelines.

Future studies using the PROPPR data will closely evaluate problems with inflammation and clotting after trauma, and to influence the guidelines regarding the way massively hemorrhaging trauma patients receive transfusions.

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