

# In-flight blood transfusions increase survival rates and improve trauma patient outcomes

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Air-lifted trauma victims who received blood transfusions in the helicopter before arriving at a trauma center had higher one-day survival rates and less chance of shock than air-lifted patients who did not receive blood transfusions until they arrived at the trauma unit, according to study findings published online in the *Journal of the American College of Surgeons*. The study appears as an "article in press" and will appear in a print edition of the journal this spring.

The researchers evaluated the air medical evacuation strategy at the University of Pittsburgh Medical Center (UPMC), which has a network of 18 helicopter bases in Pennsylvania, Ohio, and Maryland. It is the largest study to date of a civilian in-flight trauma resuscitation protocol that has been used by the military in Iraq and Afghanistan.

"After matching patients for how badly they were injured at the scene, the people who received [blood](#) transfusions while they were on the helicopter were more likely to survive on the first day after being injured; were less likely to be in shock when they showed up at the hospital; and didn't need as many blood transfusions at the hospital just because they did get that first [blood transfusion](#) in the helicopter," study author Joshua Brown, MD, said.

The STAT MedEvac helicopter teams at UPMC have been carrying blood for transfusion on their flights for about two decades, but this is the first study that evaluated the use of transfused blood in civilian trauma victims air evacuated directly from the injury scene and

compared them with air-evacuated trauma victims who did not receive transfused blood.

Hemorrhage is the leading cause of death in trauma victims. Early transfusions of red blood cells have been known to reduce the chance of death, and the use of transfusions before trauma victims arrive at the trauma center has been growing. The study aimed to determine if pre-trauma center blood transfusions were indeed associated with improved outcomes. During a five-year period ending in 2012, 240 patients who received in-flight transfusions were evaluated in comparison with 480 who did not receive blood until they arrived at the hospital.

Based on the study data, the UPMC has modified its protocol in recent years, Dr. Brown said. "It used to be the paramedics had to give the patient two liters of saline before giving them blood, and we dropped that down to only one liter of saline. Now, based on this study, we're actually looking at giving patients blood without any saline who meet the criteria of low blood pressure and elevated heart rate and are clearly in shock," Dr. Brown reported.

The UPMC protocol involves giving guidelines on when to administer the transfusions to the paramedics and nurses onboard flights. All the STAT MedEvac flights at the institution carry two units of [red blood cells](#) for transfusion. Helicopter staff can communicate with the medical command doctor at the [trauma center](#) to get the go-ahead order to give blood to patients who may not meet the guidelines for transfusion but still may benefit from receiving it.

However, there are regulatory issues that may prevent such a protocol from being adopted universally, Dr. Brown noted. In Pennsylvania, paramedics who have had additional training are permitted to start a blood transfusion without a physician present, but not all states allow paramedics to do so.

Dr. Brown also explained the logistics and challenges of storing blood away from the blood bank. "The blood needs to be refrigerated, the helicopter base must have a freezer, and the helicopters must have coolers when they're actually out on a mission to keep the blood at an appropriate temperature," Dr. Brown said. Meeting these requirements involves close coordination with the blood bank and having a way to return unused blood after it expires in 30 days. The University of Pittsburgh has registered all of its helicopter bases as satellite blood banks to comply with the regulations.

**More information:** Pre-Trauma Center Red Blood Cell Transfusion Is Associated with Improved Early Outcomes in Air Medical Trauma Patients, *Journal of the American College of Surgeons*. DOI: [dx.doi.org/10.1016/j.jamcollsurg.2015.01.006](https://doi.org/10.1016/j.jamcollsurg.2015.01.006)

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