



## **EMS Focus: Prehospital Blood Transfusion in Practice Webinar FAQ**

### **Working with a Blood Supplier in Your Prehospital Blood Program**

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**The following answers are provided by:**

- **Jeff Hinshaw, PA**  
Assistant Medical Director  
Wilkes County Emergency Services, North Carolina
- **Christina Warren, MSHS, MLS (ASCP) SBB**  
Blood Bank and Stem Cell Transplant Cellular Therapies Manager  
Atrium Health Wake Forest Baptist, North Carolina

### **Partnering With a Blood Bank or Blood Center**

#### ***1. What is the difference between a blood bank vs. a blood center or supplier?***

Blood centers, such as the [American Red Cross](#), [OneBlood](#) and [The Blood Connection](#) collect, test and distribute blood, while a hospital-based blood bank is a transfusion service that issues blood to patients. An EMS program can partner with either blood supplier type to implement a prehospital blood program in their community.

#### ***2. If a blood transfusion service does not have a U.S. Food and Drug Administration (FDA) license (i.e. the service does not modify, irradiate, etc. blood products) does it need to be registered to be able to say you are storing and distributing to others? E.g. smaller hospitals supporting more rural EMS units.***

No, there are many transfusion services/blood banks that are not registered with the FDA. The Atrium Health Wake Forest lab registers with the FDA because we further modify products after receipt. Some transfusion services do not and may not be registered with the FDA. The FDA confirmed that a facility can select “distributing to others” on its existing FDA registration to cover this activity, without needing to separately designate itself a “depot” or “blood supplier.”

## Planning Your Program

- 3. *Is there a number of blood product units given that a service should aim for to know that the program will be feasible? What other metrics can be used to predict use? Is [National Emergency Medical Services Information System \(NEMSIS\)](#) data able to pick out those numbers?***

There is no explicit unit-count threshold for feasibility. Wilkes County Emergency Services pulled its numbers from NEMSIS data. It started with patients who were hypotensive and tachycardic, then looked at whether they responded to a crystalloid fluid bolus. Patients who did not respond became the target population. A retrospective analysis of a year of transports identified roughly 45-75 potential candidates, and the agency asked whether treating half of them could make a difference. The program transfused 13 patients (20 units) in its first year and grew to 35 patients (47 units) by 2025.

Agencies can also use shock index as a marker for transfusion. Shock index also helps determine whether a patient receives blood by drip infusion or pressure infusion, because a patient with a worse shock index may be more critically ill. These are all trackable numbers that an agency can use to build a matrix of which patients to transfuse.

## Blood Products and Clinical Use

- 4. *I've heard some studies may have shown that whole blood may not be superior to blood components, but these same studies have shown that it is not inferior, right?***

There are no studies proving whole blood is better than a one-to-one ratio of components, and it would be hard to prove whole blood is superior. However, whole blood is seen as the “golden nugget” of blood products because it includes all components.

- 5. *If there is a shortage of blood for the field, how do you feel about blood versus frozen plasma in the field?***

Packed red cells and liquid plasma that has never been frozen (28-day expiration) are acceptable substitutes where whole blood is hard to get. Freeze-dried plasma is at least three to five years from the market, but liquid plasma is available now and a suitable substitute for whole blood in the field.

**6. *What is recommended for the second unit if whole blood is given first? Is fresh liquid plasma a good option?***

Yes. Whole blood is considered the “golden nugget” because it contains platelets, red blood cells and plasma. If an agency has only one unit of whole blood, it can supplement with packed red blood cells or plasma. Platelets are not commonly carried in the prehospital setting, so the focus is on red cells and plasma. For a patient in extremis who is not responding to traditional resuscitation, plasma is worth considering if it is available.

Plasma also has a role with head injuries, burns and sepsis. Wilkes County Emergency Services currently carries low-titer O-positive whole blood in both of its coolers and is exploring adding plasma.

**7. *What do you do about blood typing screens? For instance, how do you ensure the right blood and right prothrombin time (PT)?***

The Atrium Health Wake Forest lab doesn't do PT testing. It only gives universally compatible products to EMS agencies for emergent prehospital administration. These are the same products that would be given to in-house patients at the hospital in an emergency regardless of blood type. Once a patient arrives at the hospital and a type and screen arrives in the blood bank for testing, there are methods and procedures to determine the patient's true blood type even if it is a post-transfusion sample. Continued blood bank support will follow protocol developed by the specific institution.

In the prehospital setting, low-titer O-positive or O-negative whole blood (LTOWB) is used as an emergency transfusion product and is considered the current standard of care for patients with life-threatening hemorrhage. Because LTOWB is group O blood with low anti-A and anti-B antibody titers, the risk of an acute hemolytic transfusion reaction is extremely low. The immediate priority in hemorrhagic shock is rapid restoration of oxygen-carrying capacity and circulating volume, as the risk of death from uncontrolled bleeding far exceeds the very small risk associated with emergency uncrossmatched transfusion. Once the patient arrives at the hospital, standard blood typing and compatibility testing are performed and subsequent transfusions can be tailored appropriately after resuscitation.

**8. *Do you think that education on hemolytic disease of the newborn and fetus (HFDN) and new treatments available could possibly change the thought process of EMS clinicians/agencies? Can it help agencies move toward component therapies and their safety rather than the preference for whole blood?***

An article by Dr. Yazer's team calculates the risk of a subsequent fatal HDFN case from Rh-alloimmunization at well under 1 percent, versus an 8 to 20 percent death rate from hemorrhage. Atrium Health Wake Forest Baptist actively monitors Rh-negative females

who receive blood products. After five years of a liberal Rh-positive transfusion policy, it has seen an alloimmunized male but no alloimmunized females. Wilkes County Emergency Services has had no Rh incompatibility issues in females. It has had two other incompatibility issues, neither of which harmed the patient's outcome.

Further reading:

- [Yazer MH, Scorer T, McConnell D, Gluyas-Harris J. What is the risk of transfusing group O RhD-positive red blood cells to female service personnel of childbearing potential? BMJ Mil Health. 2026 Mar 20;172\(2\):103-106. doi: 10.1136/military-2024-002904. PMID: 39800429.](#)
- [Yazer MH, Delaney M, Doughty H, Dunbar NM, Al-Riyami AZ, Triulzi DJ, Watchko JF, Wood EM, Yahalom V, Emery SP. It is time to reconsider the risks of transfusing RhD negative females of childbearing potential with RhD positive red blood cells in bleeding emergencies. Transfusion. 2019 Dec;59\(12\):3794-3799. doi: 10.1111/trf.15569. Epub 2019 Oct 18. PMID: 31625172.](#)

#### **9. Are you administering calcium in conjunction with your blood products?**

Yes, there is debate in the medical community about when to give calcium. Most agree it is indicated once multiple units of blood have been given, but there is still debate early in a resuscitation. Wilkes County Emergency Services uses a bundled approach to blood administration. If the crew opens the blood cooler and the administration equipment, and transport time allows, the patient receives the blood and calcium. If the patient has non-compressible hemorrhage, the patient also receives tranexamic acid (TXA).

### **Storage, Rotation and Restocking**

#### **10. Can you share what tracking device is used to ensure that the units are maintained within temperature requirements?**

Atrium Health Wake Forest Baptist uses multiple devices from multiple companies. If an EMS agency already has a device, the blood bank will validate it for use. We recommend looking for a device that is FDA approved. Devices that are not FDA approved can be used, but temperatures must be logged every four hours. Ideally, the device will notify you when the temperature leaves the range of one to six degrees Celsius so you can act before the blood products are affected. Temperature indicators that change color if the temperature has been exceeded are also used.

Wilkes County Emergency Services uses two storage methods: a traditional foam pack cooler and a refrigerator. Each has its own temperature monitoring device. Each unit of blood also carries an AccuView indicator on its side that changes color if the temperature changes, so there are two levels of monitoring.

**11. How do you evaluate and assure that the blood that is returned to you by EMS has been treated per protocol and is safe to give to patients in other health care environments (e.g., hospitals)?**

Atrium Health Wake Forest Baptist closely manages all of the blood it sends to EMS crews. A refrigerator at an EMS agency is treated like a refrigerator in the blood bank. The blood bank validates it before giving it to the agency, and the agency sends four-hour temperature logs and quarterly temperature and alarm checks. Every unit that goes to an EMS agency also has a temperature tracking device on it, so the blood bank can tell if it went over temperature. Coolers are sealed in-house and are not opened unless a unit needs to be transfused, which keeps the process as hands-off as possible for crews.

Wilkes County Emergency Services once had a thermometer go bad and sound an alarm showing the temperature was too high. The crew addressed it and got the cooler back to the blood bank to be evaluated. It takes diligence from the EMS side, but technology helps.

**12. How long do units typically stay with the EMS agency before they are rotated back to the blood center? Do they hold them for the full 42-day shelf life, or is the return timed earlier so the units still have enough left to be transfused at a hospital?**

Whole blood has shorter expiration dates than other products, at just 21 days. Packed red cells expire in 42 days at most. Unused units are returned before they expire.

**13. Does the blood bank monitor utilization for each of its EMS partners and work to minimize the amount of product rotated back to the hospital?**

The blood bank receives the EMS chart for every transfusion and reviews it for appropriateness and documentation. A rotation model helps limit wastage.

**14. What are the protocols and costs associated with emergency deliveries versus routine scheduled restocks?**

Routine restocks utilize daytime couriers to shuttle blood back and forth. After hours/emergency restocks may be cheaper if the crew is bringing a patient to the facility and can restock in-person or more expensive if they are going to an outside facility and need a STAT or after-hours courier. The counties Atrium Health Wake Forest supports do not transfuse daily and the difference in costs are negligible.

Most EMS blood programs allow for routine scheduled restocks and that is coordinated through their local blood bank or blood provider. This is part of the cost of doing business. Also incorporated in the cost of your program is when the splint needs to be replaced after being used. That can be determined on an individual basis depending on the blood supplier. Restock and cycling of blood is dependent on cooler type as well.

**15. What is your inventory buffering capacity to ensure our EMS agency won't face stockouts during regional shortages or mass casualty incidents?**

Atrium Health Wake Forest Baptist is a Level 1 pediatric and adult trauma center in Winston-Salem, N.C. and is at least two hours from a blood center such as the American Red Cross or The Blood Connection. In a mass casualty incident, it would have to support itself for at least four hours without backup, so it keeps its inventory heavy. On any given day, it has about 50 units of whole blood on its shelves that it rotates in and out, 200 units of O-positive red cells and perhaps 50 units of O-negative red cells.

**16. Regarding the Pay-As-You-Go model, is there an agreed upon shelf-life date when the blood is transferred to the hospital? Does the hospital pay a reduced price for those units?**

Under Pay-As-You-Go arrangements, the blood supplier or hospital will accept the EMS agency's "short-dated" (near-expiration) unused units back into its own inventory for use on trauma patients, which reduces waste.

**Quality Assurance and Outcomes**

**17. Is there any QA/QI done on cases where blood was given when it may not have been needed? How do you approach this in training and education?**

Yes, Wilkes County Emergency Services sends the chart for every transfusion to its medical director and the Atrium Health Wake Forest Baptist blood bank team at the same time. The first review looks at vital signs, documentation and patient changes. The blood bank also reviews each chart for appropriateness of transfusion and documentation, files the signed emergency release for 10 years, and has its medical director check for signs and symptoms of transfusion reactions. When a case is unclear, the team looks at it together, including post-transfusion results such as hemoglobin.

In a few cases, a patient's vital signs were abnormal at first but changed quickly, and the small amount of blood given could not have caused the change. The agency's training division then goes back to those crews to reiterate patient assessment, shock index and protocols. It uses scenario-based training in real time to build psychomotor skills and problem solving. The goal is for paramedics to understand that a low blood pressure alone does not mean a patient needs blood immediately. Such cases have been few and far between in the program's nearly five-year history.

**18. Are you tracking outcome data and sharing it with the blood bank?**

Yes, Wilkes County Emergency Services, the emergency department and the blood bank share information on whether patients arrive alive, are discharged alive or die. The

agency's numbers show a large reduction in mortality over nearly five years of the program. We keep and share a spreadsheet that tracks all of this data. Follow-up is relatively easy in about 90 percent of cases, as most trauma patients go to an Atrium Health facility. When a patient goes to another facility, the blood bank relies on the EMS team for follow-up.

## **Supporting the Blood Supply**

### ***19. Can we establish joint educational initiatives or community blood drives to help offset supply costs and maintain inventory?***

Blood drives will not offset supply costs because blood centers do not charge less when more blood is donated, but they do help with inventory shortages. Anything an agency can do to support the American Red Cross, OneBlood or The Blood Connection by holding blood drives helps, because many areas are blood deserts. Supply is at crisis levels, especially during "trauma season" between Memorial Day and Labor Day.

Wilkes County Emergency Services has held regular blood drives at its EMS headquarters since its program began. Cabarrus County holds a regular "Battle of the Badges" among fire, EMS and law enforcement to see who can give the most units.

Donors can give about every eight weeks, so blood centers need repeat donors rather than one-time donors. The NHTSA Office of EMS also encourages agencies to partner with their blood center on donor drives and to encourage their own EMS clinicians to donate.