

Commonwealth of Virginia Medical Direction Committee

DRAFT WHITE PAPER ON PREHOSPITAL BLOOD ADMINISTRATION

BACKGROUND

Trauma is the leading cause of death for patients under 46 years old, and uncontrolled hemorrhage remains the number one cause of preventable death in trauma.¹ The use of blood products for the resuscitation of patients in hemorrhagic shock is a well-established practice in the hospital setting with positive outcomes. However, the common use of large volumes of crystalloid in prehospital systems to resuscitate patients in hemorrhagic shock is associated with worse outcomes from dilutional coagulopathy and acidosis.²⁻⁵

Feasibility of blood transfusion in out-of-hospital settings has a long history with military programs since the First World War. While component therapy with 1:1 packed red blood cells (pRBCs) to plasma ratio or 1:1:1 adding platelets to the ratio is superior to transfusion of pRBCs alone, evidence suggests that whole blood is a better option for hemorrhagic shock resuscitation and can increase survival of severely injured patients.⁶⁻⁸

SCIENTIFIC BASIS

There are several published military and HEMS transfusion studies which demonstrate prehospital feasibility, safety and positive outcomes.⁹⁻¹³ A study of prehospital blood product transfusion in Afghanistan recently presented data that demonstrated a 20-fold survival benefit when blood is given within 34 minutes of injury.¹⁴ Although combat data does not always correlate with civilian medicine, this data may still present some benefit for EMS. Recent data from the U.K. suggest prehospital blood may reduce transfusion requirements.¹³

Civilian prehospital transfusion programs have begun with many air medical programs internationally¹⁷, nationally and in Virginia. Nationally, there are also several ground prehospital EMS programs utilizing blood. The experience in San Antonio, Texas (Southwest Texas Regional Advisory Council or STRAC) with Low Titer O positive Whole Blood (LTOWB)^{15, 16} found a 53% reduction in post-ED blood product transfusion and two-fold increase in likelihood of survival with whole blood compared to component therapy.^{18, 19} This group also found that non-traumatic etiology accounted for 46.5% of prehospital whole blood recipients. Their accounting analysis suggests that the average cost to save a life will be approximately \$5,000.00 which compares favorably with interventions such as cardiac monitor defibrillation.²⁰

HISTORY OF EMS BLOOD TRANSFUSIONS IN VIRGINIA

The Virginia OEMS Scope of Practice allows blood transfusion initiation at the paramedic level, maintenance at the Intermediate level. Nationally, most civilian prehospital blood programs have utilized a forward-deployed model with a limited supply placed in strategic locations on air medical or ground response units.

PHI AirMedical began carrying blood in 2015 using packed red cells/plasma and currently whole blood obtained from Texas. Current blood supply is limited and PHI AirMedical is not able to carry the two units of whole blood on each helicopter that its leadership thinks would save the most lives.

The Field Available Coordinated Transfusion Response (FACT*R) program in Northern Virginia began in 2019 and involves a virtual supply, available to be brought from the hospital to an EMS

scene such as a prolonged entrapment.²¹ FACT*R began using 1:1:1 components and has since transitioned to using Low-tier O Positive whole blood (LTOWB). In 2020, Northern Virginia added a forward-deployed LTOWB model beginning in Loudoun and Arlington Counties, and now including Fauquier County with other agencies working to come online.

VSP Medflight 1 carries blood products since 20XX.

Commented [JM1]: Need additional detail here (start date and what they carry) and add any other Virginia EMS agencies we know of.

BARRIERS TO IMPLEMENTATION

There are some barriers to the implementation of a prehospital blood program. Blood is tightly regulated and most often in short supply. Issues of consent must be considered when clinically appropriate. Although generally considered safe, blood transfusion does bring some risks for transfusion reactions or exposure to infectious disease. If reactions occur, a process for reporting must be defined with information sharing between EMS agency, receiving hospital and blood supplier. Developing partnerships with regional blood suppliers and hospital systems are essential to a successful program. If LTOWB is used, consideration of transfusion indications for premenopausal women should be made due to potential for Rh incompatibility. There are equipment costs for storage and administration of blood as well as the expense of blood itself. Initial and ongoing training of EMS personnel must be performed. Availability of whole blood is an issue since most blood services offer fractionated components only. For example, PHI in Virginia currently purchase whole blood from out of state due to lack of adequate suppliers.

Properly stored and preserved, a unit of whole blood can last up to 35 days.¹⁶ The STRAC program has successfully recruited LTOWB donors in their region to build a consistent supply and created a model for rotation of product to minimize waste with the blood deployed in a prehospital vehicle for 14 days then rotated back to the trauma center if it is not used in the field.^{15, 16} This model of rotation was duplicated in Northern Virginia though due to a limited utilization of whole blood in hospital settings regionally, often the returned unused blood is spun down to use the PRBC's only.

Lastly, active oversight by an EMS operational medical director (OMD) in partnership with EMS agency leadership is essential. Developing protocols and policies that address the many considerations of a prehospital blood program are a major undertaking. A robust quality assurance program must ensure proper indications for transfusion are met along with proper techniques for storage and administration.

CALL TO ACTION

The availability of whole blood for injured patients is lifesaving and cost effective. It is possible to create a system that is cost effective and that does not result in waste of blood supply. The Department of Health should make it a priority to develop an EMS Blood Products program that will ensure that EMS systems can develop blood transfusion programs.

A multi-disciplinary committee of the Advisory Board should be developed to address this issue, proposed funding mechanisms, and suggest necessary regulatory or legislative changes.

CONCLUSION

EMS has a proud history of bringing life-saving care that was at one time only available in the hospital setting to the scene. More recently, lessons from battlefield experiences with hemorrhage control have been brought into civilian practice. While the use of blood products in the prehospital setting needs further study, there are opportunities developing. Significant

investments in system design, implementation and ongoing quality assurance are essential to success.

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