



CENTEX
Regional Advisory Council

Clinical Best Practice Recommendations: Prehospital Blood Product Transfusion in EMS Systems

PURPOSE

This Best Practice Recommendations provides essential instructions for prehospital blood product transfusion in civilian emergency medical service (EMS) systems. This Best Practice supports early resuscitation with blood products for patients experiencing hemorrhagic shock, regardless of etiology, with the objective of reducing mortality and improving clinical outcomes. Implementation of a prehospital blood transfusion program requires careful planning, appropriate training, quality control measures, adherence to regulations, close physician medical oversight, and coordination with regional blood suppliers and receiving facilities. **This document is a Best Practice Statement by the CENTEX RAC PHWB Task Force and is in no way a Protocol, Guideline or Structure intended to supersede Medical Director Oversight and authorization to practice.**

INTRODUCTION

Early administration of blood products to patients experiencing hemorrhagic shock, irrespective of etiology, has been demonstrated to improve survival. Research indicates that patients who receive blood products within the initial minutes after injury or onset of hemorrhagic shock exhibit significantly decreased mortality compared with those who receive delayed transfusion. Prehospital transfusion programs are, by their nature, resuscitation programs intended for patients with clear evidence of hemorrhagic shock. The body of evidence surrounding prehospital transfusion continues to evolve. When creating this CPG, the recent literature was reviewed, including, but not limited to, the 2025 Prehospital Trauma Compendium: Transfusion of Blood Products in Trauma–A Position Statement and Resource Document of the National Association of Emergency Medical Services Physicians (NAEMSP) by Brown et al. This CPG represents the current position of the prehospital blood transfusion coalition and is meant to complement existing recommendations, while building on established principles. It is based on current evidence and best practices and is expected to evolve as the body of evidence expands. These guidelines serve to reaffirm the importance of robust clinical planning and implementation while addressing evolving needs in prehospital transfusion programs. As such, this CPG represents a living document intended to outline the indications, procedures, equipment, and monitoring required to safely administer blood products in the prehospital setting.



Effective team communication and coordination constitute the cornerstone of successful resuscitation from hemorrhagic shock. Team members are often tasked with multiple urgent interventions occurring in parallel; therefore, effective communication is essential to ensure positive patient outcomes and to prevent adverse effects. Structured handoffs between prehospital clinicians and hospital resuscitation teams are essential to ensure that relevant information is conveyed without delaying critical interventions. EMS systems seeking to implement prehospital blood transfusion are encouraged to implement standardized team communication and structured handoff procedures to enhance patient care continuity from the prehospital environment to definitive care.

These guidelines should be implemented in concert with local medical oversight and are not intended to supersede local protocols or medical direction. Successful prehospital blood programs must be thoughtfully planned, incorporate multiple safeguards, ensure adequate training and credentialing processes, and involve responsible stewardship of blood resources. Implementation requires clear indications for transfusion, both clinical and programmatic accountability, and appropriate documentation procedures.

Prehospital Principles of Resuscitation and Transfusion

(APPENDIX A&B are Regional Practice Recommendations)

1. 1. Rapid recognition of life-threatening hemorrhagic shock:
 - Clinical assessment remains the cornerstone for recognition, including physiological parameters such as vital signs, shock index, end-tidal carbon dioxide (ETCO₂), and others.
 - Consider point-of-care testing devices if available, such as lactate measurement.
2. 2. Hemorrhage control with appropriate adjuncts:
 - Pressure dressings and wound packing (preferably with hemostatic products) for severe wounds.
 - Tourniquets for significant extremity hemorrhage.
 - Pelvic binders for suspected pelvic fractures.
 - Wound packing or junctional tourniquets for junctional hemorrhage.
3. 3. Vascular access must be promptly obtained:
 - Intravenous access (18 g or greater) is preferred.



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- If intravenous access cannot be rapidly established, obtain intraosseous access.
 - Humeral intraosseous access is preferred over tibial access due to significantly higher flow rates.
4. 4. Hemostatic resuscitation:
 - WB when available.
 - Low-titer O WB.
 - Plasma.
 - Packed RBCs.
 - Aim for balanced 1:1 ratio of plasma to RBCs when possible.
 5. 5. Minimize crystalloid use:
 - Limit crystalloid resuscitation to less than 500 mL.
 - Excessive crystalloid worsens coagulopathy and contributes to hemodilution.
 6. 6. Prevent hypothermia:
 - Use appropriate warming devices for blood products.
 - Maintain patient temperature with passive warming measures.
 - Consider active warming devices when available.
 7. 7. Tranexamic Acid (TXA) administration:
 - For patients who will receive blood and are within 3 hours of injury.
 - Adult dose options:
 - 2 g intravenous/intraosseous once.
 - or
 - 1 g intravenous/intraosseous over 10 min, followed by 1 g over 8 hours.
 - Pediatric dose:
 - 15 mg/kg (maximum 1 gram) intravenous over 10 min.
 8. 8. Calcium replacement:
 - Consider calcium intravenous after 2 units of blood products have been administered and after other hemostatic interventions are completed.
 - Calcium Gluconate 3 g (less caustic to tissue).
 - Calcium chloride 1 g.
 - Monitor for signs of hypercalcemia.
 - Pediatric dose:
 - 60 mg/kg calcium gluconate.
 - or
 - 20 mg/kg calcium chloride.
 - Flush the line with a minimum of 10 mL of saline.
 - Monitor closely for signs of intravenous/intraosseous infiltration/extravasation.



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Criteria for Transfusion

Clinical indications

Suspected hemorrhagic shock from trauma or medical cause

Adults

- ▶ Systolic blood pressure (SBP) less than 90 mm Hg (or less than 100 mm Hg in patients 65 years and older), or weak or absent radial pulse, and
- ▶ Heart rate (HR) greater than or equal to 100 bpm unresponsive to initial interventions, or
- ▶ Shock Index (HR/SBP) greater than 1.0.

Pediatrics

- ▶ SBP less than $70 + (\text{age in years} \times 2)$.
- ▶ HR:
 - 1 year: greater than 190.
 - 2–10 years: greater than 140.

AND (for all patients)

One or more of the following physiological criteria indicative of hypoperfusion

- ▶ Altered mental status (not believed to be due to intoxication or head injury).
- ▶ Pale, cool, clammy skin; pale mucosa.
- ▶ Delayed capillary refill (>2 s).
- ▶ Tachypnea.
- ▶ $\text{ETCO}_2 < 25$ mm Hg.

Exclusions from Transfusion

- ▶ Conscious patients, with decision-making capacity, should be evaluated for refusal of blood transfusion, whether for religious, cultural, social, or personal reasons.
- ▶ Unconscious or incapacitated patients should be briefly assessed for the presence of medical alert identifiers, power of attorney wallet cards, or other obvious documents indicating patient objection to receiving blood products.
 - This good-faith effort shall not delay transfusion more than 1 min and should ideally occur in approximately 30 s.



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Examples of Patient Presentations Consistent with Suspected Hemorrhagic Shock Necessitating Prehospital Blood Transfusion

Trauma patients with uncontrolled hemorrhage

- ▶ Any proximal amputation above knee/elbow or amputations requiring a tourniquet.
- ▶ Penetrating trauma to neck/chest/abdomen/pelvis with signs of shock.
- ▶ Evidence of significant blood loss (>500 mL estimated).
- ▶ Unstable pelvic fracture with hemodynamic instability.

Medical patients with significant hemorrhage

- ▶ Gastrointestinal bleeding.
- ▶ Ruptured ectopic pregnancy.
- ▶ Peripartum hemorrhage.
- ▶ Ruptured aortic (thoracic or abdominal) aneurysm.
- ▶ Ruptured arteriovenous (AV) fistulas/grafts.
- ▶ Postsurgical complications.
- ▶ Epistaxis.
- ▶ Post-tonsillectomy bleeding.
- ▶ Other causes of significant blood loss.

Prehospital Blood Transfusion Guidelines

Special Populations

Patients with known bleeding disorders who are in hemorrhagic shock

- ▶ Resuscitation priority should be given to the administration of blood products first, followed by appropriate treatment for the specific bleeding disorder.

Pregnant patients

- ▶ Consider early blood administration for suspected obstetric or postpartum hemorrhage with signs of hemorrhagic shock.
- ▶ Place in left-lateral recumbent position (left side down).
- ▶ When O-positive blood is administered to females of childbearing potential, ensure that it is communicated to the receiving attending physician that Rhesus Factor positive (Rh+) blood was transfused.

Special considerations



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- ▶ If O-positive blood is administered to Rh-negative females of childbearing potential, inform receiving facility for potential post discharge consultation with hospital transfusion services and maternal-fetal medicine.
- Additional information and resources can be found at <https://allohopefoundation.org>.
- ▶ There is no role for the administration of RhoGAM in the acute resuscitation of hemorrhagic shock.

Equipment Requirements

1. FDA-approved blood storage container/cooler validated for prehospital use.
2. Temperature monitoring devices with local alarms, as well as remote tracking and audit capabilities consistent with established requirements.
3. Blood administration sets with 170–260 μ m filter.
4. Blood warming devices.
5. Rapid infusion devices.
6. Large-bore intravenous/intraosseous access equipment.
7. Vital signs monitoring equipment.

Procedure

Preparation and storage

1. Maintain blood products in approved storage containers between 1°C and 6°C or as outlined in the agency Blood Services Agreement.
2. Monitor and document temperature continuously.
3. Inspect blood products for:
 - Expiration date.
 - Integrity of the bag.
 - Evidence of hemolysis, clotting, or contamination.
 - Temperature indicator compliance.

Adult dosing guidance

- ▶ Initial dose: One unit of any blood product.
- ▶ Reassess vital signs and clinical response every 3 min and after each unit.
- ▶ Administer additional units as indicated.
- ▶ Target SBP 90–100 mm Hg for hemorrhagic shock from trauma or obstetric/medical conditions.
- ▶ Target higher SBP (>110 mm Hg) for patients with traumatic brain injury (TBI) or



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suspected neurological injury.

Pediatric dosing guidance

- ▶ Initial dose:
 - <35 kg: 10 mL/kg of unit of any blood product.
 - >35 kg: One unit of any blood product.
- ▶ Reassess vital signs and clinical response after each unit.
- ▶ Additional units based on clinical response and transport time.
- ▶ Target age-appropriate SBP for hemorrhagic shock from trauma or obstetric/medical conditions.
- ▶ Target higher SBP (>110 mm Hg) for patients with TBI or suspected neurological injury.

Transfusion Process

1. Obtain preferably two points of intravenous/intraosseous access (18 gauge or larger preferred).
2. Quickly assess for any indicators that the patient would not want to receive blood products.
3. Verify and document blood product identification:
 - Product type
 - Unit/donor number
 - Expiration date
 - Blood type
 - Temperature indicator status (if present)
4. Connect administration set with appropriate filter to blood product.
5. Prime straight-type blood tubing with blood (no saline).
6. Prime Y-type blood tubing with saline.
7. Connect to warming device and/or rapid infusion device.
8. Connect the blood tubing directly to the intravenous/intraosseous hub.
9. Infuse over 3–5 min as clinically indicated.
10. Monitor vital signs every 5 min during transfusion:
 - BP
 - HR
 - Respiratory rate
 - Oxygen saturation
 - ETCO₂
 - Temperature when possible



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Prehospital Blood Transfusion Guidelines: Transfusion Reactions, Documentation, and Quality Control

Transfusion Reactions:

Signs and Symptoms

Hypotension or hypertension.
Flushed face, urticaria, or rash.
Wheezing or respiratory distress.
Fever or chills.
Flank pain.
Chest pain or back pain.
Nausea/vomiting.

Management

Stop transfusion immediately.
Maintain intravenous access to keep the line open.
Administer oxygen as needed.
For anaphylaxis:
– Epinephrine 0.3–0.5 mg of 1:1000 intramuscular.
– Diphenhydramine 25–50 mg intravenous/intraosseous/intramuscular.
– Consider methylprednisolone 125 mg or dexamethasone 4–8g intravenous for severe reactions.
Notify receiving facility of suspected transfusion reaction.
Transport all blood product bags/documentation to hospital.

Documentation Requirements

Blood products are documented as a medication.
Every transfusion should have two procedures listed:
– Route (intravenous/intraosseous).
– Transfusion of blood products.
Blood product information:
– Type of blood product.
– Unit/donor number.
– Expiration date.
– Time of removal from storage.
– Temperature status during storage and transport.
Transfusion details:
– Time transfusion started and completed.



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- Total volume transfused.
- Route of administration.
- Post-transfusion physician authorization statement with signature.

Patient assessment:

- Verification of consent (verbal or implied).
- Vital signs pretransfusion, during (every 3 min), and post-transfusion.
- Clinical presentation and indication for transfusion.
- Patient response to transfusion.

Additional interventions:

- Hemorrhage control.
- Calcium administration.
- TXA administration.
- Other medications or interventions.

Adverse events:

- Description of any reaction.
- Interventions performed.
- Patient response.

Handoff information:

- Notification to receiving facility.
- Blood product bag(s) with segments attached.
- Transfusion-related paperwork.
- Disposition of unused blood products.

Quality Control Measures

Storage and transport:

- Continuous temperature monitoring with documentation.
- Regular inspection of storage containers.
- Proper handling procedures.

Equipment maintenance:

- Regular checks of administration equipment.
- Calibration of warming devices, if needed.

Personnel:

- Initial and ongoing training.
- Skills verification for all providers.
- Competency-based assessment annually.

Program management:

- Case review of all prehospital transfusions (consider as sentinel event).



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- Tracking of clinical outcomes.
- Regular reporting to medical director.
- Blood product utilization analysis.

Training Requirements and Program Implementation Considerations

Training Requirements

Initial training:

- Pathophysiology of hemorrhagic shock.
- Blood product overview and indications.
- Recognition of hemorrhagic shock.
- Transfusion procedures and equipment.
- Recognition and management of transfusion reactions.
- Storage and transport requirements.
- Documentation requirements.
- Practical skills demonstration.
- Processes for non-conformance, recall, quarantine, and discard of blood products.

Continuing education:

- Annual refresher training.
- Annual skills verification and simulation.
- Case reviews and lessons learned.
- Updates to protocols or equipment.

Competency validation:

- Written examination.
- Practical skills assessment.
- Simulation scenarios.



- Clinical oversight during initial cases.

Program Implementation Considerations

Training and education:

- Initial didactic training.
- Hands-on skills practice and sign-off.
- Simulation and case-based training.
- Ongoing demonstration of procedural competency and skills currency.

Medical oversight:

- Transfusion Administration Service Medical Director shall have authority and responsibility for all medical and technical policies, processes, and procedures that relate to the care and safety of the transfusion recipient.
- Regular protocol review and updates.
- Credentialing of all personnel who are authorized to administer prehospital blood.
- 100% total quality review on every prehospital transfusion case.
- Reports, reviews, audits, and follow-up of transfusion-related reactions, including Food and Drug Administration Fatality Reporting events.

Blood product management:

- Coordination with blood suppliers.
- Storage and transport requirements.
- Rotation protocols to minimize wastage.
- Documentation requirements.
- Return policies for unused products.

Hospital coordination:

- Communication protocols with receiving facilities including the hospital blood bank.
- Handoff procedures for transfused patients.
- Handoff procedures for blood products.



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- Tracking of patient outcomes.

Infrastructure requirements:

- Proper storage facilities.
- Temperature monitoring systems.
- Administration equipment.

Community engagement:

- Outreach to local EMS agencies regarding operational questions, the handling of mutual aid requests, and deployment strategies.
- Public messaging and communication with general and healthcare community members including resources and frequently asked questions.
- Support from policy-makers to help facilitate program implementation.

Administrative considerations:

- Costs and billing procedures.
- Legal and regulatory compliance.
- Document control, reviewed minimum of every 2 years.
- Data collection for quality improvement.
- Outcomes reporting, registry participation.

Legal and regulatory compliance.:

- Document control reviewed minimum of every 2 years.
- Data collection for quality improvement.
- Outcomes reporting, registry participation.



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Source List:

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CENTEX RAC Regional Practice Recommendations**XXX****Low Titer O+ Whole Blood - Medical**

History:

- Shock is defined as inadequate perfusion of blood and oxygen to the brain, heart, and other vital organs
- Medications- blood thinners or anticoagulants (Coumadin, Plavix, Aspirin, Pradaxa, Xarelto, Eliquis)
- Beta Blockers and Calcium Channel Blockers may not allow HR to increase appropriately

Key Concepts:

- Low Titer O+ Whole Blood (LTO+WB) is now being used to treat critically ill medical patients who have or are at risk for severe hemorrhage.

Examples of Patients in Hemorrhagic Shock:

- Gastrointestinal bleed
- Postpartum hemorrhage
- Cirrhotic liver or liver failure
- Vascular- bleeding from shunt, fistula, or varicose vein
- Urological- recent surgery or procedure
- Uncontrolled epistaxies

Criteria:**Adult:**

- Patients in hemorrhagic shock with (2) of the following:
 - Systolic ≤ 90 mmHg
 - Sustained Heart Rate ≥ 125 bpm
 - Shock index ≥ 1 (HR $\div$ systolic B/P)
 - Altered Mental Status
 - ETCO₂ ≤ 25 mmHg
 - Witnessed cardiac arrest < 5 minutes prior to provider arrival and continuous CPR throughout downtime

Pediatric:

- Age ≥ 2 years old with clinical suspicion of hemorrhagic shock with (2) of the following:
 - Systolic ≤ 90 mmHg ($70 + 2 \times \text{age in years}$)
 - Sustained Tachycardia
 - Signs of Poor Perfusion
 - Altered Mental Status
 - ETCO₂ ≤ 25 mmHg
 - Witnessed cardiac arrest < 5 minutes prior to provider arrival and continuous CPR throughout downtime
- On-line medical direction required for patients under 1 years of age.

Contraindications:

- Patient indicates refusal to receive blood
- Medic alert tag indicating patient objection to receiving blood

Low Titer O+ Whole Blood - Medical

Basic Life Support**B**

- Follow the Routine Patient Care Guidelines

Advanced Life Support**P**

- Follow the General Medical Management Protocol
- Establish Vascular Access X 2 (preferred 18ga or larger IV or IO Adult, Pediatric IV is Preferred)
- **Adult:** administer 1 Unit of Whole Blood IV/IO by rapid infusion
- **Pediatric ≤ 37kgs:** administer 10ml/kg of Whole Blood IV/IO via push/pull method
- Assess for signs of transfusion reaction***
- Upon hospital arrival, inform the receiving team of patient's receipt of whole blood, and provide empty whole blood bags and tubing for hospital blood bank evaluation

Notes:

***Although rare with LTO+WB products, monitor for signs of transfusion reaction such as: new onset flank pain, abdominal or back pain, fever, chills, vomiting, or signs of anaphylaxis. If signs of a transfusion reaction are suspected:

- Immediately discontinue the transfusion
- Administer dexamethasone IV/IO AND diphenhydramine IV/IO in age-appropriate dosage
- Consider administration of TXA in a different IV line for patients receiving blood products.

CENTEX RAC Regional Practice Recommendations**XXX****Low Titer O+ Whole Blood - Trauma**

History:

- Mechanism of injury- blunt (MVC, fall, blow to body) vs penetrating (stabbing, GSW, foreign body)
- Did a medical condition contribute to the mechanism of injury?
- Medications- blood thinners or anticoagulants (Coumadin, Plavix, Aspirin, Pradaxa, Xarelto, Eliquis)
- Beta Blockers and Calcium Channel Blockers may not allow HR to increase appropriately

Key Concepts:

- Low Titer O+ Whole Blood (LTO+WB) is now being used to treat severely injured trauma patients who have or are at risk for severe hemorrhage.

Criteria:**Adult:**

- (1) of the following for Penetrating Traumatic Injury or (2) for Blunt Trauma
 - Systolic ≤ 90 mmHg
 - Sustained Heart Rate ≥ 125 bpm
 - Shock index ≥ 1 (HR $\div$ systolic B/P)
 - Altered Mental Status
 - ETCO₂ ≤ 25 mmHg
 - Witnessed traumatic cardiac arrest < 5 minutes prior to provider arrival and continuous CPR throughout downtime

Pediatric:

- Age ≥ 2 years old with clinical suspicion of hemorrhagic shock
- (1) of the following for Penetrating Traumatic Injury or (2) for Blunt Trauma
 - Systolic ≤ 90 mmHg ($70 + 2 \times$ age in years)
 - Sustained Tachycardia
 - Signs of Poor Perfusion
 - Altered Mental Status
 - ETCO₂ ≤ 25 mmHg
 - Witnessed traumatic cardiac arrest < 5 minutes prior to provider arrival and continuous CPR throughout downtime
- On-line medical direction required for patients under 1 years of age.

Contraindications:

- Patient indicates refusal to receive blood
- Medic alert tag indicating patient objection to receiving blood

<u>Basic Life Support</u>

Low Titer O+ Whole Blood - Trauma

B

- Follow the General Trauma Management Protocol

Advanced Life Support**P**

- Follow the General Trauma Management Protocol
- Establish Vascular Access X 2 (preferred 18ga or larger IV or IO Adult, Pediatric IV is Preferred)
- **Adult:** administer 1 Unit of Whole Blood IV/IO by rapid infusion
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- Assess for signs of transfusion reaction***
- Upon hospital arrival, inform the receiving team of patient's receipt of whole blood, and provide empty whole blood bags and tubing for hospital blood bank evaluation

Notes:

***Although rare with LTO+WB products, monitor for signs of transfusion reaction such as: new onset flank pain, abdominal or back pain, fever, chills, vomiting, or signs of anaphylaxis. If signs of a transfusion reaction are suspected:

- Immediately discontinue the transfusion
- Administer dexamethasone IV/IO AND diphenhydramine IV/IO in age-appropriate dosage
- Consider administration of TXA in a different IV line for patients receiving blood products.
- Isolated head injury rarely requires blood transfusion.



CENTEXRAC REGIONAL WHOLE BLOOD* PROGRAM
MEMORANDUM OF UNDERSTANDING

**Whole Blood refers to Low Titer O-Positive Whole Blood*

PURPOSE

The purpose of this Memorandum of Understanding (MOU) is to establish a framework for collaboration among program stakeholders in the development, operation, and sustainment of the Regional Whole Blood Program. This agreement defines the roles, responsibilities, and expectations of each participating organization to ensure the appropriate collection, distribution, and utilization of Low Titer O+ Whole Blood in compliance with regulatory guidelines. While not legally binding, this MOU serves to guide cooperative efforts enhancing patient care outcomes across the region.

BACKGROUND

The CENTEXRAC Whole Blood Program is established as a multi-disciplinary, multi-institutional initiative involving regional helicopter and ground EMS agencies, regional trauma center, Baylor Scott and White Temple, Blood Center, and CENTEXRAC. It was created by likeminded professionals dedicated to developing a program that ensures appropriate, timely, and early resuscitation using Low Titer O+ Whole Blood in pre-hospital and rural hospital settings. The program's objectives include managing the regional supply of donors to meet demand without excess waste, maintaining strict compliance with regulatory guidelines, and sustaining an evidence-based system of care to optimize patient outcomes.

DEFINITIONS

Circular of information for the Use of Human Blood and Blood Components: In accordance with FDA requirements under 21 CFR 606.122, this circular must be available for review by transfusion Services, prescribing physicians, and staff anywhere blood is issued or transfused.

<https://www.aabb.org/news-resources/resources/circular-of-information>

Rotation site: EMS agency or hospital with return privileges to Baylor Scott and White Temple, Blood Center (ensuring the LTOWB is rotated through to a higher usage rotational center).

Rotation center: Medical Facility receiving LTOWB already cycled through the prehospital or rural hospital setting. This process is intended to be free of bias, agnostic to any entity and in the best interest of those involved.

Transfusion Administration Service (TAS): A service provider responsible for receiving and transmitting orders of blood for transfusion, transporting blood to the transfusion site, performing the transfusion, monitoring the patient during transfusion, reporting outcomes, and ensuring the traceability of the unit is maintained.

Transfusion Site: The patient care area where a transfusion is performed.

ROLES AND RESPONSIBILITIES

All Participating Agencies and Facilities Agree to the Following:

1. Program Resources & Training
 - Program updates and training information are available through CENTEXRAC.
2. Regional Process Improvement
 - This is a regional process improvement program. All data and shared information will be used solely to enhance the delivery of care in the Central Texas region.

3. Governance and Participation

- The CENTEXRAC Regional Whole Blood Task Force will serve as the guiding body for the regional Low Titer O+ Whole Blood (LTOWB) program.
- Membership includes all EMS agencies (air and ground), healthcare facilities (or systems), and organizations contributing to the supply, administration, accounting, and patient care aspects of LTOWB.
- The committee meets monthly, and each member agency/organization is required to attend at least nine (9) meetings annually. All agencies will be given attendance credit for cancelled meetings. Compliance will be evaluated annually in accordance with the CENTEXRAC Fiscal Year, Sep-Aug.
- Key program execution and operational decisions will be made by consensus among all participating members.
- Any agencies not meeting a program requirement, to include Committee Meeting attendance, the CENTEXRAC WB Program Manager will schedule a meeting to discuss a 6-month performance improvement plan. If no improvements are made a re-evaluation of deficiencies will be conducted and dismissal from Regional Whole Blood Program may be recommended. Dismissal recommendations will be referred to and decided by the WB Task Force Chair, CENTEXRAC Executive Director, and the CENTEXRAC WB Program Manager. Dismissal from the program will be for 12 months and consideration for re-entry into the program will require a performance improvement process verification.

4. Clinical and Administrative Support

- Baylor Scott and White Blood Center will provide administrative training on ordering, managing, and storing LTOWB at participating sites.
- Each agency and facility will designate a primary point of contact to address concerns and actively participate in discussions and decision-making.

5. Blood Supply Standardization

- To maintain regional consistency, Baylor Scott and White Temple, Blood Center will serve as the single supplier of rotational LTOWB.

6. Performance Improvement and Data Sharing

- Agencies and facilities will provide clinical and administrative performance improvement data as requested by CENTEXRAC.

7. Documentation Requirements

- Prehospital LTOWB transfusions must be documented using the CENTEXRAC Regional Prehospital Blood Product Transfusion Record (Appendix B).
- This record is not a replacement for an agency's electronic patient care record (EPCR) but serves as a real-time communication tool between EMS providers, receiving emergency departments, and hospital blood banks/transfusion services.
- Hospital blood banks/transfusion services must receive immediate notification when untyped and uncross-matched blood has been administered.
- The Transfusion Administration Service (TAS) shall be responsible for recording the final disposition of blood or blood components, ensuring proper tracking and compliance with AABB standards.

PROCEDURES

A. Receiving Blood

1. Agencies and facilities will follow CENTEXRAC and Baylor Scott and White Temple, Blood Center policies and procedures for blood product ordering and delivery.
2. Blood and blood components shall be inspected each time they are received to verify the following:
 - The unit has remained in a validated transport container or storage device within the specified period.
 - The unit appearance meets visual inspection criteria.
 - The unit has an attached label or tag indicating the donation identification number, and compatibility testing has not been performed.
3. Receipt of a unit of blood shall be annotated using the CENTEXRAC Whole Blood app (BloodCOMM Premium). Agency representative will log into the app, select "Initial Receipt" and scan all appropriate bar codes assigning the unit to their agency.

B. Storing and Transporting Blood

1. Temperature Monitoring & Recording
 - Low Titer O+ Whole Blood will be stored in an approved program cooler between the temperatures of 1-6°C. The blood supplier, Baylor Scott and White Temple, Blood Center acceptance criteria regarding product suitability for return to available inventory for re-issue is based on the visual temperature indicator (Safe-T-Vue 10). A white indicator means the blood has been kept below 10°C for the duration of issuance. If the indicator turns red, the blood temperature reached or exceeded 10°C. (Appendix A)
 - In those instances where the cooler temperature has deviated from the 1-6°C range, corrective action and blood temperature verification using an infrared thermometer must be performed.
 - The TAS shall ensure all containers are validated for the handling, storage, and transport of blood and blood components.
 - Blood containment temperatures shall be continuously monitored in accordance with procedures established by the program administrators and the Whole Blood Task Force.
 - Temperature recordings must be documented at least every four (4) hours.
 - If a temperature deviation occurs rendering the product unusable (any color change), it must be reported immediately to agency leadership, Baylor Scott and White Blood Center, and CENTEXRAC WB Program Manager.
2. An inventory check, utilizing the CENTEXRAC Whole Blood app will be conducted daily. During the handling of the unit for scanning in the app, the unit should be inspected for any clots, bag leaks, frothing, or any other suspicious defects.

C. Equipment

1. General Equipment Use

- All equipment used in the handling, storage, transport, and administration of blood shall be operated in strict accordance with the manufacturer's written instructions and shall be limited to devices explicitly specified on the approved products list referenced in Appendix X "Approved Products List".
- Blood and blood components shall be transfused through a sterile, pyrogen-free transfusion set that has a filter designed to retain particles potentially harmful to the recipient.

- Except for 0.9% sodium chloride, drugs or medications shall not be added to blood or blood components unless: they have been approved for the use by the FDA or component Authority or there is documentation available to show that the addition is safe and does not adversely affect the blood or blood component.
2. Coolers
 - Storage and transport devices must be designed to maintain proper temperatures.
 - Blood and blood components shall remain within the acceptable temperature range during storage and transport.
 - Calibration will be performed by the manufacturer as required by our Blood Center partner to ensure continued compliance with FDA regulations.
 3. Warming Devices
 - Warming devices shall be equipped with a temperature-sensing device and a warning system to detect malfunctions and prevent hemolysis or other damage to blood components.
- D. Administration
1. Verification Prior to Administration
 - Immediately before transfusion, the following information shall be verified:
 - The intended unit for transfusion meets TAS protocol and has not expired.
 - Unit ABO group.
 - Unit appearance meets visual inspection criteria.
 - The unit has remained in compliance with temperature requirements during storage/transport.
 2. The patient shall be monitored for potential transfusion-related adverse events by the TAS until the time of transfer of care.
 3. Documentation & Compliance
 - All EMS agencies will use the CENTEXRAC Whole Blood form to notify the receiving hospital and/or other prehospital care providers of the patient's transfusion status, the unique patient identifier, and any transfusion-related adverse reactions through the continuum of care.
 - The statement on the CENTEXRAC Whole Blood form indicating that the "clinical situation was sufficiently urgent to require emergency release of un-crossmatched blood before completion of compatibility testing" shall be signed, either physically, or electronically, by the ordering physician. This signature can occur before or after the release/transfusion of the blood.
 - The CENTEXRAC Whole Blood Application ("Whole Blood App") shall be utilized for inventory management, and transfusion documentation.
- E. Reporting and Process Improvement
1. All organizations shall capture, assess, investigate, and monitor failures to meet specified requirements both local and programmatic, and any adverse events or non-compliance issues related to blood administration.
 2. All organizations shall collect data, perform analysis, and follow up on issues requiring corrective/preventive action, including near-miss events.
 3. The TAS shall have a process for providing relevant unit and/or patient information as requested when notified by the blood collection facility and/or transfusion service.
 4. The TAS shall have a process for the monitoring of blood utilization and wastage.
 5. CENTEXRAC will maintain program records using data from prehospital providers, Baylor Scott and White Blood Center, and receiving facilities.

6. If a fatality is suspected or confirmed to have occurred as a result of a transfusion, this is to be considered a Sentinel Event and shall notify organizational leaders and CENTEXRAC Whole Blood Program Manager immediately. The Program Manager will notify Baylor Scott and White Blood Center, CENTEXRAC Leaders, and any appropriate stakeholder to initiate investigation and FDA notification if required.

TERM

This MOU is a living document and will be evaluated every **2 years**. The signatories are attesting to the commitment of their organization to follow and enforce the practices, roles, and responsibilities for their organizations as delineated in this MOU.

***This memorandum of understanding is in effect on the date on which it is signed and remains in effect until written notification is received revoking the Memorandum of Understanding with the CENTEXRAC. All parties reserve the right to terminate this MOU at any time, with or without cause. Thirty (30) day written notification is required for termination of the MOU.**

ORGANIZATION: _____

(Indicate Hospital or Agency Name here)

PRIMARY POC: _____

(This is a role, not a person. Example ED shift supervisor)

PRIMARY POC CONTACT INFORMATION (EMAIL/PHONE):

(Business URL only, NO gmail/yahoo, etc., personal accounts)

POC FOR PROVIDING FEEDBACK (OUTCOMES DATA FOR TRAUMA AND MEDICAL):

(This is a role, not a person. Example ED shift supervisor)

POC FOR PROVIDING FEEDBACK CONTACT INFORMATION (EMAIL/PHONE):

(Business URL only, NO gmail/yahoo, etc., personal accounts)



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Pre-Hospital Whole Blood Transfusion: Maternal Best Practice Recommendations

Purpose: To provide guidance on the use of Low Titer Group O Whole Blood in the resuscitation of reproductive-aged female trauma patients, including pregnant patients, prior to admission to a treating facility.

Definitions and Abbreviations:

- Reproductive age female: 0-50 years
- Low Titer O Whole Blood: LTO+WB
- Rhesus Factor: Rh
- Rh immunoglobulin: RhIG

Practice Guideline:

- For reproductive-aged females with clinical parameters indicative of hemorrhage shock from trauma or medical causes (e.g., ruptured ectopic pregnancy, pregnancy-related hemorrhage) who are unresponsive to initial resuscitative measures, administration of LTOWB prior to hospital arrival is recommended.
- Use of LTOWB is recommended for use in reproductive-aged females regardless of pregnancy status as the benefit of maternal life-saving measures outweighs theoretical risks to the pregnancy or future childbearing.

Special Considerations:

- Pregnant individuals should maintain the same guidelines for initial evaluation and management as they would for a nonpregnant patient.
- In a pregnant patient beyond 20 weeks gestation (fundus at level of umbilicus), ensure displacement of uterus by placing maternal patient in left-lateral recumbent position.
- Use of LTOWB may result in Rh mismatch where an Rh negative reproductive-aged female receives LTOWB.
- Consultation of a Women's Health Provider is required for pregnant individuals who have an Rh mismatch later identified following resuscitation from trauma.
- All Rh-negative women should be counselled about risks to their pregnancies and followed by Women's Health Providers in cases of Rh alloimmunization.



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Documentation requirements:

- When administering LTOWB to reproductive-aged females, teams are required to communicate this to receiving facility.
- When Rh mismatch of Rh negative reproductive-aged female is identified, a notification of Transfusion Medicine Specialist/Pathologist or Women's Health Provider is required. Follow-up antibody testing at 4-14 weeks is required. Additional management strategies that may be considered are provided in Best Practices.



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Best Practices for Reproductive-Aged Females:

1. Example letter for reproductive-aged female patient following Rh mismatch during trauma resuscitation:

[Date]

[Patient Name]

[Patient Address]

Subject: Important Information Regarding Rh-Positive Blood Transfusion and Pregnancy

Dear [Patient Name],

This letter is to provide you with important information regarding your recent trauma and the Rh-positive blood transfusion you received. In order to treat your life-threatening hemorrhage as quickly as possible, you received whole blood during your medical care. This means that we gave you a blood type that is safe for all patients because we could not safely wait to determine your blood type or could not safely wait for blood that matched your type.

Your blood type was ultimately determined to be Rh-negative [insert exact blood type here], while the blood you received was Rh-positive. Understanding this difference is crucial, especially if you plan to become pregnant in the future.

When a Rh-negative woman is exposed to Rh-positive blood, such as during a transfusion or delivery of a child, she can develop antibodies against the Rh-positive blood. If she later becomes pregnant and the fetus is Rh-positive, these antibodies can cross the placenta and harm the developing fetus. This condition, called erythroblastosis fetalis, can lead to serious health problems for the baby.

The first step to understand your risk is to check an antibody screen at least 4-14 weeks after the transfusion you received in the hospital. If this test is abnormal you will be referred to the Maternal Fetal Medicine clinic for counseling to understand your risks in future pregnancies.

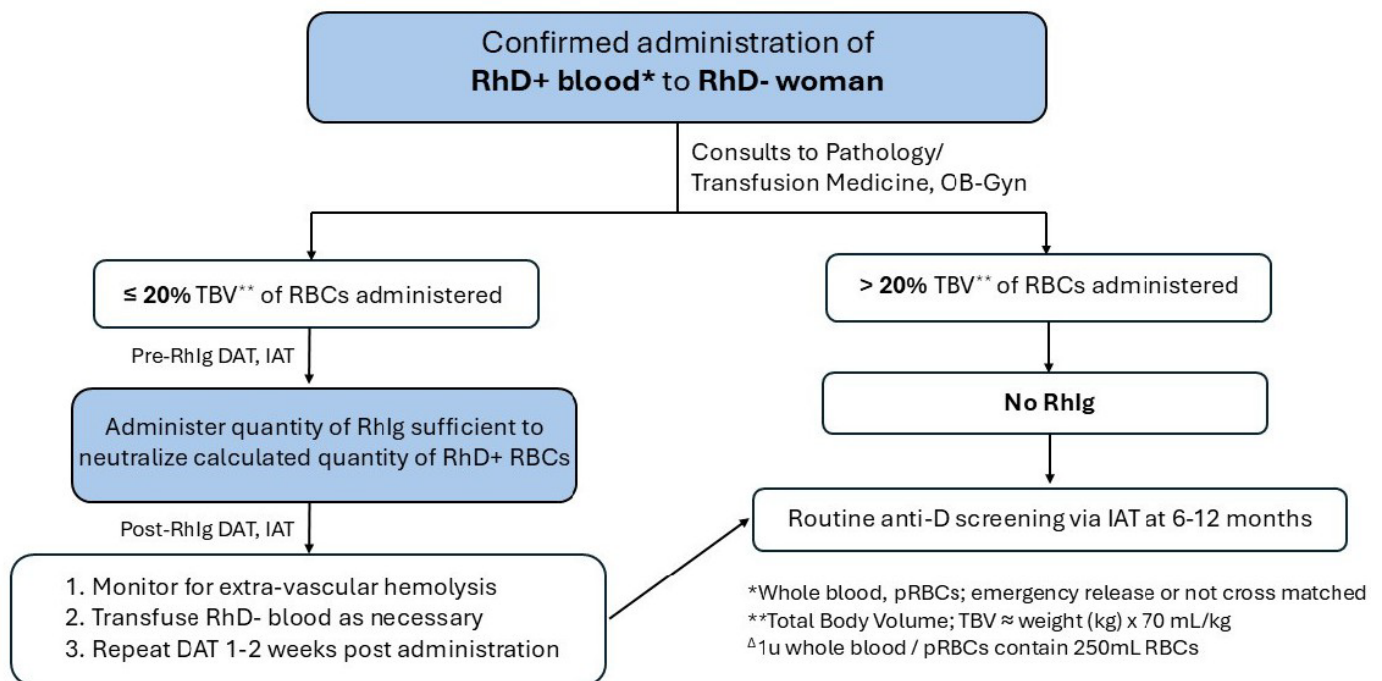
Important Steps to Take: Complete antibody testing at least 4-14 weeks after exposure, either at [treating facility] or with your usual health care provider



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2. Example treatment algorithm for Rh mismatch in reproductive-aged female for use of RhIG. Specific treatment recommendations can be found in references.



Note: some organizations may use differing threshold of total blood volume transfused in Rh mismatch, including observation only.



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