Subcommittee: Prehospital Blood Ad Hoc Subcommittee
Advisory Status: FINAL
Date: 3/18/26

Arkansas Department of Health
Office of Preparedness and Emergency Response, Section of EMS
Arkansas EMS Advisory Committee
Advisory and Recommendations

Arkansas Prehospital Blood Utilization Advisory: Pilot for Standards for Safe and Effective Use in Arkansas EMS

As prepared by the Prehospital Blood Ad Hoc Subcommittee

A. Executive Summary

Early recognition and treatment of hemorrhagic shock is a defining determinant of survival in trauma and other critical conditions. Over the past decade, a robust and growing body of evidence has demonstrated that the timely administration of blood products—particularly whole blood and balanced component therapy—significantly improves outcomes when delivered as close to the point of injury as possible. As a result, prehospital blood administration has increasingly become the standard of care in modern EMS systems, supported by national organizations, military experience, and civilian data showing reductions in mortality, decreased need for massive transfusion, and improved physiologic stability prior to hospital arrival.

Currently, the paramedic scope of practice in Arkansas does not allow for the initiation of blood products in the prehospital setting, or the administration of additional blood or blood products during interfacility transport of patients.. The purpose of this advisory is to create a mechanism by which licensed paramedics employed by participating EMS agencies may take part in a "pilot project" to carry and deploy blood products in the prehospital environment or during interfacility transports, after successful completion of this training and credentialing program. Until a scope of practice change is approved through statutory language updates, the initiation of prehospital blood products will only be allowed via permission granted from the Arkansas Department of Health Section of EMS.

Arkansas EMS systems operate across diverse geographies—from densely populated metropolitan regions to vast rural and frontier areas where transport times can be prolonged. These realities make early resuscitation, including access to blood products, not just beneficial but essential to ensuring equitable, time-sensitive care statewide. Implementing prehospital blood programs requires thoughtful alignment of clinical practice, operations, and system-level coordination to ensure safety, sustainability, and seamless integration with receiving hospitals and blood banks.

This advisory document establishes a comprehensive framework to guide EMS agencies, medical directors, and system partners in delivering safe, evidence-informed prehospital blood therapy. It outlines statewide expectations and best practices across several key domains for those EMS agencies wishing to participate in a prehospital blood transfusion program:

- **Clinical Standards and Protocol Alignment:** Evidence-based indications, contraindications, dosing strategies, product selection, and integration with existing trauma, medical, and resuscitation protocols.
- **Operations Framework Development:** Requirements and considerations for storage, transport, cold-chain maintenance, equipment readiness, and agency-specific deployment models, as well as documentation requirements.
- **Quality Assurance and Performance Measures:** Metrics, review processes, and data elements necessary to ensure program effectiveness, patient safety, and continuous improvement, as well as monthly reporting requirements to the Arkansas Department of Health.
- **Stakeholder Coordination:** Facilitate coordination and alignment with hospitals, trauma region leadership, blood suppliers, medical directors, Arkansas Trauma Communications Center, Arkansas Department of Health Section of EMS, and other regional partners to build cohesive, interoperable programs.
- **Education and Training:** Competency standards for EMS clinicians, Service Directors, and Medical Directors, including training frequency and system-wide educational alignment.

Together, these components define a consistent statewide approach that promotes high-quality care, optimizes patient outcomes, and supports the safe and effective deployment of prehospital blood products across Arkansas. This advisory is intended to serve as a practical resource, blueprint, and policy foundation for agencies seeking to adopt, refine, or expand their prehospital blood capabilities in alignment with current best practices and emerging evidence.

The following pages further elaborate on each of the five domains listed above.

B. Clinical Standards & Protocol Alignment

1. Purpose and Scope

This section provides evidence-based clinical guidance for the safe and effective use of blood products by paramedics across the State of Arkansas. It is intended to assist EMS agencies and medical directors in the development, implementation, and oversight of blood product protocols that are aligned with national standards, integrated into existing trauma, medical, and

resuscitation pathways, and compliant with applicable regulatory and accreditation requirements.

Protocols developed under this guidance should align with the Prehospital Blood Transfusion Committee (PHBTC) Clinical Practice Guidelines and the AABB Standards for Emergency Prehospital and Scheduled Out-of-Hospital Transfusions.[1,2] **Refer to Appendix A for the full Arkansas Prehospital Blood Transfusion Clinical Practice Guideline.**

2. Indications for Prehospital Blood Product Administration

    a. Prehospital transfusion should be considered for patients with suspected life-threatening hemorrhage or hemorrhagic shock, particularly when early blood administration is anticipated to improve outcomes and definitive hemorrhage control may be delayed.
    b. Recommended indications include, but are not limited to:
        - Traumatic hemorrhagic shock, including blunt or penetrating trauma with signs of inadequate perfusion
        - Non-traumatic hemorrhage (e.g., gastrointestinal bleeding, obstetric hemorrhage, ruptured aneurysm) with hemodynamic instability
        - Cardiac arrest or peri-arrest states, where hemorrhage is suspected to be a contributing etiology
        - Shock refractory to crystalloid resuscitation, where further crystalloid administration is unlikely to be beneficial
    c. Clinical triggers may include hypotension, tachycardia, altered mental status not otherwise explained, weak or absent peripheral pulses, elevated shock index, or clinician judgment consistent with massive hemorrhage.

3. Contraindications and Cautions

    a. Absolute contraindications are rare in the setting of life-threatening hemorrhage. However, transfusion should be approached cautiously or deferred when:
        i. Hemorrhage is not suspected, and shock is attributable to non-hemorrhagic causes (e.g., cardiogenic, distributive, anaphylactic, etc.)
        ii. There is evidence of fluid overload without signs of bleeding
        iii. Product integrity, temperature control, or traceability cannot be verified per protocol
        iv. A patient or their surrogate raises religious objections to receiving a blood transfusion or blood products.

b. Protocols should emphasize that the risk of delaying transfusion in true hemorrhagic shock generally outweighs the risk of uncrossmatched blood administration in the prehospital environment.

4. Blood Product Selection

a. Whole Blood
    i. When available, low-titer group O whole blood is recommended as the preferred first-line product for patients with life-threatening hemorrhage. Whole blood provides balanced resuscitation with red blood cells, plasma, and platelets in physiologic proportions and aligns with current military and civilian trauma system best practices.
b. Plasma
    i. Plasma may be administered:
        1. As part of balanced resuscitation alongside PRBCs
        2. As an early intervention in hemorrhagic shock when PRBCs are not immediately available
        3. In medical causes of hemorrhage or coagulopathy, where volume expansion alone is insufficient
    ii. Agencies should define whether plasma is thawed, liquid, or frozen (or freeze-dried, if and when available) at the time of issue and ensure that it is compatible with storage and transport capabilities.
c. Packed Red Blood Cells
    i. PRBCs are an acceptable alternative when whole blood is unavailable. They should be administered in conjunction with plasma when feasible to support balanced resuscitation and mitigate dilutional coagulopathy.

5. Dosing and Administration Strategies

a. Blood products should be administered using goal-directed resuscitation, guided by the patient's response rather than by fixed volumes. Recommended principles include:
    i. Early initiation once the indications are met
    ii. Incremental administration with assessment after each unit
    iii. Avoidance of unnecessary crystalloid once blood products are initiated
    iv. Use of approved blood warming devices when available (as best practice)
b. Maximum transfusion volumes per patient should be defined by the medical director and consistent with AABB emergency release standards.

6. Integration with Existing EMS Protocols

    a. Trauma Protocols
        i. Blood product administration should be embedded within existing trauma pathways, including:
            1. Hemorrhage control (tourniquets, pressure, pelvic binders, etc.)
            2. Rapid transport to definitive care
            3. Trauma team or trauma center pre-notification
    b. Medical and Cardiac Arrest Protocols
        i. Protocols should allow for transfusion in select non-traumatic emergencies and cardiac arrest when hemorrhage is suspected, ensuring alignment with resuscitation priorities and minimizing interruptions in high-quality CPR.
    c. Mass Transfusion and Hospital Coordination
        i. Prehospital transfusion protocols should be coordinated with receiving hospitals to ensure:
            1. Continuity of transfusion strategy
            2. Communication of product type, quantity, and timing
            3. Transfer of required documentation, tubing, and blood product identifiers

7. Oversight and Medical Direction

    a. All prehospital blood product protocols shall be approved, reviewed, and overseen by the EMS agency's medical director. Medical directors should ensure:
        i. Alignment with PHBTC guidelines and AABB standards[1,2]
        ii. Defined inclusion and exclusion criteria
        iii. Training and competency validation for all authorized clinical personnel, utilizing the Arkansas Department of Health Section of EMS-approved training curriculum
        iv. Integration into quality assurance and performance improvement programs.
    b. Protocols should remain adaptable to local operational realities while maintaining adherence to evidence-based clinical standards.

8. Summary

Early, balanced blood product administration is a cornerstone of modern hemorrhage resuscitation. When implemented within a structured, medically-directed framework and aligned with national standards, prehospital transfusion has the potential to significantly improve survival and outcomes for critically ill and injured patients across Arkansas.

C. Operations Framework Development

1. Purpose and Scope

   The operational framework for a prehospital blood program establishes the systems, processes, and controls required to ensure the safe, compliant, and reliable delivery of blood products in the out-of-hospital environment. This framework must integrate clinical operations, logistics, documentation, quality oversight, and regulatory requirements across the continuum of care.

   This section provides guidance for EMS agencies and medical directors to develop an operations framework that is consistent with the Prehospital Blood Transfusion Coalition (PBTC) Clinical Practice Guideline for Civilian EMS, the AABB Standards for Emergency Prehospital and Scheduled Out-of-Hospital Transfusions, and national EMS documentation best practices.

2. Governance and Operational Oversight

   a. Each EMS agency operating a prehospital blood program should establish a defined governance structure that includes:
      i. Medical Director oversight of all clinical and operational policies.
      ii. Clear delineation of operational responsibility for blood storage, transport, documentation, and disposition.
      iii. Formal agreements with blood suppliers and receiving hospitals that specify roles, responsibilities, and handoff procedures.
   b. Operational policies should be reviewed at pre-defined intervals and updated as evidence, regulations, or system capabilities evolve.

3. Logistics, Storage, Handling, and Temperature Control

   a. Blood product logistics—including storage, transport, handling, and temperature control—are primarily governed by requirements established by the blood supplier and AABB standards. EMS agencies should ensure that their operational framework:
      i. Uses validated storage and transport containers approved for blood products.
      ii. Maintains continuous or interval temperature monitoring consistent with supplier specifications.
      iii. Defines acceptable temperature ranges and actions required for temperature excursions.
      iv. Ensures traceability of each unit from receipt through final disposition.

4. Chain of Custody and Traceability

    a. Agencies should maintain and documented chain-of-custody process that allows every blood product to be:
        i. Uniquely identified.
        ii. Tracked from supplier release to EMS custody.
        iii. Linked to patient administration or final disposition (e.g., transfused, returned, wasted, etc.)
    b. Chain-of-custody documentation should be sufficient to support regulatory review, quality assurance, and hospital blood bank reconciliation.

5. Documentation Requirements

    a. Accurate, standardized documentation is critical to patient safety, quality improvement, and regulatory compliance. Operational frameworks should incorporate mandatory documentation requirements consistent with:
        i. PBTC Clinical Practice Guideline documentation standards on pages 13-14 of the 2025 PBTC Guidelines.[1]
        ii. National Association of State EMS Officials (NASEMSO) Blood Product Administration Documentation: Best Practice Guidance.[3]
    b. At a minimum, EMS documentation should include:
        i. Indications for transfusion and clinical context
        ii. Product type (e.g., whole blood, plasma, PRBCs)
        iii. Blood product/unit identification number(s)
        iv. Start and stop times of transfusion
        v. Volume administered
        vi. Patient vital signs before, during, and after transfusion
        vii. Patient temperature, including documentation of hypothermia risk and mitigation
        viii. Any suspected or confirmed transfusion-related adverse events, and evidence of communication of the adverse events to receiving facility staff.
        ix. Final disposition of each blood unit
    c. These documentation elements should be considered mandatory fields within the patient care report whenever blood products are administered.

6. Waste Tracking and Documentation

    a. Operational frameworks should include explicit guidance on how blood product waste is tracked, documented, and reviewed. This includes:
        i. Documented of expired, temperature-excursed, damaged, or otherwise unusable units.
        ii. Clear categorization of waste reasons.
        iii. Reporting mechanisms to blood suppliers and receiving hospitals as required.
        iv. Inclusion of waste data in quality assurance and performance improvement measures.
    b. Waste tracking is essential for fiscal stewardship, system sustainability, and identification of opportunities for process improvement.

7. Approved Product Categories

    a. The advisory will provide recommendations on approved blood product categories appropriate for prehospital use (e.g., whole blood, plasma, PRBCs) while avoiding endorsement of specific brand names or proprietary systems.
    b. Product approval should be based on:
        i. Compatibility with AABB standards[1]
        ii. Blood supplier validation.
        iii. Operational feasibility within the EMS environment.
        iv. Medical director approval.
    c. This approach allows agencies flexibility while maintaining alignment with national standards and regulatory expectations.

8. Integration with Quality Management Systems

    a. Operational frameworks should be embedded within each agency's quality management system, including:
        i. Routine review of transfusion cases.
        ii. Monitoring of documentation completeness and accuracy.
        iii. Evaluation of temperature compliance and waste trends.
        iv. Feedback mechanisms for clinicians and leadership.

9. Summary

    a. A well-defined operations framework is essential for the safe and sustainable implementation of prehospital blood programs. By aligning logistics, documentation, chain-of-custody, and quality oversight with AABB standards, PBTC clinical guidelines, and national EMS best practices, Arkansas EMS agencies can ensure consistent, high-quality blood administration across diverse operational environments.

D. Quality Assurance and Performance Measures

1. Purpose and Scope

A structured quality assurance (QA) and performance improvement framework is essential to ensure that prehospital blood programs are safe, effective, compliant, and continuously improving. This section establishes recommended governance, performance measures, review processes, and reporting expectations to guide EMS agencies in Arkansas as they operationalize prehospital blood transfusion programs.

The framework outlined below is aligned with the AABB Standards for Emergency Prehospital and Scheduled Out-of-Hospital Transfusions, the Prehospital Blood Transfusion Coalition (PBTC) Clinical Practice Guidelines, and state-level quality objectives to promote consistency, accountability, and system-wide learning.[1,2]

2. Program Goals and Quality Objectives

    a. Primary Program Goals
        i. Prehospital blood programs should be designed to:
            1. Improve survival and clinical outcomes for patients with hemorrhagic shock
            2. Ensure safe handling, storage, and administration of blood products
            3. Minimize blood product wastage and transfusion-related adverse events
            4. Maintain compliance with regulatory, accreditation, and state EMS requirements
            5. Ensure provider competency and adherence to approved protocols
    b. Quality Objectives
        i. Recommended statewide quality objectives include:
            1. Timely delivery of blood to eligible patients
            2. Greater than 95% compliance with approved protocols
            3. Transfusion-related adverse event rates below 1%

4. Blood product wastage rates below 5%, including from blood supplier to EMS agency (e.g., shipping and receiving) as well as within the agency
5. 100% provider credentialing and competency validation prior to independent practice

3. Governance and Oversight Structure

   a. Each EMS agency should establish a formal QA governance structure for its prehospital blood program. As best practice, this may include, but is not limited to:
      i. Oversight Committee Composition
         1. EMS Medical Director
         2. EMS Operations Leadership
         3. EMS QA/QI Manager
         4. EMS Training Officer
         5. EMS Logistics or Supply Chain Representative
         6. Trauma Surgeon and/or Trauma Program Manager
         7. Blood Bank Medical Director or Designee
      ii. Review Frequency
         1. Monthly operational and process review
         2. Quarterly clinical outcomes and utilization review
         3. Annual comprehensive program evaluation
      iii. This multidisciplinary structure promotes shared accountability across clinical, operational, and hospital stakeholders.

4. Key Performance Indicators/Measures (KPIs/KPMs)

   a. Clinical Effectiveness Metrics
      i. Agencies should track metrics that assess whether blood is delivered to the right patient, at the right time, with measurable physiologic benefit. Examples include:
         1. Time from dispatch or patient contact to initiation of transfusion
         2. Prehospital blood utilization rate among eligible patients
         3. Evidence of shock reversal (improvement in blood pressure, heart rate, or shock index)
         4. Survival to hospital admission
         5. Survival to 24 hours post-arrival when data are available
   b. Patient Safety Metrics

i. Patient safety metrics should focus on prevention of harm and early detection of system failures, including:
    1. Suspected transfusion reaction rate
    2. Wrong-blood or ABO/Rh mismatch events
    3. Protocol deviations (blood administered outside defined criteria)
    4. Incomplete or missing mandatory documentation elements
ii. Targets should emphasize zero tolerance for wrong-blood events and continual reduction in preventable deviations.

c. Blood Product Management Metrics
    i. To ensure stewardship of a limited and high-value resource, agencies should monitor:
        1. Blood wastage rates due to expiration, temperature excursion, or damage
        2. Temperature compliance during storage and transport
        3. Accuracy of chain-of-custody documentation and traceability, from the time it leaves the supplier until it arrives at the EMS agency and is administered to a patient
        4. Return-to-stock rates for unused blood products
    ii. These metrics directly support cost containment, supplier trust, and regulatory compliance.
d. Operational Performance Metrics
    i. Operational KPIs evaluate whether system design supports timely and effective care:
        1. Accuracy of patient eligibility identification
        2. Availability of onboard blood when clinically indicated
        3. Impact of blood administration on scene time
        4. Timeliness of documentation completion
    ii. Programs should demonstrate that blood administration does not introduce clinically significant delays to transport or definitive care.
e. Training and Competency Metrics
    i. Sustained provider competency is essential for safe transfusion practice. Recommended measures include:
        1. Completion of initial credentialing prior to blood administration
        2. Bi-Annual competency validation through skills and knowledge assessment
        3. Protocol knowledge testing
        4. Performance in simulation-based hemorrhage scenarios
    ii. All licensed EMS clinicians authorized to administer blood products MUST meet these requirements without exception.

iii. It is expected that the agency will provide an updated list of EMS clinicians credentialed to provide prehospital blood transfusions twice per year (by April 1 and September 1 of each year)

5. Data Elements for QA Review

a. Agencies should define a standardized dataset to support meaningful QA review, including:
   i. Patient and Incident Data
      1. Incident identifiers and demographics
      2. Mechanism and suspected source of hemorrhage
      3. Vital signs and neurologic status
      4. Shock indices and access routes
   ii. Blood Administration Data
      1. Product type and unit identifiers
      2. Storage temperature at removal and return
      3. Timing and volume of transfusion
      4. Use of adjunctive therapies such as TXA or calcium
   iii. Safety and Compliance Data
      1. Documentation of indication criteria
      2. Verification and identification processes
      3. Adverse reactions and interventions
   iv. Outcome and Handoff Data
      1. Vital signs on hospital arrival
      2. Trauma activation level
      3. Blood product handoff confirmation to the receiving ED/trauma team
      4. Disposition and early mortality when available

6. QA Review Processes

a. Case Review Triggers
   i. At a minimum, QA review should be triggered for:
      1. All prehospital blood administrations
      2. Any suspected transfusion reaction
      3. Protocol deviations or near-miss events
      4. Blood wastage or temperature excursions at any time
      5. Complaints, sentinel events, or interfacility handoffs
   ii. Review Methodology
      1. Primary Review (within 7 days)

a. Focused on documentation completeness, protocol adherence, and operational issues

2. Secondary Clinical Review
    a. Conducted by the EMS Medical Director and hospital liaisons, emphasizing appropriateness and clinical judgment
3. Root Cause Analysis (RCA)
    a. Triggered by adverse events, near misses, wrong-blood events, or repeated deviations

7. Feedback, Corrective Action, and Continuous Improvement

    a. QA findings should be used to drive improvement through:
        i. Individualized provider feedback
        ii. Targeted remediation or retraining
        iii. Protocol or equipment modifications
        iv. System-wide education initiatives
    b. Agencies are encouraged to use Plan-Do-Study-Act (PDSA) cycles to test and standardize improvements over time.

8. Reporting, Benchmarking, and Compliance

    a. Agencies should generate:
        i. Monthly internal dashboards
        ii. Quarterly reports to medical and trauma leadership
        iii. Annual program summaries
    b. Where feasible, performance should be benchmarked against trauma registries, regional EMS collaboratives, and published civilian or military prehospital blood data. All QA activities should remain aligned with AABB standards, FDA requirements, state EMS regulations, and applicable privacy laws.
    c. At a minimum, each EMS agency providing prehospital blood transfusion will submit a report to the Arkansas Department of Health Section of EMS regarding every blood product transfused, due by the 5th day of the following month (See Appendix C). The report shall include:
        i. Service Name
        ii. Service ID Number
        iii. Patient Initials
        iv. Patient Age
        v. Date of Procedure

vi. Run Number
vii. Trauma Band
viii. Provider Names
ix. Confirmation (via "yes" or "no") of whether the case followed agency protocol with appropriate indication for blood transfusion

d. It is expected that the agency will provide an updated list of EMS clinicians credentialed to provide prehospital blood transfusions twice per year (by April 1 and September 1 of each year)

9. Summary

A robust quality assurance and performance measurement framework ensures that prehospital blood programs deliver high-value care while maintaining safety, compliance, and fiscal responsibility. Consistent measurement, multidisciplinary review, and continuous improvement are essential to sustaining trust among EMS agencies, hospitals, blood suppliers, and the communities they serve.

E. Stakeholder Coordination

1. Purpose and Scope

The development and sustainment of a prehospital blood program requires deliberate, multidisciplinary coordination across EMS, hospitals, trauma systems, blood suppliers, and regulatory partners. Early and ongoing stakeholder engagement ensures clinical alignment, regulatory compliance, operational feasibility, fiscal stewardship, and patient safety across the entire continuum of care.

This section outlines recommended stakeholders, coordination objectives, and system-level considerations to guide EMS agencies and medical directors as they establish or expand prehospital blood capabilities in Arkansas.

2. Key Stakeholders to Engage

a. EMS agencies should proactively identify and convene the following stakeholders during program development and ongoing operations, potentially including, but not limited to or required:
i. EMS Agency Leadership
1. Clinical and operational leadership from within the EMS agency desiring to initiate a prehospital blood transfusion program.

ii. EMS Medical Director
    1. Provides clinical leadership, protocol oversight, education standards, and quality assurance authority for the prehospital blood program.

iii. Receiving Hospital Leadership
    1. Including trauma program coordinators, emergency department medical directors, and hospital blood bank/transfusion service representatives. These partners are essential for alignment on product selection, handoff processes, documentation, adverse event monitoring, and continuity of transfusion care. The receiving hospital leadership are also responsible for facilitating the communication of patient outcomes and any opportunities for improvement back to the participating EMS agency.

iv. Regional Trauma Advisory Council (RAC) Leadership
    1. Ensures regional alignment, facilitates coordination among EMS agencies and trauma centers, and supports system-level planning to optimize outcomes and resource utilization.

v. Trauma Medical Director(s), if available
    1. From the trauma center(s) most frequently receiving patients from the EMS agency, whether directly or via secondary transfer. These leaders provide critical guidance on trauma system expectations, mass transfusion practices, and post-arrival integration.

vi. Emergency Department Medical Director(s)
    1. Designated Medical Director of the local receiving Emergency Department, or their interim physician assigned to oversee clinical quality care.

vii. Blood Supplier or Distributor
    1. Including regional blood centers or contracted suppliers responsible for product availability, storage specifications, rotation agreements, traceability, and regulatory compliance.

viii. Arkansas Department of Health, Section of EMS
    1. Provides regulatory oversight, protocol approval, and statewide standardization. Early involvement promotes consistency across agencies and alignment with state-approved clinical guidelines.

3. <u>Core Goals of Stakeholder Coordination</u>

a. Policy and Operational Alignment:
    i. Stakeholders should establish a shared agreement on policies addressing:
        1. Blood product procurement and supply chain logistics

2. Handling, storage, and temperature monitoring requirements
3. Product tracking, traceability, and documentation
4. Reporting mechanisms for utilization, wastage, and adverse events

ii. These policies should align with national standards and accreditation requirements while remaining feasible within the EMS operational environment.

b. Clinical Protocol Consensus
   i. Collaborative development or adoption of standardized clinical protocols should include agreement on:
      1. Indications for whole blood and component therapy.
      2. Integration with adjunctive therapies such as tranexamic acid (TXA), calcium supplementation, limitations on crystalloid resuscitation, and the role of push-dose vasopressors as a limited bridge therapy.
      3. Predefined considerations for pregnant females, females of childbearing potential, and pediatric patients are addressed prospectively rather than reactively.
   ii. Preference should be given to the use of the Arkansas Department of Health Section of EMS approved protocols in Appendix A, which are intended to standardize care, reduce variability, and support statewide consistency.
   iii. See Section B above for Clinical Standards and Protocol Alignment.

c. Quality Assurance and Performance Improvement
   i. A shared process for quality assurance (QA) and performance improvement should be established, including:
      1. Defined criteria for appropriate and inappropriate utilization
      2. Structured case review and feedback loops to EMS agencies and medical directors
      3. Collaboration between EMS and hospital partners to evaluate outcomes, trends, and opportunities for improvement
   ii. This process should be transparent, educational, and focused on system improvement rather than punitive action.
   iii. See Section D above for Quality Assurance and Performance Measures.

4. <u>Blood Product Rotation and Resource Stewardship</u>

As a best practice consideration and consistent with high-performing prehospital blood programs around the nation, stakeholders should strongly consider blood product rotation agreements with the highest-level trauma center reasonably within the EMS agency's trauma region, in an effort to minimize financial burden and product wastage. This approach allows

unused products to be returned to hospital inventory before expiration, improving sustainability and reducing costs.

Because these arrangements directly impact inventory management and transfusion practices, trauma center leadership, blood bank representatives, and RAC leadership should be integral participants in early planning discussions.

It is also reasonable that EMS agencies may immediately become trained and credentialed in the administration of prehospital blood products per the guidelines set forth by this advisory document, but may not be operationally ready to begin carrying blood products for prehospital administration. However, the preparation would allow credentialed clinicians within that respective EMS agency to administer blood products during interfacility transfers for initiation of transfusion, if indicated and available from the sending facility.

5. Consideration for Rural and Resource-Limited Agencies

    a. In rural parts of the state that lack appropriately-leveled trauma centers, severely injured or critically ill patients experiencing hemorrhagic shock risk delayed transfer to definitive care by going to the nearest facility, and also risk delayed initiation of lifesaving blood products by going further to the higher level facility. Additionally, these rural agencies are also less likely to be properly resourced to begin carrying and administering blood products, given the financial burden of starting such a program.
    b. For rural and super-rural EMS agencies, stakeholders should consider whether rural interfacility blood "handoff" models may benefit agencies that lack the resources to independently carry blood products. In such models:
        i. Blood products may be transferred between facilities and EMS units under predefined conditions.
        ii. Participating EMS agencies must meet the same training, credentialing, documentation requirements, and oversight standards as agencies that routinely carry blood.
        iii. Given the potential risk of overutilization or deviation from intended use, it is recommended that 100% of cases involving interfacility blood handoff undergo formal QA review.
        iv. In such a "handoff" model, if implemented, proper tracking of these blood products out of the rural facility will be crucial. In this case, it may be reasonable to consider assigning a Trauma Band (or Universal Band) to the patient and provide that band number to the facility providing the blood products for immediate transfusion. The mechanism for financial reimbursement or

replacement of those blood products must be discussed ahead of a "handoff" program being implemented, and involving the stakeholders described above who come to a consensus on the process.

v. It is important to follow EMTALA guidelines when presenting to the rural hospital for blood "handoff." If the intent is to present to the facility ONLY for receiving blood products that will be administered en route to the higher level of care facility, the hospital is not bound by EMTALA guidelines. Per EMS State Operations Manual Appendix V, Interpretive Guidelines[4]:

1. If an ambulance is on hospital property (within 250 yards), EMTALA obligations are triggered, unless:
    - The ambulance is merely passing through, or
    - EMS has made a prior determination that the patient will be taken to another facility, and
    - There has been no request made for examination or treatment at that hospital.

c. These models require heightened coordination and collaboration with hospitals and blood banks, but may significantly expand access to life-saving therapy in underserved areas.

6. Summary

Effective stakeholder coordination is foundational to the success of a prehospital blood program. By engaging key partners early, establishing shared goals, and aligning clinical, operational, and quality frameworks, EMS agencies can implement blood programs that are safe, sustainable, and fully integrated within Arkansas's trauma and emergency care systems.

F. Education and Training

The Arkansas Department of Health Section of EMS, through the Arkansas EMS Advisory Committee, shall create and make available for distribution an approved training curriculum, which should be deployed and implemented at the agency (See Appendix B below). The EMS agency will be required to complete the following:

1. Each EMS clinician who will be administering prehospital blood transfusions must complete the required training and then complete both a written and skills proficiency evaluation at the agency.
2. The EMS agency must provide written documentation back to the Arkansas Department of Health Section of EMS with the following information:
    a. Name and license number of each EMS clinician credentialed to provide prehospital blood transfusion
    b. Date of completed training and credentialing

It is expected that the agency will provide an updated list of EMS clinicians credentialed to provide prehospital blood transfusions twice per year (by April 1 and September 1 of each year), and will repeat the blood education training every 2 years with their recertification cycle.

The Arkansas Department of Health Section of EMS will create a standing CE course and create a mechanism for approved instructors (through a train-the-trainer program) to make the completion of this approved training reportable for licensure and CE credit through the state.

G. References

1. Prehospital Blood Transfusion Coalition. (2025). *Clinical practice guidelines for prehospital blood transfusion*. https://prehospitaltransfusion.org/wp-content/uploads/2025/06/PHBTC-CPG-final-BOD-app-6-3-25.pdf
2. AABB. (2025). *Standards for emergency prehospital and scheduled out-of-hospital transfusions* (1st ed.). https://www.aabb.org
3. National Association of State EMS Officials. (2025). *Blood product administration documentation: Best practice guidance*. https://nasemso.org
4. State Operations Manual: Appendix V — Interpretive Guidelines – Responsibilities of Medicare Participating Hospitals in Emergency Cases. Centers for Medicare & Medicaid Services, U.S. Department of Health & Human Services. Rev. 191 (effective July 19, 2019). Available at: https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/downloads/som107ap_v_emerg.pdf

H. Appendices

1. Appendix A - Arkansas Prehospital Blood Transfusion Clinical Practice Guideline

2. Appendix B - Arkansas Department of Health Section of EMS Prehospital Blood Transfusion Training and Education

3. Appendix C - Arkansas Department of Health Section of EMS Monthly Report Template

Appendix A
Arkansas Prehospital Blood Transfusion Clinical Practice Guideline

I. Prehospital Principles of Resuscitation and Transfusion

A. **Rapid Recognition** of life-threatening hemorrhagic shock
   1. Clinical assessment remains the cornerstone for recognition, including physiologic parameters such as vital signs, shock index, end-tidal carbon dioxide (ETCO2), and others.
   2. Consider point-of-care devices, if available, such as lactate measurement

B. **Hemorrhage Control** with appropriate adjuncts
   1. Pressure dressings and wound packing (preferably with hemostatic products) for severe wounds)
   2. Tourniquets for significant extremity hemorrhage
   3. Pelvic binders for suspected pelvic fractures
   4. Wound packing or junctional tourniquets for junctional hemorrhage

C. Hemostatic Resuscitation
   1. Whole blood (WB) when available
   2. Low-titer O+ whole blood (LTOWB), or
   3. Plasma, or
   4. Packed red blood cells (PRBCs)
      a) Aim for balanced 1:1 ratio of plasma to RBCs when possible

D. Minimized Crystalloid Use
   1. Limit crystalloid resuscitation to less than 500mL (preferred balanced crystalloid such as Normosol/Plasmalyte)
   2. Excessive crystalloid worsens coagulopathy and contributes to hemodilution

E. Prevent Hypothermia
   1. Utilize appropriate warming devices for blood products
   2. Maintain patient temperature with passive warming measures
   3. Consider active warming devices when available

F. TXA Administration
   1. For patients who will receive blood and are within 3 hours of injury:
      a) Adult dose (12+ years old):
         (1) 2 grams IV/IO over 1-2 minutes
      b) Pregnant Females (12+ years old):
         (1) 2 grams IV/IO over 1-2 minutes
      c) Pediatric dose (2-12 years old):
         (1) 15 mg/kg (maximum 1 gram) IV/IO over 10 minutes

G. Calcium Replacement
   1. Consider calcium replacement after the first unit of blood product has been administered and after other hemostatic interventions are completed
      a) Adult dose (12+ years old):
         (1) Calcium gluconate 2g IV/IO (over 10 minutes, do not exceed 200mg/min), or
         (2) Calcium chloride 1g IV/IO (over 10 minutes, do not exceed 100mg/min)

(3) Monitor for signs of hypercalcemia

b) Pediatric dose (2-12 years old):
   (1) Calcium gluconate 100mg/kg IV/IO (max dose 2g, over 10 minutes, do not exceed 200mg/min), or
   (2) Calcium chloride 20mg/kg IV/IO (max dose 1g, over 10 minutes, do not exceed 100mg/min)
   (3) Flush the line with 10mL of normal saline
   (4) Monitor closely for signs of IV/IO infiltration or extravasation

II. Criteria for Transfusion

A. Table 1: Clinical Indicators of Hemorrhagic Shock

Clinical Indicator	**Description**
Shock Index*	> 1.0 (Heart Rate / Systolic BP)
Hypotension*	Systolic BP <90 mmHg
Tachycardia*	Heart Rate > 100bpm; unresponsive to initial interventions
Respirations	Rapid and shallow for age and body habitus
Pulse quality	Weak, thready central pulses, and/or Absent peripheral pulses
Capillary refill	>2 seconds
Mental status	Decreased (excluding head injury or intoxication)
EtCO2	<25 mmHg (cmH20)
Skin	Pale, cool, and/or clammy
Bleeding	Actual or suspected active hemorrhage from a non-compressible source

**See discussion on age-specific shock index, hypotension, and tachycardia in Section B.2. below.*

B. Clinical Indications (Must meet criteria from Box 1 AND at least 1 criteria from either Box 2 or Box 3):

Box 1	Clinical suspicion of hemorrhagic shock from trauma or medical cause

Box 2	Vital signs outside normal parameters for age
Box 3	Physiologic criteria indicative of hypoperfusion

1. Suspected hemorrhagic shock from trauma or medical cause, **AND**

2. Vitals outside normal parameters as follows:
    a) Adults
        (1) Systolic blood pressure (SBP) less than 90 mmHg or weak/absent radial pulse, or
        (2) Heart rate greater than 100 bpm, unresponsive to initial interventions, or
        (3) Shock index (HR/SBP) greater than 1.0
    b) Geriatrics (65+ years old)
        (1) Consider "relative" hypotension and tachycardia, and should have clinical suspicion of hemorrhage as the source of that relative hemodynamic instability
        (2) In general, consider a shock index > 0.9, SBP < 100, and HR > 90 as signs of hemodynamic instability, but in the proper clinical context of suspected hemorrhage
    c) Pediatrics
        (1) Systolic blood pressure (SBP) less than 70 + (Age in years x 2), or weak/absent radial pulse, or
        (2) Heart rate:
            (a) 0-24 months: greater than 190
            (b) 2-10 years: greater than 140, **OR**

3. One or more of the following physiologic criteria are indicative of hypoperfusion:
    a) Altered mental status (not believed to be due to intoxication or head injury)
    b) Pale, cool, clammy skin; pale mucosa
    c) Delayed capillary refill (>2 seconds)
    d) Tachypnea
    e) EtCO2 < 25 mmHg (cmH20)

C. Examples of patient presentations consistent with suspected hemorrhagic shock necessitating prehospital blood transfusion:
    1. Trauma patients with uncontrolled hemorrhage
        a) Any proximal amputation above the knee/elbow or amputations requiring a tourniquet, with signs of hemorrhagic shock as a result of previous blood loss prior to bleeding control
        b) Penetrating trauma to the neck, chest, abdomen, or pelvis with signs of shock
        c) Evidence of significant blood loss (>500mL estimated)

d) Unstable pelvic fracture with hemodynamic instability

2. Medical patients with significant hemorrhage
    a) Gastrointestinal bleeding
    b) Ruptured ectopic pregnancy
    c) Peripartum or postpartum hemorrhage
    d) Ruptured aortic (thoracic or abdominal) aneurysm
    e) Ruptured AV fistula/graft
    f) Postsurgical complications
    g) Epistaxis
    h) Post-tonsillectomy bleeding
    i) Other causes of significant blood loss with signs of shock

D. Special Patient Populations
    1. Patients with known bleeding disorders who are in hemorrhagic shock
        a) Resuscitation priority should be given to administering blood products first, followed by appropriate treatment for the specific bleeding disorder.
    2. Pregnant patients
        a) Consider early administration for suspected obstetric or postpartum hemorrhage with signs of hemorrhagic shock.
        b) Place in left-lateral recumbent position (left side down).
        c) 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.
        d) There is no role for the administration of RhoGAM in the acute resuscitation of hemorrhagic shock.
    3. Special Considerations for non-pregnant females
        a) If O-positive blood is administered to Rh-negative (Rh-) females of childbearing potential, inform the receiving facility for potential post-discharge consultation with hospital Transfusion Services and maternal-fetal medicine, if indicated.
            (1) Additional information and resources can be found at https://allohopefoundation.org.
        b) There is no role for the administration of RhoGAM in the acute resuscitation of hemorrhagic shock.

E. Contraindications and Cautions
    1. Absolute contraindications are rare in the setting of life-threatening hemorrhage. However, transfusion should be approached cautiously or deferred when:
        a) Hemorrhage is not suspected, and shock is attributable to non-hemorrhagic causes (e.g., cardiogenic, distributive, anaphylactic, etc.)
        b) There is evidence of fluid overload without signs of bleeding

c) Product integrity, temperature control, or traceability cannot be verified per protocol
d) A patient or their surrogate provides religious objections to the receipt of a blood transfusion or blood products.

F. Dosing and Administration Strategies
1. Blood products should be administered using goal-directed resuscitation, guided by patient response rather than fixed volumes. Recommended principles include:
a) Early initiation once the indications are met
b) Incremental administration with assessment after each unit
c) Avoidance of unnecessary crystalloid once blood products are initiated
d) Use of approved blood warming devices when available (as best practice)

G. Blood Product Selection (in order of preference):
1. Whole Blood
a) When available, low-titer group O whole blood is recommended as the preferred first-line product for patients with life-threatening hemorrhage. Whole blood provides balanced resuscitation with red blood cells, plasma, and platelets in physiologic proportions and aligns with current military and civilian trauma system best practices.
2. Component Therapy (preferred plasma first, followed by PRBCs)
a) Plasma
(1) Plasma assists in both volume expansion AND in the correction of coagulopathy secondary to uncontrolled hemorrhage, and may be administered:
(a) As part of balanced resuscitation (1:1) alongside PRBCs
(b) As an early intervention in hemorrhagic shock when PRBCs are not immediately available.
(c) In medical causes of hemorrhage or coagulopathy where volume expansion alone is insufficient.
b) Packed Red Blood Cells (PRBCs)
(1) PRBCs provide volume expansion and improved oxygen-carrying capacity, and are an acceptable alternative when whole blood is unavailable. They should be administered in conjunction with plasma when feasible to support balanced resuscitation (1:1) and mitigate dilutional coagulopathy.

Appendix B
Arkansas Prehospital Blood Transfusion Program
Training and Credentialing Curriculum

I. PowerPoint Slide Deck (46 slides)
   A. Intro to the Prehospital Blood Transfusion Coalition
   B. Review of the Human Circulatory System
   C. Understanding the indications for blood product administration
   D. Reviewing types of blood products
   E. Procedures for administration
   F. Identifying and managing transfusion reactions
   G. Safe documentation and hand-off
   H. Scenario knowledge check, wrap-up
II. Post-course exam (35 multiple-choice and 10 scenario-based questions)
III. Post-course exam answer key with rationales
IV. Train-the-trainer packet for the scenario-based practical evaluation
V. Scenario practice evaluations with scoring/evaluation forms (7 different scenarios)

Appendix C
Arkansas Prehospital Blood Transfusion Program
ADH Section of EMS Monthly Reporting Template

Per the Arkansas Prehospital Blood Transfusion Program requirements, and to maintain agency-wide credentialing, each EMS agency will submit a report to the Arkansas Department of Health Section of EMS regarding every blood product transfused, due by the 5th day of the following month. Use this template to submit the report. Submit additional pages as needed, along with the ePCR for each incident/run. The agency Medical Director must also sign for approval of the monthly blood report.

ADH EMS Monthly Blood Transfusion Report (____/____)								
Service Name	Service ID	Patient Initials	Patient Age	Date	Run Number	Trauma Band (or N/A)	Clinician Name	Agency Protocol Followed? (Yes/No)