

The First Drop: Saving Lives of Traffic Crash Victims Through Pre-Hospital Blood Transfusions

Governor's Highway Safety Association

September 1, 2026

Jon R Krohmer, MD, FACEP, FAEMS
Chair, PHBTC



**PREHOSPITAL
BLOOD TRANSFUSION
COALITION**



- EMS SME and BOD (non-executive) Velico Medical, Inc



PREHOSPITAL
BLOOD TRANSFUSION
COALITION

Exsanguination (severe blood loss) remains the leading cause of preventable deaths among victims of trauma with nearly half of these patients dying in the prehospital setting.^{1,2}

Prehospital blood resuscitation is also clinically indicated for selected patients who hemorrhage from medical conditions (e.g., post-partum hemorrhage, abdominal bleeds) potentially doubling the number of patients who would benefit from field transfusions.

Individuals requiring blood transfusions in the field in most locations in the US do not have access to pre-hospital blood transfusions due to inadequate reimbursement policies and state by state scope of practice limitations.

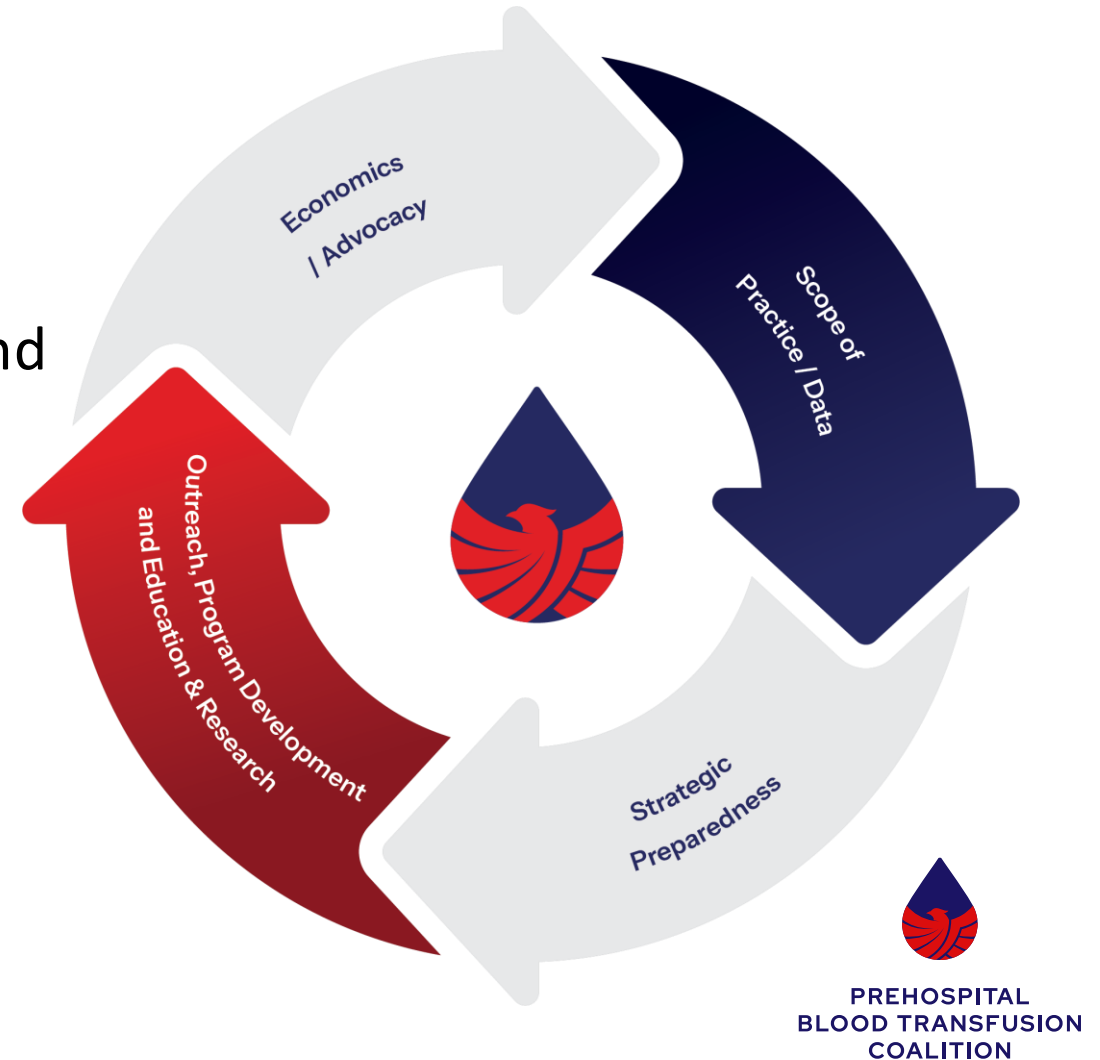
1. Sperry JL, et al. Prehospital Plasma during Air Medical Transport in Trauma Patients at Risk for Hemorrhagic Shock. N Engl J Med. 2018 Jul 26;379(4):315-326.
2. Tompeck AJ, et al. A comprehensive review of topical hemostatic agents: The good, the bad, and the novel. Journal of Trauma and Acute Care Surgery 88(1):p e1-e21, January 2020.

- Blood is part of the bleeding control continuum
- Compressible hemorrhage control with hemostatic dressings and tourniquets is important
- Blood is the preferred resuscitation fluids for bleeding patients, **especially prehospital**
- Components will be used for hemodynamically stable patients that need repair of only one aspect of their blood system
- Crystalloid is great for diarrhea, dehydration and maintenance fluids

- Coordination / Collaboration / Facilitation / Resources
 - Non-regulatory / no standards development
- Open to all interested
 - EMS agencies / individuals / regulators / industry partners / federal partners (ex-officio)
- Implementation of prehospital blood on all eligible ground ambulances:
 - All blood products
 - All Causes of hemorrhagic shock such as:
 - Traumatic injuries (gunshot wounds, motor vehicle crashes, industrial/work-related injuries, falls)
 - Obstetric and Gynecological – during and after pregnancy
 - Medical – gastrointestinal bleed / dialysis fistula ruptures
 - All Patient ages



- Strategic Preparedness
 - Federal activities and Military
 - Homeland Security / Disaster Preparedness
- Outreach, Program Development & Education and Research
 - Resources and best practices
 - Web references
- Scope of Practice and Data
 - Scope of Practice – state level issue
 - Data discussion
- Economics and Advocacy
 - Prehospital and blood community
 - Consistency



- Scope of Practice
 - National Scope of Practice Model - guidelines
 - States determine actual SoP
 - 47 states allow for initiation of transfusion
- Reimbursement
 - EMS reimbursement based on transportation to ED
 - 50-year-old CMS Authorizations
 - Mileage and level of care based
 - No consistent reimbursement for field transfusions
 - Funded through grants / donations / operational budget
 - CMS regulatory modification for ground ambulances – Jan 2025
 - LTO+WB / no additional reimbursement
- Availability of blood / components
 - Initial focus on LTO+WB / acknowledge utility of other components
 - Increase donation pool



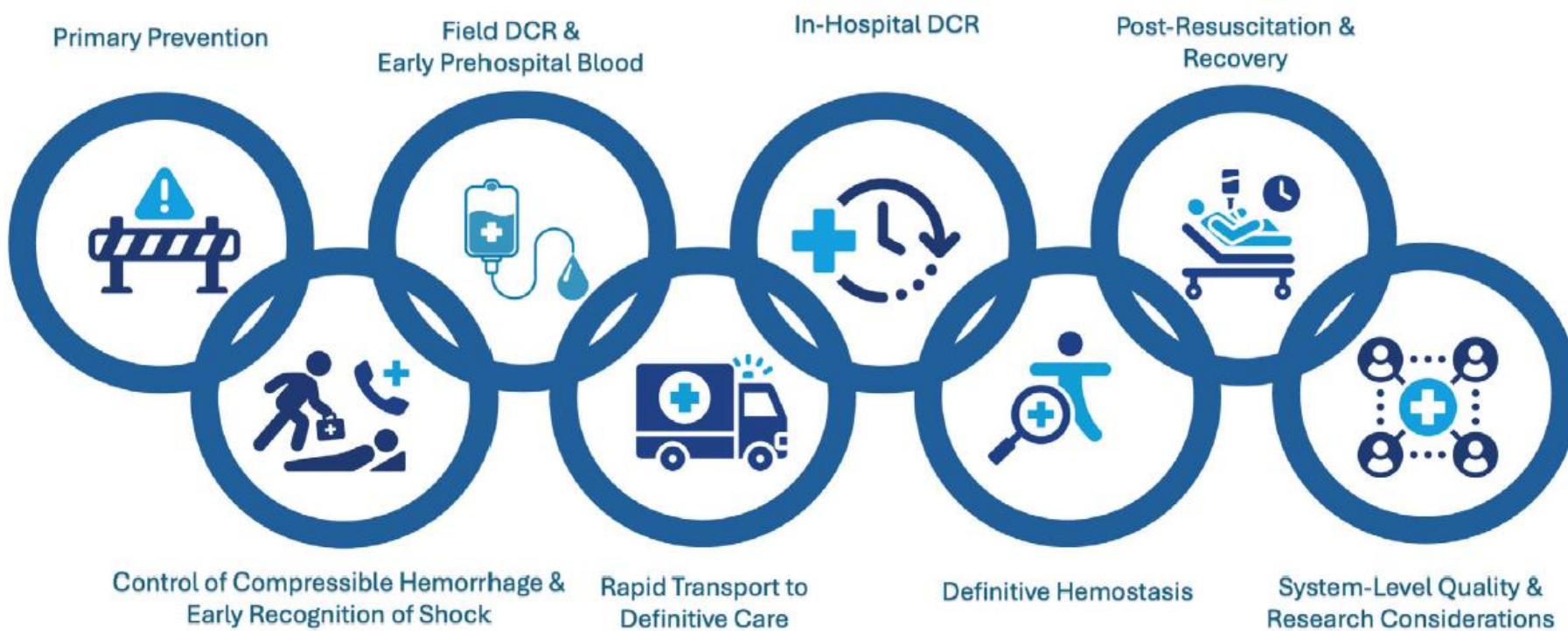
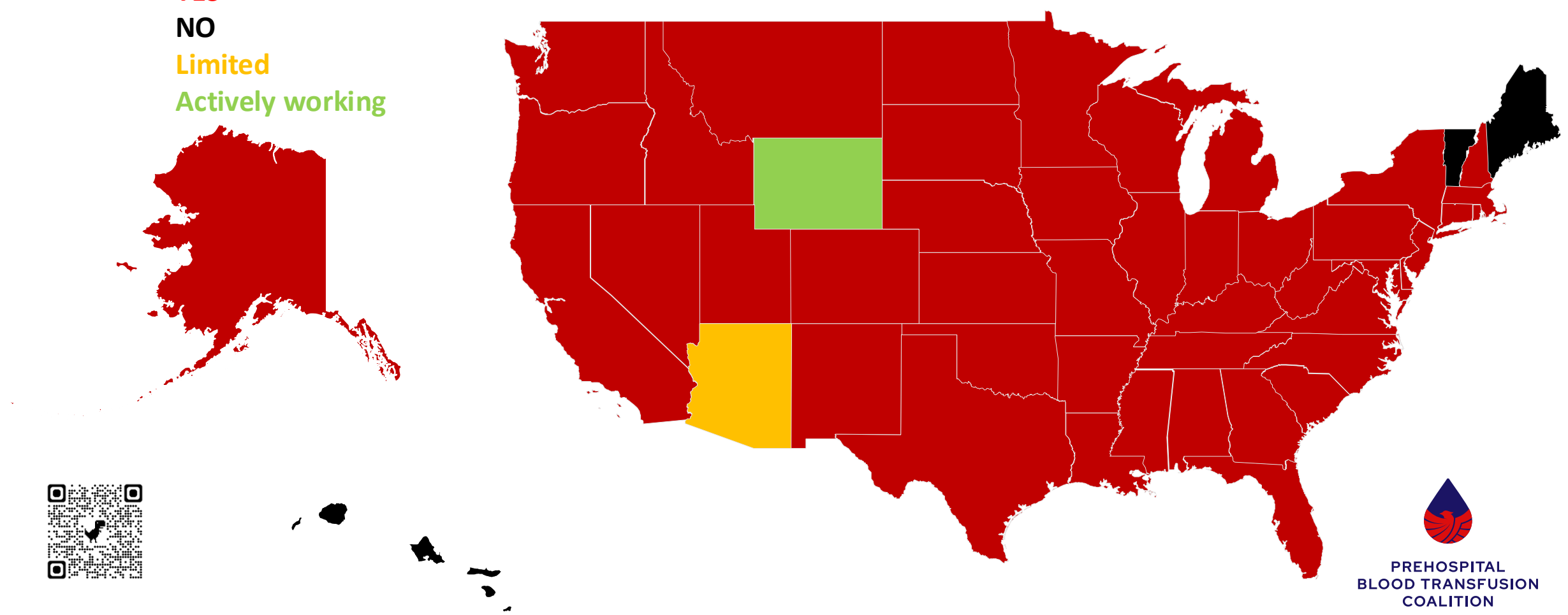


FIGURE 2 Updated hemorrhagic shock chain of survival.

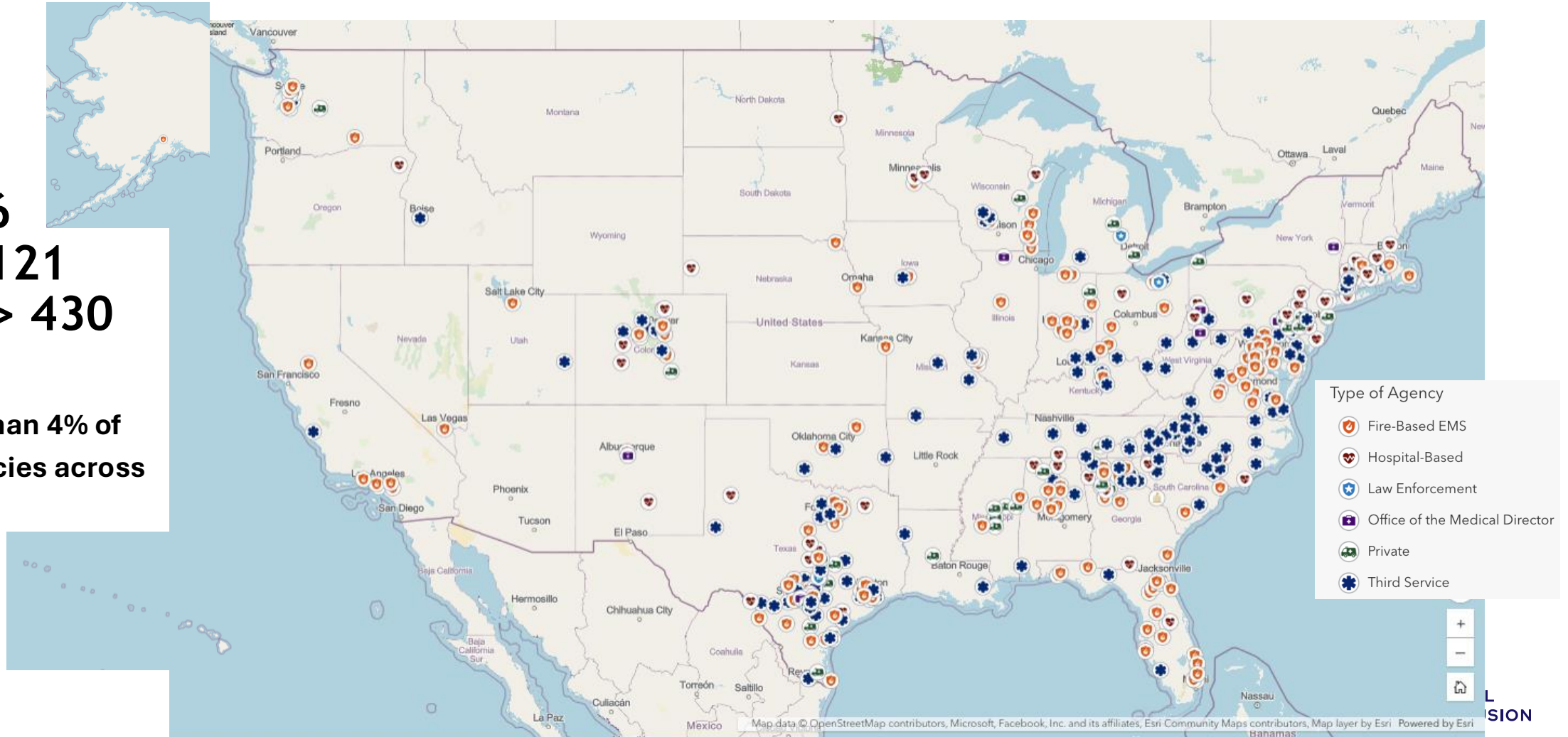


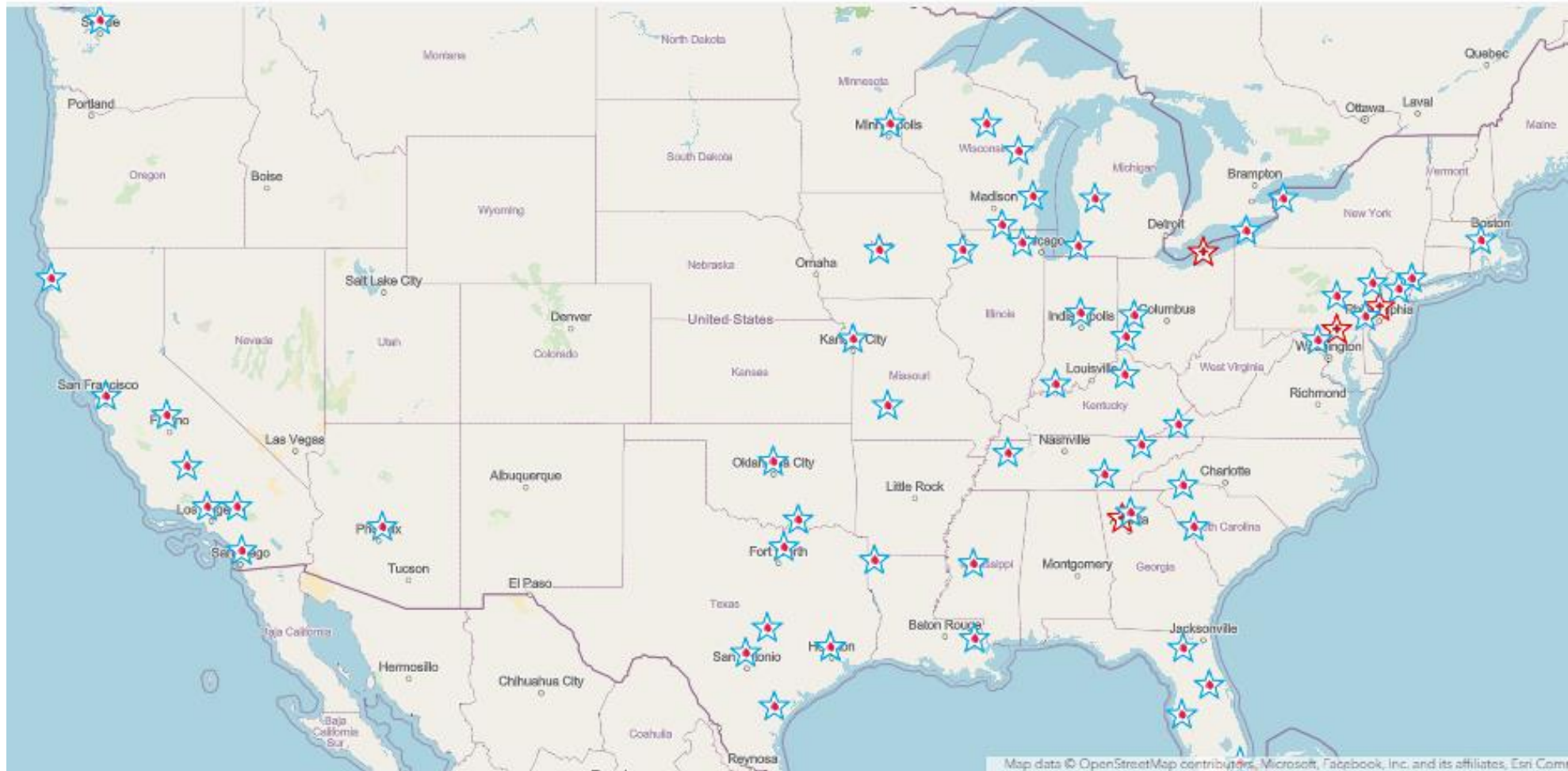
YES
NO
Limited
Actively working



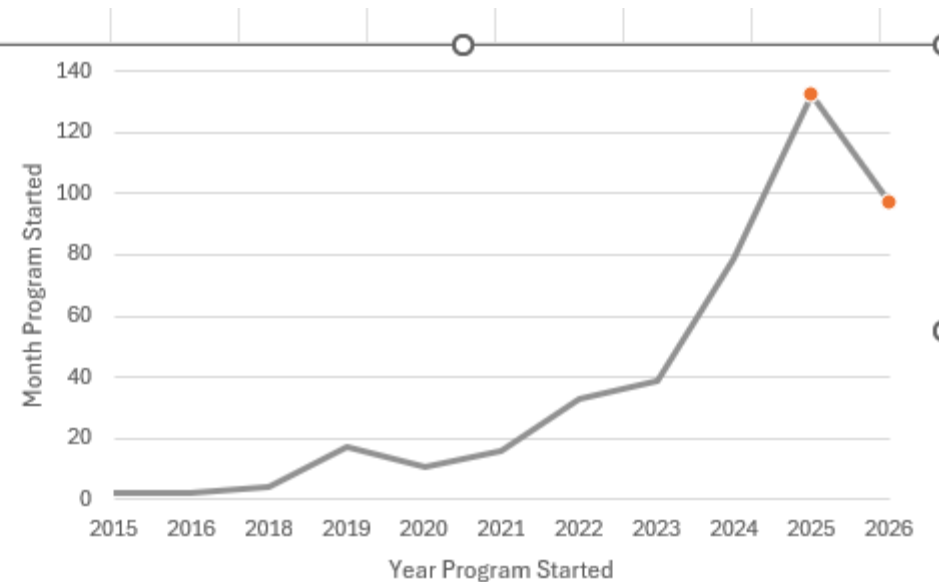
2016 = 6
2023 = 121
8/2026 > 430

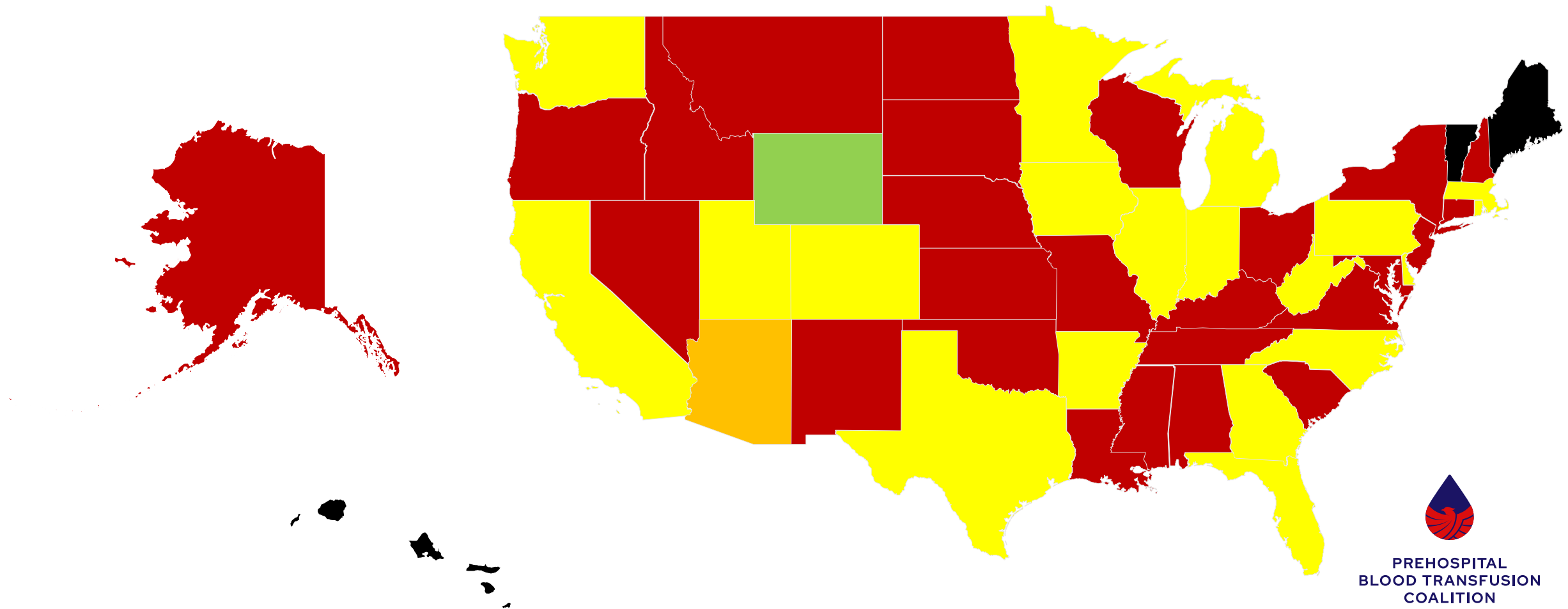
**This is less than 4% of
ground agencies across
the country.**





Year Program Started ▾	Count of Month Program Started
2015	2
2016	2
2018	4
2019	17
2020	11
2021	16
2022	33
2023	39
2024	79
2025	132
2026	97
Grand Total	432





FATALITIES ALIVE AT CRASH SCENE (2022)



PREHOSPITAL
BLOOD TRANSFUSION
COALITION

ALABAMA PREHOSPITAL BLOOD
PRODUCT TRANSFUSION
ADVOCACY PACKET



Produced in partnership with the Students, Residents and
Fellows Trauma Advocacy Coalition (SRF-TAC)

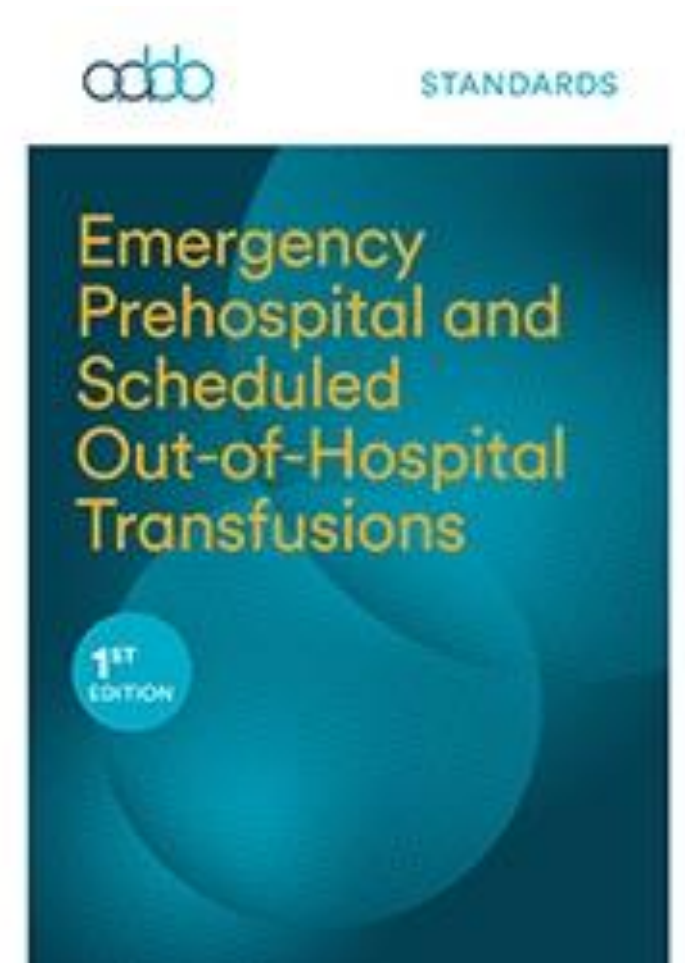


FARS Data



PREHOSPITAL
BLOOD TRANSFUSION
COALITION

- Who is responsible?
 - Depends
- Prehospital agencies do *NOT* have lab capabilities, pathologists, or Transfusion Service capabilities.
- **Transfusion Administration Service**
 - EMS Medical Director
- Prehospital agencies can meet (and exceed) regulatory requirements for transport and storage
- Education and Training Standardization



Prehospital Blood Transfusion Program Pillars

Needs Assessment

- Retrospective Review & Analysis
- Stakeholder Engagement
- Equity & Access

Program Development

- Interagency Coordination & Communication
- Scope of Practice & Medical Oversight
- Consent
- Religious & Other Considerations
- Blood Inventory

Documentation

- Electronic Patient Care Records (ePCR)
- Electronic Medical Records (EMR) & Prehospital Data Integration
- Prehospital Transfusion Record

Equipment & Logistical Considerations

- Blood Products
- Cold-Chain Management
- Administration of Blood Products

Training & Continuing Education

- Administrative Management
- Clinical Training Program
- Continuing Education & Recertification
- Program Specific Competency Metrics

Quality Assurance & Quality Improvement

- Performance Improvement
- Review & Feedback Mechanisms
- Adverse Event Monitoring & Reporting
- Advanced Resuscitative Care



Blood Bag



Credo Box



Sensor Push



Blood Y-tubing



QinFlow Warmer



LifeFlow



IV > IO



QinFlow CDU
Compact Disposable Unit

QinFlow Warmer



Prehospital blood transfusion coalition clinical practice guideline for civilian emergency medical services

Matthew J Levy ¹, Randall M Schaefer,² Holly Obyrne,³ Jon R Krohmer,⁴ Eric A Bank,⁵ John B Holcomb ⁶

Trauma Surgery & Acute Care Open

► Additional supplemental material is published online only. To view, please visit the journal online (<https://doi.org/10.1136/tsaco-2025-001931>).

¹Emergency Medicine, Johns Hopkins University School of Medicine, Baltimore, Maryland, USA

²Schaefer Consulting, LLC, New Braunfels, Texas, USA

³Department of Fire and Rescue Services, Government of the District of Columbia, Washington, District of Columbia, USA

⁴EMSMD PLLC, Ann Arbor, Michigan, USA

PURPOSE

This Clinical Practice Guideline (CPG) provides essential instructions for prehospital transfusion in civilian emergency medical services (EMS) systems. This guideline supports citation with blood products for preventing hemorrhagic shock, regardless of the setting, with the objective of reducing clinical outcomes. Implementing a prehospital blood transfusion protocol requires careful planning, appropriate training, control measures, adherence to regulatory physician medical oversight, and coordination with regional blood suppliers and receiving hospitals.

INTRODUCTION

Prehospital blood transfusion coalition core competencies for emergency medical services personnel

Jon Krohmer,^{1,2} Holly O'Byrne ³, Randall Schaefer,⁴ Eric A Bank,⁵ John B Holcomb ⁶, William J Bullock,⁷ Ronnie L Hill,⁸ Matthew Levy ⁹

¹Emergency Medicine, Michigan State University, East Lansing, Michigan, USA

²EMSMD, Grandville, Michigan, USA

³Department of Fire and Rescue Services, Government of the District of Columbia, Washington, DC, USA

⁴Schaefer Consulting, New Braunfels, Texas, USA

⁵EMS, Harris County Emergency Services District No 48, Katy, Texas, USA

PURPOSE

These competencies establish the coalition's recommendations for comprehensive educational standards and competency requirements for emergency medical services (EMS) personnel authorized to administer blood products in the prehospital environment. This guideline serves as a resource document to ensure that EMS clinicians possess the requisite knowledge, skills, and competencies to safely and effectively perform blood transfusions, recognize and manage complications, and maintain quality standards. Implementation of these guidelines

specialized requirements of blood product administration.^{11,12}

Effective training programs must incorporate multiple educational modalities, including didactic instruction, simulation-based learning, practical skills assessment, transfusion case study analysis and ongoing competency validation, using established frameworks such as Kern's six-step model.¹³ The goal of this training should be to develop clinicians who can confidently identify appropriate candidates for blood transfusion, perform the procedure safely, recognize and manage complications, and maintain

► Additional supplemental material is published online only. To view, please visit the journal online (<https://doi.org/10.1136/tsaco-2025-001931>).

First published as 10.1136/tsaco-2025-001931
Protected by copyright, incl

Establishing the Standardized EMS Metrics for Survival in Transfusion and Advanced Resuscitation: the SEMSTAR project

Matthew J Levy ^{1,2}, Holly O'Byrne ³, Kaytlin Hack,¹ Amanda Staudt ⁴, Remle Crowe,^{5,6} Eric A Bank,⁷ Joshua B Brown ⁸, Timothy Brown,⁹ Armand Cayer,¹⁰ David Edwards,⁹ Gabriel H Gan,³ Eric Garfinkel,¹ Craig Goolsby,^{11,12} Frances Guyette ¹³, Ryan B Fransman ¹⁴, John B Holcomb ^{15,16}, Dionne Huggins,¹⁷ Donald H Jenkins,¹⁸ Michelle Kobayashi,¹⁷ N Clay Mann,¹⁹ Asa M Margolis,¹ Kevin Nicholes ¹⁹, Shaun Patterson,¹⁷ Art Samaras,²⁰ Randall Schaefer,²¹ Philip Spinella,²² David Vitberg,²³ Christopher M Wend ²⁴, Kelsey Wilhelm ^{11,25}, Christopher Winckler,⁶ Tung-Lin Jesse Yuan ^{10,26}, Jon Krohmer^{27,28}

ABSTRACT

Background Prehospital blood transfusion is increasingly recognized as an important early resuscitation intervention for patients with

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Prehospital blood transfusion programs vary widely in their data elements, definitions, and



PREHOSPITAL
BLOOD TRANSFUSION
COALITION

The First Drop: Saving Lives of Traffic Crash Victims Through Pre-Hospital Blood Transfusions

Governor's Highway Safety Association

September 1, 2026

Jon R Krohmer, MD, FACEP, FAEMS

jrkrohmer@gmail.com

jrkrohmer@emsmd.net

616-450-2206



**PREHOSPITAL
BLOOD TRANSFUSION
COALITION**

