Prehospital Blood & Gastrointestinal Hemorrhage

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No Financial Conflict of Interest

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San Antonio Texas
United States of America

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USA Military Medicine

- **Combat transfusion**
- **Civilian collaboration**

UNITED STATES ARMY
INSTITUTE OF SURGICAL RESEARCH

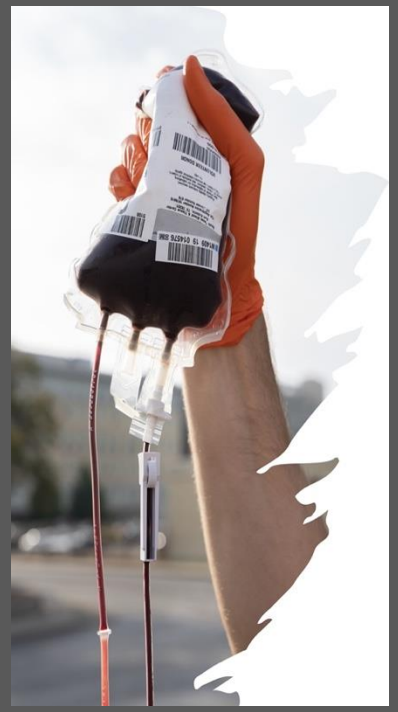
DEDICATION
DUTY SERVICE

SAMMC
City of Military Medicine

San Antonio Fire & EMS

Prehospital Blood Transfusion Program

- Initiated 10/01/2018
- Over 1500 Prehospital transfusions
- 74% Traumatic patients
- 26% Medical patients



TRAUMATIC ARREST & NEAR OBGYN FATALITY

San Antonio mom survives pregnancy complications with EMS blood transfusion

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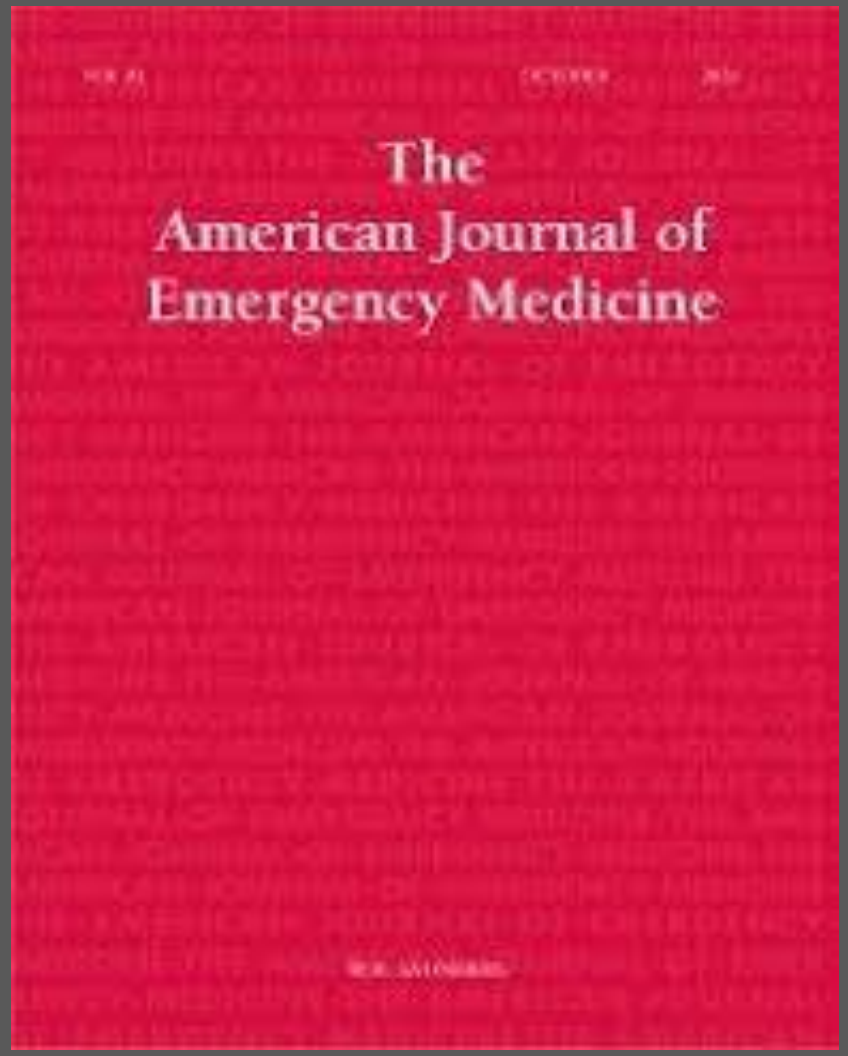
Paramedic Triggers for Transfusion of Prehospital Whole Blood (April 2024)



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 – Coumadin? Plavix? Aspirin? Pradaxa? Xarelto? Eliquis? (any blood thinners or anticoagulants)
- Beta Blockers and Calcium Channel Blockers may not allow HR to increase appropriately

Key Concepts
- Low Titer O + Whole Blood 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 (GI) bleed
- Postpartum hemorrhage
- Cirrhotic liver or liver failure
- Vascular – such as an uncontrolled bleeding shunt, fistula or varicose vein
- Urological – especially with recent surgery or procedure
- Potentially a recent surgical patient
- Uncontrolled epistaxis

Criteria
HEMORRHAGIC SHOCK in medical or trauma Adult and Pediatric (≥ 6 yo) patients

Relative Contraindications
- Patient < 6 years old
  - Consult Medical Direction if patient is in hemorrhagic shock and < 6 yo
  - Medical Director may elect to give blood in patients < 6 yo

Contraindications
- Religious objection to receiving whole blood—consult On Call Medical Director

EMT
- Follow General Medical Care Guideline
- Follow appropriate Shock Guideline

Paramedic

For Patients in HEMORRHAGIC SHOCK:
Administer Whole Blood with signs of acute hemorrhagic shock as evidenced by:

- Systolic Blood Pressure < 70 mmHg **OR**
- Systolic Blood Pressure < 90 mmHg with Heart Rate ≥ 110 beats per min **OR**
- ETCO2 < 25 **OR**
- Witnessed cardiac arrest < 5 min prior to provider arrival and continuous CPR throughout downtime **OR**
- Age ≥ 65 yo and SBP ≤ 100 **AND** HR ≥ 100 beats per minute

In general only 500mL (1 unit) of Low Titer O+ Whole Blood (LTO+WB) will be available per patient. If more than 500 mL of Whole Blood is available on scene the following general guidelines apply:

- 6-10 yo are eligible for a total of 500 mL of Whole Blood
  - Consult Medical Direction for further orders, if needed
- 11-13 yo are eligible for a total of 1000 mL of Whole Blood
  - Consult Medical Direction for further orders, if needed
- ≥13 yo are eligible for >1000 mL of Whole Blood
  - Consult Medical Direction for further orders, if needed

Of Note: At this time the unit of LTO+WB does not have volume markings on the bag.

Components vs. Whole Blood

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Low Titer O+ Whole Blood

Heroes in Arms donations are non-leukoreduced LTOWB+ units using CPDA preservative with a usable life of 35 days

EMS Respond: Weak & Dizzy, Syncope, Unconscious, Vomiting, Nausea, Sick Person, Person Down, Diabetic, Overdose, Cardiac Arrest.

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San Antonio Fire Department Prehospital Blood Transfusions of Medical Origins

- Gastrointestinal Bleed
- OBGYN
- Other: Dialysis Shunt, Varicose Veins

BACKGROUND

- Prehospital gastrointestinal (GI) hemorrhage is a leading cause of hemorrhagic shock resulting in significant morbidity and mortality.
- **Shock Index (SI)** (defined as heart rate over systolic blood pressure) >1.0 is an <u>independent predictor of mortality</u> in hemorrhagic shock.
- Prehospital whole blood (WB) outcomes remain unknown for GI hemorrhage.
- SAFD began transfusing LTOWB for the undifferentiated hemorrhagic shock patient in October 2018

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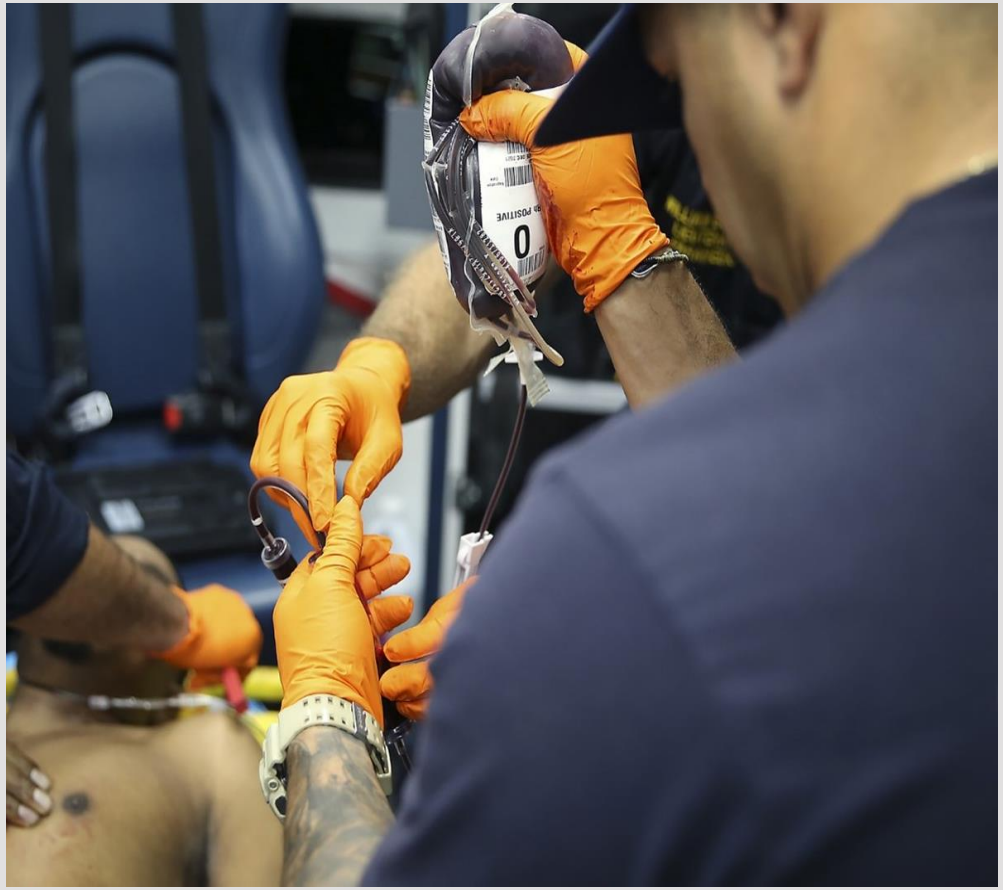
GASTROINTESTINAL HEMORRHAGE STUDY GOAL

The goal of this study was to compare shock index, and vital sign changes before and after receiving prehospital low titer O+ whole blood (LTOWB) in GI hemorrhagic shock.



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STUDY DESIGN

Retrospective review of consecutive prehospital transfusions cohort defined as:

Patients receiving whole blood for GI hemorrhage

Dates: October 2018 – June 2021

Data source: CQI registry held by San Antonio Fire Department (SAFD)

- **Inclusion Criteria:** adult patients receiving LTOWB for GI hemorrhage
- **Exclusion Criteria**: any hemorrhage other than GI bleeding, pediatric patients

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STUDY MEASURES

Primary Outcome

SI before and after whole blood administration

Secondary Outcome

Systolic blood pressure (SBP), heart rate (HR) respiratory rate (RR)

Data analysis was performed with descriptive statistics using Microsoft Excel.

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RESULTS

- 645 LTOWB Transfusions
- 531 Excluded (non-GI cause)
- 114 GI Transfusions

- **Shock Index significantly decreased**
  - Before: 1.41±0.54, CI:1.31-1.52
  - After: 0.99±0.34, CI:0.92-1.06
- **Heart rate significantly decreased**
  - Before: 105±26 bpm, CI:100-110
  - After: 97±19 bpm, CI:94-101
- **Systolic blood pressure significantly increased**
  - Before: 80±21 mmHg, CI:76- 84
  - After: 105±24 mmHg, CI:101-110
- **Respiratory Rate was unchanged**
  - Before: 21±8 rpm
  - After: 21±8 rpm, p>0.9

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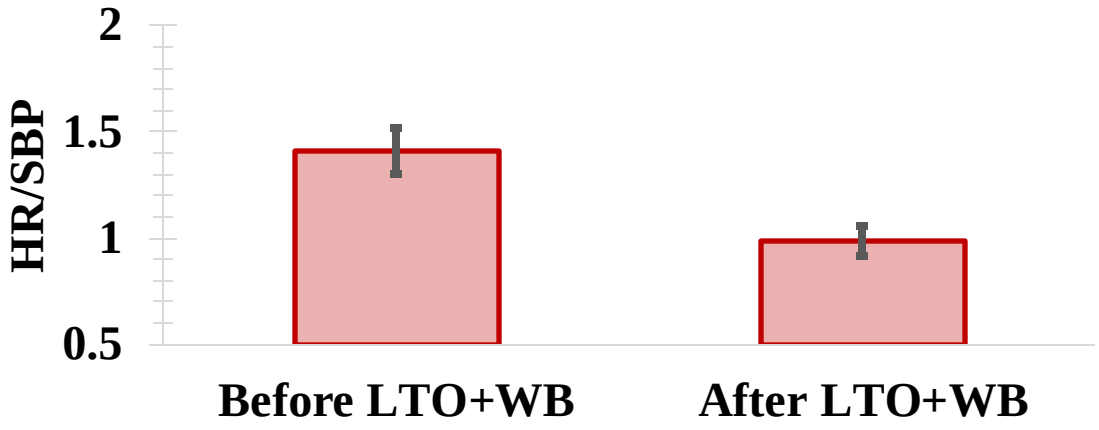
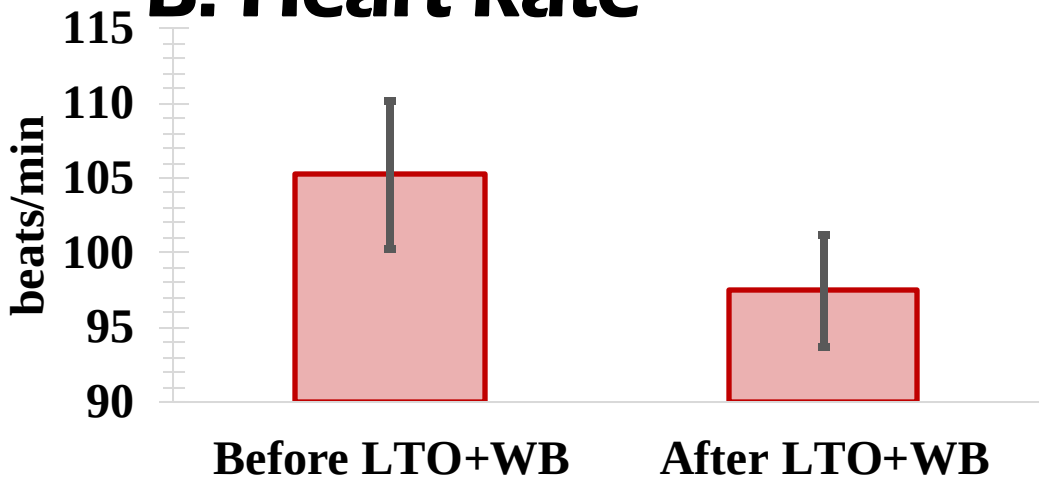
LTOWB Administration Affect

(Shown as means with confidence intervals)

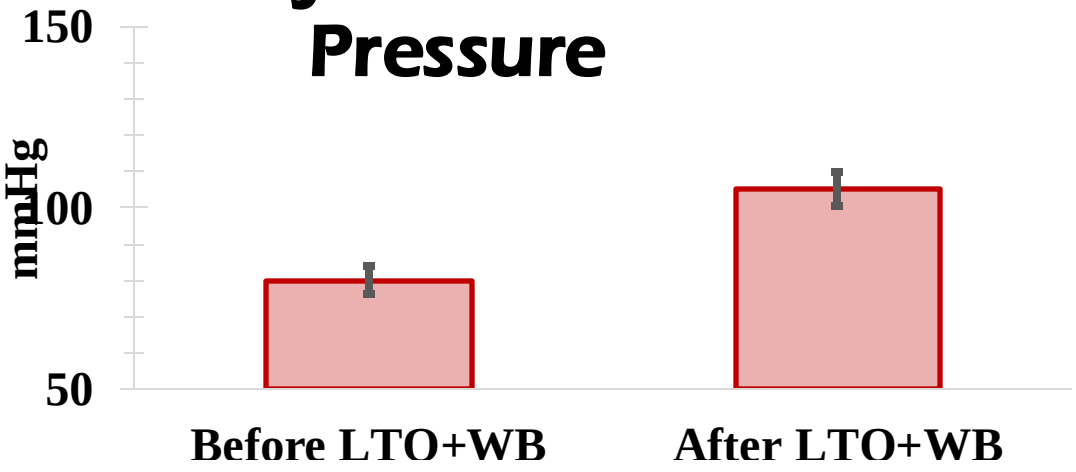
A. Shock Index



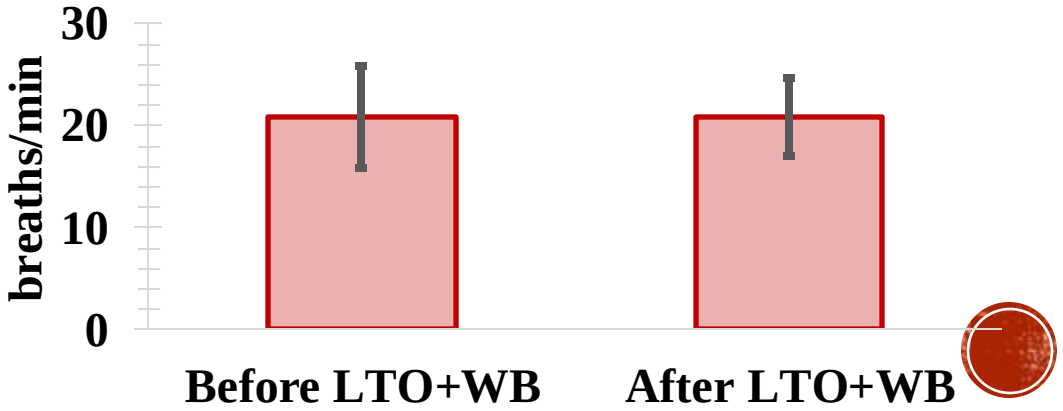
B. Heart Rate



C. Systolic Blood Pressure



D. Respiratory Rate



DISCUSSION

- Prehospital WB administration for GI hemorrhage was associated with **decreased shock index**, **decreased heart rate** and an **increased blood pressure**.

- Evidence of benefit for MEDICAL PATIENTS vs. TRAUMA

- **Limitations:**
  - Retrospective Review
  - Unable to show impact on survival

Prehospital Low Titer O+ Whole Blood Administration for Gastrointestinal Hemorrhage: Effect on Shock Index and Vital Signs

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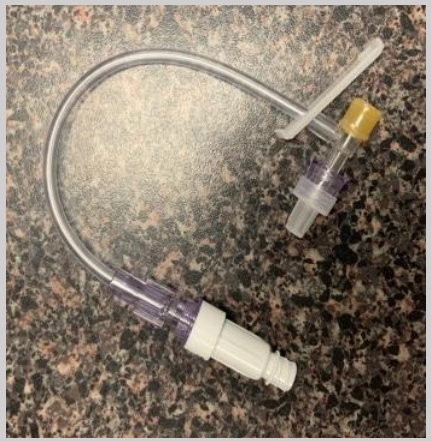
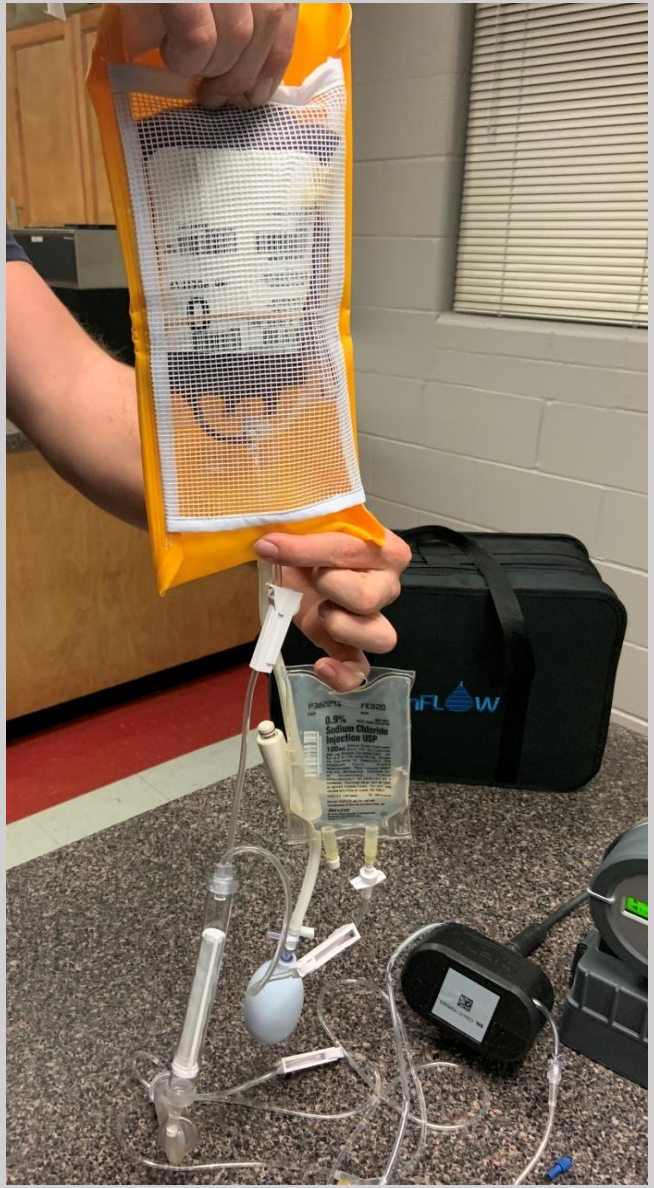
Transfusion Practices

- **Access: Intravenous vs Interosseous**
  (Removal of one way valve on extension set)
- **Standard filtered Tubing: 3.4 mm diameter**
- **Wide Diameter Tubing: 5.2 mm diameter**





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