Carroll County Department of Fire & EMS
Standard Operating Procedure

DOCUMENT DETAILS

Standard Operating Procedure: 3.48	**Effective Date: May 9, 2025**
Subject: LTO+ Whole Blood Program	**Section: Emergency Medical Services**
Authorized: Eric Zaney, Assistant Chief	**Revision Date: August 28, 2025**

Applicability: **[X] Volunteer** **[X] Career**

I. PURPOSE

The prehospital administration of whole blood has been shown to improve critically ill patients' survival and decrease the need for hospital blood product administration, thus helping conserve precious and limited blood resources. An increasing number of jurisdictions within the Maryland EMS system, and worldwide, have implemented prehospital whole blood programs. The Carroll County Department of Fire and Emergency Medical Services (CCDFEMS) is committed to providing our patients with the highest-quality emergency medical care through the implementation of evidence-based practices.

This SOP outlines CCDFEMS' prehospital whole blood program, including supply, storage, administration, and documentation. It is vital for our patients' safety and this program's sustainability that all personnel strictly adhere to the practices outlined in this document.

II. APPLICABILITY

This policy applies to CCDFEMS career and volunteer personnel with a valid Advanced Life Support (ALS) provider certification, and who have acquired the appropriate credentials to administer Whole Blood as outlined in this document

III. DEFINITIONS

Patient: Person directly receiving medical care from an EMS clinician.

Low Titer O+ Whole Blood (Whole blood/blood products): Type-O blood comprising of red blood cells, plasma, and platelets; contains low levels of antibodies generally considered safe for emergency transfusion, despite the patient's Rh factor.

Hemorrhagic Shock: Systemic hypoperfusion that occurs following blood loss.

Shock Index: A calculation to quantify the degree of shock. *Shock Index = Heart Rate / Systolic Blood Pressure*. Shock Index >1 is considered moderate shock and is associated with increased mortality rates.

Delta Ice 2L (Delta): Cold chain smart cooler that insulates a Temperature Control Insert (TCI) and is used to store Whole Blood.

Temperature Control Insert (TCI): The primary container that houses whole blood providing the required temperature range.

Excursion: Any recorded temperature of the cooler that falls out of 2℃ - 6℃ range.

Safe-T-Vue: Blood temperature indicator attached by the blood bank onto the unit of blood.

LifeFlow Infuser (LifeFlow): Hand-operated rapid infuser used to administer fluids and blood products. It works by a standard push-pull mechanism with the mechanical advantage of a trigger. The LifeFlow delivers 10mL of fluid or blood when the trigger loop is fully depressed.

TEMPWATCH: A standalone temperature monitoring device that alerts when the conditioned Delta's Temperature Control Insert has reached its operating temperature during daily exchanges.

QinFlow Warrior Lite Fluid Warmer (QinFlow): A high-performance, compact warmer for fluids and blood products. The QinFlow can warm up to 180mL/min of frozen blood products to body temperature in a matter of seconds.

AABB: The American Association of Blood Banks.

Inova: Healthcare system in Northern Virginia and home to *Inova Blood Donor Services,* who provides our supply of blood products. They provide a courier to facilitate the exchange and replacement of blood products. Located at 45745 Nokes Boulevard, Suite 160, Sterling, VA 20165. Phone: 1-866-256-6372

MIEMSS: Maryland Institute for Emergency Medical Services Systems

Carroll County Public Safety Training Center (PSTC): Location of CCVESA and CCDFEMS representatives. Located at 50 Kate Wagner Road, Westminster, MD 21157.
CCVESA Phone: (410) 848-1488
CCDFEMS Phone: (410) 386-6812

Sinai Hospital of Baltimore: Located at 2401 W Belvedere Ave, Baltimore, MD 21215.
- **Sinai Hospital (Main):** (410) 601-9000
- **Sinai Hospital Blood Bank Contact:** (410) 601-5112

Designations:

- **Chase Cars:** EMS101, EMS102, EMS103
- **Battalion Chief:** BC101 (410) 386-6823
- **Blood Program Manager:** Assistant Chief Eric Zaney. ezaney@carrollcountymd.gov
- **Agency Medical Director:** Dr. Stephanie Kemp. skemp@carrollcountymd.gov
- **Blood Program Designee:** Christopher Petry. ckpetry@carrollcountymd.gov
- **Blood Program Designee:** Anthony Cavanaugh. acavanaugh@carrollcountymd.gov
- **Blood Program Designee:** Chloe Natividad. cnatividad@carrollcountymd.gov

Category 1 condition (Reference CCDFEMS "Extreme Weather Operations" SOP): Heat Stress Index/Wind Chill temperature is 10.9°F and below.

Category 2 condition (Reference CCDFEMS "Extreme Weather Operations" SOP): Heat Stress Index/Wind Chill temperature is 11-39.9°F

Category 4 condition (Reference CCDFEMS "Extreme Weather Operations" SOP): Heat Stress Index/Wind chill temperature is 80-89.9°F.

Category 5 condition (Reference CCDFEMS "Extreme Weather Operations" SOP): Heat Stress Index/Wind Chill temperature is 90°F and above.

IV. EQUIPMENT

A. Blood Storage Equipment

All blood shall be continuously housed inside of the Delta 2L coolers to maintain a storage temperature between 2º-6º Celsius per ABBA regulations. The blood shall only be removed immediately prior to transfusion to a patient, or when changing over TCIs. Only blood products shall be stored in the Delta bag. Absolutely no food, drink, or other materials shall be stored in the TCI freezers or Delta 2L coolers.

The Delta 2L coolers shall be kept in an environment where the surrounding ambient temperature is maintained between 5-27℃ (41-80F). The vehicle housing the Delta 2L cooler shall be parked in a temperature-controlled building between calls and locked to maintain security when left unattended.

B. Blood Program Equipment

1. Critical Intervention Bag

a. The "critical intervention bag" shall contain all blood administration equipment, excluding the actual units of blood- which shall be stored in a Delta 2L cooler. Additionally, this bag shall contain red patient bracelets indicating the administration of whole blood, a prefilled syringe of 10 % calcium chloride, equipment needed to

administer TXA, and the necessary medications and equipment needed to treat a transfusion reaction. It also contains various guides for easy reference and troubleshooting during the blood administration procedure. This bag will be carried on the BC101, EMS100, EMS101, EMS102, and EMS103 vehicles.

2. **Portable Cold Storage**
    a. One Delta 2L cooler containing a TCI shall be issued to EMS101, EMS102, and EMS103 units. An additional Delta 2L cooler titled "DFEMS SPARE" shall be housed at the PSTC and utilized in the event of a frontline cooler malfunction or a cooler is sent out for maintenance.
    b. The Delta cooler with TCI is certified to maintain temperatures between 2-6℃ for at least 24 hours.
    c. The TCI shall be rotated promptly at the beginning of each shift (every 24 hours), or every 12 hours depending on weather category/condition, with one that has been conditioning in the dedicated station freezer.
    d. The TCI in use should be completely frozen solid and no "sloshing" of liquid should be heard when moving the newly conditioned TCI.

3. **TempWatch**
    a. A TempWatch mat shall be issued to Station 4 (Manchester), Station 5 (Taneytown), and station 14 (Winfield).
    b. TempWatch is designed to interface with the Delta ICE TCI during conditioning to monitor the embedded temperature sensors and alert the user once the pack has reached 2-degree Celsius.
    c. During the morning changeover, the conditioned TCI will be removed from its respective freezer and placed on the TempWatch. Once ready, the old TCI will be removed from the Delta 2L cooler, the freshly conditioned one will be inserted along with the unit of blood, and the cooler will be closed. The safe temperature range for blood storage is between 2-6-degree Celsius.

4. **Dedicated TCI Freezers**
    a. A freezer shall be issued to Station 4 (Manchester), Station 5 (Taneytown), and Station 14 (Winfield). An additional freezer will be located at the Public Safety Training Center (PSTC). These freezers shall be utilized for the conditioning of the (Temperature control inserts) TCIs.
    b. Each freezer shall be plugged into an outlet that is generator-supported and set to a temperature of -14℃ or cooler.
    c. Each freezer shall have a thermometer for continuous temperature monitoring and validation.
    d. Each freezer shall have one TCI conditioning for at least 8 hours.
    e. If a freezer fails to maintain an appropriate temperature, the Shift Commander, Blood Program Manager, and designees shall be notified immediately.
    f. At no time shall any units of whole blood be placed within the TCI freezer.
    g. At no time shall food, drink or other materials be stored within the TCI freezer.

5. **Dedicated Whole Blood Refrigerator**
    a. A medical-grade refrigerator shall be issued to Station 4 (Manchester), Station 5 (Taneytown), and station 14 (Winfield). An additional (spare) refrigerator will be located at the Public Safety Training Center (PSTC). This refrigerator shall be utilized for storage of whole blood units in the event of a Delta cooler failure, such as a failure to monitor or maintain an appropriate storage temperature.
    b. This refrigerator shall be plugged into an outlet that is generator-supported and set to a temperature of 2-6℃.
    c. This refrigerator shall have a thermometer for continuous temperature monitoring and validation.
    d. If the refrigerator fails to maintain an appropriate temperature, the Shift Commander, Blood Program Manager, and designees shall be notified immediately.
    e. At no time shall the whole blood units be stored within the designated refrigerator for an extended period unless for any of the reasons indicated within this SOP.
    f. At no time shall food, drink or other materials be stored within this refrigerator.

6. **Wireless Temperature Monitoring**
    a. The Delta 2L cooler has an integrated temperature monitoring system for both internal and ambient temperature, which communicates wirelessly via cellular to the phones/iPads issued to each unit carrying blood products.
    b. Alarms are set for high (6℃) and low (2℃) ranges, with an audible alarm sounding on the device and notifications sent to all applicable devices when temperature thresholds are encountered.
    c. All temperature data is available through generated reports which cannot be altered or deleted.

7. **Pressure Infuser Bag**
    a. All blood products must be administered using a pressure infuser for adult patients when a LifeFlow device is not available.

8. **Specialized Filtered "Y" Tubing**
    a. This tubing is specifically designed for the administration of blood products.
    b. It is wider than regular IV tubing. It contains a specialized filter and a force reducer on the distal end to mitigate excessive pressure during infusion.

9. **LifeFlow Plus Volume Infuser**
    a. This is a hand-operated rapid infuser for precise volume delivery and shall be the primary device used for blood administration in all patients.

10. **QinFlow Warrior Lite Fluid Warmer**
    a. A QinFlow Warrior Lite Fluid Warmer will be issued to BC101, EMS100, EMS101, EMS102, and EMS103 within the "critical intervention bag".
    b. It is comprised of the base unit, extension cable, battery, and a compact disposable unit (CDU) through which the blood products flow.

V. PROCEDURES

A. Authorization to Administer Whole Blood

Battalion Chiefs, Chase Car Clinicians, and those eligible to act in such roles who have completed the approved training program may administer whole blood to a patient who meets the criteria as outlined in the Maryland Medical Protocol. The CCDFEMS whole blood training and credentialing process consists of successfully completing the following components:

1. Initial Credentialing for Authorized Advanced Life Support (ALS) Clinicians
    a. Online fundamentals of whole blood administration training modules completed via FireRescue1 Academy.
    b. In-person demonstration of blood product storage, administration, and documentation procedural skills.
    c. Evaluation of simulated resuscitation scenarios involving use of whole blood products.
    d. Written and/or verbal clearance to administer whole blood in a clinical setting by the Agency Medical Director or their designee.

*Although Basic Life Support (BLS), and non-authorized Advanced Life Support (ALS) clinicians will not be credentialed in the administration of whole blood, they will have the opportunity to complete a "Whole Blood Awareness" training module on FireRescue1 Academy. Clinicians not trained in the administration of whole blood are expected to be able recognize the signs and symptoms of hemorrhagic shock and request whole blood resources as early as possible.

2. Ongoing Maintenance of Credentials for Authorized Advanced Life Support (ALS) Clinicians
    a. In-person demonstration of blood product storage, administration, and documentation procedural skills.
    b. Evaluation of simulated resuscitation scenarios involving use of whole blood products.
    c. This shall be conducted annually or otherwise at the discretion of the Agency Medical Director or designee.
    d. A training record of initial and ongoing maintenance of credentials including LMS and hands on training shall be maintained for all credentialed personnel.

B. Daily Operations

1. A daily shift check of blood products and associated equipment must be done daily by 07:00, upon any change of responsible personnel, or as soon as reasonably possible.
2. The ***CCDFEMS Whole Blood Daily Check*** form will be completed and submitted after the daily check. The daily check form can be found in SharePoint or can be accessed via the hyper-link or QR code below. The incoming provider is responsible for the completion and submission of this form. This can be found on SharePoint in the Whole Blood Group.
3. The Minimal Blood Administration equipment shall include the following:
    a. [1] Delta 2L Cooler containing:
        i. (1) TCI
        ii. (1) Unit of Low-Titer O+ Whole Blood.

b. [1] QinFlow Warrior Lite Blood Warmer Base
c. [1] QinFlow Warrior Lite Blood Warmer Extension Cable
d. [1] QinFlow Warrior Lite Blood Warmer Compact Disposable Units (CDUs)
e. [1] QinFlow Warrior Lite Blood Warmer Extra Battery
f. [1] Specialized Filtered "Y" Blood Tubing
g. [1] 500ml Pressure Bag
h. [1] 500ml normal saline bag
i. [1] LifeFlow Plus Rapid-Infuser
j. [1] Labeled 2.5-gallon bag
k. [1] Prefilled 10% Calcium Chloride
l. [1] 1,000 mg vial of TXA
m. [1] 100 mL NSS
n. [1] 60 gtt/min IV drip set
o. [2] Red patient identification bracelets

4. Also included within the "critical intervention bag" will be a transfusion reaction kit and will include the following:
    a. [2] 10mg/ ml vial of Dexamethasone (Decadron)
    b. [1] 50mg/ ml vial of Diphenhydramine Hydrochloride (Benadryl)
    c. [2] 3ml syringes
    d. [2] Blunt fill needles
    e. Alcohol prep pads

CCDFEMS Whole Blood Daily Check

5. Daily Changeover should include the following:
    a. TCIs in the Delta 2L replaced with a frozen/conditioned TCI from the storage freezer at the start of every shift.
        i. The frozen TCI shall be removed from the TCI freezer, placed on the TempWatch, and left at ambient room temperature. Remain within hearing distance.
        ii. An audible alarm will sound on TempWatch when the TCI reaches 2°C.
        iii. Wipe TCI dry of moisture. Move the blood to the new TCI and place both in the Delta cooler, securing the lid.
        iv. Inspect the Safe-T-Vue temperature indicator attached to the unit of blood to confirm that it has not been compromised. If the circle is **WHITE** the temperature indicator is active, and the temperature of the unit is <9°C. If there is **RED SPOTTING** contact the on-duty Battalion Chief to report the observation and receive further guidance. If the Safe-T-Vue is **MOSTLY RED** the temperature of the unit has reached 9°C, promptly place the unit into the appropriate designated refrigerator or Delta 2L cooler. If the indicator is **COMPLETELY RED,** the unit

has exceeded the excursion temperature range (>10℃). Contact the on-duty Battalion Chief immediately.

v. Complete the Whole Blood Daily Check and place the used TCI into the storage freezer.

C. Whole Blood Accountability

Each on-duty Chase Car Clinician is responsible for the daily accountability, exchange of TCIs, and temperature monitoring of their unit's blood products. The Clinician shall always keep the assigned cell phone/iPad on their person to receive automated push notifications from the Delta 2L cooler. The designated Blood Program Manager shall maintain an electronic temperature data logger. The electronic log database records shall be maintained for three (3) years for inspection by Inova Blood Donor Services (Inova), MIEMSS, and/or other regulatory agencies.

D. Exchange or Replacement of Blood Products

All blood products in CCDFEMS' possession will be routinely exchanged every 14 days. Blood products are supplied by Inova Blood Donor Services and are stored within the blood bank at Sinai Hospital of Baltimore. CCDFEMS will have access to 5 units of LTO+ Whole Blood from Inova/Sinai Hospital unless supply chain issues dictate otherwise. Three (3) of these units will be in-county onboard the EMS chase vehicles, while the remaining two (2) units will remain at the blood bank of Sinai Hospital for replacement of any units administered.

When the exchange cycle is due, or when replacement of blood products becomes necessary, a CCDFEMS Blood Program Designee shall report to Sinai Hospital of Baltimore to complete the exchange/replacement process.

1. Exchanges:
    a. Exchanges shall occur every 14 days.
    b. Exchanges shall take place at Sinai Hospital of Baltimore within their blood bank.
    c. The morning of the exchange, each chase vehicle will deliver their Delta 2L cooler and blood to the Public Safety Training Center no later than 07:30. If this is not feasible due to extenuating circumstances, a CCDFEMS Blood Program Designee will locate and retrieve the respective 2L cooler and blood.
    d. A CCDFEMS Blood Program Designee shall take all three (3) Delta 2L coolers to Sinai to perform the blood exchange. The exchange of all three (3) units shall occur simultaneously and shall be completed prior to 09:00.
    e. Enroute to Sinai Hospital, the CCDFEMS Blood Program Designee shall contact the blook bank of Sinai Hospital to inform them that they are enroute to their facility, and that they are intending to perform an exchange of blood products.
    f. The exchange shall be documented while at Sinai Hospital by signing for the exchange of blood via Sinai's paper documentation, and the digital ***CCDFEMS Whole Blood Exchange and Replacement Form.***
    g. Once the exchange is complete, the CCDFEMS Blood Program Designee shall promptly report back to the PSTC so that the Delta 2L coolers containing whole blood can be picked up and redistributed throughout the county.

2. Replacements:
    a. Replacements shall occur any time that a unit of blood is administered in the field or is otherwise wasted.
    b. Replacements, like exchanges, shall take place at Sinai Hospital of Baltimore within their blood bank.
    c. CCDFEMS, depending on availability, will be allotted two (2) additional units of LTO+ Whole Blood which shall remain within the blood bank of Sinai Hospital until the need for an unscheduled replacement of whole blood arises.
    d. CCDFEMS may obtain a replacement unit(s) of whole blood 24/7 as needed.
    e. Once the need for replacement of a unit of whole blood is indicated, the on-duty Battalion Chief shall confer with the Blood Program Manager and Blood Program Designees to coordinate when the replacement shall occur.
    f. An available CCDFEMS Blood Program Designee shall obtain the Delta 2L cooler from the chase vehicle requiring whole blood replacement and transport it to Sinai Hospital of Baltimore to receive the replacement unit. This process ensures that the respective chase vehicle does not need to be taken out of service or travel out of the county for an extended period.
    g. Enroute to Sinai Hospital, the CCDFEMS Blood Program Designee shall contact the blook bank of Sinai Hospital to inform them that they are enroute to their facility, and that they are intending to obtain a replacement unit of whole blood.
    h. The replacement shall be documented while at Sinai Hospital by signing for the replacement of blood via Sinai's paper documentation, and the digital ***CCDFEMS Whole Blood Exchange and Replacement Form.***
    i. Once the replacement is complete, the CCDFEMS Blood Program Designee shall promptly report back to the respective chase vehicle so that the Delta 2L cooler containing whole blood can be picked up and placed back in service.

CCDFEMS Whole Blood Exchange and Replacement Form which includes the lot numbers, a picture of each unit of blood (including the lot number and Safe-T-Vue), and the time of exchange. A CCDFEMS Blood Program Designee or other CCDFEMS representative must be present to receive, exchange, or replace blood products at Sinai Hospital. The Exchange and Replacement form can be accessed through SharePoint or the hyper-link and QR code below.

Whole Blood Exchange and/or Replacement Form

E. Blood Discrepancies

1. If the Safe-T-Vue indicator shows that a unit of blood has been compromised, and/or if the temperature falls outside of the acceptable range, the on-duty Battalion Chief and the Blood Program Manager (Assistant Chief of EMS) shall be notified immediately. They will then contact Inova Blood Donor Services and the Sinai Hospital Blood Bank for further instructions.

   If the Safe-T-Vue window confirms that the blood unit has been breached, the following actions must be taken without delay:

   a. Keep the affected blood in the Delta 2L cooler or place it into the designated station refrigerator if there is a suspected Delta 2L cooler failure and alert the on-duty Battalion Chief and Blood Program Manager by phone, who shall notify the Agency Medical Director. If unable to reach to Blood Program Manager by phone, text message **AND** e-mail notifications shall be sent as soon as possible.
   b. Take a picture of the Safe-T-Vue with lot number.
   c. The Blood Program Manager shall produce a temperature data log report and immediately notify Inova to inform them of the temperature excursion. The decision to exchange or discard blood products shall be at the discretion of Inova.
   d. At the discretion of the Blood Program Manager, the Clinician shall perform immediate preliminary efforts to determine how, when, and why the discrepancy may have occurred. If the initial gathering of information cannot rule out tampering or inappropriate use of blood or equipment, the discrepancy shall be considered unresolved, and further investigation will be required.
   e. The Blood Program Manager shall provide a summary of the preliminary investigation to the on-duty Battalion Chief and Agency Medical Director.
   f. If further investigations reveal inappropriate handling or access to blood products, or its associated equipment, internal escalation shall result at the discretion of leadership staff and the Agency Medical Director.
   g. If the recorded temperature falls below 2ºC or between 6-10ºC for more than 30 minutes, the following actions must be taken immediately:
      i. Immediately move the Delta 2L cooler to an acceptable ambient temperature environment.
      ii. Follow the TCI exchange procedures as outlined in **B, Daily Operations, section 5** of this standard operating procedure.

1. If the temperature excursion cannot be corrected within 30 minutes:
   a. The unit shall go out of service and report to the closest station with a conditioned TCI, if not in quarters.
   b. While enroute to change TCI, attempt to have in-station personnel remove a conditioned TCI and place it on the conditioning mat with TEMPWATCH.

c. Complete the daily blood form as blood products are being moved to the new TCI.
d. Notify the Blood Program Manager and provide the following information:
    i. The maximum/minimum temperature recorded
    ii. The event(s) causing the temperature to fall out of range
    iii. What actions have been done to return blood to acceptable range.

2. The Safe-T-Vue temperature indicator appears on the unit of blood as displayed in the photo below:

a. **White** – Active temp indicator, temperature below 9°C.
b. **Red spotting** – Temperature has reached 9°C. Refrigerate promptly.
c. **Red** – Temperature breach >10°C

F. Upgrades and Transports

A Chase Car Clinician may be required to upgrade a BLS transport unit or accompany an ALS transport unit during patient transport, either at the request of the primary patient care provider or as otherwise necessary.

Chase Car Clinicians shall exercise and consider the following:

1. When a Chase Car Clinician departs their vehicle to upgrade or ride onboard a transport unit for the duration of transport to the hospital, they shall remove the Delta 2L cooler containing whole blood, and the Critical Intervention Bag from the chase vehicle. These items must remain in the clinician's possession for the duration of patient care and transport to the hospital, regardless of the destination.

2. Additional equipment (e.g., cardiac monitor, medications, etc.) may also be required to support patient care and should be taken as needed.

3. Whenever feasible and safe to do so, the chase vehicle shall follow the respective transport unit to the receiving in-county hospital. If this is not possible, or the transport destination is out of county, the chase vehicle shall either be secured on scene or returned to its respective quarters.

4. **At no time shall the Delta 2L cooler containing blood or the Critical Intervention Bag be left in the chase vehicle or separated from the responsible Chase Car Clinician for an extended period.**

G. Extreme Weather Operations

The Delta 2L cooler's ideal ambient operating temperatures are between **14°F - 104°F**. Seasonal extreme weather conditions can cause excessively hot or excessively cold ambient conditions which in turn can affect the operation of the cooler's internal electronic components, temperature monitoring capabilities, and TCI connectivity. Although outside temperatures may appear to fall between the ideal operating temperatures, the temperatures within a vehicle can be much higher or lower due to a multitude of variables. Chase car clinicians shall exercise the following to ensure the Delta 2L cooler remains in a stable environment and operates without issue:

1. When Carroll County is operating under **Category 1** (Heat Stress Index/Wind Chill temperature of **10°F or below**), and **Category 2 conditions** (Heat Stress Index/Wind Chill temperature of **11-39.9°F**) Chase Car Clinicians shall ensure the Delta 2L cooler is not exposed to extreme cold environments for extended periods.
    a. If the vehicle is out of quarters with the Delta 2L cooler inside, the vehicle shall remain running during brief stationary periods (e.g., incident scenes, brief station visits, short errands) with the heat or warm air on to maintain an appropriate ambient environment.
    b. If the vehicle is shut off and left outside for an extended period (e.g., lengthy administrative duties, prolonged station visits), the cooler shall be removed and accompany the responsible Chase Car Clinician into a temperature-controlled environment.
    c. While in quarters, if the apparatus bay the chase vehicle is stationed in is temperature controlled, or maintains an appropriate ambient temperature, the Delta 2L cooler may remain secured within the chase vehicle. If this is not the case, the Delta 2L cooler shall be taken into the temperature-controlled environment of the station.
    d. The responsible Chase Car Clinician shall ensure that they retrieve the Delta 2L cooler and secure it back into the chase vehicle prior to departing quarters to respond on an emergency incident or other reason.

2. When Carroll County is operating under **Category 4** (Heat Stress Index/Wind Chill temperature of **80-89.9°F**), and **Category 5 conditions** (Heat Stress Index/Wind Chill temperature of **90°F** and above) Chase Car Clinicians shall ensure the Delta 2L cooler is not exposed to extreme heat environments for extended periods.
    a. If the vehicle is out of quarters with the Delta 2L cooler inside, the vehicle shall remain running during brief stationary periods (e.g., incident scenes, brief station visits, short errands) with the air conditioning on to maintain an appropriate ambient environment. The Delta 2L cooler shall also sit on the front passenger's seat to allow full exposure to the air conditioning.
    b. If the vehicle is shut off and left outside for an extended period (e.g., lengthy administrative duties, prolonged station visits), the cooler shall be removed and accompany the responsible Chase Car Clinician into a cool and temperature-controlled environment.
    c. While the chase vehicle is in quarters, the Delta 2L cooler shall be taken into the temperature-controlled environment of the station and closely monitored by the responsible Chase Car Clinician.
    d. The responsible Chase Car Clinician shall ensure that they retrieve the Delta 2L cooler and secure it back into the chase vehicle prior to departing quarters to respond on an emergency incident or other reason.

e. 2 TCI swaps shall be performed throughout a 24-hour shift (once every 12 hours) to ensure the appropriate temperature of the Delta 2L cooler is maintained.

H. Administration

Whole Blood Products shall be administered in accordance with the indications outlined within the Maryland Medical Protocols. Whole Blood Products may be indicated in a variety of patients who are suffering internal or external hemorrhage because of either medical or traumatic origin. Whole Blood shall only be administered by ALS clinicians who meet the training, qualification, and certification requirements as set forth by the Agency Medical Director and designees, and that are outlined within this policy.

1. Administration of Whole blood products should follow the chronological directions as outlined in the attached document ***Whole Blood Administration Procedures***.

2. The general procedures for Whole Blood administration are outlined in the Maryland Medical Protocols and are as follow:

    a. Ensure applicable hemorrhage and shock interventions: tourniquet, wound-packing, pelvic binder, and thoracic decompression.
    b. Assess for contraindications to administration of Whole Blood.
    c. Obtain IV access (18 gauge or larger, if possible), and keep IV catheter hub accessible to allow direct connection of blood tubing. A large-bore IV extension set, and large-bore stopcock may be utilized if available. Obtain pre-transfusion blood sample, if time and patient's condition permit.
        i. IV infusion is preferable to IO infusion for optimal flow rates.
    d. Transfuse Whole Blood:
        i. Patients less than 35 kg: Administer 10 mL/kg IV/IO
        ii. Patients greater than or equal to 35 kg: Administer 1 unit IV/IO
    e. Apply Whole Blood identification bracelet to patient's wrist or ankle.
    f. Assess for signs of transfusion reaction: hives, wheezing, rigors, fevers, abdominal pain, vomiting, sudden worsening of hypotension or tachycardia that is not consistent with patient's underlying condition.
    g. Assess for clinical improvement for patients with non-compressible hemorrhage. Look for signs of improved perfusion with presence of central pulses but exercise permissive hypotension approach. Target to SBP of:
        i. 90 mmHg for patients less than 35 kg
        ii. 100 mmHg for patients greater than or equal to 35 kg
        iii. 110 mmHg for patients greater than or equal to 35 kg with significant TBI
    h. Reassess for signs of transfusion reaction.

In cases where a patient experiencing suspected hemorrhagic shock, consider administration of Tranexamic Acid (TXA) if indicated in accordance with Maryland Medical Protocol. Much like Whole Blood, early administration of TXA is ideal, but initial management of airway, breathing, and circulation must first take place. TXA may be given before blood in the same IV/IO line, after blood in the same IV/IO line, or at the same time in a **different** IV/IO line but cannot be given simultaneously in the same IV/IO line as blood.

After administration of the first unit of Whole Blood administer calcium chloride through a separate IV/IO line or after flushing the primary IV/IO line. Follow Maryland Medical protocol dosing as indicated:

a. Patients less than 35 kg: 20 mg/kg slow IV/IO
b. Patients greater than or equal to 35 kg: 1 gram slow IV/IO

Blood Products should be administered utilizing the LifeFlow fluid administration device along with associated, commercial IV tubing. In circumstances which the LifeFlow device or associated IV tubing is compromised or unavailable, the Whole Blood shall be administered with a pressure bag and the specialized filtered "Y" blood tubing.

I. Transfusion Reaction

A patient who receives Whole Blood Products may develop an immune response from receiving uncrossmatched blood products. This is known as a **Transfusion Reaction**. Signs and symptoms of a transfusion reaction include but are not limited to hives, wheezing, rigors, fever, abdominal pain, vomiting, and sudden worsening of hypotension or tachycardia that is not consistent with the patient's underling condition. If a transfusion reaction is suspected, perform the following:

1. Immediately discontinue the whole blood transfusion.
2. Flush the patient's IV/IO with normal saline.
3. Administer the patient age-appropriate doses of dexamethasone IV/IO AND diphenhydramine IV/IO.
4. Reassess the patient's condition and continue to treat the signs and symptoms of the transfusion reaction in accordance with MMP.
5. Place the unit of Whole Blood, blood administration filtered tubing, LifeFlow fluid administration device, and QinFlow CDU into a red biohazard bag. Secure the bag and maintain custody of the bag and its contents.
6. If reassessment of the patient indicates that the patient is still in need of Whole Blood, a new transfusion from a **different** unit of LTO+ Whole blood may be initiated utilizing a separate set of administration equipment.
7. Upon transfer of care, to either aeromedical or receiving facility staff, the respective clinician will be verbalized in their hand-off / TOC report that the patient presented with the signs and symptoms of a transfusion reaction after receiving a unit of Whole Blood, and that the patient was treated accordingly. Additionally, the unit of Whole Blood and administration equipment

within the biohazard bag will be provided to the receiving facility so that it may undergo the appropriate testing.

Following the transfer of care and conclusion of the incident, immediate notification will be made to the on-duty Battalion Chief. Additionally, email notification from the administering clinician and on-duty Battalion Chief will be made directly to the Blood Program Manager and Agency Medical Director. The email notification will include the incident date and number, the indications for Whole Blood administration, the unit of Whole Blood the patient was administered and had a reaction to, the indications of the patient experiencing a transfusion reaction, actions taken to treat the transfusion reaction, the patient's response to treatments, and the facility the patient was transported to. The Blood Program Manager and Agency Medical Director will then make notification to Inova and Sinai Hospital as well as their respective representatives who will then begin the investigative process into the transfusion reaction in accordance with Inova's procedures.

J. Transfer of Patient Care

The clinician who administered Whole Blood shall accompany the patient and other providers during transport to the respective facility if applicable and feasible. In cases where patient care is laterally transferred to a service and provider that is certified in Whole Blood administration where accompanying the patient and providers may be challenging (e.g. Maryland State Police Aviation Command), the clinician who administered Whole Blood is not required to accompany the patient for the remainder of transport to definitive care.

If patient care is transferred to a service such as Maryland State Police Aviation, and whole blood has been administered prior to the arrival of the service and transfer of patient care, the empty whole blood bag and pre-transfusion blood sample, if obtained, should be transferred with the patient and to the new providers so that it may be provided to the receiving facility.

Upon hospital arrival, inform receiving team of patient's receipt of whole blood, and provide empty whole blood bags and pre-transfusion blood sample, if obtained, for hospital blood bank evaluation. Patients who receive Whole Blood shall have a red identification bracelet placed on either the patient's wrist or ankle. If able, the time of administration should be documented in black ink on the bracelet.

VI. DOCUMENTATION

Proper documentation of blood product acquisition, exchange, and usage is imperative for the evaluation of the blood program's efficacy. Additionally, this data is collected and observed by National Emergency Medical Services Information System (NEMSIS), MIEMSS, and Inova.

A. Documentation of Daily Checks

The ***CCDFEMS Whole Blood Daily Check*** shall be completed at the start of the clinician who assuming custody of the blood products and respective equipment's shift. The Daily Check shall account for and document the presence of the proper blood storage and administration equipment, as

well as the condition of the Whole Blood. The Daily Check shall be completed in a timely manner respective to the start of the respective clinician's shift. Any deficiencies found during the Daily Check will be documented via the Daily Check form and will be reported to the Shift Commander or respective Whole Blood Program designee.

B. Documentation of Blood Exchange and/or Replacement

The ***CCDFEMS Whole Blood Exchange and Replacement Form*** shall be completed at the time of replacement and/or exchange of blood products by the provider conducting the exchange with the blood bank staff at Sinai. This form shall be submitted promptly prior to leaving Sinai/or disseminating the blood products to other chase vehicles. This document can be found on SharePoint in the Whole Blood Group. Should there be any discrepancies or concerns during the exchange, the Blood Program Manager and Agency Medical Director should be notified via e-mail as soon as possible, in addition to the completion of the form.

C. Documentation of Whole Blood Usage

The ***CCDFEMS Whole Blood Administration Log*** shall be completed immediately upon completion of the call, or as soon as reasonably possible. This document can be found in SharePoint or can be accessed via the hyper-link and QR code below.

CCDFEMS Whole Blood Administration Log

The on-duty Battalion Chief shall be notified by phone immediately upon completion of the call, or as soon as reasonably possible. Additionally, an e-mail notification shall be sent to the Blood Program Manager, Agency Medical Director, and Blood Program Designees. This notification must include, at minimum, the incident number, amount of blood given, and any exceptional circumstances or concerns during the call. Either EMS100 or MD1, will notify the Center Medical Director when a unit of Whole Blood is transfused in the field. The notification shall include the transfusion date, the unit number, and the receiving facility. Notifications shall be sent to the Center at IBDSdistribution@Inova.org

All whole blood administrations will be reviewed by the Agency Medical Director and blood program designees for quality assurance, quality improvement, and tracking purposes. Additionally, a follow-up of the patient's outcome will be obtained and documented under a secured log.

D. Documentation In eMEDS:

1. Clinicians shall document the administration of Whole Blood via the eMEDS PowerTool labeled "Blood Trans" which is located on the righthand side while completing the report. After the prompted information is completed, the relevant details will automatically populate into the "Procedures" and "Medications" tab of the eMEDS report.

2. Additionally, clinicians should include the following in the eMEDS report.
    a. A photo of the blood unit administered (with Safe-T-Vue and lot number visible) uploaded under the "Attachments" tab and labeled as "Other Picture/Graphic".
    b. The initiation and completion times of the Blood Transfusion documented within the "Narrative" section of the eMEDS report.

VII. RECISION

This Standard Operating Procedure rescinds all directives regarding Low Titer O+ Whole Blood Administration or similar content previously issued for personnel of the Carroll County Department of Fire & EMS.

VIII. RELATED STANDARD OPERATING PROCEDURES / DOCUMENTS

A. The Maryland Medical Protocols For Emergency Medical Services

IX. ATTACHMENTS

1. Attachment A- "Whole Blood Administration Procedures"
2. Attachment B- "Whole Blood Administration- Troubleshooting Guide"
3. Attachment C- "Whole Blood Administration- Dosing Guide"
4. Attachment D- "Whole Blood Administration- Calcium Chloride Dosing Guide"
5. Attachment E- "Whole Blood Administration- Tranexamic acid TXA Dosing Guide"
6. Attachment F- "Whole Blood administration- Indications Guide"
7. Attachment G- "CCDFEMS Whole Blood Administration with QinFlow Warrior Lite and Lifeflow Scoring Rubric"
8. Attachment H- "CCDFEMS Physician Authorization for Emergency Release of Uncrossmatched Blood Products"
9. Attachment I- "Inova Blood Donor Services Transfusion Related Adverse Reaction Report"
10. Attachment J- "CCDFEMS, Inova, Sinai Hospital MOU"
11. Attachment K- "CCDFEMS, Inova, and Sinai Exchange/Replacement Flow Chart"

Whole Blood Administration Procedures
SOP 3.48 Attachment A

The following information is based on device manufacturers' recommendations and most effective practices.

1. Connect QinFlow battery and base unit and check battery level. Connect extension cord to base if needed.
2. Remove LifeFlow set from packaging. Close all clamps and spike NSS bag.
3. Connect LifeFlow to CDU at the short tubing set labeled "In."
4. Open NSS clamp and squeeze the lower air-check chamber so that fluid is above filter and ball is floating. There should be NO air gap in either lower or upper chamber, unlike regular IV tubing.
5. Load LifeFlow syringe into infuser by securing the white plunger into the blue slot with the numbers facing up.
6. Squeeze the LifeFlow infuser to prime LifeFlow and CDU to remove air from all units and tubing.
7. Connect the distal end of the CDU to the IV catheter hub or extension set. Flow NSS to ensure patency.
8. Attach CDU to base unit of QinFlow Warmer.
9. Allow base unit to go through checks. • The battery indicator and green check light will remain on; it may be solid or blinking. • If the red "X" illuminates, replace CDU and reprime. • If the red "X" illuminates again, place Qinflow out of service and administer blood without warmer.
10. Squeeze LifeFlow infuser to flow NSS and reaffirm patent flow to patient.
11. Remove unit of blood products from the Delta, inspect Hemo-Trac, and slightly agitate.
12. Spike blood bag. Close NSS clamp and open blood clamp. Squeeze the air-check chamber to remove small amount of air reintroduced from spiking blood bag.
13. Squeeze LifeFlow infuser to administer blood. Each squeeze provides 10 mL.
14. Monitor vitals and observe for signs of transfusion reaction*.
15. Place wristband on patient and take picture of unit of blood with lot number.
16. If not already done, administer TXA and administer 1 gram Calcium Chloride per Maryland Medical Protocols.
17. Provide empty blood bag to receiving nurse or physician.

18. Notify the on-duty Shift Commander via phone immediately upon completion of the incident and send an email notification to MD1. Additionally, an email notification shall be sent to Blood Program Manager and Agency Medical Director.
19. Document blood administration in the "Whole Blood Administration Log" and in EMEDS under both the procedures and medication tab, to include picture(s) of the unit(s) of blood.

***If a transfusion reaction occurs, immediately stop blood administration**, treat for an allergic reaction, and notify receiving hospital. Place unit of blood, CDU, and LifeFlow in the supplied 2.5-gallon bag to provide to hospital. A new transfusion from a different unit of LTO+ WB with new LifeFlow and CDU may be initiated if patient reassessment indicates continued need for blood.

Whole Blood Administration- Troubleshooting Guide

SOP 3.48 Attachment B

The following information is based on the Maryland Medical Protocols and device manufacturers' recommendations.

Problem	User Action
Transfusion Reaction: signs include hives, wheezing, tremors, fevers, abdominal pain, vomiting, sudden worsening of hypotension/tachycardia that is not consistent with patient's underlying condition	Immediately stop transfusion and treat for allergic reaction per the MMP. Notify the receiving hospital ASAP. Place unit of blood, CDU, and LifeFlow in the supplied 2.5-gallon bag and provide to hospital. Patient may receive a new unit with an entirely new set-up if need for blood persists.
Air in Chamber/Air-Check Ball Begins to Drop: indicates air in chambers or that you are out of blood and/or fluid.	Stop infusing and check fluid and blood bags. If there is still volume in the bags, re-prime the air-check chamber. If no volume remains, disconnect the tubing from the patient, spike a new bag if needed and re-prime the line.
Air in Tubing Below the Air-Check Chamber	Stop infusing and disconnect from the patient. Re-prime the entire line and CDU with NSS prior to connecting to the patient.
Vacuum in the Air-Check Chamber: indicates that you are out of fluid	Close blood clamp. Open NSS clamp and squeeze the air-check chamber to refill and release vacuum.

LifeFlow Trigger Not Engaging the Syringe: indicates that the syringe plunger is not properly seated into the shuttle.	Open the LifeFlow infuser and place the edge of the syringe plunger into the slot of the blue shuttle.
Resistance in LifeFlow Trigger: indicates interruption in flow downstream from the LifeFlow, or infusion is too rapid.	Slow down the rate of squeezing the trigger. If that does not work, stop infusing. Ensure IV clamps are open, IV is patent, and that there are no kinks in the tubing. DO NOT APPLY EXCESSIVE FORCE TO TRIGGER.
LifeFlow Trigger Breaks Off During Use: this is a safety feature designed to mitigate excessive pressure during transfusion.	Open the LifeFlow and remove syringe from the shuttle. Discard the LifeFlow infuser and continue infusion using manual push-pull technique on the syringe or apply a pressure bag.
QinFlow- No Lights on Panel: CDU is attached but system does not turn on or initialize. No indication lights on panel.	Press the on/off switch, if no response replace battery with a fully charged battery or plug in extension cord. If issue persists, replace CDU. If still not resolved, do not use warmer. Remove CDU and infuse the cold blood products.
QinFlow Blue Indicator Light On: indicates fluid temperature is below set point; flow rate is higher than the warmer's capabilities.	Reduce infusion rate until blue indicator light turns off.
QinFlow Red Indicator Light On: indicates internal communication error between CDU and base unit or warning cutoff to prevent overheating.	Fix flow complications and restart unit. Ensure that the CDU is correctly primed. If problem persists, replace the CDU with a new one, re-prime, and connect it to base unit. If it remains unresolved, do not use warmer.
QinFlow Low Battery Indicator: one steady battery bar remains indicating low battery.	Replace battery or plug in power cord.

QinFlow Battery Indicator Blinking: indicates critically low battery; blue light may also turn on as it reduces warming capability to preserve power.	Replace battery or plug in power cord. Unit will shut off without warning if unresolved.

Whole Blood Administration- Dosing Guide

SOP 3.48 Attachment C

On-line medical direction required for patients under 1 year of age.

AGE	IDEAL WEIGHT	ML OF BLOOD
PREEMIE	2 KG	20 mL
NEWBORN	4 KG	40 mL
4MO	6 KG	60 mL
6MO	8 KG	80 mL
1YR	10 KG	100 mL
2YR	12 KG	120 mL
3YR	15 KG	150 mL
4YR	17 KG	170 mL
5YR	20 KG	200 mL
6YR	22 KG	220 mL
7YR	25 KG	250 mL
8YR	27 KG	270 mL
9YR	30 KG	300 mL
10YR	35 KG	1 Unit (500 mL)

Whole Blood Administration- Calcium Chloride Dosing Guide

SOP 3.48 Attachment D

AGE	IDEAL WEIGHT	MG	ML of CaCl
PREEMIE	2 KG	40 MG	0.4 mL
NEWBORN	4 KG	80 MG	0.8 mL
4MO	6 KG	120 MG	1.20 mL
6MO	8 KG	160 MG	1.60 mL
1YR	10 KG	200 MG	2.00 mL
2YR	12 KG	240 MG	2.40 mL
3YR	15 KG	300 MG	3.00 mL
4YR	17 KG	340 MG	3.40 mL
5YR	20 KG	400 MG	4.00 mL
6YR	22 KG	440 MG	4.40 mL
7YR	25 KG	500 MG	5.00 mL
8YR	27 KG	540 MG	5.40 mL
9YR	30 KG	600 MG	6.00 mL
10YR	35 KG	1 Gram	10 mL

Whole Blood Administration- Tranexamic Acid (TXA) Dosing Guide

SOP 3.48 Attachment E

AGE	Amount of TXA	Amount of TXA	Mixed in amount of Dilutant	Infusion Rate
<5YR	Requires Consult	N/A	100mL (NS, LR, D5W)	N/A
5YR to 11YR	500 MG	5 mL	100mL (NS, LR, D5W)	Over 3-5 minutes
12YR and Older	1000 MG/ 1 Gram	10 mL	100mL (NS, LR, D5W)	Over 3-5 minutes

Whole Blood Administration- Indications Guide

SOP 3.48 Attachment F

Shock Index= Heart Rate ÷ Systolic BP

No Shock	Mild Shock	Moderate Shock	Severe Shock
<0.6	0.6≥ to <1.0	1.0≥ to <1.4	≥1.4

Indications:

Clinical suspicion for major blood loss, such as:

- Penetrating trauma to the trunk
- Unstable pelvic fracture or multiple long bone fractures
- Blunt trauma mechanism consistent with major internal blood loss
- Observed major external blood loss
- Signs and symptoms of massive GI bleed, ruptured aortic aneurysm, or ruptured ectopic pregnancy

WITH Evidence of significant physiologic compromise:

- Age-defined hypotension* **PLUS** at least **one** of the following:
- Age-defined tachycardia**
- ETCO2 less than 25
- Positive eFAST exam (if available)
- Lactate greater than 4 (if available)
- Capillary reperfusion greater than 3 seconds
- Altered sensorium thought not secondary to intoxication or head trauma
- Witnessed PEA cardiac arrest less than 5 minutes in duration

*Age-Defined Hypotension	**Age Defined Tachycardia
Ages less than 10YRS: systolic BP less than (70 + 2 x age in years)	Age 1 year: greater than 190
Ages 10-65: systolic BP less than 90	Ages 2-4 yrs: greater than 140
Ages Greater than 65: Systolic BP less than 100	Ages 5-12 yrs: greater than 140
Any age: absent radial pulses	Ages greater than 12 yrs: 120

SOP 3.48 Attachment G

Carroll County Department of Fire & EMS

Paramedic Skills Scoring Rubric

Whole Blood Administration with Warrior Lite & LifeFlow

DATE: ___/___/____ Clinician Name: _____ MIEMSS Provider #: _____

PASS or FAIL: [ ] PASS [ ] FAIL

Evaluator Name: _____ Attempt: _____

Preparation	
Takes appropriate PPE precautions (including gloves and mask).	☐
Assess for indications for whole blood administration.	☐
Assess for contraindications for whole blood administration.	☐
Verbalize treatments taken prior to whole blood administration in accordance with MMP (i.e. Hemorrhage control, Airway management, Pelvic binder, TQ/ Junctional TQ, and TXA administration).	☐
Retrieve blood administration supplies	
• Delta 2L cooler with unit of blood • 250ml NS • LifeFlow (Pressure bag if LifeFlow is unavailable) • Warrior Lite base • Warrior Lite battery • CDU • Extension cable (if applicable) • Equipment to establish IV/IO access	☐
Connect battery to base unit to check battery level; connect extension cord to base unit if using.	☐

Remove LifeFlow from packaging, close all clamps, and spike NS bag.	☐
Open clamp below NS and squeeze drip chamber so that fluid covers filter (ball should float).	☐
Connect LifeFlow set to CDU.	☐
Place 10mL syringe in LifeFlow device, numbers up, and close lid.	☐
Squeeze trigger with LifeFlow device pointed up to remove all air. Stop once primed.	☐
Connect the distal end of the CDU directly to the IV catheter hub.	☐

Blood Administration with Warrior Lite Fluid Warmer	
Attach CDU to base unit or extension cord. Make sure either is secured to the base unit.	☐
Allow base unit to go through checks. (All indicators will illuminate, then battery indicator and green check light will remain on; it may be solid or blinking).	☐
Gently agitate blood products and spike bag for administration.	☐
Close clamp below NS and open clamp below blood.	☐

During/After blood administration	
Administer blood using LifeFlow device using smooth, quick squeezes.	☐
Monitor the patient for signs of clinical improvement and for signs of transfusion reaction.	☐
Student appropriately addresses red “X” illumination.	☐
Verbalize the appropriate treatment actions that would be taken in the event of a transfusion reaction.	☐
If transfusion reaction is suspected and the blood infusion is incomplete, leave LifeFlow connected to the bag of blood, discontinue the IV/convert to J-loop. Place LifeFlow, CDU and blood in a marked bag. Treat per MMP, notify hospital staff. Make STAT notification immediately upon hospital arrival. Follow SOP 3.48.	☐
Blood products have been administered.	
Close clamp to blood products and open bag to NS to flush.	☐
Verbalize the administration of 10% Calcium Chloride following whole blood administration.	☐
Take a picture of bag of blood. Place **RED** wristband on patient. Document transfusion start and end times.	☐
Unspike bag of whole blood and give to hospital staff. Ensure that a photo is obtained of the blood bag (picture including Hemo-Trac and Lot #) to be uploaded into eMEDS.	☐
Verbalize the appropriate documentation steps both in eMEDS and in accordance with SOP.	☐

Overall Evaluation	
0	Unsuccessful; required critical or excessive prompting; inconsistent; not yet competent
1	Approaching competency, marginal or inconsistent.
2	Successful; competent; no prompting necessary

CRITICAL ACTIONS

___ Failure to take or verbalize appropriate PPE precautions ___ Failure to screen for contraindications to blood administration ___ Performs any improper technique resulting in the potential for uncontrolled hemorrhage, catheter shear or air embolism	___ Performs an action that allows the loss of blood product ___ Fails to use an aseptic technique

To pass, a student clinician must score an Overall Evaluation Score of 2 and have no Critical Actions. If a fail, a detailed written explanation must be provided.

PASS ____ FAIL_____

EVALUATOR SIGNATURE _____

EVALUATOR COMMENTS

NOTE: If student(s) failed, please provide explanation.

SOP 3.48 Attachment H

CARROLL COUNTY DEPARTMENT OF FIRE & EMS
225 N. CENTER STREET WESTMINSTER, MD 21157
410-386-6800

CCDFEMS Incident Number:

Incident Date:

Physician Authorization for Emergency Release of Uncrossmatched Blood Products

Due to the critical condition of this patient, the immediate release of uncrossmatched blood products for emergency transfusion was authorized in accordance with the Maryland Medical Protocols for Emergency Medical Services Personnel, per the Code of Maryland Regulation 30.03.05.03.

Pursuant to this, the risks incurred by lack of complete transfusion testing were felt to be outweighed by the clinical benefit of resuscitation with blood products.

Blood Product Unit ID Number:

This patient received

- Leukoreduced whole blood approx. 500ml, plus CPD 70ml
- Blood Type O+
- No high antibody titer to A and B antigens detected
- Uncrossmatched

For immediate concerns or questions, please contact the on-Duty Shift Commander at 410-386-6823 or the Assistant Chief of Emergency Medical Services at 410-386-6811.

Sincerely,

Medical Director

Carroll County Department of Fire and Emergency Medical Services

SOP 3.48 Attachment I

INOVA BLOOD DONOR SERVICES

TRANSFUSION RELATED ADVERSE REACTION REPORT

Please check any of the following that apply:

_____HBV _____HCV _____HTLV _____HIV _____TRALI _____Other

RECIPIENT INFORMATION

1. Reported by:

_____ _____

Name Date Reported

_____ _____

Title Hospital/Institution Name

_____ _____

Address City/State/Zip Phone

2. Brief Summary of Clinical Events including Transfusion Reaction (please attach written description, including recipient's gender and age, diagnosis and laboratory findings)

3. Was this case reported to any of the following (check all that are applicable):

Health Dept._____ Date_____

CDC _____ Date_____

Other _____ Date_____

4. Please provide the unique donor number of all suspect blood and blood components supplied by Inova Blood Donor Services.

Unit Number	Component	Date Received	Date Transfused

Please send completed report via secure email or fax to the Director, Medical Director or Compliance Manager at 571-434-3682 or ibdsregulatory@inova.org. If you are unable to send information via the methods mentioned, please send physical forms to:

Compliance Manager

Inova Blood Donor Services

45745 Nokes Blvd, Suite 160

Sterling, VA 20166

MEMORANDUM OF AGREEMENT
BETWEEN
INOVA HEALTH CARE SERVICES,
ON BEHALF OF ITS UNINCORPORATED DIVISION,
INOVA BLOOD DONOR SERVICES,
SINAI HOSPITAL OF BALTIMORE, INC. AND
CARROLL COUNTY, MARYLAND, ON BEHALF OF
Carroll County Department of Fire & EMS

This Memorandum of Agreement ("Agreement") is entered into as of August 27, 2025 ("Effective Date"), by and between Carroll County, Maryland, a body corporate and political and a subdivision of the State of Maryland ("County"), on behalf of Carroll County Department of Fire & EMS ("CCDFEMS"); Sinai Hospital of Baltimore, Inc., a Maryland non-profit, non-stock corporation ("Hospital"); and Inova Health Care Services, a Virginia non-profit, non-stock corporation, on behalf of its unincorporated division Inova Blood Donor Services ("Center"). (The County, Hospital, and Center are jointly referred to individually as "Party" or jointly as "Parties.")

A. Background

The County, through CCDFEMS, has a need for low titer group O whole blood ("whole blood") which can be transfused emergently to recipients of any blood group type. The Hospital has agreed to provide whole blood to CCDFEMS on an as-needed basis, and will obtain the whole blood from the Center. CCDFEMS paramedics will administer whole blood to patients in the field based on clinical judgment and the Maryland Medical Protocols for Emergency Medical Services. The purpose of this Agreement is to establish the terms and conditions and respective rights and obligations of the Parties pursuant to which Center will supply whole blood to Hospital, and Hospital will in turn provide such whole blood to CCDFEMS for the management of injured and/or hemorrhaging patients in the field.

B. Term and Termination

The initial term of this Agreement shall commence on the Effective Date and shall continue in effect for a period of one (1) year ("Initial Term"). Upon conclusion of the Initial Term, the Agreement shall be automatically renewed for successive one (1) year renewal terms (each a "Renewal Term") unless the Agreement is sooner terminated in accordance with the provisions herein.

The Initial Term and each Renewal Term, as applicable, shall be referred to herein collectively as the "Term." Any Party may terminate this Agreement at any time, without

or without cause, by providing the other Parties with at least thirty (30) days' prior written notice of such termination.

This Agreement shall immediately terminate upon an occurrence of any event of default by a party, such termination to be effective upon the defaulting party's receipt of written notice of cancellation for default. An event of default shall include: (a) fraud or any fraudulent practice with respect to this Agreement; (b) dissolution of the party; (d) upon the bankruptcy, insolvency or receivership of another party; or (e) upon the imposition of any sanction against or the exclusion of a party by any governmental health program, including, but not limited to the Medicare and Medicaid programs. Each party shall immediately notify the other parties in writing of any default.

C. Roles and Responsibilities

Each party agrees to the roles and responsibilities as set forth on the Guidelines attached hereto as Exhibit A.

D. HIPAA Requirements

To the extent applicable to this Agreement, the Parties agree to comply with the Health Insurance Portability and Accountability Act of 1996, as codified at 42 USC§ 1320d ("HIPAA") and any current and future regulations promulgated thereunder including without limitation the federal privacy regulations contained in 45 C.F.R. Parts 160 and 164 (the "Federal Privacy Regulations"), the federal security standards contained in 45 C.F.R. Part 142 (the "Federal Security Regulations"), and the federal standards for electronic transactions contained in 45 C.F.R. Parts 160 and 162, all collectively referred to herein as " HIPAA Requirements." The Parties agree not to use or further disclose any Protected Health Information (as defined in 45 C.F.R. § 164.501) or Individually Identifiable Health Information (as defined in 42 USC§ 1320d), other than as permitted by HIPAA Requirements and the terms of this Agreement.

The Parties shall make their internal practices, books, and records relating to the use and disclosure of Protected Health Information available to the Secretary of Health and Human Services to the extent required for determining compliance with the Federal Privacy Regulations.

E. Indemnification

Each Party agrees to indemnify and hold harmless the other Parties, and their respective affiliates, employees, agents, trustees, officers and directors from and against any and all claims, losses, damages, suits, costs relating to any negligent or intentional act or omission of the indemnifying party, its employees, and agents undertaken

pursuant to this Agreement, or any failure to perform any other covenant of this Agreement.

The provisions of this Section E shall survive termination or expiration of this Agreement.

F. Liability Insurance

At all times during the Term of this Agreement, the Parties shall each, at their own expense, maintain general liability insurance coverage, in an amount no less than $1,000,000 per occurrence and $3,000,000 in the aggregate.

Upon request, each Party shall provide a Certificate of Insurance to the other Parties evidencing the aforementioned coverage. Notwithstanding any other provision in this Agreement, in the event that any policy maintained by a Party is cancelled, expires or is subject to a reduction in the amount of coverage, the other Parties shall have the option to immediately terminate this Agreement. This Section shall survive the termination of this Agreement.

G. Independent Contractors

The Parties shall at all times be independent contractors, and no Party shall be considered or hold itself out as an employee or agent of another Party employees or agents of the other Parties. No Party shall withhold on behalf of the employees of another Party, any sums for income tax, unemployment insurance, social security or any other withholding or benefit pursuant to any law or requirement of any governmental body.

Nothing in this Agreement is intended nor shall be construed to create any employer/employee relationship, a joint venture relationship, or to allow the parties to exercise control over one another or the manner in which their employees or agents perform the services which are the subject of this Agreement.

H. Entire Agreement and Amendment

This Agreement supersedes all earlier agreements between the Parties and contains the final and entire Agreement between the parties with respect to the subject matter hereof and they shall not be bound by any terms, conditions, statements, or representations, oral or written, not herein contained, unless contained in a written executed amendment of this Agreement signed by all Parties. No amendment of this Agreement shall be valid unless it is in writing and signed by both Parties.

I. Governing Law

This Agreement shall be construed and enforced under the laws of the State of Maryland, excluding choice of law provisions, and it shall be construed in a manner so as to conform

with all federal, state, and local laws and regulations. The Parties further agree that any action to enforce or construe any provision of this Agreement may be brought only in the State of Maryland, notwithstanding the appropriateness of the jurisdiction the courts of any other state.

J. Compliance with Applicable Laws

The Parties agree to comply with applicable laws, regulations, rulings, and standards and amendments thereto, of all entities that regulate, license, govern and/or accredit the Parties, including, but not limited to, federal, state and local governmental entities, and the Joint Commission (if applicable).

K. No Third-Party Beneficiaries

This Agreement is not intended to and shall not confer upon any other person or business entity, other than the Parties hereto, any rights or remedies with respect to the subject matter of this Agreement.

L. Counterparts

This Agreement may be executed in counterparts, each of which shall be deemed to be an original.

M. Notices

All notices hereunder shall be in writing and shall be deemed to have been duly given if delivered in hand or sent by registered or certified mail, postage prepaid, return receipt requested, to each party at the address set forth below.

If to Hospital:

Sinai Hospital of Baltimore, Inc.
Attention: James Gannon, MS, RN, CEN,
Trauma Program Manager
2435 W. Belvedere Avenue, Suite 53
Baltimore, Maryland 21215

With a copy to:

LifeBridge Health, Inc.
Attention: General Counsel
10090 Red Run Boulevard
Owings Mills, Maryland 21117

If to County:

Carroll County, Maryland, on behalf of
Carroll County Department of Fire & EMS

Attention: Eric Zaney
50 Kate Wagner Road
Westminster, Maryland 21157

If to Inova:

Inova Blood Donor Services
Attention: Nicholas Lilly
45745 Nokes Boulevard, Suite 160
Sterling, Virginia 20166

With a copy to:

Inova Health System
Attention: General Counsel
8095 Innovation Park Drive
Falls Church, Virginia 22031

[SIGNATURES APPEAR ON THE PAGE THAT FOLLOWS.]

IN WITNESS THEREOF, the Parties hereto have executed this Agreement as of the day and year indicated.

SINAI HOSPITAL OF BALTIMORE, INC.

By: _____

Name: Jonathan Moles

Title: Vice President Operations

Date: 8/15/2025

CARROLL COUNTY, MARYLAND,
on behalf of Carroll County Department of Fire & EMS

By: _____

Name: Eric Zaney - Eric Zaney

Title: Assistant Chief

Date: 08/19/2025

INOVA BLOOD DONOR SERVICES

By: _____

Name: Nicholas Lilly

Title: Senior Director

Date: 8/20/25

EXHIBIT A

GUIDELINES

Use of Whole Blood in the Management of Injured Patients

PRINCIPLE

In an emergency situation it may be necessary for the County to transfuse blood product without completing a type and screen. Low titer group O whole blood can be transfused emergently to recipients of any blood group type. Center will supply whole blood to Hospital, and Hospital in turn will provide whole blood to the County to administer to patients in the field by paramedics based on clinical judgment and the Maryland Medical Protocols for Emergency Medical Services.

I. Prehospital Setting

a. Center will provide whole blood with an approved and intact blood temperature indicator to Hospital for distribution to the County for use in the prehospital setting. The number of whole blood units will be designated by the County, as discussed and agreed upon by the Parties.

b. Whole blood must be stored between 1-6°C and expires 21 days from when it was collected. It takes approximately 15 minutes at room temperature for the whole blood unit to warm up out of the acceptable temperature range for transfusion. Blood may be used more quickly with an approved field blood warmer for transfusion.

c. Once the whole blood unit is spiked it must be transfused or discarded within 4 hours. Patients will receive whole blood under the Maryland Medical Protocols for Emergency Medical Services by properly trained County paramedics. The County will provide Center with the patient care protocols for blood administration.

II. The following procedure shall be used to monitor and track patients who receive whole blood:

a. The County will notify the Center Medical Director of any patient who is transfused in the field.

b. Transfusion Reaction Reporting and Data Management: In the event of a suspected transfusion reaction, a post transfusion reaction workup will be performed by the blood bank of the receiving hospital. It is recommended that the whole blood unit and container are turned over to the receiving hospital blood bank for any further testing or workup that needs to be performed. The Center shall be notified by the County of such a reaction whenever applicable. In addition, the Center's Medical Director is available for consult to review cases.

III. Cost

a. Center will charge Hospital an amount equal to $589 for each unit of whole blood provided to the County that is transfused or wasted. Hospital will pass through such cost to the County. Units that are not transfused will be returned to the Center, and Hospital will not be charged for such units.
b. Courier will charge Hospital a shipping and handling fee of $120 for one-way shipment between Center and Hospital and $200 for round-trip shipment between Center and Hospital, regardless of whether or not units from the shipment are transfused or wasted, and Hospital will pass through such fee to the County. This fee will be evenly divided across other County Fire and Rescue agencies receiving whole blood from the Hospital.
c. The cost of whole blood and any other associated fees, if applicable, may increase by a maximum of 3% on an annual basis, subject to at least thirty (30) days prior written notification from Center to Hospital and the County.

IV. Recruitment of Blood Donors

a. Center will collaborate with the County and Hospital to determine the potential of community and hospital based mobile blood drives to support the efforts of the whole blood program.

V. Stock Management

a. Whole blood will be stored in the Inova Blood Center refrigerators and in a validated shipping container stored within a temperature-controlled compartment in the transport vehicle.
b. Pursuant to a standing order for an agreed upon number of units, the courier service will deliver whole blood products from the Center to the Hospital blood bank every other week. Depending on the demand for whole blood the standing order may be changed by the Center Medical Director to meet the needs of the Center and the County.
c. Upon receipt of whole blood units, the blood will be appropriately stored in the Hospital blood bank. Hospital will notify the County of the receipt of the blood.
d. Upon notification that Hospital is in receipt of the blood, each County vehicle that carries whole blood units will travel to the Hospital blood bank to conduct an exchange. Hospital will exchange unused whole blood units from the County for new whole blood units approximately every 14 days.
e. When a unit of blood is transfused by the County, the County will notify Hospital that they require a replacement unit. Hospital will coordinate resupply of the County

emergently and notify the County when the blood arrives in the Hospital blood bank.

f. Unused units being returned to Hospital for exchange must be found to be acceptable. Each unit of blood must have an intact temperature indicator and must not be broken or outdated. The County will be charged for wasted units (outdated, broken, or out of acceptable temperature range) as described under Section III.

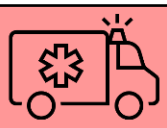
g. The Center will receive unused whole blood units from the Hospital, every other week.

h. Parties will maintain a custody log which must be shared when requested by another Party. This log must contain the following minimum data:

    1. Agency name
    2. Employee names associated with the exchange
    3. Date
    4. Time
    5. Nature of the exchange

FRESH BLOOD
Courier
Pick-up
INOVA
Wednesday
Anytime

FRESH BLOOD
Courier
Deliver
SINAI
Wednesday
Anytime



EMS SWAP
SINAI
Thursday
Before 9am

OLD BLOOD
Courier
Pick-up
SINAI
Thursday
After 9am

Exchanges will occur every other Wednesday and Thursday

COURIER

To ensure products are ready for prompt distribution, **please call Inova prior to pick-up of fresh units.**

EMS

Call the Sinai blood bank when you are on your way to swap products.

If blood products are needed between shipments, please call Sinai blood bank for availability.

Global Messenger		(410) 234-3100
Inova Blood Center	Distribution Line	(571) 434-3614
Inova Blood Center	Rebecca Owusu-Ansah	(571) 220-1997
Sinai Hospital	Blood Bank Laboratory	(410) 601-5112
Sinai Hospital	Keli Renoud- BB Manager	(410) 693-3180
Sinai Hospital	Jaime Gannon- Trauma	(410) 967-1369
CCDFEMS	Chris Petry	(443) 952-1755
CCDFEMS	On-call Battalion Chief	(410) 386-6823
CCDFEMS	Assistant Chief of EMS	(717) 688-1476
CCDFEMS	Backup Contact	(410)596-5371