

**POLICY #:** CLIN      **NAME:** Administration, Storage, and Replacement of liquid plasma (LP)

**ORIGINATING DEPT. /COMMITTEE:** AIR CARE & MOBILE CARE

**REVIEWED BY:** William R. Hinckley, MD, FACEP, CMTE

**PREVIOUS REVISIONS:** 03/2014

**DATE ORIGINATED:** 03/2014

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**I. POLICY**

Administration and transport of liquid plasma

**II. DEFINITIONS:**

- A. Plasma: the liquid, noncellular portion of whole blood, which contains coagulation factors, water, electrolytes, and fibrinogen.
- B. Fresh Frozen Plasma (FFP): plasma that is separated and prepared from whole blood and then frozen within 8-24 hours of collection to allow long-term storage. Prior to administration, FFP must be thawed to a liquid state, which takes approximately 45 minutes. The delay created in thawing FFP limits its use in the emergency situations frequently encountered in the prehospital and transport environment.
- C. Liquid Plasma (LP): plasma that is separated and prepared from whole blood in a liquid state and is never frozen. It is FDA approved and is stored at 1-6°C for up to 40 days. Because LP is stored in a liquid state, it is ready for immediate administration, and is thus ideal for use in the prehospital and transport environment.

**III. BACKGROUND**

Over three million people worldwide die of traumatic injuries every year making it a leading cause of death for people ages 5-45 years.<sup>1</sup> Extensive hemorrhage is a common cause of death in these severely injured patients, both in and out of the hospital setting. Multiple studies, many from military combat zones, strongly suggest that clinical outcomes are improved by administration of plasma alongside RBCs in a 1:1 ratio.<sup>2</sup> Furthermore, the concept of damage control resuscitation advocates for minimizing crystalloid infusion and maximizing early aggressive resuscitation with blood products in patients with life threatening hemorrhage. Recent unpublished analysis suggests that expanding these resuscitation principles to the prehospital environment via helicopter EMS was associated with improved outcomes.<sup>3</sup>

Although this balanced transfusion strategy of plasma and RBCs was first implemented for bleeding trauma patients, it has since been adopted by other medical specialties, such as vascular surgery, gastroenterology, and ob-gyn in treatment of a variety of hemorrhaging patients.<sup>4</sup>

Thus given the high number of critically ill, bleeding, and coagulopathic, adult patients that are transported by Air Care and Mobile Care (ACMC) each year, our transport professionals will now begin administering liquid plasma when clinically indicated.

#### IV. PURPOSE

To define when and how liquid plasma should be administered while transporting adult patients with evidence of or concern for severe hemorrhage or coagulopathy.

To assure that the liquid plasma that is carried by ACMC is properly stored and monitored.

#### V. PROCEDURE

##### 1. INDICATIONS:

Air Care and Mobile Care providers will consider transfusion of liquid plasma to **adult patients (age ≥ 16 years) who are ≥ 50kg** and who meet the following inclusion criteria:

##### TRAUMA

- i. **Evidence of or concern for severe internal or external hemorrhage** based on history of present illness, physical exam, or mechanism of injury. (ex: ejection from automobile, fall > 20 feet, pedestrian struck, bleeding requiring a tourniquet, penetrating injury to head, neck, torso, etc.)

**AND**

- ii. **Presence of hemodynamic instability or acute coagulopathy of trauma** as evidenced by any of the following criteria

- a. Systolic Blood pressure < 90mmHg or < 100mmHg if patient age is > 55 years)
- b. Pulse rate > 110 beats per minute
- c. Tachypnea > 24 breaths per minute
- d. Clinical findings of peripheral vasoconstriction including cool, pale skin & capillary refill of > 2 seconds
- e. INR > 1.5
- f. Base deficit < -6mmol/L
- g. Hemoglobin < 11 g/dL
- h. Platelets < 200,000

*\*\*\*When blood product transfusion is indicated for the hemorrhaging trauma patient, it is the preference of ACMC that 2 sites of vascular access be obtained to allow infusion of both pRBC and liquid plasma simultaneously. However, if a second vascular access cannot be obtained during transport, **strongly consider***

*transfusion of liquid plasma first followed then by pRBC to maintain the desired 1:1 ratio.\*\*\**

*\*\*\*If an APMC crew is transporting a patient who has already received or will receive pRBC during transport as treatment for a traumatic injury with severe hemorrhage causing hemodynamic instability, infusion of liquid plasma in a 1:1 ratio, and administration of TXA should be strongly considered\*\*\**

### **ACUTE MEDICAL HEMORRHAGE**

- i. Liquid plasma administration is strongly encouraged along with pRBC in a 1:1 ratio for treatment of hemodynamically unstable (SBP < 90mmHg) medical hemorrhage such as
  - a. Massive gastrointestinal bleeding
  - b. Ruptured abdominal aortic aneurysm
  - c. Postpartum hemorrhage
  - d. Spontaneous retroperitoneal hemorrhage
  - e. Life threatening bleeding from any source with an INR  $\geq$  1.5
  - f. Anticipated emergent or urgent invasive/surgical procedure with an INR  $\geq$  1.5
  - g. Acute disseminated intravascular coagulation (DIC) and active life threatening hemorrhage

### **TRAUMATIC BRAIN INJURY / INTRACEREBRAL HEMORRHAGE**

- i. Liquid plasma administration is strongly encouraged for those patients with CT documented TBI (epidural/subdural hematoma, subarachnoid hemorrhage, or contusion) or spontaneous intracerebral hemorrhage with an INR  $\geq$  1.5

*\*\*\* Elevation in INR can result from multiple causes including Coumadin therapy, liver disease, congenital factor deficiency, and acute coagulopathy of trauma.*

### **2. CONTRAINDICATIONS**

- i. Patients  $\leq$  16 years old and or  $\leq$  50kg
- ii. Documented intolerance to plasma or its components
- iii. Congenital deficiency of IgA in the presence of anti-IgA antibodies. *(This information will rarely be known for patients transported by APMC, thus it is imperative that crew members monitor for signs of anaphylaxis with initiation of plasma transfusion)*

### **3. ADMINISTRATION**

- i. Refer to University of Cincinnati Medical Center Administration of Blood and Blood Products policy for administration protocol.

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#### 4. STORAGE

- i. All blood products will be checked at the beginning of each shift by the on duty nurse. Documentation of expiration dates and temperatures within the appropriate range will be recorded on the designated blood record.
- ii. The UCMC Blood Bank will be monitoring the temperature management of the blood coolers annually and will inform the Clinical Manager if equipment needs to be replaced. All flight personnel are required to inform the Clinical Manager of damage to the cooler that could deem it inappropriate for use.
- iii. Number and location of units:
  - Two (2) units of type A thawed plasma will be kept in the Center for Emergency Care (CEC) blood refrigerator at all times for emergency transfusion.
  - Two (2) units of type A liquid plasma will be kept in the remote base Air Care office refrigerators at all times for emergency transfusion.
- iv. Upon notification of a patient flight the cooler with ice and two units of O-Negative pRBC and two units type A thawed plasma or liquid plasma are to be taken from the refrigerator and secured in the helicopter. It is the responsibility of the nurse to ensure that appropriate temperature of the blood products is maintained throughout the duration of time the products is not in the refrigerator. When blood products are out of the refrigerator and stored in the transport cooler, it will be monitored at a minimum of every 4 hours to ensure the appropriate temperature of 1-6°C is maintained. Bags of ice will be changed as needed and inspection that bags are filled with ice, and not water, will be done.

#### 5. REPLACEMENT

- i. The flight nurse is responsible for accurate and timely replacement of fresh frozen plasma or liquid plasma. When appropriate, the flight nurse will take the completed blood bank slip to the UCMC Blood Bank for replacement. If the nurse is replacing units that were taken from the CEC refrigerator, they will replace the units with FFP. Units that were used from the North or East base will be replaced with Liquid Plasma. In the event that the blood bank can not acquire Liquid Plasma in a timely manner, they will replace the units with FFP. Once the blood bank receives Liquid Plasma they will notify the Air Care & Mobile Care Communication Center. When appropriate, the units of FFP will be returned to the blood bank in exchange for the Liquid Plasma.

*\*\*\*The flight nurse will log all blood products on the designated blood log and note the expiration dates of each unit\*\*\**

#### VI. RESPONSIBILITY

Critical care transport nurses, advanced practice nurses/midlevel providers, and physicians

#### VII. MONITORING / CONTINUOUS QUALITY IMPROVEMENT

Administration of liquid plasma will be tracked using our electronic charting program. All transport missions where liquid plasma is administered will be reviewed in the monthly APMC CQI meeting by the appropriate transport medical director.

#### VIII. ATTACHMENTS / REFERENCES

1. Roberts I, Shakur H, Ker K, Coats T, on behalf of the CRASH-2 Trial Collaborators. Antifibrinolytic drugs for acute traumatic injury. *Cochran Database of Systematic Reviews* 2011, Issue 1. Art. No.: CD004896.
2. Phan HH, Wisner DH. Should we increase the ratio of plasma/platelets to red blood cells in massive transfusion: what is the evidence? *Vox Sanguinis* 2010;98:395-402.
3. Holcomb J Pati S. Optimal trauma resuscitation with plasma as the primary resuscitative fluid: the surgeon's perspective. *Hematology* 2013: 656-659.
4. Burtelow M, Riley E, Druzin M, et al. How we treat: Management of life-threatening primary postpartum hemorrhage with a standardized massive transfusion protocol. *Transfusion Medicine Reviews*. 2009;23:255-65.

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**(Signatures on File)  
on/review date**

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Clinical Director

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Jonathan VanZile, MD  
Ground Medical Director

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**(Signature On File) DATE: same as last**

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William Hinckley, MD, FACEP, CMTE  
Air Care Medical Director

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Ruda Jenkins, RN, BSN, MBA, CFRN, CMTE  
Clinical Manager



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Matt Gunderman RN, BSN, CEN, CFRN  
Clinical Manager

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Jennifer Jackson, RN, MSN  
VP Patient Service University Hospital