Policy #:	704 (PLH 704-002)	**Effective Date:**	10/3/2013	**Reviewed Date:**	8/1/2016
Subject:	MASSIVE TRANSFUSION PROTOCOL				
Approved by: Laboratory Director, Jerry Barker (electronic signature)					
Approved by: Laboratory Medical Director, Mark P. Burton, MD (electronic signature)					
Approved by: Affiliate Lab Medical Director, Chris Giampapa, MD (electronic signature)					
Approved by: Affiliate Lab Medical Director, Paul J. Sims, MD (electronic signature)					
Approved by: Affiliate Lab Medical Director, F.E. Williamson, MD (electronic signature)					

Massive Transfusion Protocol

Medical Center Laboratory Transfusion Service
Jackson, TN

Principle

Massive Transfusion Protocol, defined as damage control resuscitation, establishes a standard transfusion protocol for patients experiencing hemorrhagic shock. It has proven to result in improved patient outcomes and is associated with decreased transfused products, fewer inflammatory complications, and improved survival.

Clinical assessments include:

- Estimated age of 15 years or older / weight of 50 kg or greater
- Predicted to receive >10 units of blood within 24 hours
- One unit of any blood component transfused prior to arrival or within one hour of admission

Signs of acute blood loss include: tachycardia, hypotension, increased respiratory rate, pallor, palpitations, decline in urinary output, cooling of extremities, acidosis, reduced arterial pressure, reduced central venous (jugular) pressure, mental status changes.

Once hemorrhagic control is achieved, the Massive Transfusion Protocol should be stopped and product orders transitioned to laboratory-guided treatment.

Order

A physician request for Massive Transfusion Protocol must be relayed to the Transfusion Service by phone.

Obtain the following information: patient ID and location (for example, Trauma 1), name of person relaying the order and the name of the ordering physician.
Immediately initiate a Massive Transfusion Protocol form.

In addition, the order must be placed in the computer system. If a doctor or nurse does place the order, we will order and comment verbal order.

Name of orderable test: **Initiate Massive Transfusion Protocol**
Append a Verbal Order comment

A crossmatch sample must be drawn, preferably before the first transfusion.

In the computer system, see that a type and screen and crossmatch are ordered on the patient. Standard protocol will be followed if any of the transfusions are "uncrossmatched".

Dose

In order to meet the ratio of equal parts RBC, plasma and platelets equivalent to those removed from 1 unit of blood, we will dispense products as follows:

Round 1

1. First products dispensed - preferable to transfuse in the following order
   1 apheresis platelet – equivalent to 6 whole blood derived platelets
   1 RBC
   1 apheresis plasma (jumbo) – volume equivalent to 2 FFP
   1 RBC
2. Next products dispensed- preferable to transfuse in the following order
   1 RBC
   1 apheresis plasma (jumbo)
   1 RBC

3. Next products dispensed- preferable to transfuse in the following order
   1 RBC
   1 apheresis plasma (jumbo)
   1 RBC

Round 2

Repeat sequence in round one, adding 10 units of cryoprecipitate to the last products dispensed (#3). These will be dispensed at room temperature.

Continue round 1 and round 2 sequentially. If requested, coolers #2 and #3 can be dispensed at the same time.

Note: if the patient has more than one line, products may also be administered simultaneously.

Product Preparation

1. Initiate a Massive Transfusion Protocol form, and record the number of products dispensed.
   - ➢ Transfusion ratio: 6 RBC: 3 FFPJ: 1 APLAT
   - ➢ Pre-printed tags with "order of transfusion" are in the file folder with the form. Tape the appropriate tag to each cooler.
   - ➢ After 12 RBC are given, transfuse 10 cryoprecipitate.
   - ➢ If uncrossmatched blood has been given and subsequently massive transfusion protocol is ordered, just start from that point with the ratios in this procedure.

2. Immediately prepare the <u>first cooler</u> and dispense:
   - ✓ one Apheresis platelet at room temperature (not in cooler)

   Cooler – pack in following order:
   - ✓ 1 RBC
   - ✓ 1 thawed FFPJ (apheresis only) or 5-day plasma (thawed type A)
   - ✓ 1 RBC

3. Immediately start thawing 3 additional FFPJ. If the patient ABO/Rh is known, thaw type compatible FFPJ. If not, thaw type AB.

4. Request a crossmatch sample if not yet received.

5. Dispense the next round of products in the computer system and pack the <u>second cooler: 1 RBC / 1 thawed FFPJ / 1 RBC</u>

6. Once the second cooler is picked up, dispense round 3 of products in the computer and pack in cooler: 1 RBC / 1 thawed FFPJ / 1 RBC.

7. If the inventory of O negative blood is low, the patient may be switched to Rh positive blood without notifying a pathologist (Massive Transfusion Protocol only).

8. Once all the refrigerated thawed plasma is dispensed, and recently thawed (warm) plasma is being dispensed, it cannot be packed in the cooler with the RBC because it will warm up the blood and cooler. Since we anticipate rapid transfusion, dispense this thawed plasma at room temperature.

9. Continue with this cycle of dispensing products until notification to stop or if products dispensed in a cooler are returned.

10. Assess blood product inventory and order additional platelets, blood or FFPJ if indicated.

<u>Two or more simultaneous massive transfusion patients</u>

- ❖ Initially it may not be possible to provide enough thawed plasma. Use thawed plasma based availability and the sequence in which the orders are received.

- ❖ Immediately thaw 6 AB FFPJ apheresis and process as soon as possible. If patient blood types are known, type specific FFPJ preferred.
- ❖ Modify subsequent dispensed products, increasing the number of units of plasma, so that the ratio of 1 FFPJ :2 RBC is obtained.
- ❖ On every cooler, add a white hang tag having the patient name. This will assist in tracking what products are given to each patient.
- ❖ Initiate a product tracking form for each patient.

Complications associated with massive transfusion

- o Acidosis
- o Hypothermia
- o Reduced circulating concentrations of calcium and magnesium due to citrate toxicity
- o Storage lesion (Metabolism of stored blood is restored rapidly after transfusion, but the capacity initially of transfused RBCs to efficiently transport oxygen to tissue may be significantly impaired.)
- o Acute Lung Injury (TRALI or TACO)
- o Ischemia-reperfusion injury (cardiac overload)

References

AABB Technical Manual, current edition

Holcomb JB, Tilley B, et al Transfusion of Plasma, Platelets, and Red Blood Cells in a 1:1:1 vs a 1:1:2 Ratio and Mortality in Patients With Severe Trauma The PROPPR Randomized Clinical Trial. JAMA, 2015:313

Pohlman T, Walsh M, et al Damage Control Resuscitation, Blood Review, July 2015, Vol 29, Issue