

LOS ANGELES GENERAL MEDICAL CENTER POLICY

Subject: MASSIVE TRANSFUSION PROTOCOL (MTP) AND RAPID RESPONSE PACK (RRP)	Original Issue Date: 12/29/14	Policy # 929
	Supersedes: 7/11/22	Effective Date: 12/7/23
Policy Owner(s): Blood Utilization (BUC) Committee Chair/Co- Chair Executive Sponsor(s): Chief Medical Officer		
Departments Consulted: Blood Bank Acute Care Surgery Obstetrics and Gynecology Critical Care Office of Risk Management Ethics Resource Committee Fetal/Infant/Children Committee Diagnostic Services	Reviewed & approved by: Attending Staff Association Executive Committee Senior Executive Officer	Approved by: Chief Medical Officer Chief Executive Officer

PURPOSE

Large volume, protocolized transfusion may be required in the treatment of patients with severe or massive bleeding.

Severe or massive bleeding can be defined as:

- a. Need for the transfusion of > 4 red blood cell units in one hour
- b. Need for the replacement of >50% of total blood volume by blood products within 3 hours
- c. Need for the transfusion of ≥ 10 red blood cell units in 24 hours

The purpose of having a protocolized transfusion plan is threefold:

- a. To facilitate the rapid, uninterrupted provision of blood products in a massively bleeding patient
- b. To ensure sufficient infusion of plasma and platelets along with red cells to prevent or minimize the development of a dilutional coagulopathy
- c. To promote effective coordination between the Clinical Team and the Blood Bank

At Los Angeles General, there are three types of large volume transfusion protocols available, the Rapid Response Pack (RRP), a Massive Transfusion Protocol, and an Obstetrical Massive Transfusion Protocol. Each will be described in detail within the policy below.

POLICY

Any physician with attending staff privileges at Los Angeles General may request a RRP or activate an MTP at their discretion. The protocol is initiated by a phone call to the Blood Bank, either by the initiating physician or a designee.

Two (2) properly labeled, full, pink-top tubes, drawn at different times, must be received by the Blood Bank as soon as possible.

Subject: MASSIVE TRANSFUSION PROTOCOL AND RAPID RESPONSE PACK	Effective Date: 12/7/23	Policy # 929
	Chief Executive Officer's Initials:	

Rapid Response Pack (RRP):

The rapid response pack is designed to provide large volume transfusions for patients who do not need an MTP. Each RRP cooler requires a separate order/request to the blood bank. The standard issue will consist of a cooler of blood, stocked with 3 units of packed red blood cells (RBC) and 3 units of thawed plasma. One unit of apheresis platelets may also be issued upon request for every other cooler. Cryoprecipitate pools will be filled on request.

If a patient has received two consecutive RRP coolers, is still actively bleeding, and a third RRP cooler is requested, MTP initiation should be considered.

Massive Transfusion Protocol (MTP):

The massive transfusion protocol will consist of a rigid structure of blood deployment. The standard issue will consist of a cooler of blood, stocked with 6 units of packed red blood cells (RBC) and 6 units of thawed plasma to create one MTP "block". One unit of apheresis platelets will also be issued if activation of a local emergency blood refrigerator preceded the MTP order.

Subsequent coolers will also include one unit of apheresis platelets. This will result in a **1 RBC:1 plasma:1 platelet** transfusion ratio when the cooler is fully utilized.

If any other ratio or combination of red cell or plasma blood products is needed, the order will not be acknowledged as MTP. Cryoprecipitate and additional platelet orders will be filled while the MTP is active. Large volumes of blood products may still be issued at the ordering physician's discretion in the absence of MTP activation. In the event of massive bleeding without MTP activation, Blood Bank can also provide a Rapid Response Pack (RRP) or adhoc orders, staff will confirm the number of blood products required and issue as requested.

Obstetric Massive Transfusion Protocol

The Obstetric massive transfusion protocol will consist of a rigid structure of blood deployment. The first standard issue will consist of a cooler of blood, stocked with 6 units of packed red blood cells (RBC) and 6 units of thawed plasma, one (1) unit of apheresis platelets will also be issued if activation of a local emergency blood refrigerator preceded the MTP order, and one (1) pool of cryoprecipitate upon request.

Subsequent coolers will also include one unit of apheresis platelets. This will result in a **1 RBC:1 plasma:1 platelet** transfusion ratio when the cooler is fully utilized.

Additional pools of cryoprecipitate will be thawed upon request.

Subject: MASSIVE TRANSFUSION PROTOCOL AND RAPID RESPONSE PACK	Effective Date: 12/7/23	Policy # 929
	Chief Executive Officer's Initials:	

Pediatric Massive Transfusion Protocol:

The Pediatric massive transfusion protocol will consist of a weight-based structure of blood deployment. The coolers of blood products will contain appropriate numbers of units needed to replenish the child's blood volume relative to weight. Please reference the following chart:

Weight in kg	RBC Units	Plasma Units	Platelet units	Cryoprecipitate
<3kg	1	1	1 (counts towards 6 cooler)	Single unit with each box, upon request
3-20kg	2	2	1 (counts towards 3 cooler)	
20-30 kg	4	4	1 (counts toward 2 cooler)	
>30kg (treat as an adult MTP)	6	6	1 (every cooler)	1 Pool (5 units) with each box, upon request.

In addition to deploying blood for hemorrhaging patients, management of a hemorrhaging patient should include:

- a. Blood warming and patient warming techniques to prevent hypothermia due to infusion of large volumes of refrigerated blood products.
- b. Maintenance of normal blood pH to prevent coagulopathy due to acidosis.
- c. Laboratory testing to assess hematologic and coagulation parameters and guide transfusion therapy. Testing to consider includes hemoglobin, hematocrit, platelet count, PT/INR, fibrinogen, and thromboelastography.

Consultation for management of hemorrhage can be obtained at any time through either the Blood Bank (contact lab to reach physician on call) or the Trauma service (x97768 Trauma Fellow Voip).

Factor concentrates, such as Prothrombin Complex Concentrate (ie KCentra®), are available at Los Angeles General inpatient pharmacy for refractory bleeding and/or persistent coagulopathy.

Subject: MASSIVE TRANSFUSION PROTOCOL AND RAPID RESPONSE PACK	Effective Date: 12/7/23	Policy # 929
	Chief Executive Officer's Initials:	

These orders require approval by an attending physician or fellow from trauma, hematology, or cardiac surgery prior to release.

Deactivating the Massive Transfusion Protocol:

The attending physician or designee will call the blood bank to deactivate the MTP when clinically appropriate. The blood bank staff members will record the date, time, and attending physician name. Orders for off protocol red cell or plasma components will trigger a request to the clinical team to end the MTP.

LIMITATIONS/CONSIDERATIONS

1. Preparing the first "cooler" of blood products requires set up time. Emergency un-crossmatched blood is available from designated refrigerators in ED, OR and OB for immediate use and can also be requested directly from the blood bank by either pick-up or pneumatic tube delivery (depending on the requesting hospital location).
2. Patients with a history of red cell antibodies in blood bank records will need assessment for urgency of transfusion as uncross matched blood with an unknown antigen profile may place the patient at risk for hemolysis.
3. The use of whole blood and/or, liquid plasma should be considered for the massively bleeding trauma patient while awaiting MTP cooler. These are available in designated refrigerators in the ED and the blood bank.

RESPONSIBILITY

Blood Bank
Blood Utilization Committee

REFERENCES

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Holcomb JB, del Junco DJ, et al. The prospective, observational, multicenter, major trauma transfusion (PROMTTT) study: comparative effectiveness of a time-varying treatment with competing risks. JAMA Surg. 2013;148(2):127-36.

Khan S, Allard S, et al. A major hemorrhage protocol improves the delivery of blood component therapy and reduces waste in trauma massive transfusion. Injury. 2013;44(5):587-92

Bandarenko N, Wong E, Roseff S. eds. (2020) Pediatric Transfusion: A Physician Handbook. 5th edition. Bethesda, MD: AABB

Subject: MASSIVE TRANSFUSION PROTOCOL AND RAPID RESPONSE PACK	Effective Date: 12/7/23	Policy # 929
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Attachments

Addendum: Massive Transfusion Protocol (MTP) Nursing Responsibilities

REVISIONS

October 19, 2018, July 11, 2022; December 7, 2023