**Purpose:**

To outline the necessary steps to be taken by the Harborview Medical Center Transfusion Services Laboratory (TSL) to ensure timely and adequate delivery of blood products to patients experiencing massive hemorrhage when a massive transfusion protocol (MTP) has been activated.

**Policy**

HMC TSL will prioritize and respond immediately to massive transfusion protocol activation. HMC TSL will always have universal blood products available for emergency or MTPs. HMC adult MTP follows a 1:1:1 protocol for 6 units of Packed Red Blood Cells (RBC), 6 units of Plasma, and 1 unit of apheresis platelets. HMC pediatric MTP follows a 1:1:1 protocol for 3 units of RBC, 3 units of plasma, and 1 unit of apheresis platelets.

**Procedure:**

|  |  |  |
| --- | --- | --- |
| **Step** | **Action** | **Related Documents** |
| **General Statements** |
| 1 | A massive transfusion is defined as:* + Replacement of 30% total blood volume (TBV) within 2 hours (4U RBC in adult)
	+ Replacement 50% TBV within 3 hours (5-6U RBC in adult)
	+ Replacement 100% TBV within 24hrs (10-12U RBC in adult)
 | HMC APOP Pediatric MTP 140.1HMC APOP Adult MTP 140.2 |
| 2 | An MTP may be activated anytime there is severe hemorrhage/ blood loss and a massive transfusion is anticipatedActivation may occur:* + Prior to patient arrival at HMC (e.g. Trauma with significant hemorrhage en route)
	+ In the ED (e.g. Severe hemorrhage noted upon patient arrival)
	+ In the OR (e.g. Massive bleeding occurs)
	+ In an inpatient unit (e.g. patient develops severe GI bleed)
	+ For ECLS (ECMO) cannulation procedure in OR or TSICU
 |  |
| 3 | An Adult MTP is activated for patients who are:* ≥ 13 years age
* ≥ 40 kg

A Pediatric MTP is activated for patients who are* < 13 years age
* < 40kg
 |  |
| **Blood Components for MTP** |
| 1 | **Stock Trauma Packs*** At all times the transfusion services laboratory (TSL) maintains stock trauma packs of Whole Blood, RBCs, plasma and platelet
* As part of an initial trauma response or initial MTP response, Whole Blood, RBCs, Plasma, and Platelet packs are immediately taken to the patient care area
 | Trauma Response ProcessStock Trauma Pack Maintenance |
| **Step** | **Action** | **Related Documents** |
| 1 Cont | * Whole blood is taken as part of initial trauma response for those that meet requirements
* E.D. Refrigerator stock available for MTP response in E.D
* Credo Coolers can be used for up to 4 individual blood components or 2 units of whole blood
 | Using Portable Blood Refrigerators Management of Emergency Department RefrigeratorAirlift NorthwestMedic OneReceiving and Using Low Titer group O Whole Blood |
| 2 | **Definition of Universal Usage Products:*** Whole Blood: Low titer Group O
* RBCs: OPOS or ONEG
* Platelets: Group A, B, or AB, Low titer Group O
* Plasma:
	+ - Thawed or Liquid Plasma
		- Group AB or Low Titer plasma (LTP)
 | Selection of Red Blood CellsSelection of Platelets, Plasma, and CryoprecipitateReceiving and Processing Low Titer Platelets Receiving and Processing of Low Titer PlasmaReceiving and Using Low Titer group O Whole Blood |
| 3 | **MTP** blood component levels are identical to levels issued for a Trauma Response.  |  |
| 4 | **Use of Low Titer Plasma (LTP) and Low Titer Whole Blood (LTWB)*** Limit transfusion of LTP and LTWB to less than 10 units in adult patients, if possible. If more than 10 units given to adult of unknown or non-compatible blood group, notify Medical Director on next business day by printing out BBI summary.
* Infants and small children: use of LTP should be minimized to during emergency when AB plasma is not available or there will be a delay. Use of LTWB should also be minimized. Notify Medical Director as soon as possible.
* Subsequent transfusion of LTP and LTWB to a non-group compatible patient should be performed after consultation with the TS Lead, Manager, and/or Medical Director.
* Any evidence of hemolysis is to be immediately investigated and reported to the Medical Director.
 | Receiving and Processing Low Titer PlasmaReceiving and Using Low Titer Group O Whole BloodTransfusion Reaction Investigation Process |
| 5 | **Cryoprecipitate** is **NOT routinely** included in either adult or pediatric MTP response.* Cryoprecipitate will be ordered “as needed”.
* Cryo should NOT be thawed until product ***release*** is requested.
 | Selection of Plasma, Platelets and Cryoprecipitate  |
| **Step** | **Action** | **Related Documents** |
| **Activation of a MTP** |
| 1 | An MTP may be activated by:* + The patient’s physician
	+ The Charge nurse or designee
	+ Transfusion Services Medical Director/Resident/Covering Physician if blood product ordering and release is consistent with levels seen with massive hemorrhage
 |  |
| 2 | Requests may be made:* + Pager activation for direct admission to O.R.
	+ Via a phone call to TSL
	+ In person to a TSL staff member (e.g. present during a trauma response, present in the OR, etc)
	+ In CPOE
 |  |
| 3 | * MTP takes priority over other routine testing and work in the lab.
* Notification to the on call TSL Medical Director must be made in cases where the MTP is impacting the inventory and operations of the lab
 |  |
| **Initial Response** |
| 1 | **If TSL staff and portable refrigerator are NOT already present with the patient:*** + - Respond per Trauma Response Process:
			* Age and gender appropriate Whole Blood, RBCs, Plasma, and Platelet
			* Portable refrigerator, platelet box, and a wireless phone
		- Notify clinical care staff of available products and obtain appropriate signature(s)
		- Ask if units are needed sooner than a portable fridge can be dispatched. Appoint a point person and send 2 units in a 1:1 ratio via tube station if necessary. Staff responding with portable must verify use or place in portable fridge and complete documentation
 | Trauma Response ProcessStock Trauma Pack MaintenanceUsing Portable Blood Refrigerators  |
| 2 | **If TSL staff & portable refrigerator are already present with the patient*** Determine what blood products are currently in the refrigerator and platelet box
* Immediately send to the patient care area the required number of blood products to total the number required for the appropriate protocol.
	+ - Notify clinical care staff of available products and obtain appropriate signature(s)
 | Using Portable Blood Refrigerators  |
| **Step** | **Action** | **Related Documents** |
| **Initial Response (continued)** |
| 3 | **Emergency Room Refrigerator*** Stocked with RBCs and plasma
* Available for clinical care staff to access prior to arrival of TSL staff with MTP response.
* Available for MTP response by TSL staff
 | Management of Emergency Department Refrigerator |
| 4 | **Simultaneously** Check the patient history in Sunquest and determine if there is:A current unexpired patient sample ABO/Rh type & screen (TSCR) results from the current HMC hospital encounterAny crossmatched RBC or other assigned blood products for this patient that can be sent to the patient care areaA history of any atypical RBC antibodies or transfusion reactions | Using Blood Bank Inquiry Function |
| 5 | **Simultaneously** Prepare replacement trauma packs.Restock E.D. Refrigerator | Stock Trauma Pack MaintenanceManagement of the Emergency Department Refrigerator |
| 6 | Coordinate exchange of universal donor type blood components with units released based on:* + Subsequent physician orders
	+ Admitting name and HID
	+ In-date sample
	+ Plasma and Platelets: Type specific or ABO compatible if patient has had ABO/Rh performed during current HMC encounter

NOTE: Every effort should be made to issue products in SQ using patient identifiers even if blood type is not available. Products issued with patient identifiers have increased safety. |  |
| **Subsequent Blood Products: Selection and Issue** |
| 1 | Subsequent blood products will be requested and issued based on the patient’s clinical status and laboratory results (e.g. Emergency Hemorrhage Panel – EHP)If significant concern about the appropriateness of blood products being requested/not requested by clinical team, notify Transfusion Services Medical Director, Resident, or Covering Physician **(**e.g. Fibrinogen < 100 mg/dL and no cryo has been given or ordered) |  |
| 2 | **If** **the patient does not have a hospital ID**, issue further trauma packs. | Trauma Response Process |
| 3 | **NO current, in-date ABO/ Rh type and screen (TSCR):** | Trauma Response ProcessReceiving and Processing Emergency Release OrdersQP: Pre-analytic Sample Requirements |
| **AND** | **AND** | **ISSUE** |
| No ABO/Rh from current HMC encounter | No sample(s) yet received in TSL  | Trauma Packs |
| No ABO/Rh from current HMC encounter | * Sample received in TSL
* ABO/Rh completed
* Antibody screen and antibody ID (if applicable) incomplete
* 2nd ABO/Rh performed, if indicated
 | * Uncrossmatched type specific/compatible RBCs or Whole Blood
* Type specific or ABO compatible plasma and platelets
 |
| ABO/Rh performed during current HMC encounter | No sample yet received in TSL  | * Uncrossmatched group O RBCs or Whole Blood
* Type specific or ABO compatible plasma and platelets
 |
| **Step** | **Action** | **Related Documents** |
| **Subsequent Blood Products: Selection and Issue (continued)** |
| 4 | **Current, In-date Sample in TSL:*** TSCR performed
* Negative antibody screen
* No clinically significant antibody history
* 2nd ABO/RH performed, if indicated
 | Issue crossmatched type specific or ABO/Rh compatible RBCsSend a few units via tube station in a 1:1 ratio if unable to wait for portable fridge response | Compatibility Process |
| 5 | **History of clinically significant antibodies and/or a positive antibody screen**:* Notify the patient’s physician
* Notify the Transfusion Services Medical Director/ Resident/ Covering Physician
* Issue emergency release uncrossmatched RBC or Whole Blood
	+ Generate a Urgent Blood Product Release form to be signed by the patient’s physician for subsequent RBC orders until patient starts receiving crossmatched, antigen negative (if applicable) units
 | Receiving and Processing Emergency Release OrdersRequest for Urgent Blood Product Release form |
| 6 | If an Rh neg female < 50 years old has been transfused > 6-8 units RBC and there is significant ongoing blood loss, it may be prudent to switch blood groups to Rh pos until rapid bleeding subsides for inventory management purposes* + - This may ONLY be done with approval by the Medical Director of Transfusion Services/ Resident/Covering Physician
		- If there are no Rh neg group O or type specific RBCs in stock for females < 50 years old:
			* Release O pos units
			* Notify Medical Director/Resident/Covering Physician
 |  |
| 7 | Continue to provide blood products as requested. |  |
| **Patient Care Area Response & Inventory Management** |
| 1 | Upon arrival, request clinical team to draw sample as soon as possible if this is not already done. TSL will participate in the 2 person sample verification as requested by the clinical care team.Have patient’s physician sign the Request for Urgent Release of Blood Products form (this can be signed by the anesthesiologist if patient is in the OR)***NOTE:*** *The FDA requires that this be signed even if no RBCs are subsequently transfused.* | Blood Product Issue ProcessTrauma responseNursing Procedure: Blood Transfusion: Obtaining Blood Sample for Compatibility Testing (Type & Screen) and Confirmation ABO/Rh Sample Testing |
| **Step** | **Action** | **Related Documents** |
| **Patient Care Area Response & Inventory Management (continued)** |
| 2 | Contact TSL:* When patient has been admitted to ED/HMC and has a hospital ID
* To request additional blood products
* For any questions/updates as applicable
 |  |
| 3 | Receive blood products/MTP packs and store appropriately* Whole Blood, RBC and plasma – in portable fridge
* Platelets and Cryoprecipitate –in a temperature stabilizer box or platelet shelf on portable fridge
 |  |
| 4 | Continuously update Portable Refrigerator Response Log and/or Urgent Release Unit cards. |  |
| **Inactivation of an MTP** |
| 1 | The MTP should be inactivated by the clinical team* If there have been no blood products ordered/released for ≥ 1 hour, check with clinical team if they would like to inactivate the MTP
 |  |
| **Final Disposition of Blood Products** |
| 1 | Complete paperwork:* Review PRR Log
* If units transfused; forward unit segments, PRR Log and/or URU cards to an MLS for SQ allocation and issue
* Forward Trauma/MTP paperwork to a 2nd CLT or MLS for review all documentation has been completed.
* Record “Reviewed by (Tech ID), (date)” in the upper right corner of the Trauma/MTP paperwork.
* File paperwork in the Trauma notebook.
 | Using Portable Blood RefrigeratorsManagement of Emergency Department RefrigeratorCompatibility ProcessAirlift NorthwestMedic OneTrauma Response Process |

**References:**

Standards for Blood Banks and Transfusion Services, Current Edition. American Association of Blood Banks. AABB Press, Bethesda, MD.

Roback J (ed). Technical Manual, Current Edition. AABB Press, Bethesda, MD