

2. CLINICAL MANAGEMENT GUIDELINES
G. Massive Transfusion Protocol (MTP)

OBJECTIVE: To define criteria for the activation of the Massive Transfusion Protocol.

DEFINITION: Massive transfusion can be defined by any one of the following:

- a. Transfusion ≥ 10 units of PRBCs in 24 hours
- b. Transfusion of ≥ 4 units PRBCs in one hour

Guidelines:

1. Factors predictive of the need for massive transfusion include high magnitude of injury, signs of active bleeding, the presence of hypotension or shock index > 1 , and base deficit > 6 mMol/L.
 - a. The ABC Score can be used to objectively predict the need for massive transfusion. Activation of MTP should be considered for patients meeting ≥ 2 criteria
 - Penetrating Mechanism
 - Systolic BP ≤ 90
 - HR ≥ 120
 - Positive FAST
2. The decision to activate the massive transfusion protocol can be made prior to patient arrival by the trauma team leader, the trauma surgery Attending, or the emergency medicine Attending
3. The decision to activate and terminate the massive transfusion protocol is a clinical decision that can be made based on:
 - a. Clinician judgment
 - b. Endpoints of resuscitation (i.e., lactate and base deficit)
 - c. Rotational Thromboelastometry (ROTEM)
4. Tranexamic Acid (TXA) can be administered with the massive transfusion protocol if within 3 hours from the time of injury (1 gram loading dose given over 10 minutes, to be followed by an infusion of 1 gram over 8 hours)
5. Earlier administration of platelets is preferred and should be transfused via blood tubing. Additional platelets may be given to maintain a platelet count $\geq 100,000$ or if indicated by ROTEM (see algorithm below).
6. Patients with massive bleeding are often hypocalcemic prior to initiation of MTP and calcium (1gm CaCl or 2mg calcium gluconate) should be administered empirically as soon as is feasible via a separate venous access site from the blood transfusion. A minimum of 1gm CaCl or 2mg calcium gluconate per round of MTP should administered. Additional doses may be given based on labs/ point of care testing.

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7. Total crystalloid volume has been well correlated with mortality in patients requiring massive transfusion. Total crystalloid volume and volume of crystalloid boluses will be reviewed in the MTP tracker with a goal of the lowest amount of crystalloid possible. All patients receiving MTP, **who receive** >4L of crystalloid within 24hrs of admission will undergo secondary review.

Procedure:

1. Attending/Designee dials ext. 7911 and notifies the Operator to activate a Massive Transfusion Protocol. The operator shall page the Blood Bank and MTP Courier. The dispatcher shall activate the beeper with "MTP - patient location" message.
2. Attending/Designee notifies Blood Bank of the MTP activation at extension at 7610 or 7611 and provides patient's full name, medical record number, pertinent clinical information (i.e., patient diagnosis), and location/ phone extension. If the patient has an alias (trauma or stroke identifiers), their actual (not assigned) age and sex should also be provided to the Blood Bank.
3. Attending /Designee shall ensure drawing of blood sample from the patient, labeled with the correct required information for the Blood Bank, and request Type and Screen test either using CPOE or paper Request for Blood Bank Laboratory Tests form.
4. MTP Courier responds to the patient location and obtains patient's demographic label(s) and, if available, appropriately labeled, completed, and signed Request for Emergency Release Blood / Massive Transfusion Protocol form, a specimen (pink or purple top EDTA tube) along with the Request for Blood Bank Laboratory Tests form for Type and Screen, which are then delivered to the Blood Bank.
5. When MTP Courier reaches the Blood Bank, they present a Release Form for Blood and Blood Products labeled with patient's full name and medical record number. They shall pick up and immediately transport two (2) units of "emergency release" RBCs from the Blood Bank to the patient location (if not already transported to the patient's location via pneumatic tube), then return to the Blood Bank. At the discretion of patient's attending, order for emergency released blood components can be repeated until arrival of MTP pack.

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For ADULT MTP

MTP Packs	RBC Units	Plasma Units	Platelet Units	Cryoprecipitate Units	
Pack 1	6	6	1		
Pack 2	6	6	1		
Pack 3*	6	6	1	10	*10 units of cryo should be requested with every 3rd pack if MTP is expected to be continued
Pack 4	6	6	1		
Pack 5	6	6	1		

THROMBOELASTOMETRY RESULTS:

- If used and abnormal, targeted transfusion and administration of products will be performed, and the MTP may continue if desired by the Trauma Attending or TTL. If bleeding continues, Prothrombin Complex Concentrate (Kcentra) or recombinant Factor VIIa (NovoSeven) may be considered.