

## Standard Operating Procedure

**Title:** Massive Transfusion Protocol (MTP)  
(Main Campus-only)

Category	Insert Here
Approval Date	Month Year
Effective Date	Month Year
Supersedes	Month Year

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**Applicable to:** ☐ Adult Enterprise ☐ Pediatric Enterprise ☐ Behavioral Health Enterprise ☐ VUMC

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This SOP correlates directly with VUMC policy  
Blood Administration Policy

### I. Purpose:

- A. To outline a standard process for safe, rapid preparation, delivery, and administration of blood products for patients experiencing massive hemorrhage.
- B. To provide guidance on the conservation of blood components while ensuring the safe and rapid administration of blood products.

### II. Definitions:

- A. Massive transfusion is defined as the replacement of the patient's total blood volume over a 24-hour period or actual/anticipated administration of
  1. >40mL/kg PRBC for pediatrics in 2 hours or less.
  2. >10 u blood products in 24 hours in adults
- B. Massive Transfusion Protocol (MTP) should also be considered for cases of massive blood loss with profound hemorrhagic/hypovolemic shock or conditions of disseminated intravascular coagulopathy (DIC).
- C. In the setting of massive transfusion, blood cells and other blood components (platelets, plasma and fibrinogen) will become depleted, and ongoing laboratory monitoring (platelet count, prothrombin time and fibrinogen level) will be necessary to replace these appropriately.
- D. Commonly accepted age-specific blood volumes are:
  1. Preterm infant: 90 – 100 mL/kg
  2. Term infant <3months: 80 - 90 mL/kg
  3. Child >3months: 70 mL/kg

### III. Specific Information:

- A. Indications for initiation of the MTP include severe blood loss (Class III/IV hemorrhagic shock with blood loss greater than 30-40% blood volume) with no imminent end to the bleeding. Actual hemorrhage does not have to occur before the determination is made to activate MTP; anticipated large-volume blood loss is an appropriate MTP activation criterion.
- B. Patient selection
  1. Patients with current, ongoing, or impending massive blood loss should be considered for activation of MTP.

2. Activation of the massive transfusion protocol should be strongly considered for patients who receive more than two units of blood products in the emergency department or who have an ABC (Assessment of Blood Consumption) score of 2 or greater (Assessment of Blood Consumption)

#### IV. Procedures:

##### A. Activation

1. Upon identification of need, the attending provider or designee will order the Massive Transfusion Protocol
  - a. Order MTP in eSTAR and **call the blood bank to confirm.**
  - b. Verbal MTP activation is allowable only when electronic MTP order entry is impossible due to patient condition or eSTAR downtime. ALL verbal MTP activations require subsequent eSTAR MTP orders to be placed by the provider or designee.
  - c. Blood products for MTP and any products prepared in a cooler are retrieved from the Blood Bank by a member of the receiving department's personnel. The transporting staff member presents a patient identification sticker and participates in a readback to verify patient identity prior to the release of the cooler.
2. The following must be provided (electronically or verbally) to the blood bank for activation.
  - a. Patient name (this may be an assigned STAT name)
  - b. Patient medical record number (MRN)
  - c. Sex of the patient
  - d. Approximate age of the patient (*Required to identify females of likely childbearing age*)
  - e. Approximate weight (or  $\leq 40\text{kg}$  or  $>40\text{ kg}$ ) (*children's only*)
  - f. Patient location
  - g. Name of attending physician initiating MTP. Note that when MTP is activated by a surgical fellow, the name of the **attending** must also be provided.
3. For obstetrical emergencies such as post partem hemorrhage, the provider must specify the need for **OB-MTP** when ordering.
4. Type & Screen sample and ABO Verification sample (if indicated) is collected within 15 minutes of the MTP activation if not already done so.
  - a. Each sample must be obtained in accordance with the blood admin policy with a minimum of 2 mL. This sample cannot be diluted or drawn from a site with active infusion/transfusion running distally. (*ref blood admin policy/SOP*)

##### B. Cycle Process

1. Blood bank will read back the information provided and announce the MTP verbally in the blood bank.
  - a. First cooler to be ready within 10 minutes of the activation time.
  - b. First cooler will contain uncrossmatched trauma products based on the provided information.

- c. For OB-MTP
    - i. Cryoprecipitate (2- 5pks) in every other cycle, starting with cycle 2 for OB-MTPs only.
    - ii. OB-MTP Only Fibrinogen concentrate is administered with the first MTP cooler.
    - iii. Fibrinogen Concentrate is available from pharmacy or designated medication supply cabinets.
  - d. **Platelets and Cryoprecipitate cannot be infused with a rapid infuser or fluid warmers.**
2. Coolers will be set up with the product following amounts based on the type of MTP requested and available patient information.

<b>Adult MTP</b>		
	<b>Male / Female &gt; 50</b>	<b>Female &lt; 50</b>
<b>RBC</b>	4	4
<b>Plasma</b>	4	4
<b>Platelet**</b>	1	1
<i>** Platelets will come with every other cycle starting at cycle 5</i>		

<b>OB- MTP</b>	
<i>Note: Requester must specify OB-MTP</i>	<b>Female</b>
<b>RBC</b>	4
<b>Plasma</b>	4
<b>Platelet</b>	1 (every other after starting at cycle 5)
<b>Cryoprecipitate</b>	2 (5pks) even cycles only
<b>Fibrinogen Concentrates</b>	Ordered in tandem with MTP to allow Cryoprecipitate to be thawed for cycle 2

<b>Peds MTP</b>		
	<b>Under 40kg</b>	<b>Over 40kg</b>
<b>RBC</b>	2	4
<b>Plasma</b>	2	4
<b>Platelets</b>	1 (odd cycles only)	1

3. Consider pharmacological interventions per activating attending physician discretion such as:
  - a. Calcium repletion with each MTP cooler administration and prn
  - b. Administration of Tranexamic Acid
  - c. Administration of Prothrombin complex concentrate or other reversal agents of therapeutic anticoagulation.
4. Cooler pickup and return.
  - a. The runner sent to retrieve the coolers MUST bring a patient label, including at least two identifiers.
  - b. A verbal readback will be performed at the blood bank window to verify the correct cooler is being picked up. (MTP may be running concurrently in multiple units/areas for multiple patients)
  - c. Returned coolers are to be given to the blood bank technologists, and the time of return is noted on the MTP form.

- i. Unused products MUST be returned in the cooler they were packed in.
    - ii. Products waiting to be transfused should remain in a closed cooler until needed.
    - iii. Marking the unit label or bag in any way is prohibited.
    - iv. **Platelets and cryoprecipitate are never to be placed inside or on top of coolers.**
  5. The blood bank will prepare the next cycle upon pickup of the current cycle.
  6. MTP coolers are intended to be given in their entirety until completed. If all products are not desired, strong consideration should be given to MTP discontinuation. A la carte blood products can be ordered upon MTP discontinuation.
  7. When MTP cooler #5 is delivered, the designated team member receiving the cooler will announce its arrival by stating, "MTP cooler number 5," prompting a multidisciplinary discussion on clinical futility.
    - a. Attending providers will, at this point, lead a discussion on the patient's overall clinical status, salvageability, and current status of hemorrhage control. Based on these factors, the attending provider(s) will decide on continuing MTP or consider cessation of efforts based on futility.
- C. Laboratory Sample Collection and Patient Monitoring
  1. Active monitoring of patient lab values. Consider every 30-60 minutes during the MTP event and at discontinuation if appropriate:
    - a. CBC
    - b. Coagulation profile
    - c. Ionized Calcium
    - d. Arterial Blood Gases (to include full panel if able)
  2. Vital signs (heart rate, blood pressure, respiratory rate, and temperature) are to be obtained and documented for each unit of product given.
    - i. Vitals should be captured at a minimum of 15-minute intervals, and continuous temperature monitoring is preferred due to the risk of hypothermia and subsequent coagulopathy.
- D. MTP Discontinuation
  1. Most reliable transfusion endpoint is a collaborative decision based on achieving hemorrhage control (operative field examination), laboratory results, and clinical parameters. The attending physician must be aware of and in agreement with the decision to discontinue MTP.
    - a. Consider the following indications for Deactivation:
      - i. Systolic Blood Pressure (SBP)
        - a. Greater than 70 plus (age in years x 2) in Pediatrics
        - b. MAP > 60mmHg in Adults
      - ii. INR less than 1.5
      - iii. Blood pH greater than 7.2
      - iv. Improving base deficit
      - v. Urine Output (UOP) greater than 0.5mL/kg/hr.
      - vi. Improved clinical exam.
      - vii. Resuscitation is futile.
      - viii. Bleeding has been controlled.

- b. It is the responsibility of the Trauma Surgeon for trauma patients and the attending physician for non-trauma patients to terminate the MTP.
    - c. The blood bank will be notified by the physician immediately when the MTP has been terminated.
  - 2. Premature discontinuation of MTP should be avoided to minimize catch-up reactive transfusions.
  - 3. The blood bank may consider auto-cancellation if the ready cooler has not been picked up after 2 hrs.
- E. MTP Documentation
  - 1. A completed Transfusion Administration Record (TAR) is required for each unit of product administered. The TAR documentation must include all of the following information:
    - a. start time,
    - b. stop time,
    - c. volume,
    - d. dual verification signatures,
    - e. acknowledgment of deferral of consent/education as this was emergent,
    - f. expiration verification,
    - g. vitals signs (may indicate they are captured elsewhere, such as eSTAR or code sheet) and
    - h. if a transfusion reaction occurred (on the back)
  - 2. Label both sides with the correct patient label and upload it into the electronic medical record.
  - 3. The total volume of each type of blood product is to be documented in the EMR.
    - a. If using the TAR and vital signs are captured elsewhere, indicate “see EMR” or “see code sheet” in the vitals section of each TAR.

## **V. Quality Review and Improvement**

- F. Unused products will be returned promptly to the blood bank with the cooler they were issued. Platelets and Cryo DO NOT go inside the cooler – they must stay at room temperature.
  - 1. Regular review and performance monitoring is ongoing based on current recommended practices and guidelines.
    - a. Not limited to and subject to change
      - i. Utilization metrics
      - ii. Waste of products
      - iii. Time to prepare the first and second cycles.
      - iv. Time interval to crossmatch availability
      - v. Compliance with the call to discontinue.
      - vi. Stewardship of products

## **VI. Lead Author and Content Experts:**

Lead Author:

Kirk Krokosky RN, BS, AEMT

Jill Streams, MD, FACS

Contributing Authors:

MTP Taskforce on behalf of the Patient Blood Management Committee

VII. Endorsement:

Insert name of Executive Committee  
Executive Policy Committee

Month Year  
Month Year

VIII. References:

VUMC Policy Manual. (2023). Retrieved from <https://vanderbilt.policytech.com>.

Remember to include references to any housewide policies related to or referenced within this document. For instance, if this is a unit-specific scheduling policy or SOP, also include the housewide scheduling policy.