

Massive Transfusion Protocol v1.0

Type: Procedure

Effective Date: 12/19/2023

Last Approved: 12/19/2023

Last Reviewed: 12/19/2023

148355.1258 Massive Transfusion Protocol

Copy of version 1.0 (approved and current)

**Last Approval or
Periodic Review Completed** 12/19/2023

**Next Periodic Review
Needed On or Before** 12/19/2024

Effective Date 12/19/2023

Uncontrolled Copy printed on 12/20/2023 7:13 AM

Printed By Brittany Houghton-Depietro
Technical Assistant (M07740)

Organization Bassett Medical Center Lab

Comments for version 1.0

Initial version

adjusted formatting; uploaded from SofTech

Approval and Periodic Review Signatures

Type	Description	Date	Version	Performed By	Notes
Approval	Lab Director	12/19/2023	1.0	Timothy Chapman MD Clinical Laboratory Director (M11669)	
Approval	Lab Director	12/18/2023	1.0	John Fisk MD Clinical Laboratory Director (M08480)	
Approval	Lab Director	12/18/2023	1.0	Ghazala Nathu MD Clinical Laboratory Director (S00134)	
Approval	Lab Director	12/17/2023	1.0	Samantha Davenport MD Service Line Chief (M03764)	

Version History

Version	Status	Type	Date Added	Date Effective	Date Retired
1.0	Approved and Current	Initial version	12/14/2023	12/19/2023	Indefinite

Massive Transfusion Protocol

Key Words:

1. MTP Activation
2. Massive
3. Hemorrhage

Purpose:

The purpose of this policy is to standardize the process and type of blood product being requested in a Massive Transfusion clinical situation as well as to standardize the related system response.

Principle:

Massive hemorrhage, defined for the purpose of this protocol, is blood loss necessitating replacement of total blood volume within twenty four (24) hours. This is a distinct clinical entity that requires interdepartmental and interdisciplinary cooperation in prioritizing resuscitation efforts and procuring blood/blood products.

This protocol is to provide a hospital wide standard for facilitating the rapid acquisition of appropriate blood and blood components safely during a massive hemorrhagic event while limiting the untoward effects of stored blood such as hypothermia, metabolic effects and dilutional coagulopathy through effective communication between clinical and laboratory staff.

Protocol:

A. Initiation of Massive Transfusion Protocol (MTP)

1. The Trauma Surgery Attending (or designee), Anesthesiology attending (or designee) or ICU Attending will determine which patients, based upon physiology and/or anatomic injury complex, meet the criteria for massive hemorrhage as defined above.
2. The Trauma Surgery Attending (or designee), Anesthesiology Attending (or designee), or ICU Attending will notify the Blood Bank (x3720) and activate a "Massive Transfusion Protocol".
3. The Massive Transfusion Prescriber's Order Sheet (Form #8278) is started in the Blood Bank documenting the initiation of a Massive Transfusion and initial request. Subsequent requests and completion of the MTP is documented as well.

B. Notification:

The Trauma Surgery Attending (or designee), Anesthesiology Attending (or designee) or ICU Attending will give the Blood Bank Technologist the following information:

1. Patient name/Unidentified identification and Medical Record Number
2. Age and Sex (Date of birth, if available, or approximate age of unidentified patient)
3. Diagnosis
4. Location of patient (i.e., Emergency Department, Operating Room number)
5. Anticoagulant or Anti-Platelet Therapy: Yes or No (To be circled on the Prescriber's Order Sheet)

C. Patient Sample:

1. A blood sample for Type and Crossmatch (sample requirement, if not already collected: two 6ml. pink top tube, EDTA anticoagulated) and Trauma Panel must be collected. Additional specimen may be requested to continue crossmatching red cell products.

2. Obtaining the Blood Bank specimen:

- Patient's wristband must be scanned.
- Barcode labels printed at patient bedside.
- Specimen obtained and labeled with barcode labels.
- Specimen scanned into collection.

Note: Alternatively, specimen may be hand labeled with:

- **Patient's name or unidentified identification**
- **Medical Record number**
- **Date, time and initials of person collecting the sample.**

Scanning of patient wristband, and scanning into collection must occur.

If a scan override occurs, a phone call must be placed to the laboratory (CLP), or specimen will be rejected.

Note: Unlabeled and incorrectly labeled specimens are unacceptable. These will be rejected and a new specimen requested.

3. Specimens will be delivered via the Pneumatic Tube System to the Laboratory (Station #202-Central Lab Processing –CLP) as soon as possible after patient arrival and optimally before picking up MTP Pack #1.

4. If the MTP Pack #1 is being requested prior to the Blood Bank receiving and testing the specimen, the Blood Bank technologist will transport the products to the location along with the form for Release of Uncrossmatched Blood Products for the PGY2 or Attending to sign as well as pick up the patient specimen.

Note: Packing and transporting the red cell units in a BioFridge may be the best option when responding to an MTP. Each patient situation must be evaluated, example: An OR case may initially want 2 red cell units sent stat, to be followed by 4 units in a BioFridge.

5. If the Pneumatic Tube System is unavailable, the specimen must be hand delivered by Transport to Central Lab Processing, STAT.

D. Communication:

1. The Trauma Surgery Attending (or designee such as the Trauma resident), Anesthesiology Attending (or designee) or ICU Attending will coordinate all communications with the Blood Bank throughout the Massive Transfusion episode.

2. As the patient changes location, it is the responsibility of the Trauma Surgery Attending (or designee), Anesthesiology Attending (or designee) or ICU Attending to ensure that the Blood Bank is immediately notified of the patient's new location.

3. The Blood Bank will designate a coordinating technologist whenever possible to handle all communications regarding the patient. When the first Massive Transfusion Pack has been issued to the designated courier, the Blood Bank technologist will contact the current patient location with notification that the initial Massive Transfusion Blood Product Order pack is en route.

Note: The designated courier must be trained in sign-out and transport of blood products.

4. The Blood Bank will notify the Hematology Department so that appropriate reagents and controls can be prepared for recommended testing (Fibrinogen and D-Dimer).

E. Blood Bank Response/Delivery

1. Upon receipt of the official notification call from the Trauma Surgery Attending (or designee), Anesthesiology Attending (or designee) or ICU attending, the Blood Bank tech will review the patient history in the Laboratory Information System to determine if a Separate and Hold (SEP), Type and Screen (TSC) or Type and crossmatch (RCP) has been ordered and if testing has been completed on a specimen received in the last three days.
2. Request a patient specimen if needed.
3. Red Cell Products, Plasma Products, Platelet Products and/or Cryo Order will be entered into EPIC by the Blood Bank staff if there is not yet an order placed in EPIC by the provider.
4. Prepare and dispense "**MTP Pack #1**" with the following products as part of the initial response:
 - Four (4) Units PRBC's
 - Four (4) Units of FFP

Note: The provider may request fewer than 4, Provider specific orders supersede the pre-defined packs listed.

5. Assess red cell, plasma, platelet and cryoprecipitate inventory levels.

Order additional product, if necessary. If it has been noted in EPIC that the patient is on anticoagulant or anti-platelet therapy, ordering at least one extra pheresis product early on is recommended unless otherwise specified by the provider.

Notes:

- ⇒ For additional pooled cryoprecipitate or platelet products, contact St. Elizabeth's.
- ⇒ Consider contacting other locations such as St. Luke's, A.O. Fox, etc. for a more immediate need of red cell or plasma products until an order from Red Cross is received.
- ⇒ If ordering from Red Cross, ask from which location products are being sent. It may be necessary to bring in multiple stat taxis, especially if platelets are needed.

For plasma products when Massive Transfusion Protocol has been activated, if:

- Blood type unknown: Give A plasma.
- Blood type known: Give type specific.

Notes:

- ⇒ Every blood type may receive AB plasma, however, inventory is limited
- ⇒ In the event type A plasma is not in the inventory, use AB plasma.
- ⇒ Monitor plasma inventory closely during an MTP and order as appropriate to prevent depleting the inventory.

Releasing red cells and plasma products to the patient:

- ✓ If testing is not completed or there is no sample available for testing, release type O negative red cell units and type A plasma. Upon delivery of products, the Uncrossmatched Blood Product Request Form must be signed by the PGY2 or, Attending.

Note: When issuing units that are O negative and uncrossmatched, if available, select the O negative units that are antigen typed and found negative for CDE and Kell until testing has been completed. If these phenotyped units are not available, issue non-phenotyped O negative units.

- ✓ If the blood type testing has been completed and the antibody screen and crossmatch have not been completed, release type specific red cell units and type specific plasma. Upon delivery of products, the Uncrossmatched Blood Product Request Form must be signed by the PGY2 or Attending.
- ✓ If the type, screen and crossmatch testing has been completed, issue ABO/Rh type compatible, crossmatch compatible red cells, and type specific plasma.
- ✓ If a patient has received O Negative or non ABO/Rh type specific red cells from a transferring institution, ABO/Rh typing may be mixed field and the Rh typing may be difficult to interpret. In the event that this occurs, Rh negative blood must be used for transfusion.

Status of Specimen	Red Cell ABO/Rh Type	Plasma ABO/Rh		Emergency Uncrossmatched Form Needed
		Historical Type Known	Historical Type Unknown	
Unavailable	O Negative, CDE and K negative Uncrossmatched	Type Specific	A	Yes
Specimen in BB, not tested				
ABO/Rh testing completed, Ab screen – not completed	ABO Type specific, Uncrossmatched	Type Specific		Yes
Type, Screen and Crossmatch completed.	ABO/Rh Type Compatible, Crossmatch Compatible	Type Specific		No

6. Unless the Blood Bank is instructed otherwise, immediate preparation of MTP Pack #2 will begin after issue of MTP Pack #1. MTP Pack #2 includes:
 - Single (1) dose apheresis Platelets
 - Four (4) units PRBC's
 - Four (4) units of Fresh Frozen Plasma

Note: MTP Pack #2 will not be issued until requested.
7. Consult with the Transfusion Service Medical Director or Pathologist on Call if the patient is Rh negative and the supply of Rh negative red cell units is low or the situation does not allow for transport time involved in receiving Rh negative units from Red Cross or other facility to determine if the patient is a candidate to be switched to Rh positive red cells.
8. Any changes to the number of each type of product needed for delivery of the next Massive Transfusion Pack must be ordered by the Trauma Surgeon, Anesthesiologist or ICU Attending or designee and be communicated immediately to the Blood Bank technologist.
9. Once Pack #2 has been issued, immediate preparation of MTP Pack #3 will begin. MTP Pack #3 includes:

- Four (4) units PRBC's
- Four (4) units of Fresh Frozen Plasma
- 2 Frozen ARC Pooled Cryoprecipitate should be on hand and immediately thawed at 37 C once MTP Pack #3 has been issued.
- The tech will be responsible for communicating with the provider that the cryoprecipitate will follow in approximately 20 minutes. (Each pool of cryoprecipitate is the equivalent of 5 single cryoprecipitate). This order does not need to be approved by the Pathologist on Call.
Note: MTP Pack #3 will not be issued until requested.

10. Subsequent orders will consist of the following and released upon request:

- Four (4) units PRBC's
- Four (4) units of Fresh Frozen Plasma
- Every even numbered pack will include a platelet pheresis
- Every third pack will include 2 Pooled Cryoprecipitate –
Cryoprecipitate should be on hand and immediately thawed at 37 C once the MTP Pack containing cryoprecipitated has been issued. The tech will be responsible for communicating with the provider that the cryoprecipitate will follow in approximately 20 minutes. This order does not need to be approved by the Pathologist on Call.

11. Once the initial package of products has been issued, ensure that are always 4 red cell units crossmatched, four fresh frozen plasma thawed, one platelet pheresis and two pooled cryoprecipitate (or the equivalent) available throughout the duration.

12. See table below a summary of recommended products per pack and EPIC order codes.

Order Codes for Massive Transfusion					Quantity
RCP PLASMA PLATELET CRYO		Red Cell Products Plasma Products Platelets Cryoprecipitate			20 20 5 6
MTP Pack#	Packed Red Cells	Plasma	Apheresis Platelet	Pooled Cryo	Novoseven Factor VIIa
1	4	4			
2	4	4	1		
3	4	4		2	
4	4	4	1		
5	4	4			Consider Novoseven. Refer to recommendations.
6	4	4	1	2	
7	4	4			
8	4	4	1		
9	4	4		2	
10	4	4	1		Consider Novoseven. Refer to recommendations.

F. Recommendations for use of Factor VIIa during Massive Transfusion

On rare occasions, it may be appropriate to infuse Recombinant Factor VIIa for ongoing non-surgical bleeding refractory unresponsive to conventional therapy. This should be limited to:

- Patients without known CAD or PVD
- Transfusion of >10 units PRBC's with ongoing requirement
- No evidence of "surgical" bleeding

The **dosage of Factor VIIa** should be: **90 microgram/1 kg and is considered off-label use**. The drug should be infused, and repeated once in two hours if bleeding persists. In a massive transfusion, this must be ordered by an attending.

Patients who receive Factor VIIa should ideally have the following testing and values:

- D-Dimer (if DIC is suspected).
- Elevated PT and PTT
- Fibrinogen level >100
- pH parameter should not be less than 7.1

G. Provider Response

1. It is recommend that the provider fax the order to Pharmacy for Calcium Gluconate -1gm/50ml D5W IVPB x1 after MTP#2 has been requested and infused.
2. Additional testing is recommended every 30-60 minutes:
 - CBC
 - PT, PTT, Fibrinogen, D-Dimer (if DIC issuspected)
 - ISTAT testing* – **CG8** (ABG,Na,K,Gluc, ICAL), **EG7** (ABG, Na,K,ICAL) or **G3**(ABG)
Note: *This testing is performed by Respiratory Therapy.
3. Use of a fluid warmer to infuse IV fluids and blood products is recommended.

H. Nursing Response

1. Collect the specimen (2-6ml. pink top tubes) for a Type and Crossmatch* and Trauma Panel if not already collected. Ensure that properly labeled specimens are sent STAT to the Central Lab Processing area of the laboratory via the Pneumatic Tube System (Station #202).
Note: *This is CRITICAL & must be done immediately.
2. Call the **Blood Bank STAT (3720)** when the type and crossmatch sample has been sent and confirm the MTP order.
3. Acquire the Level I warmer (IV warming device) STAT and use it for administration of all blood products.
4. Administer and record in EPIC as per policy, the type and volume of blood products when they are transfused.
5. If the storage cooler is being requested, ensure that delivered red cell blood products remain in the cooler until they are administered.
6. If subsequent MTP packs are needed after the initial request, contact the Blood Bank by phone at 3720 to check on mode of transport.

I. Proper Handling of Blood Products:

1. Red blood cells and plasma can be requested in a storage cooler for the Emergency Department, CT scan area or in the Operating Room.
Note: Because fresh frozen plasma is thawed at 37°C, only plasma that has been stored at 4°C for 120 minutes (2 hours) can be sent to a location in storage cooler.
2. Fresh Frozen Plasma, Platelets and/or cryoprecipitate must not be placed in the MTP storage cooler with the red cell products. Platelets and Cryoprecipitate must be kept at room temperature until transfused and within 30 minutes from the time of issue.
3. If the patient changes location (e.g. transported from the Emergency Room to Interventional Radiology and then to the Operating Room or Intensive Care Unit), any cooler with remaining blood products must be transported with the patient to his or her new location. Do NOT leave coolers of blood components unattended in the location where the patient last was.
4. All products received that are not being stored in the storage cooler should have the infusion started or returned to the Blood Bank within 30 minutes from the time of issue.

J. De-activation of Protocol

1. The Trauma Surgery Attending (or designee), Anesthesiology Attending (or designee) or ICU Attending will immediately notify the Blood Bank when the Massive Transfusion Protocol is to cease. This includes situations where the patient has expired. Alternatively, if the Blood Bank coordinator has received no communication from the Trauma Surgery Attending (or designee), Anesthesiology or ICU Attending, the Blood Bank will contact the attending.
2. Upon notification that the Massive Transfusion Protocol has been de-activated, the Blood Bank tech will advise the Hematology department of the de-activation.
3. To minimize product wastage and facilitate Blood Bank inventory reconciliation, it is imperative that unused products be returned as soon as possible after the cessation of the Massive Transfusion Protocol by the Emergency Department RN, circulating RN in the OR, or ICU charge nurse.

K. Documentation

1. The provider, at the time of each Massive Transfusion Pack is requested, must be ordered in EPIC at the time the order is received either by a provider or a Blood Bank technologist.
2. The de-activation must be documented on the nursing flow sheet in the Emergency Department (ED), Operating Room (OR), or Intensive Care Unit (ICU).
3. The MD or designee will order the de-activation of the Massive Transfusion Protocol when blood products are no longer needed by contacting the Blood Bank at 3720.
4. Throughout the Massive Transfusion, standard transfusion documentation requirements must be followed as per the Blood Administration Policy.

L. Blood Bank Follow-up after a Massive Transfusion for subsequent transfusions:

Following a massive transfusion, when twelve (12) units or more of type O red cells are transfused within a twenty four (24) hour time period to ABO blood type A, B, or AB:

1. A new specimen must be requested if additional units are needed 24 hours from the time a patient received the first unit of type O. A Type and Screen must be repeated and full coombs crossmatch performed in order to detect passively acquired ABO antibodies that may be present. If the crossmatch is incompatible because of ABO antibodies, transfusion with type O red cells should be continued.
2. If the change in blood type involves only the Rh type, returning to Rh type specific blood is recommended.

M. Quality Review

All trauma cases for which the policy is initiated will be evaluated as part of the Blood Bank Quality Plan. The Blood Bank will maintain a summary transfusion documentation record for each MTP patient. Blood Bank retrospective review of Laboratory activities will include the following:

1. Turn-around time for Lab results
2. Turn-around time for delivery of MTP packs
3. Number and types of blood products transfused, discarded, and compliance with documentation requirements.
4. Review of the Rh negative patient that was switched to Rh positive red cell products

All Massive Transfusion Protocol activations and outcomes will be reviewed by the hospital Transfusion Committee.

References:

An FFP: PRBC Transfusion Ratio ≥ 1.5 is Associated with a Lower Risk of Mortality after Massive Transfusion. The Journal of Trauma, November 2008, Vol 65, No 5, Pages 986-993.

Guidelines for Massive Transfusion. AABB, Bethesda, MD, 2005.

Standards for Blood Banks and Transfusion Services, 30th ed. AABB, Bethesda, MD, p. 41, 2016.

Technical Manual, current edition. AABB, Bethesda, MD