Current Status: *Active* **PolicyStat ID:** *10814298*

Origination: *9/15/2021*
Effective: *9/15/2021*
Last Approved: *12/7/2021*
Last Revised: *12/7/2021*
Next Review: *12/7/2023*
Document Contact: *Kelly Sartor: Supv, Laboratory*
Area: *Laboratory-Blood Bank*
Key Words:
Applicability: *Dearborn*

Providing Components for a Massive Transfusion - Dearborn

Document Type: Procedure

I. PURPOSE AND OBJECTIVE:

A. This document will provide the Blood Bank staff with instructions for providing blood components for massive transfusion of all patients, regardless of age.

II. PRINCIPLE:

A. A patient who is exsanguinating due to physical trauma, unexpected massive bleeding during a surgical procedure or delivery of an infant requires:

1. Fluid resuscitation,
2. Red cell mass replacement to maintain tissue oxygenation, and
3. Platelet and coagulation factor replacement to counteract depletion resulting from consumption and dilution.

B. The massive transfusion protocol (MTP) provides red blood cells (RBCs), thawed plasma (FFP), and platelet components (PLTs) in pre-determined ratios with the intent to prevent or minimize the risk of dilutional coagulopathy in the massively bleeding patient. In this protocol, Pooled Cryoprecipitate components (PCR) are dispensed upon the caregiver's request.

C. The Blood Bank must be prepared to support the patient's transfusion requirements, keeping in mind the blood supplier's ability to provide components, as well as the transport times between the blood supplier, the Blood Bank, and the patient. Blood components can be infused to the patient in less time than is required to dispense them from the Blood Bank as heated infusions systems are capable of infusing about one unit of RBCs per minute. The massive transfusion protocol is designed to allow the Blood Bank staff to rapidly prepare and dispense blood components for the massively bleeding patient.

D. The Blood Bank will make every attempt to have one cooler of refrigerated components prepared and one platelet ready to be dispensed at all times after initiation of the massive transfusion protocol.

III. DEFINITIONS:

A. Adult patient: For the massive transfusion protocol, a patient who is 12 years or older.

B. Pediatric patient: For the massive transfusion protocol, a patient who is less than 12 years old.

C. Current sample: A sample that was collected no more than 3 days before the current date. For example, if a sample is drawn on Monday (day 0), then the sample remains "current" all day Mon., Tues., Wed., and Thur.

D. Complete blood type: ABO/Rh typing that includes both a forward and a reverse typing.

E. Dispense: Process of issuing blood products for transfusion

F. Plasma: The term used throughout this document referring generally to both FFP and liquid plasma.

G. FFP (Fresh Frozen Plasma): The acronym "FFP" throughout this document refers generally to any thawed plasma component.

H. Liquid Plasma: A plasma product that is never frozen. Compared to frozen and thawed plasma components, liquid plasma has extended expiration times but may contain diminished coagulation factors.

I. PLT: Acronym for platelet.

J. ABO-identical: A component that is of the identical ABO blood group as the recipient.

K. ABO- plasma-compatible: Refers to platelets, fresh frozen plasma, and cryoprecipitate components that do not contain ABO antibodies corresponding to the recipient's ABO antigens.

L. ABO compatible: Refers to donor RBCs that lack the ABO antigens corresponding to the recipient's ABO antibodies.

M. Rh(D) identical component: A component that is of the identical Rh(D) as the recipient.

N. Rh(D) compatible component: A blood component of the following specificity:

1. For a Rh(D) negative recipient, the component is Rh(D) negative.
2. For a Rh(D) positive recipient, the component is either Rh(D) positive or Rh(D) negative.
3. For a recipient with a Rh(D) type that is undetermined for any reason, the component is Rh(D) negative.

O. Massive transfusion: The administration of 8-10 RBC units within a 24 hour period, or the acute administration of 4-5 RBC units within a one-hour period to an adult patient

P. Post Issue Crossmatch: Serologic compatibility testing of donor unit and recipient after the unit has been issued in an emergency situation.

Q. Trauma massive transfusion: The acute administration of 4-5 red cell units within one hour.

R. Emergency issue (EI): A bleeding event in which the attending physician determines that blood components must be dispensed/transfused prior to completion of applicable compatibility testing.

S. Standard blood bank cooler: A cooler used for inpatients:

1. That is intended for the transport of 1 - 6 blood components which require refrigeration.
2. That has been validated for the transport of blood components.

T. EPIC: Hospital computer information system

IV. POLICY:

A. **Component Ratios During Massive Transfusion**

1. Component sets will be prepared and dispensed in the pre-determined ratios as indicated in the

table below.

2. Requests from the Trauma department will also include an initial release of two RBC units in a Trauma Pack issued prior to release of first cooler of the protocol.

Cooler Components & Ratios During Massive Transfusion	
Components will be dispensed in the following ratio: **6 RBCs/ 6 Plasma/ 1 Platelet**	
Upon activation of the massive transfusion protocol, the cooler will likely be dispensed as described below to allow the Blood Bank time to thaw additional FFP	
*Cooler # 1 (MTP1)	3 RBC/ 3 FFP/ 1 PLT
Cooler # 2 (MTP2)	3 RBC/ 3 FFP
Cooler # 3 (MTP3)	3 RBC/ 3 FFP/ 1 PLT
Cooler # 4 (MTP4)	3 RBC/ 3 FFP
Cooler # 5 (MTP5)	3 RBC/ 3 FFP/ 1 PLT
Replicate component sets of cooler 4 & 5 will automatically be prepared until the protocol is terminated by the patient's caregivers, after which time the caregivers may deviate from these pre-determined component ratios.	
*Trauma Pack (TPAK)	2 RBCs issued prior to Cooler # 1 for Trauma Patient only.

B. **Persons Authorized to Activate the Massive Transfusion Protocol**
Activation of this procedure can be requested by verbally with a phone call to the Blood Bank or by written order by any of the patient's clinicians (e.g., a surgeon, anesthesiologist, physician's assistant, certified registered nurse anesthetist, resident, fellow, etc). It should be followed up immediately with an order and collection of a patient specimen for Type and Screen as soon as possible (if not previously obtained). **Note: advance notice by phone is the preferred method of communication since it allows Blood Bank an opportunity to prepare and dispense the component(s) while the runner is en route to the Blood Bank.**

C. **Communication**

1. The Blood Bank employee who takes a phone call indicating that the massive transfusion protocol is being activated shall:
   a. Document the appropriate information on the attached Blood Bank Communication for Massive Transfusion or Emergency Issue Form, and
   b. Inform other employees of the activation, and enlist supporting help to prepare components and coolers, and
   c. Perform a patient history check to determine if there is a current sample available, the degree of compatibility testing that has been performed and any special transfusion requirements.
2. If a Medical Technologist becomes aware that six (6) or more RBCs have been dispensed from the Blood Bank on a given patient within one (1) hour, then the technologist should communicate with the patient's caregiver(s) the potential for activation of the massive transfusion protocol. This policy is meant to enhance awareness but is not intended to replace physician responsibility for activation of this protocol based upon the unique circumstances and condition of the patient.
3. The Medical Director should be notified immediately if availability of blood products is compromised or if it is necessary to modify the application of the massive transfusion protocol.

D. **Information Required**

The Blood Bank requires the following information in order to dispense blood components under the massive transfusion protocol:

1. Patient's Name
2. Medical Record Number (MRN)
3. Wristband Number

E. **Requirement for Written Documentation of the Required Information**

1. In order to dispense components, the runner must present **written** documentation of the patient's name, MRN, wristband number, and number and kind of components requested. *The Urgent Request for Blood Product Form* (F-1565) is usually used for this purpose.
2. All attempts will be made to obtain the required written information; i.e. the runner can complete F-1565 or the Blood Product Dispense Form (F-1564) if they have the patient's name, medical record number, and wristband number. The runner may also call to the patient's location to acquire the required information.

F. **Extenuating Circumstances / Unable to Obtain the Required Information**

Extenuating circumstances may prevent the patient's caregivers from providing the required information to the Blood Bank. In this case, the technologist will weigh the amount of time needed to obtain the required information, versus the patient's need for an immediate transfusion. After weighing these factors, the technologist will proceed as described below:

1. Obtain the required information; i.e. the runner can complete F-1565 or F-1564 if they have the patient's name, medical record number, and wristband number. The runner may also call to the patient's location to acquire the required information. Or,
2. Immediately dispense group O-negative RBCs as described in Transfusion Medicine policy, Downtime Emergency Issue.
   The Blood Bank shall never refuse to dispense components or unduly delay an emergency transfusion when the required information cannot be obtained.
3. Any time that the patient's caregivers do not provide the required information, a Variance Report shall be completed.

G. **Inventory**

The Blood Bank will assess current inventory levels of RBCs, plasma, and platelets as indicated in Transfusion Medicine policy, Inventory and Ordering of Blood Components. Inventory levels shall be assessed upon activation of the massive transfusion protocol and periodically throughout the event.

1. If the inventory of any component is less than the minimum, then the Blood Bank shall seek replacement inventory from blood suppliers or other area hospitals.
2. If the Blood Bank is unable to obtain replacement inventory or if there is a regional shortage of components, then the Medical Director or designee shall be notified immediately.
3. If inventory cannot be obtained in a timely manner, the Blood Bank will notify the emergency department and Operating Room (OR) physicians of inventory status.
4. **Liquid A Plasma Inventory**
   The Blood Bank will maintain an inventory of group A liquid plasma that may be used during a massive transfusion protocol. Refer to Use of Group A Liquid Plasma for additional information.

5. **Pre-Thawed Plasma Inventory**
   In anticipation of an activation of the massive transfusion protocol or an emergency issue event, the Blood Bank will attempt to maintain the following minimum inventory of thawed plasma at all times: 3 group AB. Additional plasma units should be thawed immediately as described in Table 421: Cooler Components & Ratios during Massive Transfusion.

H. **ABO and Rh of Components Dispensed Under the Massive Transfusion Protocol**

1. If compatibility testing is complete, the appropriate ABO/Rh of the blood products dispensed under this massive transfusion protocol is described throughout the Transfusion Medicine Policies, *RBC Crossmatch Guidelines*, and *Newborn Testing Compatibility Guidelines*.
2. If compatibility testing is not complete, then the appropriate ABO and Rh blood products dispensed under this massive transfusion protocol is indicated in the Transfusion Medicine policy, Emergency Issue of Blood Products .
3. If patient has a previous history but the blood type has not been confirmed on current admission then O RBC must be used. Rh Negative units must be used for women <50 years of age and males less than 18 years of age. If the sex of the patient is unknown Group O Negative blood must be used.

I. **Use of Group A Liquid Plasma**
Group A liquid plasma should be used prior to thawed plasma for the following situations:

1. If the MTP is emergency issue because there is no current/valid blood type on the patient, the patient should be receiving group A liquid plasma in the massive packs.
2. If the MTP is non-emergency issue, the patient's blood type is group A or O, and the liquid plasma expires within the next 5 days, the patient should be receiving group A liquid plasma in the massive packs.
3. No more than 6 liquid plasma should be given to a patient within a 24 hour period, unless directed by the Blood Bank Medical Director.
4. If directed by the Blood Bank Medical Director, group A liquid plasma may be used in situations outside of the above examples.

J. **The Use of Coolers**

1. Refrigerated components will be dispensed from the Blood Bank in a cooler. These coolers have been validated to maintain the required transport temperature.
2. All technologists who dispense components under the Massive Transfusion Protocol must also comply with the Transfusion Medicine policy, *Transporting Blood Components in a Cooler*.

K. **Policies Relating to Preparation and Dispense of Components**

1. The massive transfusion protocol is intended to prevent or minimize the risk of dilutional coagulopathy and is designed to allow the Blood Bank staff to rapidly prepare and dispense blood components. If the patient's caregivers wish to deviate from the pre-determined component ratios, the result may be an increase in the time required to prepare and dispense components.
2. During a massive transfusion protocol, the Blood Bank will make every effort to have one cooler of refrigerated components and a room temperature platelet prepared and ready to be dispensed at all times.
3. The preparation of replicate sets of blood components must be continued until the patient's caregivers request termination of the massive transfusion protocol.

L. **Special Instructions and Transfusion Requirements**

1. The Blood Bank will attempt to supply components that meet patients' special instructions / transfusion requirements. However, the first priority will be to dispense components expeditiously. However, Blood bank staff must alert and receive approval from the medical director prior to deviating from any special instructions or transfusion requirements. For example:
   a. The Blood Bank director may suspend irradiation of blood components during a massive transfusion event.
   b. The Blood Bank director may decide not to dispense antigen negative RBCs to a massively bleeding patient with a history of unexpected antibodies.
2. If a patient's special instructions / transfusion requirements are not met, then document the occurrence on a Variance Report. Communication is essential to confirm that antigen negative or irradiated components are available when the bleeding event is under control.

M. **Crossmatching RBCs Dispensed Under the Massive Transfusion Protocol**

1. If the patient is eligible for electronic crossmatches, then electronic crossmatches will be performed.
2. If the patient is not eligible for electronic crossmatches and RBCs are not already crossmatched, then the components will be emergency issued. For example, if compatibility testing is incomplete, or if the patient has unexpected antibodies or an unresolved ABO or Rh(D) discrepancy, the patient's authorized caregiver must sign Form-1565, *Urgent Request for Blood Products* as described in the Transfusion Medicine policy Emergency Issue of Blood Products. This form may be signed before or after the incident; the signature is not required at the time of issue.

N. **Post-Issue Crossmatches**

A serologic crossmatch must be performed post-issue for units dispensed by Emergency Issue, and for the first 12 units issued under the massive transfusion protocol. It is not necessary to perform a post-issue crossmatch for units dispensed after the first 12 under the massive transfusion protocol, unless the patient has a historical or current indication of unexpected antibodies. Post-issue crossmatches may not be indicated for neonates. Note that the computer system does not allow post-issue electronic crossmatching. Refer to Transfusion Medicine policy, Emergency Issue of Blood Products ; *Post Issue Crossmatching*

O. **Ordering and Resulting the MTP test in SoftBank**

The Massive Transfusion Initiated test is to be ordered in SoftBank and resulted with the date and time of the massive transfusion initiation. Refer to the Blood Bank CDM, *Ordering and Resulting the Massive Transfusion Initiated Test* for further instruction.

V. SPECIMEN COLLECTION AND HANDLING:

A. A specimen is not required to initially dispense emergency issue components under the massive transfusion protocol.

B. A specimen is required in order to dispense ABO-identical components or ABO plasma-compatible plasma and platelets.

C. All specimens must meet the requirements of Transfusion Medicine policy, Triaging and Identifying Acceptable Samples for Testing.

VI. EQUIPMENT / SUPPLIES:

A. Standard cooler

B. Frozen Transport Packs

C. Refrigerated Transport Packs

D. Biohazard /Plastic Bags

E. Urgent Request for Blood Product, F-1565

F. Blood Product Dispense Form, F-1564

G. Record of Transfusion Form , F-1566

H. Blood Bank Communication Form for Massive Transfusion or Emergency Issue

VII. QUALITY CONTROL (QC):

A. Activation of this procedure is evaluated by the Medical Director or designee for appropriateness of the activation, adequacy of response, and outcome.

B. Inappropriate activations are reported to the Chiefs of the Trauma Team and Anesthesiology Department.

VIII. PROCEDURE:

A. **Preparation and Dispense of Blood Components during a Massive Transfusion Event**
Follow the steps below to prepare and dispense blood components under the massive transfusion protocol. These steps may be repeated as necessary to provide replicate coolers. This procedure is intended only to provide a framework for the massive transfusion protocol, minor modifications may be required.

1. Upon notification that an authorized person has activated the massive transfusion protocol, document the Communication for Massive Transfusion or Emergency Issue Form and immediately alert your co-workers.
2. Immediately perform a history check to determine if a there is a current admission specimen and patient blood type available.
3. Immediately thaw FFP as needed.
    a. Refer to the policy, *Use of Liquid A*
    b. Refer to the policy above, *Inventory/Prethawed Plasma*
    c. Refer to table, *Components during Massive Transfusion*
    d. Refer to procedure, *Thawing Plasma and Cryoprecipitate*
4. Place orders in Blood Bank Computer
    a. EIR for RBCs
    b. EIF for Liquid or Thawed Plasma
    c. EIP for Platelets
    d. MTP; test code used to document the date /time that MTP was initiated.

Refer to Blood Bank CDM, *Massive Transfusion* for additional detail.

B. Crossmatch and tag 3 RBCs

1. If no current sample, then uncrossmatched group O RBC must be used. Rh Negative units must be used for women <50 years of age and males less than 18 years of age. If the sex of the patient is unknown Group O Negative blood must be used. Refer to Blood Bank CDM - Emergency Issue.
2. If there is a current admission specimen with confirmed blood type, negative antibody screen and history of no antibodies, give type specific, electronic crossmatched units. Refer to the Blood Bank CDM - Electronic Crossmatch and *Massive Transfusion.*
3. If there is a current admission specimen but the antibody screen is not yet complete and/or patient is not eligible for electronic crossmatch, issue Emergency release uncrossmatched group O units to the patient. Refer to Blood Bank CDM - Emergency Issue

- Refer to Transfusion Medicine Policy, *Tagging Blood Products.*

C. Select and tag 3 thawed plasma

1. Refer to the policy above, *Use of Group A Liquid Plasma.*
2. Refer to the policy *Inventory / Pre-Thawed Plasma Inventory.*
3. Refer to Table : *Cooler Components and Ratios during Massive Transfusion.*
4. Regardless of the patient's ABO type, the Blood Bank should be able to provide 3 liquid plasma or FFP right away for the first set (from the pre-thawed inventory)

Refer to Blood Bank CDM- *Selecting Non-Cellular Products* and Transfusion Medicine policy, T*agging Blood Components.*

D. Select and tag 1 Platelet Pheresis

1. A platelet pheresis should be dispensed with the first set of 3 RBCs and 3 FFP.
2. An additional platelet pheresis is dispensed with alternating sets of RBCs / FFP, so that a platelet pheresis is dispensed with the 1st, 3rd, 5th,etc. set of RBCs / FFP.

E. Place the (3 RBCs, 3 plasma) in a standard cooler prepared in accordance with Transfusion Medicine Policy, T*ransporting Blood Components in a Cooler*

F. Place the PLT in the designated pouch affixed to the cooler. Note: If there is no pouch available on the cooler model being used place the platelet in a biohazard bag labeled with a "Room Temperature" sticker and attach it to the cooler. Refer to Transfusion Medicine Policy, *Transporting Blood Components in a Cooler.*

G. Contact the requesting unit to notify the first cooler is ready for pick up if a runner is not already available.

H. Dispense the products in the blood bank cooler whether or not the transport runner is present.

1. If the transport runner is not yet present, obtain the necessary information from the *Blood Bank Communication For Massive Transfusion Form or Emergency Issue* to pre-dispense the blood products.
2. Adherence of the Dispensing Blood Components and Transporting Blood Components in a Cooler procedure is critical to confirm that the correct blood goes to the correct patient. Refer to Table: *Cooler Components and Ratios during Massive Transfusion above and* to Transfusion Medicine Policy, *Dispensing Blood Components.*
3. Investigate and correct any discrepancies before dispensing the blood.

4. Document "MTP+cooler number used in the protocol" in the Soft "Receiver ID" field and/or on the Record of Transfusion Form, F-1566, if using downtime dispense procedures to track the distribution in the protocols. i.e. MTP1, MTP2, MTP3 etc. Note: TPAK should be entered when dispensing the initial 2 RBC for trauma patients.
5. Complete the Cooler dispense form (attached) with the patient's name, MRN and wristband #. A patient chart label may be used for this purpose.
6. Staple the dispense copies of the Record of Transfusion Forms together and place in the handle of the cooler.
7. When the transport runner arrives, obtain the product dispense form.
    a. If the runner does not have any documentation have them complete the appropriate Blood Product Dispense form with the patient's name and medical record number and the name of the requesting physician.
        i. If products are being issued uncrossmatched use Form-1565 Urgent Request for Blood Form.
        ii. If products are being issued are crossmatched use Form-1564 Downtime Blood Product Dispense Form.
8. Verify agreement between the patient's name and MRN, as it appears on the dispense form and the Record of Transfusion forms.
9. Verify agreement between the wristband number as it appears on the dispense form and the wristband number as printed on the Record of Transfusion forms (if available at time of predispense).
10. Document the employee ID# and actual time of dispense of the transport runner is physically dispensed on the dispense form and/or cooler log.
11. Attach the dispense form to the dispense copies of the transfusion forms and retain for Blood Bank records.

I. After cooler # 1 has been picked up, immediately notify the department if no current patient sample is available. Document this notification on Blood Bank Communication For Massive Transfusion or Emergency Issue Form.

J. Continue to prepare and dispense components for replicate sets by repeating these steps, until the patient's caregivers terminate the massive transfusion protocol.

K. When necessary physicians may request products in addition to standard cooler contents based on the patient's needs (i.e. Pooled Cryoprecipitate). These requests will be accommodated and filled as they are made based on available inventory.

L. Document the notification to cease the protocol on Blood Bank Communication For Massive Transfusion or Emergency Issue Form.

M. Result the MTP test code with the date and time that the Massive Transfusion was initiated. Refer to the Blood Bank CDM, *Ordering and Resulting the Massive Transfusion Initiated Test* for further instruction.

N. Perform Post-Issue Crossmatches if required. Refer to Post Issue Crossmatch in the Transfusion Medicine Policies, Emergency Issue of Blood Products and *Serological Crossmatching of Red Blood Cells.*

IX. REFERENCES:

1. AABB, Technical Manual, current edition.
2. AABB, Standards for Blood Banks and Transfusion Services, current edition.

Attachments

Blood Bank Communication for Massive Transfusion or Emergency Issue

Approval Signatures

Step Description	Approver	Date
	Jeremy Powers: Chief, Pathology	12/7/2021
Policy and Forms Steering Committe (if needed)	Kelly Sartor: Supv, Laboratory	12/2/2021
Policy and Forms Steering Committe (if needed)	Gail Juleff: Project Mgr Policy	12/2/2021
	Kimberly Geck: Dir, Lab Operations B	12/2/2021
	Kelly Sartor: Supv, Laboratory	12/2/2021
	Kelly Sartor: Supv, Laboratory	12/2/2021

Applicability

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