1.0 PRINCIPLE

To coordinate the transfusion of multiple units of blood and blood components, a system must be in place that notifies key personnel, streamlines paperwork, delineates the process, and provides rapid support of patient care needs.

Massive Transfusion Protocol (MTP) refers to the transfusion of blood products over a short period of time to a patient who has severe or uncontrolled hemorrhage/bleeding emergency in the Operating Room, Labor and Delivery, Emergency Department, ICU and other critical care areas. Massive transfusion is usually defined as the replacement of at least one blood volume (8-10 RBC units in an average-sized, 70kg adult) within 24 hours or as the acute administration of 4 to 5 RBC units in 1 hour, loss of 50% of blood volume in 3 hours, or reasonable expectation of continued profuse bleeding most often associated with trauma, obstetrical emergencies, and surgical complications. Exchange transfusion of a neonate is also considered a massive transfusion. For this procedure, please read SOP V-BB-4.30 Exchange Transfusion.

Type O Leukoreduced Packed Red Cells (LRPC) and Type AB plasma (or A, depending on the inventory levels at the time) products are the ideal types that should be given to a patient on MTP when the blood type is unknown. In a MTP, emerging data has shown that the most effective ratio of LRPC: plasma: platelet for transfusion is 1:1:1 to improve the patient’s survival. The aim of treatment is to restore blood volume rapidly and effectively to a level and composition adequate to maintain hemostasis, oxygen-carrying capacity, oncotic pressure (related to or caused by edema), and biochemical parameters.

Timely replacement of volume and oxygen carrying capacity in these situations is critical. However, due to the unexpected nature of these bleeds, providing blood products quickly without sacrificing patient safety is often a challenge. Therefore when a Massive Transfusion Protocol is called, the Blood Bank staff must work as quickly as possible to supply blood products in the ratio described in this procedure.

2.0 SCOPE/RELATED POLICIES

This protocol applies to unexpected massive transfusions in the emergency department, operating room, labor and delivery, critical care areas and patient floors.

V-BB-2.1 Emergency Blood Release
V-BB-4.30 Exchange Transfusion
3.0 SPECIMEN:
A current Blood Bank Type and Screen or 1 pink top EDTA sample labeled for Blood Bank Use.

4.0 MATERIALS:
Blood Bank Cooler

5.0 INSTRUMENTATION: N/A

6.0 SAFETY: Standard Precautions

7.0 RECORDS/FORMS/DOCUMENTS:
Emergency Blood Release Form
Massive Transfusion Protocol Form
Massive Transfusion Order Form

8.0 QUALITY CONTROL: N/A

9.0 PROCEDURE:

1. Initiation of Massive Transfusion Protocol (MTP)

   A. Only a physician or physician appointed designee can initiate the MTP.

   B. A designee must be a licensed medical practitioner (ex. MD, RN, NP, PA)

   C. The patient must be currently exsanguinating and the criteria for a massive transfusion (ex. one blood volume transfusion over 24 hours, 50% blood volume in 3 hours, ongoing blood loss >150ml/min., or 10 LRPC units in 24 hours) must be anticipated or met.

   D. Blood Bank Notification:

      1. The Initiating Physician will notify Blood Bank of his name or designee and the contact number to be used for the duration of the MTP event. If time permits, the physician will place an order for a Massive Transfusion Order in LIS using the drop down menus to provide the necessary information: Patient Name; MRN; location; diagnosis; name of contact person; and contact’s phone number. When the order is placed, the order will automatically print in the Blood Bank with the necessary information. The Blood Bank will set up 4 units of LRPC, 1 SDP and begin thawing 4 units of plasma. The tech will notify the contact person that blood is ready and result the order form as “Ready to transfuse”.

      2. The following information (if known) will be provided to the Blood Bank Staff:

         a) Patient name, MRN, location

         b) Patient diagnosis

         **If patient name and MRN is not known**, a unique identifier will be established as either UNKNOWN Male BBID # or UNKNOWN Female
BBID#. If BBID# is not available, whatever designation/labels the ER has available will be used. Some form of ID must be provided for the Blood Bank to dispense products.

3. The technologist will notify the “Initiating Physician” or designee that:
   a) You have activated the MTP
   b) Four units of LRPC and 1 SDP are available in the Blood Bank for immediate pick up:
      1. Four units O Negative LRPC if type and screen is not done
         Emergency Release Form is ready to be signed by the “Initiating Physician”
         OR
         Four units LRPC crossmatched for patient (If type and screen is current)
      2. Four units frozen plasma will be immediately thawed and contact number will be called as soon as plasma is ready.

4. Subsequent Massive Transfusion Protocol Packs will be available as indicated in the following table:

<table>
<thead>
<tr>
<th>MTP # of Pack</th>
<th>LRPC # of Units</th>
<th>Plasma-thawed-# of units</th>
<th>Platelet-SDP-of units</th>
<th>#</th>
<th>Cryo(5-pooled/u) # of units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Notes: SDP= Single Donor Platelet pheresis= 6-8 Random Donor Platelets Pooled
1 Cryo= 5 units of cryo pooled x 2 = 10 units of cryo

The Blood Bank technologist will call the contact number when the second MTP pack is placed in a cooler and is ready for pick-up. The SDP and Cryoprecipitate remain at room temperature and will be clearly marked “Store at Room Temperature”

5. The technologist will notify the Blood Bank Supervisor, Lead Technologist or designee that a MTP has been initiated. A Pathologist will be notified if there are any problems.
   a) A supervisor or most senior tech will assign one designated staff member to coordinate the issuing of blood products and tracking requests for the emergency case.
b) The following information will be provided to the Medical Director or on-call Pathologist if it becomes necessary to notify one of them:
   1. Patient name, MRN, location
   2. Patient diagnosis
   3. “Initiating Physician” or designee name and contact number
   4. If known, the patient’s
      (a) ABO Type and Rh Type
      (b) Current antibody screen
      (c) History of alloantibodies

6. If necessary (requested by the trauma team, the blood bank tech, or on pathologist initiative) the pathologist may contact the treating physician to review the MTP, advise on laboratory test selection or interpretation, or discuss inventory issues should they arise.

2. Blood Bank Staff Preparation and Issue of Products

A. The technologist will confirm the following:
   1. If the patient has a current, valid type and screen.
   2. If there is sufficient patient sample for appropriate crossmatching.
   3. If either condition is not met, the tech will inform the initiating physician to draw 2 EDTA (pink top) tubes for Type and Screen.

B. If the patient does not have a current type and screen or if the patient cannot wait for crossmatched units, then follow the SOP V-BB 2.1 Emergency Release of Blood.

C. If the conditions are met, a massive transfusion pack will be immediately prepared:
   1. A “Massive Transfusion Pack” consists of:
      a) 4 units leukoreduced packed red cells (LRPC)
      b) 4 units of plasma (thaw in plasma thawer if not immediately available)
      c) 1 Single Donor Platelet (SDP) equivalent to 6-8 units of random donor platelets

   2. Every other Massive Transfusion Pack (in addition to products a, b, and c above) will contain:
      d) 2 pooled cryoprecipitate units (each pooled `cryo` unit contains 5 single units of cryo= 10 total cryo units). This will be thawed immediately if not already available.

   3. For a patient with a positive antibody screen:
      a) If compatible LRPC cannot be quickly identified, the Medical Director and Supervisor, Lead Technologist or designee will direct the release of the most appropriate LRPCs-most likely the Emergency Release form will need to be filled out and signed if it has not already been completed
      b) If no additional specimen is available for crossmatching:
         (1) The “Initiating Physician” will be contacted for an additional specimen
         (2) Antigen negative LRPC will be released under emergency release (SOP V-BB- 2.1)
(3) After 10 units of LRPC have been transfused, techs will not have to do full crossmatches as the blood present within the patient will no longer be the patient’s cells.

D. The Blood Bank staff will prepare MTP Pack #2 consisting of 4 units LRPC and 4 units thawed plasma without additional requests from the Initiating Physician.

E. After MTP Pack #2 is issued, the Blood Bank Staff will contact the Initiating Physician or designee and ask if the Massive Transfusion Protocol should continue. If the MTP is not cancelled after MTP Pack #2, continue to prepare MTP Pack #3 with the products listed in Table 1. If the MTP is still in effect continue to prepare additional packs after each one is issued until the MTP is cancelled.

1. If the Initiating Physician cannot be immediately contacted after MTP #2, then the next MTP pack should be immediately prepared.

F. When the MTP is first initiated, the Laboratory Assistant or other Blood Bank Staff member should:

1. Determine the adequacy of in-house inventory
2. Establish adequate lines of supply for additional blood components, especially SDP.

3. Blood Components

A. Leukoreduced Packed Red Blood Cells- use O Negative for pediatric patients and women of childbearing age (unless the patient has a current type and screen is in the computer in which case type specific may be provided.) Until Type and Screen is complete, use O Positive for women over age 55 and men.

B. Platelets- use ABO identical platelets if possible, otherwise use platelets according to the following: AB, A, B, O

C. Plasma- At least 4 units of thawed plasma are to be available at all times, group A. If patient is group B or AB, immediately begin thawing ABO compatible plasma.

D. Cryoprecipitate- use pooled cryo-ABO type is not significant. Do not use individual cryo units unless pooled cryo inventory is depleted.

| GUIDELINES FOR SWITCHING BLOOD GROUPS WHEN RECIPIENT’S TYPE IS NOT KNOWN |
|-----------------------------|-----------------|-----------------|----------------|
| Patient                     | Donor RBCs       | Donor FFP       | Donor Cryo     |
| ABO and Rh unknown          | 1st 6 units O Neg; Then O Pos | AB              | Any            |
| ABO unknown, Rh known       | O                | AB              | Any            |
| ABO known, Rh unknown       | 1st 6 units Rh Neg; then Rh Pos |                |                |

GUIDELINES FOR SWITCHING BLOOD GROUPS WHEN
**RECIPIENT’S TYPE IS KNOWN**

<table>
<thead>
<tr>
<th>Patient</th>
<th>Donor RBCs</th>
<th>Donor FFP</th>
<th>Donor Cryo</th>
</tr>
</thead>
<tbody>
<tr>
<td>O Pos</td>
<td>O</td>
<td>Any</td>
<td>Any</td>
</tr>
<tr>
<td>O Neg</td>
<td>1st 6 units O Neg, then O Pos</td>
<td>Any</td>
<td>Any</td>
</tr>
<tr>
<td>A Pos</td>
<td>A, then O</td>
<td>A, then AB</td>
<td>Any</td>
</tr>
<tr>
<td>A Neg</td>
<td>1st 6 units A or O Neg, then A Pos if A used or O Pos if O used</td>
<td>A, then AB</td>
<td>Any</td>
</tr>
<tr>
<td>B Pos</td>
<td>B, then O</td>
<td>B, then AB</td>
<td>Any</td>
</tr>
<tr>
<td>B Neg</td>
<td>1st 6 units B or O Neg, then B Pos if B used or O Pos if O used</td>
<td>B, then AB</td>
<td>Any</td>
</tr>
<tr>
<td>AB Pos</td>
<td>AB, then A</td>
<td>AB</td>
<td>Any</td>
</tr>
<tr>
<td>AB Neg</td>
<td>1st 6 units AB neg or A Neg, then A Pos</td>
<td>AB</td>
<td>Any</td>
</tr>
</tbody>
</table>

4. **Discontinuation of Massive Transfusion Protocol**

   A. *Initiating Physician or designee will notify Blood Bank when MTP is cancelled*

      1. A physician or RN from the OR, ED, LDRP, ICU or critical care area or floor will notify the Blood Bank Staff by phone when the Massive Transfusion Event is over.

      2. Unused blood components should be returned immediately to the Blood Bank.

   B. The Medical Director or on-call Pathologist will contact the Initiating Physician or designee periodically to determine if products are being provided without delay, to clarify any issues with the products, discuss and recommend additional products as necessary, and to determine if the MTP should be discontinued.

   C. The Blood Bank Staff will contact the Initiating Physician to ensure that the Emergency Release Form is completed.

5. **MTP at Northern Dutchess Hospital (NDH)**

   If a MTP is activated at Northern Dutchess Hospital, it will be the responsibility of the NDH Blood Bank Tech to notify the staff at the Vassar Brothers Medical Center Blood Bank. As soon as a Vassar Blood Bank Tech has been notified, the Vassar Blood Bank Tech will pack up 4 units of LRPC- the type will depend on the information available on the patient and the status of the patient’s type and screen--; 4 units of thawed plasma and 1 SDP. The Vassar tech will call Valley Courier at 1-800-424-6695 (331-1025) and notify courier that a Massive Transfusion Protocol has been activated at Northern Dutchess Hospital and a car will be needed for the duration of the event. The first pick up will be STAT from Vassar to NDH and deliveries will continue until the event is completed.

10.0 **CALCULATIONS: N/A**
11.0 INTERPRETATION: N/A

12.0 RESULT REPORTING:

A. Documentation of units issued- Each unit must be documented.
   1. The Blood Bank Staff will create a lab initiated order for a Massive Transfusion (if the order has not be placed by the physician) using the Massive Transfusion Protocol Form V- SOP ID: VBMC 4.2a
   2. Techs can do a print screen of issued units from LIS and staple to Form V-SOP ID: VBMC 4.2a Massive Transfusion Protocol
   3. Alternately, for each unit issued, affix one of the extra unit number stickers to the form
   5. If the computer is down, then handwritten unit #s are permissible.

13.0 LIMITATIONS: N/A

14.0 REFERENCES:


REVISION HISTORY

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Revision Purpose</th>
<th>Name of reviser</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>6/15/2015</td>
<td>New Health Quest Laboratory Procedure</td>
<td>Susan E. Chmura, MT(ASCP)</td>
</tr>
<tr>
<td>2.0</td>
<td>2/08/2016</td>
<td>Update of Trauma Protocol page 3 and MTP at Northern Dutchess Hospital page 6</td>
<td>Susan E. Chmura, MT(ASCP)</td>
</tr>
</tbody>
</table>
Massive Transfusion Protocol Form  

Name of Initiating Physician: ____________________________________________

Contact’s Name: ____________________ Contact’s Phone Number: ____________

Patient’s Name: _______________________________________________________

MRN or Unique Identifier #: ____________________ DOB __________________

Patient Diagnosis: ________________________________

Location: __________________________________________________________________________

Patient’s Type: ____________ Antibody Screen: ________________________________

Antibody Identification: ___________________________________________________________

Pathologist Notified: ____________________ Date: ____________ Time: ______

<table>
<thead>
<tr>
<th>MTP# of Pack</th>
<th>LRPC of Units</th>
<th>Plasma-thawed- # of units</th>
<th>Platelet-SDP- # of units</th>
<th>Cryo(5-pooled/u) # of units</th>
<th>Time Issued</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Call</td>
<td>Continue? Y or N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Call</td>
<td>Continue? Y or N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Call</td>
<td>Continue? Y or N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Call</td>
<td>Continue? Y or N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Call</td>
<td>Continue? Y or N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Time MTP Finished: ______________________ Supervisor Review: ______________

Table 1 Delivery Schedule of Massive Transfusion Protocol Packs (MTP #)