

What's in the Massive Transfusion Protocol (MTP) Package?

The Massive Transfusion Protocol Package is a set of documents intended to improve the coordination of a Massive Transfusion Protocol.

The kit contains:

1. A checklist to help improve Massive Transfusion Protocol process
2. Tips and reminders of important points for Massive Transfusion Protocol
3. Massive Transfusion Protocol
4. A sign to alert others that a computer is dedicated to MTP
5. Blood Product Tracking form
6. Issue Voucher for Blood Products (if labels unavailable)
7. Request form for Factor VII

The process requires the assignment of 2 individuals:

1. An RN Massive Transfusion Protocol Leader
 2. A runner (cannot be a porter)
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1. **Assign an RN to be the Massive Transfusion Pathway Leader.** This role is similar to the role of the recorder in a cardiac arrest. The MTP Leader will order blood products, assign runners, monitor and coordinate pathway progress, check blood products, record MTP related interventions, prompt the physician/team members of required acts/considerations and order/follow-up on labwork. The MTP leader should be relieved of other patient care responsibilities to remain focused on recording, oversight, coordination and delegation.
 2. **Assign a Runner.** Assign a runner. Any employee with a hospital ID can pick up blood, including PSWs, RRTs and Unit Clerks. PORTERS cannot be a runner. The runner must be continuously available for BTL/Lab runs.

MASSIVE TRANSFUSION PATHWAY (MTP) CHECKLIST

- Obtain MTP Leader package from CN desk or website. **This is your only role!**
- Ensure MTP order entered in Power Chart (verbal order if needed)
- Assign a runner to pick up product/transport labs.
- Runner cannot be a porter**; anyone with a hospital ID can pick up blood including Unit Clerk or RRT if necessary.
- Initiate continuous temperature monitoring**
- Ensure Level 1 Rapid Infuser initiated. In the event that a Level 1 Rapid Infuser is not available, the HOTLINE can be used with a manual infusion pressure bag. You must add the blood tubing and the Level 1 in-line gas vent to the circuit.
- Consider using HOTLINE for administration of other IV fluids to maintain normothermia
- Hypotension should be treated with blood products. Higher use of crystalloids is associated with increased mortality.
- Review blood product tips and administration reminders contained in this kit.
- Hypothermia, acidosis and coagulopathy is referred to as the trauma triad of death.

Coordinate MTP

- Use dedicated computer for ordering/checking blood products/labs (Sign in MTP kit)
- Maintain a supply of BTL labels and reprint as required
- Prefill “next label” and have ready for runner
- Monitor rate of product utilization; order next set early to avoid interruption in supply
- Record all blood product administration on the MTP tracking record (in package)

Manage and Monitor Blood Product Administration

- Receive and cross-check all blood products. Any RN/RRT/MD can check products
- Only allow checked-blood to enter room. Place in one location and arrange products in the order they were received
- Place signed blood checked labels (2 signatures/time hung) on a blank Progress Record or Lab sheet
- Keep all empty bags in one biohazard container that is free of other waste (empty bags should be kept in one location in case a blood transfusion reaction occurs)
- Try to administer blood products as “whole blood” (not 4 units of PRBCs followed by 4 units of plasma). For example, hang PRBCs on one side of the rapid infuser and plasma on the other to balance red cells with clotting factors. Administer platelets simultaneously through another site (platelets should not be given by rapid infuser or via HOTLINE).
- Monitor tracking sheet to stay on top of next interventions (e.g. labs, fibrinogen replacement, tranexamic acid)
- Communicate MTP recommendations to physician/team
- Place orders for labwork, new transfusion samples or blood products as needed
- Assign a nurse to draw labs when due. ENSURE CORRECT LABEL (high risk situation for error and harm, use closed loop scanning once patient is admitted).

- Have runner take samples directly to lab (runner should ensure that tech knows that this is STAT)
- Monitor for lab results, communicate with lab as needed and report results to team.
- Monitor ionized calcium levels (on GEM); calcium replacement may be required due to large load of citrate during massive transfusion
- Notify BTL if patient expires or cancel MTP when no longer required
- Return any unused blood products to BTL promptly. Only red cells should be placed in cooler.
- Review the tips below to ensure products are managed and administered correctly

Massive Transfusion Pathway Tips and Information

- If MTP was ordered in Power Chart prior to CCTC admission (e.g., ED, OR, ward), labels can continue to be used (even if patient has not been admitted in Power Chart to CCTC).
- If MTP was activated by telephone and not placed in Power Chart (e.g., in the OR), blood products WILL be available but labels will not be printed. Enter MTP in Power Chart upon admission.
- Until patient is admitted in Power Chart, use the paper-based Issue Voucher for Blood Products (included in package). Uncrossed blood will be issued until group and crossmatch is completed.
- Eight Blood Transfusion Labels print when the MTP is ordered. Multiple units and products can be ordered using one label. Choose “reprint” option or reorder MTP for additional labels.
- The Blood Transfusion Lab (BTL) will crossmatch and have 4 units of red cells, 4 units of plasma and 1 platelet pool available **UNTIL** MTP has been cancelled (autostops if unused for 4 hours). It is not necessary to call the Blood Transfusion lab for red cells, plasma or platelets, just send the runner.
- Red cell to plasma matching (1:1) is the goal to prevent depletion of clotting factors. Use blood products to treat hemorrhagic shock. Crystalloids will dilute existing clotting factors.
- **Only red cells should be placed in a cooler**, all other products must be kept at room temperature.
- Frozen plasma requires 30 minutes to thaw (LHSC does not have a microwave for rapid thawing).
- Use blood filter for all products except fibrinogen concentrate or prothrombin complex concentrate (prefiltered).
- Only use normal saline with blood products (ringers and dextrose can cause coagulation).
- BTL must be called for any product other than red cells, plasma and platelets
- All blood products contain citrate anticoagulant. During massive transfusion of any blood products, hypocalcemia can occur due to excessive administration of citrate and/or impaired hepatic clearance. Consider calcium administration if patient has hypotension that is not fluid responsive or is bradycardic. Monitor ionized calcium on GEM.
- MTP is activated, the hematology lab will phone abnormal CBC and INR/aPTT results prior to repeat confirmation. A low or unmeasurable INR/aPTT during MTP suggests a critically low fibrinogen level (indication for fibrinogen replacement).
- Hypothermia can contribute to coagulopathy and a sudden rise in temperature may indicate a blood transfusion reaction.

Other Products Reminders

Platelets

- **Platelets must be hung with a NEW blood filter each time** (platelets will get stuck in a previously used filter). **Do not administer through a rapid infuser or HOTLINE (Baxter pump is okay).**
- Platelets should be kept at room temperature.

Fibrinogen Replacement Ordering **NEW**

- Obtain a STAT fibrinogen level with admission labs and during MTP.
- A delay or inability to report INR or PTT may indicate that fibrinogen level is low.
- In massive hemorrhage, order fibrinogen replacement for fibrinogen <1.5 g/L (or < 2.0 g/L) in obstetrical hemorrhage. Consider fibrinogen if hematology lab is unable to measure INR or PTT.*
- Do not order cryoprecipitate for fibrinogen replacement. The order should now be placed as “Fibrinogen Replacement (FIB.RPL)”. Do not order the care set.



- Fibrinogen Concentrate is the primary product for fibrinogen replacement. BTL will autosubstitute with cryoprecipitate if necessary to manage blood product supply.
- Either one of two Fibrinogen Concentrate products may be provided; administration requirements are the same for either RiaSTAP™ or FIBRYGA™.
- They products are both manufactured from pools of human plasma. Product is reconstituted in the blood transfusion lab; this will take approximately 30 minutes.
- One adult dose is 4 gm.
- The product should be clear or opalescent. If cloudy or turbulent, return to BTL.
- Use regular IV tubing and administer at room temperature (no blood filter required).
- Unlike prothrombin complex concentrates (PCCs), Fibrinogen Concentrate does not contain heparin (like most other blood products, they do contain citrate).
- Order online STAT. Add “Fibrinogen Replacement” to one of the printed labels.
- The risk of allergic reaction is similar to all blood products.

Prothrombin Complex Concentrate (PCCs)

- Octaplex/Beriplex are Prothrombin Complex Concentrates (PCCs).
- They contain pooled vitamin K dependent clotting factors and are indicated for urgent warfarin reversal. **They also contain heparin (contraindicated in HIT).** Administer with standard IV tubing (blood tubing or filter not required, products are filtered in BTL when pooling product).
- Octaplex™ is clear with slight blue tinge. Beriplex™ is clear with slight opalescent hue.

- Octaplex™/Beriplex™ is filtered and pooled into one transfer bag, based on weight based dosing requirements.
- The total dose is determined by the patient's weight and provided in increments of 500 IU doses (see BTL manual).
- The maximum rate of administration is different for Octaplex™ (maximum 3 ml/minute) vs Beriplex™ (maximum 8 ml/min). ***Either product may be dispensed but will have a label affixed to the bag that identifies the product and maximum infusion rate.***

Tranexamic Acid

- Tranexamic acid is now ward stock in CCTC (pharmacy product).

Factor VII

- Recombinant Factor VIIa (Niasase) comes from Blood Transfusion Lab (BTL) and no longer requires haematology approval. If you look up Factor VII in the BTL, be sure to select the correct Factor VII option.
- Factor VIIa (Niasase) must be reconstituted at bedside (gentle rotation to prevent damage to the protein). It must also be given IV push (it is like a medication versus blood product, even though it comes from BTL).
- In urgent situations, BTL will issue Factor VIIa before completion of the mandatory request form (included in this package; complete if possible). Consider before ordering:
 1. Have all surgical options (anatomical bleeding) been explored?
 2. Is INR < 1.5 , PTT < 55 sec, Fibrinogen > 1.0 g/L and Platelets > 50?
 3. Is acidosis and/or hypothermia corrected?

Desmopressin (DDAVP)

- DDAVP may be ordered (most commonly in cardiac surgical bleeding).
- DDAVP stimulates Vasopressin 2 (V2) receptors which stimulated the release of Von Willebrand Factor (VWF).
- VWF promotes platelet adhesion to the endothelium
- VWF is a carrier protein for Factor VIII. The increase in VWF prevents the inactivation of Factor VIII (therefore protecting Factor VIII levels in the blood).
- Dose of 0.3 ug/kg (~20 ug) can be given IV over 30 minutes

References

LHSC Blood Transfusion Manual.

National Advisory Committee on Blood and Blood Products. (2018). NAC statement on fibrinogen replacement.

CL Behring Riastap™ Fibrinogen Concentrate (Human) product monograph.
<http://labeling.cslbehring.ca/PM/CA/Riastap/EN/RiaSTAP-Product-Monograph.pdf>

MASSIVE TRANSFUSION PROTOCOL (MTP)

Revised February 2020

This resource has been created specifically for LHSC/St Joseph's (London, ON) and may not be applicable for other centres. These documents are the intellectual property of LHSC/St Joseph's. They are not to be shared or duplicated without permission

Severe / uncontrolled bleeding situation

Clinician (MD or designate) orders MTP

» **LABS**
draw baseline
CBC
INR / PTT /fibrinogen

» Check for in date Transfusion Medicine Lab sample, if needed order and draw Group and Screen
Blood Transfusion Lab Confirmation Test

» Assign Dedicated Runner to pick up blood products for duration of MTP

Transfusion Medicine Lab (TM) will ensure the following are always ready for issuing:
 » 4 units Packed Red Blood Cells (PRBC)¹
 » 4 units Plasma
 » 1 dose platelets

MTP ordered in EMERGENCY DEPARTMENT
Blood Products issued as Trauma Packs
(4 units PRBC, 4 units plasma, 1 dose platelets²)
(Indicate on label: Next Trauma Pack)
8 labels print



MTP ordered in OTHER SERVICES
Blood Products issued as requested by Clinician
(Indicate on label: specific product and number of units)
8 labels print



Runner takes label to TM, products issued

Bleeding settled, call TM to stop MTP³

CONSIDER:

LABS at onset and every 6-8 Units PRBC:
CBC (lavender tube)
INR / PTT / fibrinogen (blue tube)
Blood gases, Calcium

TRAUMA / OBSTETRIC patient: Tranexamic acid
1 g IV over 10 minutes

If patient on ANTICOAGULANTS
Warfarin (Coumadin) reversal: Prothrombin Complex Concentrate (PCC): weight based dose, available from TM
Dabigatran (Pradaxa) reversal: Idarucizumab (Praxbind), available from Pharmacy
Other Direct Oral Anticoagulant (DOAC) reversal: Prothrombin Complex Concentrate (PCC) 2000 IU, available from TM

FIBRINOGEN REPLACEMENT
Fibrinogen Concentrate, 1 dose = 4 grams
If Fibrinogen \leq 1.5 g/L or rapidly decreasing
OBSTETRIC or CARDIAC SURGERY patient:
If Fibrinogen \leq 2.0 g/L

CELL SALVAGE: to request, have Switchboard page Perfusion on call

¹ Uncrossmatched (O or Group Specific) or Crossmatched PRBC

² First dose platelets begins with 2nd Trauma Pack

³ MTP will auto-stop if no products are issued in a 4 hour period.

**This Computer is Reserved
for Massive Transfusion
Pathway**

Use of Transport Containers: Igloo/Cooler and PTB (Platelet Transport Bag)

- Only PRBC are placed in an igloo/cooler. Thawed plasma or platelets (or any other blood product) must **NOT** be placed in a transport igloo/cooler.
- Platelets arrive in a room temperature “lunch bag” (Platelet Transport Bag)
- Other blood products, even if they are being returned to TM, must **NOT** be placed in the transport igloo/cooler.
- Transport igloos/coolers are pre-conditioned, packed and temperature validated to safely store PRBC for a maximum of 6 hours.
- Adding other blood products to the transport igloo/cooler, removing PRBC units for extended time periods and then returning them to the transport igloo/cooler or not keeping the transport igloo/cooler closed violates the safe storage
- PRBC units must remain in the closed transport igloo/cooler until ready to transfuse

Platelet Transport Bag



Small igloo/cooler -
maximum 3 units PRBC

Large igloo/cooler -
maximum 6 units PRBC



Massive Transfusion Pathway (MTP) Tracking Form
(use of at discretion of Clinician ordering MTP)

SECTION I: Identification	
Date/Time pathway activated:	Patient ID: (Name and PIN)
Date/Time pathway discontinued:	

SECTION II: Documentation																		
Trauma Pack (TP)	TP # 1				TP # 2				Check Labs: CBC INR/PTT Fibrinogen	TP # 3				TP # 4				Check Labs: CBC INR/PTT Fibrinogen
PRBC	1	2	3	4	5	6	7	8		9	10	11	12	13	14	15	16	
Plasma	1	2	3	4	5	6	7	8		9	10	11	12	13	14	15	16	
Platelets					1					2				3				
Fibrinogen Replacement																		
Tranexamic acid																		
Trauma Pack (TP)	TP # 5				TP # 6				Check Labs: CBC INR/PTT Fibrinogen	TP # 7				TP # 8				Check Labs: CBC INR/PTT Fibrinogen
PRBC	17	18	19	20	21	22	23	24		25	26	27	28	29	30	31	32	
Plasma	17	18	19	20	21	22	23	24		25	26	27	28	29	30	31	32	
Platelets	4				5					6				7				
Fibrinogen Replacement																		
Tranexamic acid																		
Trauma Pack (TP)	TP # 9				TP # 10				Check Labs: CBC INR/PTT Fibrinogen	TP # 11				TP # 12				Check Labs: CBC INR/PTT Fibrinogen
PRBC	33	34	35	36	37	38	39	40		41	42	43	44	45	46	47	48	
Plasma	33	34	35	36	37	38	39	40		41	42	43	44	45	46	47	48	
Platelets	8				9					10				11				
Fibrinogen Replacement																		
Tranexamic acid																		

ORDERING PHYSICIAN: _____

Voucher completed/reviewed by: _____
SIGNATURE OF NURSE

Signed consent for transfusion of blood and/or blood products is in the patient's chart

Nurse's Initials: _____

CLINICAL INDICATIONS FOR TRANSFUSION:

- O.R. Abnormal Test Result (specify): _____
 Patient Bleeding Other (specify): _____

PRODUCT REQUIRED: ASAP Date/Time: _____

Paediatric Patient: Patient Weight: _____ kg

- PACKED RED CELLS _____ units or mL
 FRESH FROZEN PLASMA _____ units or mL
 PLATELETS Adult Dose Paediatric Dose _____ mL
 25% ALBUMIN 100 mL x _____ 50 mL x _____
 5% ALBUMIN 500 mL x _____ 250 mL x _____ 50 mL x _____

NOTE: Order 500 mL size only if infusion rate > 125 mL/h

- IV IMMUNE GLOBULIN (IVIG) _____ g
 Rh IMMUNE GLOBULIN (Rhlg) _____ µg
 OCTAPLEX (PCC) Patient Weight: _____ kg
 OTHER (Specify): _____

OPERATING ROOM ONLY:

Igloos requested by: _____

ORDERING PHYSICIAN: _____

Voucher completed/reviewed by: _____
SIGNATURE OF NURSE

Signed consent for transfusion of blood and/or blood products is in the patient's chart

Nurse's Initials: _____

CLINICAL INDICATIONS FOR TRANSFUSION:

- O.R. Abnormal Test Result (specify): _____
 Patient Bleeding Other (specify): _____

PRODUCT REQUIRED: ASAP Date/Time: _____

Paediatric Patient: Patient Weight: _____ kg

- PACKED RED CELLS _____ units or mL
 FRESH FROZEN PLASMA _____ units or mL
 PLATELETS Adult Dose Paediatric Dose _____ mL
 25% ALBUMIN 100 mL x _____ 50 mL x _____
 5% ALBUMIN 500 mL x _____ 250 mL x _____ 50 mL x _____

NOTE: Order 500 mL size only if infusion rate > 125 mL/h

- IV IMMUNE GLOBULIN (IVIG) _____ g
 Rh IMMUNE GLOBULIN (Rhlg) _____ µg
 OCTAPLEX (PCC) Patient Weight: _____ kg
 VOLUVEN _____ mL
 OTHER (Specify): _____

OPERATING ROOM ONLY:

Igloos requested by: _____

Request for Niasase (rFVIIa)

NIASTASE (rFVIIa) is only licensed for Hemophilia A and B patients with inhibitors or patients with acquired FVIII inhibitors, for the treatment of spontaneous bleeding events or prior to invasive procedures.

ALL other indications are OFF-LABEL.

NOTE: Thrombotic risk is associated with the use of rFVIIa off-label.

Patient name: _____ Patient PIN _____

Patient weight: _____ Dose requested: _____ mg

Patient Weight	rFVIIa dosage guideline	Vials required for dose
< or = 40 kg	2 mg	1 X 2 mg vial
41 to 60 kg	3 mg	1 X 2 mg and 1 X 1 mg vial
61 to 80	4 mg	2 X 2 mg vial
> 80 kg	5 mg	1 X 5 mg vial

Pre-rFVIIa Check List (Consider the following)

- ✓ All surgical options (anatomical bleeding) have been explored
- ✓ INR is less than 1.5
- ✓ PTT is less than 55 seconds
- ✓ Fibrinogen is greater than 1.0 g/L
- ✓ Platelet count is greater than $50 \times 10^9/L$
- ✓ Acidosis is corrected
- ✓ Hypothermia is corrected

I understand the risks associated with the use of rFVIIa and consider that this off-label use is appropriate in this situation.

Physician's Name (please print) _____

Date: _____

You will be receiving a post-infusion questionnaire by email.
Thank-you for completing both the pre and post documentation.

Sincerely,
City-Wide Blood Transfusion Committee, Sub-committee of the MAC

ID: HEMA-BTL-PRO-D-PR115
Authorized by: J.KINNEY

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