Massive Hemorrhage Protocol (Adults) – Informational Document

Purpose

This document provides information pertaining to the protocol which ensures the safe and expeditious provision of blood components and products during an identified situation of massive bleeding.[12345]

Policy

- Massive hemorrhage protocol (formerly known as massive transfusion protocol) activation is appropriate only within the context of a massively bleeding patient within a SHA Saskatoon urban hospital site.
  - **Ongoing major bleeding** is defined as blood loss of 150 mL/minute (or more) **AND** any of the following:
    - 3 or more units RBC given in 1 hour.
    - Shock Index (HR/SBP) 1.4 or greater.
    - ABC Score 2 or more.
  - The MRP (lead physician) shall clinically assess the patient to determine when ongoing major bleeding criteria are met and decide when to activate the MHP.
  - The MRP activating the MHP shall designate a 'Team Contact'.
  - If uncrossmatched red blood cells are being requested, the requesting physician MRP shall document in the patient's chart that the clinical situation justifies the transfusion and obtain informed consent from the recipient when possible.

- To activate the MHP, the 'Team Contact' designated by the MRP shall call 3-2-1 and activate a "**CODE TRANSFUSION**". The 'Team Contact" will then be transferred to the TML to notify them of a MHP activation and provide them with the following details:
  - Team Contact name;
  - Patient identification (name, HSN, sex);
  - Approximate patient age (or date of birth, if known);
  - Diagnosis;
  - Care team location;
  - Contact phone number; and
  - Name of the MRP.

- The 'Team Contact' shall notify TML by phone if the patient location changes, in order to facilitate proper component delivery.

- One TML technologist should be designated to coordinate the MHP within TML and act as the TML contact to avoid miscommunication with the bedside team.

- The TML shall notify the Hematology/Coagulation upon MHP activation and provide them with the patient's identification (name and HSN).

- MHP activation occurring outside of regularly scheduled staffed hours at SPH or SCH shall automatically trigger a callback of a TM Technologist.

- A lavender EDTA tube shall be sent to TML for testing as soon as possible to enable issue of group specific blood components.

- The MHP boxes will include the following components, unless customized upon request:
  - **MHP Box 1** = 4 units RBC, 4 units plasma, 4g Fibrinogen Concentrate (if Obstetric MHP).
    - If thawed plasma is unavailable, RBC units and Fibrinogen Concentrate (if applicable) shall be issued in Box 1 in advance of plasma thaw completion. The TML technologist will notify the clinical team as soon as thawed plasma is available.

  - **MHP Box 2** = 4 units RBC, 2 units plasma, 4g Fibrinogen Concentrate (if not issued in Box 1).
  - One (1) platelet unit may be issued on MRP request (e.g., antiplatelet meds) or if platelet count is less than 75 x 10^9/L.
    - ONE adult platelet dose is a pool of FOUR whole blood donor platelets or an apheresis platelet from ONE donor.
  - MHP box contents should be customized upon request, based on results of patient bloodwork.

- Group O RBC shall be issued until the patient's blood group is known. Group specific blood components shall **only** be issued if a blood group has been determined during the current hospital admission.
  - Group O RBC shall be issued until an ABO confirm group has been resulted.
  - The RBC Rh status shall be issued based on criteria detailed in Appendix A.

- If the patient's blood group is unknown, **only** a maximum of 8 units of AB plasma shall be issued.
  - If the patient's blood group has not been collected/tested after 8 units of AB plasma, the Transfusion Medicine Physician shall be notified to confirm a switch to Group A plasma.

- Group incompatible platelets may be issued throughout the duration of the MHP depending on inventory availability.
  - To prevent alloimmunization when Rh negative patients receive Rh positive platelets, Rh immune globulin shall be recommended to all females < 50 years of age and all males < 17 years of age once the MHP has been discontinued **AND** after consultation with the Transfusion Medicine Physician on-call.

- Special instructions in the LIS will be reviewed by the Transfusion Medicine Physician for appropriateness in the context of an MHP. Special instructions for blood components may include any of the following:
  - Irradiated, IgA deficient, washed, HPA or HLA matched, phenotype matched.

- Requests for plasma protein products (not including Albumin, Fibrinogen Concentrate, Prothrombin Complex Concentrates, Surgiflo, Tisseel or Evicel) shall be reviewed with the Transfusion Medicine Physician on-call.

- Prior to blood component issue, a requisition containing patient identifiers (name, identification number), name of the requesting physician, time of request and blood destination **shall** be received by TML.
  - If patient identification is unknown at the time of MHP activation, the TML must be provided with patient identifiers (name, hospital number) assigned by patient registration, as per the requisition. Confirmed patient identification shall be merged with the assigned identification as soon as possible.

- Once the ABO blood group has been confirmed and/or IAT crossmatch results are available:
  - An attempt will be made by TML to retrieve all issued uncrossmatched RBC and replace with group specific uncrossmatched RBC.
  - An attempt will be made to retrieve RBC units issued which have been determined to be IAT crossmatch incompatible and replace with compatible units.

- All products issued under the MHP will be provided in unsealed coolers that are not validated for product storage and therefore must either be:
  - Transfused within 4 hours of issue **OR**
  - Returned to Transfusion Medicine within 60 minutes of issue for return to available inventory **OR**
  - Discarded by TML staff if returned unused greater than 60 minutes after issue.

- The MRP shall determine when the MHP may be discontinued.
  - Notification of MHP discontinuation shall be provided by the MRP or designate to the TML within 30 minutes of the decision to discontinue the MHP.
  - The TML shall notify Switchboard to communicate a CODE TRANSFUSION – ALL CLEAR message, to enable an overhead announcement and list page-out signaling MHP discontinuation.

- Discussion of any problems arising from the MHP should be initiated within one week of the event if possible. A summary of any MHP activation event will be reported to the MHP Subcommittee of the Saskatoon Transfusion Committee. A blood product wastage report shall be provided to the MHP Subcommittee for review.

Definitions

For the purposes of this document, the following definitions apply:

Term, abbreviation, acronym, etc.	Definition
ASAP	As soon as possible
ELXM	Electronic crossmatch
Fibrinogen Concentrate (FC)	Concentrate of human fibrinogen. Brand names include RiaSTAP and Fibryga.
HSN	Health Services Number - A unique personal health number assigned to an individual. This is usually the Saskatchewan or out-of-province health number, or may be Canadian Forces (CF), Federal Penitentiary (FPS) number, etc. The HSN is entered into the 'PHN field' of the LIS. See Appendix B for HSN formats.
may	Indicates the action is optional
MHP	Massive Hemorrhage Protocol
MHP Activation Criteria	Ongoing blood loss of 150 mL/minute (or more) **AND** any of the following: • 3 or more units RBC given in 1 hour. • Shock Index (HR/SBP) 1.4 or greater. • ABC Score 2 or more.
MRP	Most Responsible Physician or lead physician
Prothrombin Complex Concentrate (PCC)	4-factor human source concentrate of Factors II, VII, IX and X. Brand names include Octaplex and Beriplex.
RBC	Red blood cells
shall	Indicates the action is mandatory
should	Indicated the action is recommended
TML	Transfusion Medicine Laboratory
TMP	Transfusion Medicine Physician
TXA	Tranexamic Acid

Procedure

Step	Action
1	Identify the presence of 'ongoing major bleeding' and determine if MHP Activation Criteria are met.
2	'Team Contact' to call 3-2-1 and activate "**CODE TRANSFUSION**". The 'Team Contact" will then be transferred by Switchboard to the TML at #2179 (regardless of hospital site of MHP activation).
3	Provide TML with the following information: • Team Contact name. • Patient identification (name, HSN, sex). • Approximate patient age. • Diagnosis. • Care team location. • Contact phone number. • Lead Physician. It is the responsibility of the 'Team Contact' to notify the TML of any updates in patient location or 'Team Contact' name to ensure accurate delivery of blood components.
4	Confirm with the TML technologist that a blood group and screen is available. If it has not yet been collected, the 'Team Contact' is responsible for ensuring the sample is drawn and sent to the TML.
5	If uncrossmatched red blood cells are being requested, MRP must document in the patient's chart the situation which justifies the transfusion. Obtain informed consent from the recipient when possible. • Complete a Blood Product Request Form and send immediately to TML. • If patient identification is unknown at the time of the MHP, the patient will remain an unidentified patient (assigned name and identification number by registration) throughout the MHP event. Confirmed patient identification will be merged once the MHP is discontinued.
6	**If not already given, ensure a total Tranexamic Acid (TXA) 2 g IV is given within 3 hours of injury, EXCEPT in GI bleeding.** • **Dosing Options**: TXA 1 g over 10 min, then 1 hour later give TXA 1 g over 10 min OR TXA 2 g over 20 min.
7	TML shall notify the Hematology/Coagulation upon MHP activation and provide them with the patient's identification (name and HSN).
8	TML shall ensure that RBC's will be switched from Group O to group specific as soon as the patient ABO blood group is confirmed and may be switched to Rh-positive, according to the policy.
9	TML shall prepare **MHP BOX 1** with 4 RBC, 4 plasma and 4g Fibrinogen Concentrate (if Obstetric MHP). TML will notify the ward when the box is ready. The ward is responsible for picking up the box. • Plasma takes about 25 minutes to thaw; the RBC and Fibrinogen Concentrate may be issued in advance of the plasma.
10	TML shall begin to prepare **MHP BOX 2** with 4 RBC, 2 plasma and 4g Fibrinogen Concentrate (if not issued in Box 1). This box shall be ready for issue within 30 minutes of MHP BOX 1. TML will notify the ward when the box is ready. The ward is responsible for picking up the box.
11	TML shall continue to prepare **MHP BOX 1 and 2.** Contents shall alternate unless the clinical team provides direction to the TML to customize box contents based on lab results. Box customization is preferred to ensure goal-directed patient care until the clinical situation is resolved.
12	Order the following laboratory tests **every 30 minutes:** • CBC, aPTT, INR, fibrinogen. • ABG, ionized Ca.

	• Lytes, Urea, Creatinine, Magnesium. • Point of care testing (TEG) should be considered, if available.
13	Administer fluid through warming devices continuing to monitor patient temperature. If temperature < 36^{o}C, actively warm patient. • Red blood cells or plasma may be infused through a blood warmer or rapid infuser (NOT platelets).
14	Assess bleeding rate between doses of blood components. If possible, wait for results of laboratory tests before transfusing additional blood components.
15	The contents of MHP boxes may be customized upon request on the basis of the last available laboratory tests:
16	Give Ca gluconate 50 mg/kg or Ca chloride 1 g IV (slowly) if ionized calcium is < 1.15 mmol/L.
17	Consider contacting the Transfusion Medicine Physician **at any time** to discuss the possibility of adjunctive blood component or plasma protein product therapy.
18	When control of bleeding has been obtained, with achievement of hemodynamic stability and the transfusion rate has slowed, or when resuscitation efforts have been withdrawn, the MRP shall discontinue the MHP. Contact the TML to communicate that the MHP has been discontinued.
19	Return any unused blood products to TML as soon as possible. **Note**: Products that are returned after more than 60 minutes may be held in the laboratory for a short period of time before being discarded taking into consideration all products must be infused within 4 hours of original release from the laboratory.
20	The TML shall notify Switchboard of the CODE TRANSFUSION – ALL CLEAR.

Laboratory Test	Treatment Triggers
RBC	Hemoglobin < 70-80 g/L
Platelets	< 75 x 10^9/L; if CNS injury < 100 x 10^9/L
INR	> 1.8 and bleeding
Fibrinogen	< 1.5 g/L and bleeding; if Obstetric, < 2.0 g/L

Appendices

Appendix A – MHP Red Blood Cell and Plasma Requirements
Appendix B – Saskatoon Adult Massive Hemorrhage Protocol (MHP) Algorithm – Job Aid
Appendix C – QR Code Saskatoon MHP Additional Resources – Job Aid
Appendix D – MHP Roles Lists – Job Aid
Appendix E – Massive Hemorrhage Protocol (MHP) Team Contact Checklist

Appendix A – MHP Red Blood Cell and Plasma Requirements

MHP Red Blood Cell and Plasma Requirements

Note: *The Transfusion Medicine Physician may recommend alternative blood components depending on inventory limitations and degree of blood component utilization.*

Patient's Testing Status	Red Cell Requirements	Plasma Requirements	
Unknown patient identification OR Identified Patient Male < 17 years, Female < 50 years NO blood group this admission	Group O NEG* **Uncrossmatched**	Group AB (8 units **only**)	Group A (TMP **must** be consulted prior to switching to Group A)
Unknown patient identification OR Identified Patient Male ≥ 17 years, Female ≥ 50 years NO blood group this admission	Group O POS **Uncrossmatched**	Group AB (8 units **only**)	Group A (TMP **must** be consulted prior to switching to Group A)
Identified patient, blood Group done on this admission, but no historical blood group and the Screen is outdated or not tested. **Male < 17 years, Female <50 years**	Group O NEG* **Uncrossmatched**	Group Specific or Group Compatible	
Identified patient, blood Group done on this admission, but no historical blood group and the Screen is outdated or not tested. **Male ≥ 17 years, Female ≥ 50 years**	Group O POS **Uncrossmatched**	Group Specific or Group Compatible	
Identified patient, blood Group done on this admission (confirmed on 2 separate specimens) and the Screen is outdated or not tested. **All males and females**	Group Specific **Uncrossmatched**	Group Specific or Group Compatible	
Identified patient with an in-date Group and Screen, but no historical blood group. **Male < 17 years, Female <50 years**	Group O NEG* **Crossmatched**	Group Specific or Group Compatible	
Identified patient with an in-date Group and Screen, but no historical blood group. **Male ≥ 17 years, Female ≥ 50 years**	Group O POS **Crossmatched**	Group Specific or Group Compatible	
Identified patient with and in-date Group and Screen (blood Group confirmed on 2 separate specimens) **All males and females**	Group Specific **Crossmatched**	Group Specific or Group Compatible	

*If inventory allows, all female patients of childbearing potential (≤ 50 years of age) should receive Kell negative RBC.

Appendix B – Saskatoon Adult Massive Hemorrhage Protocol (MHP) Algorithm – Job Aid

JA–214 Saskatoon Adult Massive Hemorrhage Protocol (MHP) Algorithm

Appendix C – QR Code Saskatoon MHP Additional Resources – Job Aid

JA–215 QR Code Saskatoon MHP Additional Resources

Appendix D – MHP Roles Lists – Job Aid

JA–216 MHP Roles Lists

Appendix E – Massive Hemorrhage Protocol (MHP) Team Contact Checklist (also available on Forms on Demand)

FORM-997 Massive Hemorrhage Protocol (MHP) Team Contact Checklist

References

[1] Tertiary Testing Centre Massive Hemorrhage Protocol, v14. https://saskblood.ca/mhp/. Accessed August 4, 2021.
[2] Callum JL, et al. A regional massive hemorrhage protocol developed through modified Delphi technique. CMAJ Open 2019. DOI:10.9778/cmajo.20190042
[3] Hunt BJ, Allard S, Keeling D, et al. A Practical Guideline for the Haematological Management of Major Haemorrhage. In: British Journal of Haematology. 2015. 170, 788-803.
[4] Dzik WH, Blajchman MA, Fergusson D, et al. Clinical review: Canadian National Advisory Committee on Blood and Blood Products – Massive Transfusion Consensus Conference 2011: report of the panel. Critical Care 2011, 15:242.
[5] ORBCoN Provincial Hemorrhage Toolkit. http://transfusionontario.org/en/provincial-massive-hemorrhage-toolkit/ Released April 30, 2021. Accessed August 4, 2021.