Massive Transfusion Protocol (Pediatric) – Informational Document

Purpose

This document provides information regarding the protocol involved to ensure the safe and expeditious provision of blood products during an identified situation of massive bleeding.[123]

Policy

- Massive transfusion protocol activation is appropriate only within the context of a massively bleeding patient within a SHR Saskatoon urban hospital site
    - Massive bleeding in pediatric patients is defined as:
        - The loss or anticipated loss of > 50% (40 mL/kg) total blood volume in 3 hours.
        - The loss or anticipated loss of 100% total blood volume in 24 hours.
        - Blood loss of > 10% total blood volume per minute.
    - The MRP (lead physician) shall clinically assess the patient to determine when massive bleeding criteria are met and decide when to activate the MTP.
    - The MRP activating the MTP shall designate a 'Team Contact' to notify TML of MTP activation.
    - 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 or caregiver when possible.

- To activate the MTP, one individual should be designated as the 'Team Contact' and shall notify the TML of MTP activation. The following details shall be provided by the team contact to TML:
    - Team Contact name
    - Patient identification (name, HSN, sex)
    - Approximate patient age (or date of birth, if known)
    - Patient weight (known or estimated)
    - Care team location
    - Contact phone number
    - Name of the MRP

- Team Contact should complete MTP Clinical 'Team Contact' Checklist.
    - A copy of FORM- 997 shall be placed into Box 1 by TML staff
    - Any change in patient location or team contact name should be provided to TML by phone at the time the change occurs in order to facilitate proper component delivery.
    - Upon MTP discontinuation, the completed Checklist should be sent to TML by fax.

- TML shall notify the following individuals upon MTP activation:
    - Transfusion Medicine Physician
    - Hematology/Coagulation

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

- The MTP boxes will include the following components, but can be customized upon request:

Patients < 10 kg	Patients 10 – 50 kg	Patients > 50 kg
MTP BOX 1: 1 RBC, 1 FP, 1 PLT	**MTP BOX 1:** 3 RBC, 3 FP, 1 PLT	**MTP BOX 1:** 4 RBC, 4 FP, 1 PLT
MTP BOX 2: 1 RBC, 1 FP	**MTP BOX 2:** 3 RBC, 3 FP	**MTP BOX 2:** 4 RBC, 4 FP

- TML will alternate between MTP BOX 1 and MTP BOX 2 until clinical situation is resolved.

- Blood component and plasma protein product considerations within the context of a MTP:

MTP Red 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	
	Crossmatched	Crossmatched Group O, Rh Compatible	Group Specific Uncrossmatched	Group O Rh Neg Uncrossmatched	Group Specific or Group Compatible	Group AB
Unknown patient identification – no blood group this admission Male or Female < 17				Yes*		Yes
Identified patient – no blood group this admission Male or Female < 17 years				Yes*		Yes
Identified patient, group and screen done this admission Male or Female < 4 months		Yes				Yes
Identified patient, group and screen done on this admission, but crossmatch is outdated Male or Female > 4 months, < 17 **ABO Confirm Tested**			Yes		Yes	
Identified patient, group and screen done on this admission, but crossmatch is outdated Male or Female > 4 months, < 17 **ABO Confirm NOT Tested**				Yes	Yes	
Identified patient, group and screen done this admission – crossmatch in-date and a historical blood group Male or Female > 4 months, < 17	Yes				Yes	

*If inventory allows, all female patients should receive Kell negative RBC

- Group incompatible platelets may be issued throughout the duration of the MTP depending on inventory availability.
  - For Rh Negative female patients receiving Rh Positive platelets, 1 dose of WinRho should be given within 72 hours of transfusion.

- Cryoprecipitate may be issued upon request.
  - Group AB Cryoprecipitate shall be issued during an MTP for patients < 4 months.
  - Cryoprecipitate does not need to be blood group matched during an MTP for patients > 4 months.

- Special instructions in the LIS will be reviewed by the Transfusion Medicine Physician for appropriateness in the context of an MTP. Special instructions for blood components may include the following:
  - Irradiated
  - Phenotype matched
  - Other product manipulation requests (washing, volume reduction) shall be waived for the duration of the MTP.

- Requests for plasma protein products shall be reviewed with the Transfusion Medicine Physician.

- Prior to blood component issue, a requisition containing patient identifiers (name, identification number, gender, patient weight), 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 MTP 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 MTP 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 MTP may be discontinued.
  - Notification of MTP discontinuation shall be provided by the MRP or designate to the TML within 30 minutes of the decision to discontinue the MTP

- Discussion of any problems arising from the MTP should be initiated within one week of the event if possible. A summary of any MTP activation event will be reported to the Saskatoon Health Region MTP Committee. A blood product wastage report shall be provided to the MTP committee 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
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.

Massive blood loss (in pediatric patients)	• The loss or anticipated loss of > 50% (40 mL/kg) total blood volume in 3 hours. • The loss or anticipated loss of 100% total blood volume in 24 hours. • Blood loss of > 10% total blood volume per minutes.
MRP	Most Responsible Physician or lead physician
MTP	Massive Transfusion Protocol
Pediatric	A patient who is < 17 years of age
RBC	Red blood cells
shall	Indicates the action is mandatory
should	Indicated the action is recommended
SHR	Saskatoon Health Region
TML	Transfusion Medicine Laboratory

Procedure

Step	Action
1	Identify the presence of 'massive bleeding'.
2	'Team Contact' to call to TML of MTP activation: • RUH: #2179
3	Using the MTP Clinical 'Team Contact' Checklist (FORM- 997), the 'Team Contact' must provide TML with the following information: • Team Contact name • Patient identification (name, HSN, sex) • Approximate patient age • Approximate patient weight • Care team location • Contact phone number • Lead Physician The 'Team Contact' should record this information on the checklist used during the MTP. At any time during the MTP, TML must be updated on patient location or team contact name to ensure accurate delivery of blood components. **Note**: This form shall be placed into Box 1 for the ward(s) to complete.
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 received by 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 or caregiver when possible. • Complete a Blood Product Request Form and send immediately to TML • If patient identification is unknown at the time of the MTP, the patient will remain an unidentified patient (assigned name and identification number by registration) throughout the MTP event. Confirmed patient identification will be merged once the MTP is discontinued.
6	Early consideration should be given to the use of tranexamic acid for patients that are less than 3 hours from trauma. • **Dose:** Tranexamic acid 10-30 mg/kg IV (MAX 1000g) over 15 minutes in **all** patients within 3 hours of injury, followed by 5-10 mg/kg/h IV infusion over 8 hours in trauma patients.

<table>
<tr><td>7</td><td>TML will notify the following individuals upon MTP activation:
• Transfusion Medicine Physician
• Hematology/Coagulation</td></tr>
<tr><td>8</td><td>TML will ensure that RBC's will be switched from Group O to group specific (if applicable) as soon as the patient ABO blood group is confirmed, and may be switched to Rh-positive according to the policy.</td></tr>
<tr><td>9</td><td>TML will prepare MTP BOX 1. 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 platelets may be issued in advance of the plasma.

<table><tr><th>Patients < 10 kg</th><th>Patients 10 – 50 kg</th><th>Patients > 50 kg</th></tr><tr><td>MTP BOX 1: 1 RBC, 1 FP, 1 PLT</td><td>MTP BOX 1: 3 RBC, 3 FP, 1 PLT</td><td>MTP BOX 1: 4 RBC, 4 FP, 1 PLT</td></tr></table>
Note: Included in MTP BOX 1 will be a copy of FORM-997 (MTP Clinical 'Team Contact' Checklist). This is to be completed by the 'Team Contact' at the bedside and returned to Transfusion Medicine once the MTP has been discontinued.</td></tr>
<tr><td>10</td><td>TML will begin to prepare MTP BOX 2. This box will be ready for issue within 30 minutes of MTP BOX 1. TML will notify the ward when the box is ready. The ward is responsible for picking up the box.

<table><tr><th>Patients < 10 kg</th><th>Patients 10 – 50 kg</th><th>Patients > 50 kg</th></tr><tr><td>MTP BOX 2: 1 RBC, 1 FP</td><td>MTP BOX 2: 3 RBC, 3 FP</td><td>MTP BOX 2: 4 RBC, 4 FP</td></tr></table></td></tr>
<tr><td>11</td><td>MTP BOX 1 and 2 will alternate until the clinical situation is resolved.</td></tr>
<tr><td>12</td><td>Order the following laboratory tests every 30 minutes (which should be ordered collectively as an "MTP Panel"):
• CBC, aPTT, INR, fibrinogen
• Venous blood gas, ionized Ca</td></tr>
<tr><td>13</td><td>Administer fluid through warming devices continuing to monitor patient temperature. If temperature <35°C actively warm patient.
• Red blood cells or plasma may be infused through a blood warmer or rapid infuser (NOT platelets).</td></tr>
<tr><td>14</td><td>Assess bleeding rate between doses of blood components. If possible, wait for results of laboratory tests before transfusing additional blood components.</td></tr>
<tr><td>15</td><td>The contents of MTP boxes may be customized upon request on the basis of the last available laboratory tests:

<table><tr><th>Product</th><th>Treatment Considerations</th></tr><tr><td>RBC</td><td>Maintain hemoglobin at 70-100 g/L</td></tr><tr><td>Plasma</td><td>INR >1.5 or aPTT >40 and hemoglobin stabilizes, prioritize plasma transfusion over red cells</td></tr><tr><td>Platelets</td><td>Platelets <$75x10^9$/L consider an additional dose of platelets</td></tr><tr><td>Cryoprecipitate</td><td>Fibrinogen <1.5 g/L consider cryoprecipitate 10 units or fibrinogen concentrate</td></tr></table></td></tr>
<tr><td>16</td><td>Consider giving 50 mg/kg Ca Gluconate IV if ionized calcium < 1 mmol/L.</td></tr>
<tr><td>17</td><td>Consider contacting the Transfusion Medicine Physician at any time to discuss the possibility of adjunctive blood component or plasma protein product therapy.</td></tr>
<tr><td>18</td><td>Inform TML when control of bleeding has been obtained, or when resuscitation efforts have been withdrawn so that MTP can be discontinued. Return any unused blood products to TML as soon as possible.</td></tr>
<tr><td>19</td><td>Fax the completed MTP Clinical 'Team Contact' Checklist to TML (#2222).</td></tr>
</table>

Appendices

JA–304 Pediatric Massive Transfusion Protocol (MTP)

References

[1] Calgary Laboratory Services. FMC Massive Transfusion Protocol (MTP) – Adult. https://www.calgarylabservices.com. Accessed September 6, 2016.

[2] 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.

[3] 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.