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| **Massive Transfusion Events** |
| **Purpose** | This process describes how to provide the delivery of blood products for trauma and other patients who meet an indication for massive transfusion. The aim of treatment is the rapid and effective restoration of an adequate blood volume and to maintain blood composition within safe limits with regards to hemostasis, oxygen carrying capacity, and biochemistry. |
| **Policy Statements** | * The ordering physician has the responsibility and authority to initiate and terminate the Massive Transfusion Protocol (MTP).
* Transfusion Service or nursing staff may request the initiation of the protocol by consulting with the responsible physician. Criteria for Transfusion Service staff to inquire about initiation of MTP:
	1. > 2 orders for RBCs transfusion within 90 minutes
	2. > 20 mL/Kg of RBC ordered with the indication code of acute blood loss
* Criteria for activation of the Massive Transfusion Protocol (MTP):
	1. >20 ml/kg in 1 hour
	2. >50% blood volume or >40 ml/kg in 12 hours
	3. Significant hemorrhage and abnormal coagulation testing i.e. INR >1.5, fibrinogen <100 mg/dl, platelets <100,000.
* The Massive Transfusion Protocol excludes ECMO prime, circuit change, apheresis or exchanges transfusions that are managed under separate protocols.
* If the patient has a positive antibody screen or history of a clinically significant antibody(s) consult with the patient’s physician or transfusion service physician on call. Red cell units will not qualify for electronic crossmatch and may need to be issued as Emergency release.
* **Note: Switching patients from group O Red Cells to group specific (A, B, AB)**

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| **If** | **Then** |
| Patients 4- 12 months | Crossmatch one unit of group specific red cells by IS tube technique using a fresh, post-transfusion specimen.* If compatible, group specific units may be issued following standard crossmatch protocol.

[TS 3.4 Crossmatch-RBC Orders for Patients over 4 months](http://khan.childrensmn.org/Manuals/Lab/SOP/TS/OrdProc/202193.pdf)* If incompatible, continue to issue group O red cells
 |
| Patients > 1 year old | Switch to group specific once the recipient’s ABO/Rh has been determined on a current specimen |

 |
| **Related Documents** | [Org Policy 36.7.00 Massive transfusion](http://khan.childrensmn.org/Manuals/Policy/350/193609.asp).[TS 13.3 Allocating/Issuing of Blood Producs for Emergency Release](http://khan.childrensmn.org/Manuals/Lab/SOP/TS/EmRel/202813.pdf)[TS 12.11 Transporting of Products in Coolers](http://khan.childrensmn.org/Manuals/Lab/SOP/TS/Alloc/202862.pdf)[TSf 01.4.1 Pathology Consultation form](http://khan.childrensmn.org/Manuals/Lab/SOP/TS/Res/Sysf/199492.pdf) |
| **Procedure** |  |
|  | **Step** | **Action** |
|  | 1 | Obtain patient information from the patient caregiver when MTP is initiated.* Patient full name
* Patient MRN
* Weight
* Patient location and phone number
* Transfusion Location
* Responsible physician/surgeon
 |
|  | 2 | Notify core lab to aid in setting priorities for pending labs. |
|  | 3 | Review patient history and status of pre-transfusion testing in BOP.

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| **If** | **Then** |
| No current pre-transfusion testing | a. Request STAT collection of a Type and Screen sample.b. Allocate and issue products following the emergency release protocol as directed by the responsible physician. |
| Patient has history of clinically significant antibody | 1. Review inventory and select antigen negative units if available
2. Order antigen negative units from blood center STAT
 |

 |
|  | 4 | Consult with responsible physician and transfusion service medical director on call as needed regarding the selection or abbreviation of standard procedure in regard to the following:* Initiation of the emergency release protocol
* Omitting AHG crossmatch of antigen negative units for patient with positive antibody screen and/or history of clinically significant antibodies. \*The risk of a transfusion related hemolytic response may be diminished by providing antigen negative units at the end of the event.

**During an MTP:*** Forgo Irradiation – use code **NOIRR** to override QA failure or temporarily delete the IRR attribute from the patient’s BAD file.
* Products will not be split or aliquoted into syringes
* Forgo requirements for removal of additive solution or Hgb S testing.
* Forgo requirements for K, E, C negative units for Sickle Cell patients.
 |
|  | 5 | Prepare, allocate and issue **INITIAL PACK*** 2 RBC- fresh as available may use ECMO stock units.
* 1 Thawed Plasma
 |
| Initial MTP Pack | 6 | Prepare, allocate and issue the 2nd MTP PACK

|  |  |
| --- | --- |
| **Patient weight: ≤ 10 Kg** | * 2 RBC-fresh as available may use ECMO stock units.
* 2 Thawed Plasma
* 1 Partial unit of SDP Platelet (May issue full unit if time dependent)
* 1 unit Cryo.
 |
| **Patient weight: > 10 Kg** | * 4 RBCs- fresh as available, may use ECMO stock units.
* 4 Thawed Plasma
* 1 SDP Platelet
* 2 units Cryo
 |

 |
|  | 7 | Notify patient care unit to send a courier for pack pickup. Dispense:* RBCs and Thawed Plasma in coolers.
* Platelets and Cryo at room temperature using separate issuing bags.
* A 60mL CharterMed syringe sets should be issued for each blood product unit.
* Place laminated copy of [Appendix\_A](#Appendix_A) in the cooler.
* Prepackage blood tubes for MTP labs.
 |
|  | 8 | Order in additional products as needed. |
|  | 9 | Notify the transfusion service medical director on call of the MTP activation. * Consult with the pathologist as needed for product selection, inventory management, staffing or patient safety concerns.
 |
| Subsequent MTP packs | 10 | Keep 1 pack of products ahead at all times until the physician terminates the MTP.

|  |  |
| --- | --- |
| **Patient weight: ≤ 10 Kg** | * 2 RBC-fresh as available
* 2 Thawed Plasma
* Prepackage blood tubes for MTP labs
* Platelets issued on even packs. (2,4,6)
 |
| **Patient weight: > 10 Kg** | * 4 RBCs- fresh as available, may use ECMO stock units.
* 4 Thawed Plasma
* Prepackage blood tubes for MTP labs
* Platelets issued on even packs. (2,4,6)
 |

* Additional Cryoprecipate will be issued based on laboratory values and dosed by patient’s weight.
* Notify physician if delay in product availability is anticipated.
 |
|  | 11 | Contact the responsible physician if > 4 hours has elapsed since the last pack was issued.Determine if MTP still in effect. |
|  | 12 | Document event on pathology consultation form and submit to transfusion service medical director notified in step 8. Include on form:* The attending provider
* Patient care unit
* Patient clinical information if known, E.g. Post-op bleeding
* Time MTP was initiated and time MTP was ended.
 |
|  |  |
| **Appendices** | [Appendix\_A](#Appendix_A)-Recommended Volume for Transfusion[Appendix\_B](#Appendix_B)-MTP Flowchart |
| **Approval****Workflow** | Transfusion Service/Medical Director |
|  |  |
| **Historical Record** | **Version** | **Written/Revised by:** | **Effective Date:** | **Summary of Revisions** |
| 1 | J. Wenzel | 08/18/2010 | Initial Version |
| 2 | J. Wenzel | 4/10/2012 | Added placement of copy of [Appendix A](#Appendix_A) in cooler.Added Appendix B-MTP FlowchartChange to documenting MTP on Pathology consultation form instead of mini-consultation log. |
|  | 3 | S. Cassidy | 03/12/14 | Added statement of switching to type specific blood products |
|  | 4 | S. Cassidy | 06/30/2017 | Added initial pack information, changed platelet frequency, and added statement about cryo.  |

**Appendix A - Recommended Volumes for Massive Transfusion**

**10 kg or LESS**

***
DO NOT GIVE ALL PRODUCTS IN THIS COOLER AT ONCE!***

**Recommended transfusion volumes in table**

**Reassess and repeat transfusions as needed**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Weight** | **RBCs** | **FFP** | **platelets** | **cryo** |
| **1 kg** | **20 ml** | **10 ml** | **5 ml** | **1 unit\*** |
| **2 kg** | **40 ml** | **20 ml** | **10 ml** | **1 unit\*** |
| **3 kg** | **60 ml** | **30 ml** | **15 ml** | **1 unit\*** |
| **4 kg** | **80 ml** | **40 ml** | **20 ml** | **1 unit\*** |
| **5 kg** | **100 ml** | **50 ml** | **25 ml** | **1 unit\*** |
| **6 kg** | **120 ml** | **60 ml** | **30 ml** | **1 unit\*** |
| **7 kg** | **140 ml** | **70 ml** | **35 ml** | **1 unit\*** |
| **8 kg** | **160 ml** | **80 ml** | **40 ml** | **1 unit\*** |
| **9 kg** | **180 ml** | **90 ml** | **45 ml** | **1 unit\*** |
| **10 kg** | **200 ml** | **100 ml** | **50 ml** | **1 unit\*** |

|  |
| --- |
|  **\*Cryoprecipitate will be delivered with second pack. Subsequent cryoprecipitate (dosed by weight of patient) will be delivered for fibrinogen levels less than 150.**  |

**MORE THAN 10 kg**

***
DO NOT GIVE ALL PRODUCTS IN THIS COOLER AT ONCE!***

**Recommended transfusion volumes in table**

**Reassess and repeat transfusions as needed**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Weight** | **RBCs** | **FFP** | **platelets** | **cryo** |
| **11-14 kg** | **250 ml** | **125 ml*****(or 1 full unit if <125 ml)*** | **50 ml** | **1 unit\*** |
| **15 kg** **and up** | **1 unit** | **1 unit** | **50 ml** | **1 unit\*** |

|  |
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|  **\*Cryoprecipitate will be delivered with second pack. Subsequent cryoprecipitate (dosed by weight of patient) will be delivered for fibrinogen levels less than 150.**  |

**Appendix B: MTP Flowchart**

**MASSIVE TRANSFUSION PROTOCOL INTIATIATED**

* Patient age
* Weight
* Current TYAS (if not EMERGENCY RELEASE)
* Special instructions to for go (irradiation, sickle negative, ect.) Need physician approval
* Patient location
* Phone number for contact

**>10 kg**

**2nd pack**

* 4 RBCs (fresh as possible)
* 4 thawed FFP
* 1 full platelet
* 2 units of Cryo

**≤10 Kg**

**2nd pack**

* 2 RBCs (fresh as possible)
* 2 thawed FFP
* 1 partial platelet
* 1 Cryo

**Initial Pack for all patients**

* 2 RBCs (fresh as possible)
* 1 thawed FFP

Additional packs

Keep 1 pack ahead

* 4 RBCs (fresh as possible)
* 4 thawed FFP
* Platelets issued on even packs (2,4,6)

Additional packs

Keep 1 pack ahead

* 2 RBCs (fresh as possible)
* 2 thawed FFP
* Platelets issued on even packs (2,4,6)