Title:	Pediatric Massive Transfusion Protocol (MTP)
Department:	Trauma Services
Effective Date:	09/2014 **Reviewed:**
Previous Version(s):	
Replaces:	

Policy and Protocol

The reader is cautioned to refer to the Central Policy Database for the most current version of this document and not rely on any printed version.

Approved by the Medical Executive Committee on September 12, 2014

Scope:

This protocol applies to pediatric patient care in the Emergency Department, Operating Rooms, and the Pediatric Intensive Care Unit within

Protocol Statement:

Roughly 5–15% of severely injured pediatric patients require massive blood transfusion and emergent replacement of blood volume of >40 ml/kg in the first 24 hours of resuscitation. Continued hemorrhage is a leading cause of death in trauma patients. Similar situations of catastrophic blood loss can be encountered in the intensive care setting or during major surgical procedures. The initiation of a Pediatric Massive Transfusion Protocol outlines a standard process for safe, rapid preparation and delivery of blood products and coagulation factors for the pediatric patient experiencing massive hemorrhage. The purpose of this protocol is to prevent the anticipated complications that occur as a result of massive transfusion; notably, thrombocytopenia, depletion of coagulation factors, electrolyte and acid/base disturbances, hypothermia, and transfusion reactions as well as conserve valuable blood components while ensuring safe and rapid administration of blood.

Definitions:

Massive Transfusion: transfusion approximating or exceeding the patient's blood volume within a 24-hour interval. Following a large volume transfusion over a short time period, the patient's own cells and plasma diminishes and the pre-transfusion specimen is no longer representative of the blood in the patient's circulation

Age-Specific Blood Volume:

Newborn to 1 month	90mL/kg
1-12 months	85 mL/kg
1-14 years	80 mL/kg
>14 years	75 mL/kg

Class IV Hemorrhagic Shock:

Pulse	Blood Pressure	CNS Status	Urine	Blood Loss

>140 (in adult)	Decreased	Lethargic	nil	>40%

Policy:

I. Blood product distribution will start with un-crossmatched O negative blood (Emergency Release Blood) and will progress to un-crossmatched, type-specific blood and/or cross-matched, type-specific product. Units will be CMV untested and will not be irradiated unless there is a known condition that requires one or both of the above.

II. Each Massive Transfusion Protocol case will be audited for appropriateness by the Blood Bank, the Trauma Section, and/or the Hospital Quality Improvement Service.

III. Guidelines for blood and blood component usage are determined by patient weight.

IV. Transportation of blood and blood products from the Blood Bank to the location of administration will be the responsibility of the unit responsible for administration of the products.

V. The Charge Nurse will notify the House Supervisor (if not already present) of all MTP activations by calling operator (Dial "0") and asking for transfer to House Supervisor Phone. The Charge Nurse will tell the House Supervisor "Pediatric Massive Transfusion Protocol activated for (patient's name) in Room (location).

VI. The House Supervisor will be available to assist with Blood Bank, communication, and arrangement of transportation of blood products.

Protocol:

I. Activation of Massive Transfusion Protocol

A. The decision to activate the pediatric MTP must be made by **an Attending Physician**. The decision to activate will be based on the recognition of massive hemorrhage with one or more of the following indicators:

1. Class IV Hemorrhagic shock

2. acute administration of 40 ml/kg of blood (or 4 units if patient weight > 30 kg) in 2 hours or less

3. Complete blood volume replacement in 24 hours

i. Approximately 250 mL packed cells (one unit) for a 5 kg patient.

ii. Approximately 500 mL packed cells (two units) for a 10 kg patient.

iii. Approximately 1200 mL packed cells (4 units) for a 30 kg patient

4. The presence of life-threatening hemorrhage not expected to respond to crystalloid fluid

B. In the event that the patient has received an acute administration of 40 ml/kg of blood in 2 hours or less, the transfusing RN will notify the ordering physician that this patient meets the criteria for pediatric MTP protocol.

C. **Single call to Blood Bank**. The treating physician or designee will make a single call to the Blood Bank personnel to activate the pediatric MTP. The caller will need to convey the following information:

1. Patient ID
2. Activation of pediatric MTP
3. Patient location
4. Attending authorizing pediatric MTP
5. Caller's name and call back number
6. Patient weight or estimated weight
7. Order pediatric MTP pack 1

D. Initial Product Release

1. RN or Lab Tech will draw appropriate amount of blood from patient for type and cross (pink or purple top tube), labeled with red band ID prior to initial blood transfusion, and bring to lab. If type and cross is not drawn prior to initiation of transfusion, it should still be completed as soon as possible.

2. If the patient is transferred to another location, the House Supervisor or designee will notify the Blood Bank of the move. If MTP is active during patient transfer, the blood products from a Pack will accompany the patient.

3. Scribe Nurse will release EPIC orders for Blood in department. An order identifying activation of Massive Transfusion Protocol must also be included in Chart.

4. The packs will be constructed based on patient weight as detailed below. If additional products are required for each or any of the Packs, for clinical reasons or for patient weight requirements, the attending physician or their designee caring for the patient will notify the Blood Bank.

Children ≤ 20 kg)

MTP Pack 1	MTP Pack 2	MTP Pack 3	MTP Pack 4	MTP Pack 5
1 U PRBCs	1 U PRBCs	1 U PRBCs	1U PRBCs	1 U PRBCs
1 U FFP Blood Bank to thaw FFP immediately after RBC issued	1 U FFP	1 U FFP	1 U FFP	1 U FFP
	1 platelet pheresis	1 platelet pheresis	1 platelet pheresis	1 platelet pheresis
Call for platelets for Pack 2		2 units unpooled cryoprecipitate	2 units unpooled cryoprecipitate	2 units unpooled cryoprecipitate

Children 20 – 49 kg

MTP Pack 1	MTP Pack 2	MTP Pack 3	MTP Pack 4	MTP Pack 5
2 U PRBCs	2 U PRBCs	2 U PRBCs	2 U PRBCs	2 U PRBCs
2 FFP Blood Bank to thaw FFP immediately after RBC issued	2 U FFP	2 U FFP	2 U FFP	2 U FFP
	1 platelet pheresis	1 platelet pheresis	1 platelet pheresis	1 platelet pheresis
Call for platelets		5 units unpooled	5 units unpooled	5 units unpooled

for Pack 2		cryoprecipitate	cryoprecipitate	cryoprecipitate

Children > 50 kg

MTP Pack 1	MTP Pack 2	MTP Pack 3	MTP Pack 4	5th MTP series
4 U PRBCs	4 U PRBCs	4 U PRBCs	4 U PRBCs	4 U PRBCs
4 FFP Blood Bank to thaw FFP immediately after RBC issued	4 U FFP	4 U FFP	4 U FFP	4 U FFP
	1 platelet pheresis	1 platelet pheresis	1 platelet pheresis	1 platelet pheresis
Call for platelets for Pack 2		10 units unpooled cryoprecipitate	10 units unpooled cryoprecipitate	10 units unpooled cryoprecipitate

E. The blood bank will immediately call the Attending physician or designee when products become available. Attending physician or designee will designate a runner to transport blood products. PRBC and thawed FFP will be issued in coolers with ice.

F. Once product is released, Blood Bank will clarify with Attending physician or designee, "Is Massive Transfusion Protocol still in use?" If YES, Blood Bank to continue process of preparing next MTP Pack in order to "stay ahead".

G. All units from current pack will be transfused prior to starting next MTP pack.

H. The protocol may be discontinued by either:
   1. Attending physician or designee answering "no" to the MTP continuation inquiry from Blood Bank personnel after each pack of products is prepared
   2. Attending physician or designee call Blood Bank personnel and order discontinuation

I. At cessation of the MTP, all unused blood should be returned to the Blood Bank in proper packaging and containers as per Blood Bank policy.

II. Recommended Laboratory Studies

	Initial	After first 80ml/kg PRBCs	Every 40 ml/kg PRBCs
Hemoglobin	X	X	X
Platelet count	X	X	X
PT	X	X	X
PTT	X	X	X
Fibrinogen	X	X	X
FDPs		X	X
Calcium (ionized)	X	X	X
Potassium	X	X	X
pH	X	X	X
Lactate			X

III. Documentation

A. Refer to the Administration of Blood and Blood Components policy for elements of documentation related to administration of blood and blood components.

B. Document the type of IV catheter (*i.e.,* angiocath, central line), rate, and site of infusion in the

electronic documentation system or trauma flow sheet.

Standard / Reference & Year:	• Advanced Trauma Life Support. American College of Surgeons. • Hendrickson J, Shaz B, et al. Implementation of a pediatric trauma massive transfusion protocol: one institution's experience, *Transfusion.* 2011; October 13: 1-9. • Barnes-Jewish Hospital Trauma Registry. 2007 • Erlanger Health System, Trauma Surgical Critical Care Department. Massive Blood Resuscitation Protocol. 2007. • American Association of Blood Banks. Standards for Blood Banks and Transfusion Services.
Rationale for Revision:	☒ New ☐ Update ☐ Consolidation
Author(s) & Department(s):	Pediatric Trauma Services
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