PRACTICE GUIDELINE

Effective Date: **2-17-04** Manual Reference: **Deaconess Trauma Services**

TITLE: BLOOD AND BLOOD PRODUCT TRANSFUSION
(Reference to the Massive Blood Transfusion Protocol)

PURPOSE: To provide guidelines for the transfusion of blood and blood products in the trauma patient.

DEFINITIONS:

1. Packed red blood cells: A blood product that contains red blood cells with most of the plasma eluted off. The average hematocrit of PRBC's is 70%. Each unit of PRBC's (250 ml) will raise the hematocrit by about 3%.

2. Fresh frozen plasma: A blood product that contains fresh components of plasma, including colloid proteins and clotting factors.

3. Platelets: A blood product that contains primarily platelets suspended in a small amount of plasma drawn from a single donor. Each unit of platelet pheresis (four- six units of random platelets) will raise the count by approximately 30,000.

4. Cryoprecipitate: A blood product component of plasma that primarily contains Factor VIII, Factor V and fibrinogen. This is the best blood product for treatment of low fibrinogen (<150 mg/dL).

GUIDELINES:

1. Resuscitation in the ED will begin with lactated ringer's solution or normal saline infused through large-bore IV catheters of 1 liter and no more than 2 liters.

2. Upon initiating resuscitation, send blood sample to the Blood Bank for immediate type and cross. If blood requirements will be excessive, initiate the massive blood transfusion protocol.

3. O, Rho (D) negative blood is available immediately as emergency release. Due to limited supply of O-negative blood, consider O, Rho(D) positive blood for males and sterile or post-menopausal females. Blood bank will bring emergency release box of PRBCs to every Category 1 activation, which includes 4 units of O uncrossmatched PRBCs (2 O- units and 2 O+ units) packed in transport cooler.

4. Type and cross-matched: Four units of type and crossed blood products are available in 45 minutes after sample received in the Blood Bank.

5. Fresh frozen plasma: available in approximately 30 minutes after sample received in the Blood Bank.

6. Platelets: available in 15 minutes after sample received in the Blood Bank.
   a. One platelet pheresis is equivalent to a pool of 4-6 units of platelets.

7. Cryoprecipitate: available 20 minutes after sample is received in blood bank.
   a. Absolute indication: bleeding with fibrinogen <100 mg/dL.

8. **<u>Massive Blood Transfusion Protocol (MTP)</u>** is indicated when it is anticipated that a patient requires massive amounts of blood and blood products in order to gain control of bleeding. Blood bank will keep a continuous supply of 4 units of thawed Type A plasma at main campus. (See Appendix A for algorithm)

    a. Blood bank should be notified via telephone call and EPIC Order that need for Massive Blood transfusion exists.
    b. This will trigger Blood Bank to send blood products at 1:1:1 ratio for administration to the patient.
    c. Blood bank will call 3700 to activate MTP Coordinator page through call center.
    d. MTP Coordinator will call Call Center back that they received the page and will call Blood Bank to establish line of communication. MTP coordinator(s) are 4800 RN and Assistant Director of Campus Operations (ADCO). Coordinator will coordinate order of products, communicate with blood bank, and document blood administration. Coordinator will coordinate products based on MTP algorithm. See appendix.
    e. The first box of MTP will include 4 units of Plasma, 4 units of PRBCs, and 1 unit of Platelets. 1 unit of Cryo will be thawed when MTP is activated and may come between box 1 and 2. If additional cryoprecipitate is needed, it must be requested to the blood bank, and they will thaw additional units.
    f. Once a box of MTP leaves the blood bank, blood bank will continue to thaw the next round of FFP to keep up the demand of thawed plasma
    g. Subsequent boxes will include 6 units of Plasma, 6 units of PRBCs, and 1 unit of Platelets.
    h. Once the MTP stops, notify blood bank immediately to decrease waste.
    i. If the Trauma Massive Transfusion Protocol is initiated and/or the patient's bleeding immediately cannot be controlled surgically, the physician may consider the use of the Prothrombin Complex Concentrate (PCC) or Tranexamic Acid (TXA). Reference EPIC order sets titled "Prothrombin Complex Concentrate (PCC) for acute Reversal of oral anticoagulation" (559) and "Tranexamic Acid Order Set" (538)

9. If patient is requiring blood products and bleeding started less than 3 hours ago, consider administration of Tranexamic acid.
    a. Dose: 1 gram bolus followed by 1 gram infusion over 8 hours
    b. Shown to decrease mortality

10. Recommend infusing 2gms Calcium Gluconate for every 4 units of PRBCs transfused.
    a. Recommend drawing an ionized calcium level after the MTP is completed.

11. During a Massive Transfusion Protocol, PRBCs and FFP must be warmed using the warmer on a rapid infuser or an in-line warmer. Platelets and cryoprecipitate should NOT be warmed.

12. Any PRBCs, FFP, and fluid boluses given in the first 12 hours of the trauma patient's admission should be warmed using the warmer on a rapid infuser or in-line warmer.

Fluids can be warmed via fluid warmer, rapid infuser, or in-line warmer. Platelets and cryoprecipitate should NOT be warmed.

13. Consider ordering a ROTEM for any trauma patient that requires MTP. See ROTEM guideline.

REFERENCES:

- Deaconess Hospital Policy and Procedure Manual 40-55, MASSIVE BLOOD TRANSFUSION.
- Advanced Trauma Life Support, American College of Surgeons
- Ditzel Jr RM, Anderson JL, Eisenhart WJ, et al. A review of transfusion- and trauma-induced hypocalcemia: Is it time to change the lethal triad to the lethal diamond? J Trauma Acute Care Surg. 2020 Mar;88(3):434-439.
- Elmer J, Wilcox SR, Raja AS Massive transfusion in traumatic shock. *J Emerg Med.* 2013 Apr;44(4):829-38. Epub 2013 Jan 30.

REVIEWED DATE	**REVISED DATE**
JAN 2005	Previous dates removed for space
JAN 2006	MAR 2014
JAN 2007	MAY 2014
OCT 2011	AUG 2014
AUG 2020	DEC 2015
	MAR 2017
	JUN 2018
	JAN 2019
	MAY 2020
	JUNE 2021
	JULY 2021
	OCT 2021

Appendix A

Massive Transfusion Protocol (MTP) Algorithm