

UAMS MEDICAL CENTER
ACS SERVICES MANUAL

SUBJECT: Massive Transfusion Protocol

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UPDATED: 4/2017, 1/2018, 8/2018, 8/2019 1/2022, 5/2022

EFFECTIVE: 12/15/2022

RECOMMENDATION(S): Kyle J. Kalkwarf, MD

APPROVAL: 04/08/2016

CONCURRENCE(S): Dr. Ron Robertson, Dr. Aaron Wyble

PURPOSE:

To describe the UAMS Acute Care Surgery Massive Transfusion Protocol (MTP).

DEFINITIONS:

ABC Score (Assessment of Blood Consumption) (1pt each):

- Penetrating mechanism to the torso or junction areas (neck, axilla, groin)
- Systolic BP \leq 90 in ED
- HR \geq 120 in ED
- +FAST (abdomen, pelvis, cardiac)

Balanced resuscitation: A ratio of blood products between 1:1:1 and 2:1:1 (RBC:plasma:platelets)

Clinical gestalt: a heuristic approach to quickly forming a diagnosis and treatment plan, often within seconds of data collection, via pattern recognition and organization of clinical observations and perception of those observations.

Designated contact: a nurse designated by the activator of the MTP will facilitate communication between the clinical area and the Blood Bank (this person may change over time).

Low-Titer Type O Whole Blood (LTOWB): UAMS will maintain Rh(+) Type O Whole Blood (WB) and define low titer as less than 1:256.

Massive Transfusion: (4:4:1 U RBC:plasma:platelets (megapack) OR 4 U WB in the first 4 hours after hospital arrival.

Massive Transfusion Protocol: designed to provide quick and efficient resuscitation to an exsanguinating patient by continuing to deliver blood to the bleeding patient until massive bleeding has stopped.

Women at risk for future Rh incompatibility: Women \leq 50 years old who are Rh(-) on presentation and receive LTOWB Rh(+) blood products

POLICY:

I. Activation of the MTP

- a. Decision: The **Massive Transfusion Protocol** can be activated by:
 - i. Attending Physician
 - ii. Senior Surgery Resident if an Attending Physician is unavailable

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- b. Criteria for a Balance Blood Product MTP:
 - i. **ABC Score** ≥ 2 (arrival vital signs – not based on pre-hospital vitals)
 - ii. Physician **gestalt** that the patient will require a **Massive Transfusion**.
- c. The Trauma Attending may activate a **Whole Blood MTP** based on:
 - i) **ABC Score** ≥ 3 (arrival vital signs – not based on pre-hospital vitals)
 - ii) Trauma attending **gestalt** with a patient being taken immediately to the OR for non-compressible torso or junctional trauma.
- d. Notification:
 - 1) Upon activating a **massive transfusion protocol**, the Attending Physician (or senior surgery resident) will assign a nurse as the **designated contact** to call the **Blood Bank Hotline at 686-7007** to inform them that a MTP is being activated.
 - i. The following information will be provided to the Blood Bank:
 - i. Destination where the blood products should be delivered (ER, OR, ICU)
 - ii. Tube station to send the blood
 - iii. Name of the patient
 - 1. If a Balance Blood Product MTP is activated and the patient’s name is “unknown,” the following designations will be used until the name of the patient appears in the electronic medical record:
 - a. “Male Doe” (if the patient is male or female > 50 y/o)
 - b. "Female Doe" (if the patient is female & ≤ 50 y/o)
 - 2. If a Whole Blood MTP is activated, the Blood Bank will be told the patient’s name, and a “**Whole Blood Activation**” is activated.
- e. Blood Bank Activation of Hemorrhage Team
 - i. The Blood Bank will activate the Hemorrhage Team when an MTP is activated using the RAVE system. The MTP location will be entered.

II. MTP Conduct & Considerations

- 1. Ensure adequate and functioning IV access (preferably 2 x 18 gauge or larger (e.g., RIC, Cordis CVL)).
 - a. Placement in an upper extremities/internal jugular (IJ)/subclavian is preferred

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(especially if there is a concern for a thoracoabdominal injury).

- b. An arterial line should also be placed as soon as possible for more accurate and timely blood pressure monitoring.

Send.

2. Send a Type and Screen (T&S) and ROTEM as soon as possible
3. Infuse **Whole Blood** or **Balanced Resuscitation** to maintain systolic blood pressure ~75-85 mmHg.
 - a. If concern for severe traumatic brain injury (TBI):
 1. MAP \geq 60 mmHg is suggested.
 2. Avoid albumin and hyponatremic fluids (e.g., lactated ringers, $\frac{1}{2}$ NS).
 - b. Each 1:1:1 MTP megapack is 6 units of RBCs, 6 units of Plasma, and 1 unit of apheresis Platelet (equivalent to a pool of 6 units of whole blood-derived platelets).
4. When available, platelets should be administered first through a separate i.v. (not through a rapid infuser such as Belmont® Rapid Infuse, 3M Ranger®). RBCs and plasma may be given simultaneously through the same IV. Whole blood can be delivered through a rapid infuser.
5. Type-compatible blood should be administered as soon as it is available.
6. Keep the patient warm ($>36^{\circ}$ C) by removing wet clothing, covering them with warm blankets, using a fluid warmer (Belmont® Rapid Infuse, 3M Ranger®), Bair Hugger®, maintaining a warm room, using warming ventilator settings, or using other techniques to prevent hypothermia.
7. Administer calcium gluconate, 2 grams (or calcium chloride 1 gram through CVL), with each MTP megapack (6:6:1 balanced resuscitation or 4 units WB).
8. Consider infusing 2g TXA as a bolus. TXA is an antifibrinolytic agent and can slow hyperfibrinolysis. Early infusion (preferably less than 1 hour after injury) results in improved outcomes for exsanguinating trauma patients.
 - a. Empiric administration:
 1. Patients who are expected to receive a massive transfusion (4:4:1 or 4U WB in the first 4 hours)
 2. Patients going immediately to the operating room for a craniectomy
 - b. ROTEM-Based administration:
 1. Hyperfibrinolysis: if the traumatic injury occurred more than three hours before infusion, TXA should be reserved for patients with ROTEM EXTEM ML \geq 15% because empiric administration more than three hours after injury is associated with more death from bleeding.

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2. If a severe TBI is not going to the operating room: TXA should be given if ROTEM EXTEM ML \geq 15%.

9. Consider giving a vasopressin bolus followed by a 48-hour infusion to reduce the volume of required blood transfusions. Endogenous vasopressin stores can be quickly depleted in hemorrhaging patients, resulting in catecholamine-resistant hypotension and increased venous capacitance. A single-center RCT showed less blood product administration to massively transfused patients who received the following vasopressin protocol:
 1. AVP Bolus: 4 IU
 2. AVP Infusion: titrated from 0 to 0.04 U/min for 48 hours to maintain a MAP = 65mmHg

10. ROTEM:
 - a. On arrival: should be checked approximately 30-60 min after arrival to look for hyperfibrinolysis (EXTEM ML >15%). If the patient is in hyperfibrinolysis, 2g of TXA should be administered as a bolus.
 - b. When bleeding has slowed: ROTEM should be checked to look for component deficiencies, especially for cryoprecipitate, which are not included in the MTP.

11. When a Whole Blood MTP is administered:
 - a. A maximum of 8 units (4 from ED Blood Safe + 4 from Blood Bank via tube system) of **LTOWB** can be transfused per patient. Because of limited supply, this resource should be limited to patients who are believed to be actively exsanguinating.
 - b. After 8 units for a patient or no remaining product in hospital, the MTP will automatically transition to balanced blood product resuscitation approximating WB (1:1:1 of RBC:plasma:platelets+/-cryo).
 - c. When Rh(+) **LTOWB** is transfused to women at risk for future Rh incompatibility: When Rh(-) women who are < 50 years old are given Rh+ **LTOWB**, the patient will be notified and given a card to provide to their obstetrician in the event of future pregnancies. This is to inform the patient of the potential risk to fetuses through Rh incompatibility.

III. MTP Administration:

1. MTP activation will result in Blood Bank personnel sending one (1) megapack (4U WB or 6:6:1 of RBC:Plasma:Platelets) for transfusion. Call the blood bank for each additional megapack.

2. Upon activation of this protocol, the Blood Bank personnel will notify the appropriate pathology personnel if problems are identified during the **massive transfusion protocol**.

3. Blood products will be delivered by a pneumatic tube system using the secure transaction procedure to the location and tube station specified at the time of activation of the MTP. Any

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change in location of the patient will require a verbal update by the **designated contact** person to the Blood Bank of the patient's new location.

4. A **Massive Transfusion Protocol** Worksheet may be used to document the administration of blood and blood products during the MTP. Stickers from each unit should be applied to the worksheet to keep track of the status of products administered to the patient.
5. The protocol should be discontinued as soon as clinically appropriate, and the Blood Bank should be notified of the termination of the **massive transfusion** by calling 686-7007.

IV. Blood Buggy

A secondary goal of the MTP is to minimize the wastage of blood products. The following procedures are designed to assist in meeting this goal.

1. The Blood Buggy is a portable refrigeration unit certified to hold blood products for up to 12 hours while maintaining appropriate storage conditions, including temperature. UAMS has two Blood Buggies kept in the OR and one each in the ED, H4, and E5.
2. The Blood Buggy shall be kept plugged into a red outlet whenever not being used for an MTP.
3. For patients in the operating room undergoing MTP transfusion, an additional circulator will be provided, as available, to help manage the MTP. This nurse's primary responsibility will be to act as the **designated contact** person with the Blood Bank and facilitate the receipt of blood products.
4. Upon activation of an MTP in the Operating Room (OR) or Interventional Radiology (IR), the first megapack will be delivered to the tube station in the OR and transferred to the Blood Buggy. RBC and plasma will be placed inside the refrigerated unit; platelets will be placed in the platelet tray. Because cryoprecipitate will only be sent by the Blood Bank when ordered, it should be administered as soon as it arrives.
5. The Blood Buggy will be moved with the patient to the OR or IR and placed in its designated location. After that, all blood products will be transferred directly from the tube station to the Blood Buggy, typically by the **designated contact** person.
6. If the patient moves from the OR to the ICU or IR before completing the MTP, the Blood Buggy will travel to the new patient location.
 - a. If the patient goes to IR, the circulating nurse will transition the role of the **designated contact** person to an assigned individual who will run back and forth between the OR tube station and IR.

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- b. If the patient goes to ICU, the circulating nurse will transition the role of the **designated contact** person to the ICU nurse and take the H4 Blood Buggy back to the OR.

7. After the MTP has concluded, the **designated contact** person will notify the Blood Bank of the termination of the MTP. The **designated contact** person will ensure that all non-transfused blood products are appropriately stored in the Blood Buggy. Platelets will be placed in the platelet tray.

8. The Blood Buggy and the **Massive Transfusion Protocol** Tracking Form will be taken to the Blood Bank as soon as possible, even if the Blood Buggy is empty. The emptied Blood Buggy will undergo quality assurance before returning it to the OR, ED, H4, or E5 as appropriate and plugged in for future use.

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