INDICATIONS FOR MASSIVE TRANSFUSION PROTOCOL (MTP)
1. Persistent hemodynamic instability
2. Active bleeding requiring operation or angioembolization
3. Need for immediate blood administration such as use of non-cross matched blood
4. ABC score $> 2$

DEFINITIONS
- **Massive Transfusion**: Receiving $> 10$ red blood cell (RBC) units in a 24 hour period.
- **ABC Score**: Consists of 4 variables:
  1. pulse greater than 120,
  2. SBP less than 90,
  3. penetrating torso injury, and
  4. + FAST (ultrasound positive for free fluid/blood in the peritoneal, pericardial, and/or pleural spaces).

AREAS FOR USE: Emergency Center (EC), Surgery (OR), Critical/Intensive Care Units- adult (ICU), Labor & Delivery (L&D), Interventional Radiology (IR), Vascular/Cath Lab

ADMINISTRATION OF MTP:
1. **Ordering MTP**: The Massive Transfusion Emergency Release Order must have MD signature and is used to pick up the first bucket of blood products. **NO Telephone/Verbal Orders accepted for MTP**.
2. **Product Administration Ratio**: The desired ratio of blood product administration is 1:1:1 (PRBCs – Plasma – Platelets) The administration ratio should only be altered based on physician decision in response to point-of-care testing, lab results, and/or Thromboelastograph (TEG®) results.
3. **Blood Product Administration**: For the order of product administration, it is preferable to pull together products (Platelets/Cryoprecipitate and PRBCs/FFP) as a group and administer quickly at the same time to mimic administration of whole blood. If there is only 1 route of access, administer platelets/cryoprecipitate first and then alternate administration of plasma and PRBCs until all products are given. If more than 1 IV line available, give all products as quickly as possible.
4. **IV Fluids**: Be cautious with crystalloid resuscitation in order to prevent dilutional coagulopathy.
5. **Patient Temperature**: The quintessential adjunct of MTP resuscitation is maintaining normothermia (avoiding hypothermia). All components of active patient warming should be undertaken before, during, and after MTP resuscitation efforts, including but not limited to, fluid warmer, Bair Hugger® warming equipment, and blankets.
ADMINISTRATION OF MTP: (cont)

6. **Lab Tests**: Obtain lab tests after each bucket.
   - Lab specimen tubes & red slips with required lab tests are included with each MTP “bucket”. These tubes must be filled, labeled & returned to the center lab immediately AFTER each “bucket” of blood products has been administered.

7. **Patient Transfer**: If patient transferred to another location during MTP, notify Blood Bank 3-1421 ASAP.

MEDICATIONS AND MTP:

Use individualized dosages based on clinical situation. Medications are to be used as an adjunct for resuscitation. Administration of these adjunct medications should only be ordered by the physician after thoughtful consideration and ongoing analysis of patient response to blood products resuscitation.

1. **Tranexemic acid (TXA)**: Stabilizes the clot via plasminogen and plasmin inhibition.
   - **Step 1**: IVP TXA 1 gram intravenous over 10 minutes
   - **Step 2**: Infusion TXA 1 gram over eight hours
   - TXA is to be considered by the physician for all injured patients who are actively and significantly hemorrhaging and are, ideally, within three hours of injury onset.
   - If given, it may be appropriate to do so during or after MTP Packet #2. The Trauma TEG results which were obtained in conjunction with the administration of MTP Packet #1 can assist the physician in deciding whether to administer TXA.

2. **Calcium supplements**: To be considered by the physician to alleviate symptoms of citrate toxicity.

3. **Prothrombin complex concentrates (PCC’s) (brand name Kcentra)**:
   Extensively used by the military, PCC’s are currently only approved for correction of warfarin-induced coagulopathy in bleeding patient. However, recent literature does suggest their effectiveness in massively hemorrhaging patients.

4. **Protamine**: Consider for Heparin reversal.

5. **Recombinant VIIa (brand name Novoseven)**: Generally not recommended for management of refractory hemorrhage in trauma.

6. **Amicar (Aminocaproic Acid)**: To be considered by the physician for antifibrinolytic therapy.

CLINICAL INDICATIONS FOR DISCONTINUATION OF MTP:

1. Normalization of waveforms on sequential Thromboelastograph (TEG ® ) tracings
2. Recognition that further resuscitation is futile, including patient expiration.
3. Hemodynamic stability/hemostasis.
4. Surgical bleeding has been controlled by the surgeon in the operating room.
5. There is radiographic and physiologic evidence of bleeding control after angioembolization.
REFERENCES:


2. ACS TQIP Massive Transfusion in Trauma Guidelines. 2014. American College of Surgeons Trauma Quality Improvement Program.


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