

# Tertiary Testing Centre Massive Hemorrhage Protocol

- Other MHP Activation Criteria**
- Shock index = HR/SBP greater than 1.4
  - Penetrating trauma
  - + FAST
  - Low initial hemoglobin (less than 80 g/L)
  - Increased lactate or base deficit

- Administration**
- Only RBCs and FP through rapid infuser
  - RBCs, FP, platelets and cryoprecipitate require blood filter
  - FC and PCCs do not require filter
  - Do not cool or warm platelets

- Appropriate Initial Interventions**
- Intravenous access → 2 large bore IVs and/or central venous line
  - Minimize crystalloid; RL for volume, Saline co-infusion with blood
  - Labs → Pre-transfusion specimen, CBC, PTT/INR/Fib, lytes, ionized Ca, acid/base status – communicate urgency to Lab
  - Continuous monitoring → Vital signs, hemoglobin, intake/output/temperature
  - Aggressive re-warming: use Bair/fluid warmer
  - Prevent/reverse acidosis – minimize normal saline/give NaHCO<sub>3</sub>
  - Correct hypocalcemia → CaCl 1 g IV slowly or Calcium gluconate 50 mg/kg
  - Transfuse with unmatched RBCs (O Neg, Kell Neg ♀ and O pos ♂) as available
- Switch to group-specific, matched RBCs ASAP**

- Abbreviations**
- ABG = arterial blood gasses
  - CRF = chronic renal failure
  - FAST = focused assessment with sonography in trauma
  - FC = fibrinogen concentrate
  - Fib = fibrinogen
  - FP = frozen plasma
  - GI = gastroenterology
  - HR = heart rate
  - MHP = massive hemorrhage protocol
  - OB = obstetrics
  - PCCs = prothrombin complex concentrates
  - RBCs = red blood cells
  - RL = Ringer's lactate
  - SBP = systolic blood pressure
  - TM = Transfusion Medicine
  - Xa inhibitors = rivaroxaban, apixaban, edoxaban
  - Ila inhibitors = dabigatran, argatroban

**Identify & Manage Bleeding with Definitive Intervention**  
**Obtain consent and pre-transfusion specimen, CBC, PTT/INR/Fib & ABG samples – Deliver STAT**

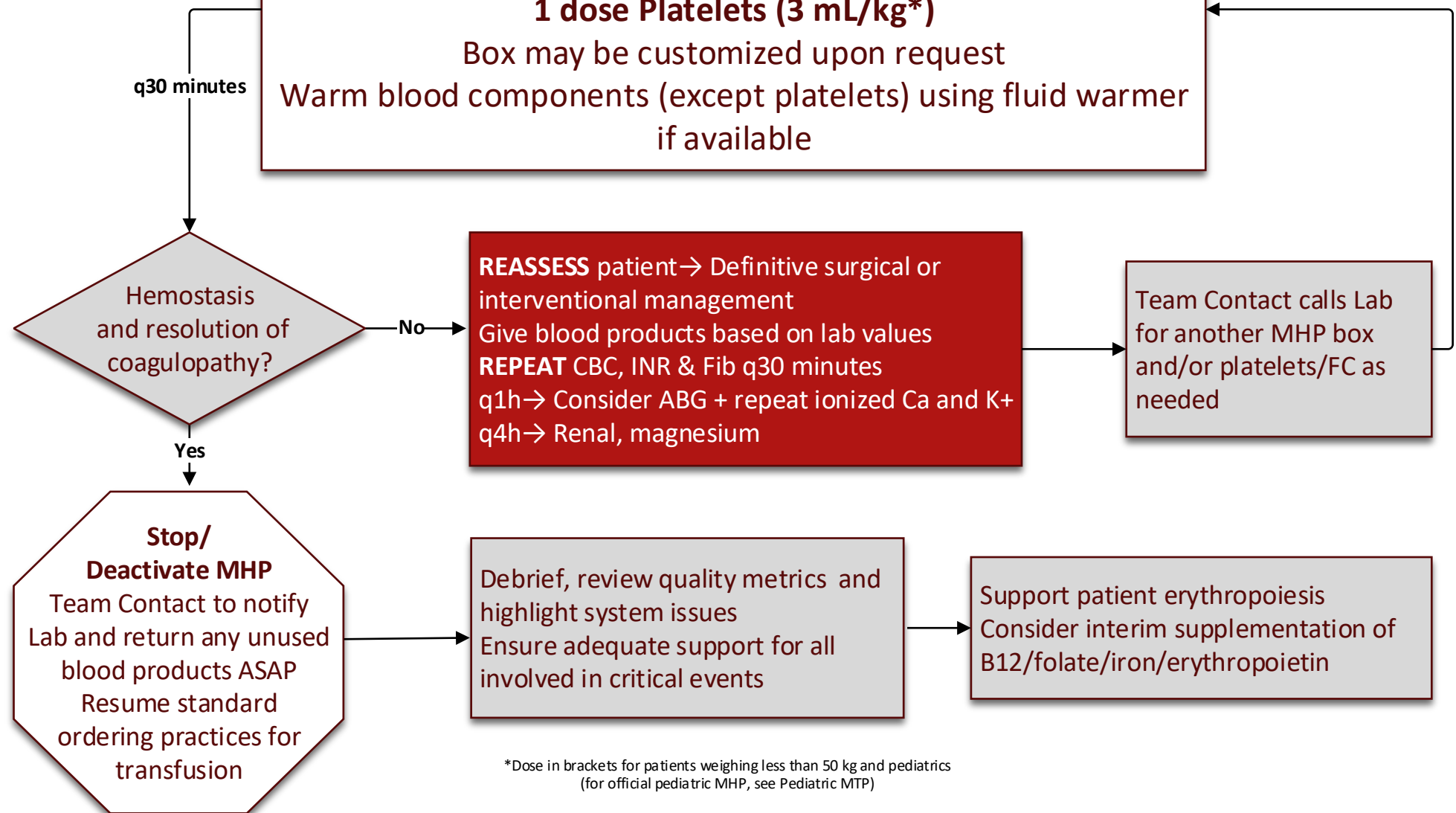
IF not already given, Tranexamic Acid (TXA) 2 g (30 mg/kg\*) IV Within 3 hours of injury, EXCEPT in GI bleeding  
 Dosing options: TXA 1 g (15mg/kg) over 10 minute then 1 hour later give TXA 1 g (15mg/kg) over 10 minute or TXA 2 g (30mg/kg) over 20 minute

Continuous hemoglobin and temperature monitoring

**ACTIVATION CRITERIA**  
**4 units RBCs transfused in less than 1 hour AND ongoing major bleeding (greater than 150 mL/minute)<sup>+</sup>**

**ASSIGN ONE** clinical team member as Team Contact to call Lab to initiate MHP, carry MHP phone and don red vest/ID badge  
**PROVIDE** patient name, sex, weight, ID#, location and ordering physician  
**PROPERLY IDENTIFY** patient and blood products  
**RECORD** all actions and blood products given

**Standard MHP Box (Foundation Ratio)**  
**4 units RBCs (20 mL/kg\*) and 4 g FC (50 mg/kg) or 4 units FP (15 mL/kg\*) or 2000 IU PCCs (25 IU/kg\*) or 1 dose Platelets (3 mL/kg\*)**  
 Box may be customized upon request  
 Warm blood components (except platelets) using fluid warmer if available



\*Dose in brackets for patients weighing less than 50 kg and pediatrics (for official pediatric MHP, see Pediatric MTP)

- Other Considerations**
- Ingestion of anticoagulant within 3 hours → Consider activated charcoal
  - Heparin reversal → Protamine 1 mg IV per 100 U of heparin
    - Assess Heparin neutralization via POC (ACT, RxDx or Hepcon)
  - Warfarin reversal → PCCs 2000 IU AND Vitamin K 10 mg IV
  - CRF and von Willebrand's → DDAVP 0.3 mcg/kg IV x 1 to a maximum of 20 mcg
  - Xa/Ila inhibitors → Consult TM, consider PCCs 25-50 IU/kg or Praxbind
  - FVIIa – consult TM; may use if pH and temperature normal
  - Intraoperative cell salvage (call perfusion)
  - Gastro → Pantoloc infusion, Octreotide infusion
  - OB → Oxytocin infusion, Hemabate, Ergonovine, Bakri balloon

**General Guidelines for Lab Based Blood Component Replacement in Adults**

PARAMETER	THRESHOLD	DOSE
Hemoglobin	Between 70-90 g/L	Additional unit RBC (10 cc/kg*) to raise hemoglobin 10 g/L
INR	If INR greater than 1.8 TEG r greater than 9 min or ACT 128 sec	Give 4 units of FP (10 mL/kg*) or PCCs 2000 IU (25 IU/kg*)
Platelets	If less than 50,000 or projected to soon be less than 50,000 TEG MA less than 55 mm	Give 1 dose platelets (5-10 mL/kg*) <i>Ideally, platelets should be infused via a separate IV line</i>
Fibrinogen	Fib less than 1.5 – 2 g/L OR evidence of microvascular bleeding TEG K greater than 2.5 min or a angle less than 60°	Give 1 unit/10 kg cryoprecipitate OR: Give 4 g FC (50 mg/kg*)
SBP	80-90 mmHg unless increased ICP then MAP greater than 80 mmHg	Treat hypovolemia Start epinephrine/norepinephrine/vasopressin infusion