ICR-MTP-036

Critical care · hemorrhage

Updated 21 Jun 2026

CRITICAL CARE EMERGENCY PROTOCOL

Massive Transfusion Protocol

Time-critical resuscitation of the exsanguinating patient. Activate early, transfuse in balanced 1:1:1 ratios, replace calcium, keep the patient warm, and chase definitive source control — all while a single team lead coordinates the blood bank. Adjust pack sizes and thresholds to your local blood-bank practice.

PATIENT / MRN	LOCATION	TIME ACTIVATED	BLOOD TYPE / WEIGHT
DIAGNOSIS / SOURCE	**MTP TEAM LEAD**	**ORDERING CLINICIAN**	**ATTENDING**

Massive transfusion protocol — ACTIVATE

Activate early in anticipated massive hemorrhage; do not wait for lab confirmation.

01 Activation & communication

INDICATION — CHECK ALL THAT APPLY

- [ ] Hemorrhagic shock with anticipated transfusion ≥ `10 units PRBC / 24 h`
- [ ] ≥ `4 units PRBC in < 1 h` with ongoing hemorrhage
- [ ] SBP `< 90 mmHg` with active bleeding despite 2 L crystalloid and/or 2–4 units PRBC
- [ ] Trauma with **ABC score ≥ 2** — penetrating torso trauma · positive FAST · SBP < 90 · HR > 120
- [ ] Obstetric hemorrhage — EBL `> 1500 mL` with ongoing bleeding
- [ ] GI bleeding with hemodynamic instability and ongoing transfusion requirement

- [ ] At intensivist's discretion for uncontrolled hemorrhage

COMMUNICATION ORDERS

- [ ] Notify **blood bank** — "MTP ACTIVATED for [name / MRN, location, diagnosis]"
- [ ] Primary team / surgeon / interventional radiology / OB / GI as appropriate
- [ ] Anesthesia (if in OR) · ICU bedside team · nursing supervisor
- [ ] Assign a single **MTP team lead** (Name: _____) to direct product flow and communicate with blood bank

02 Initial blood product package

ROUND 1 Release **immediately** — do not wait for labs. Modify numbers to match local blood-bank practice.

PRBC	FFP	PLATELETS	CRYOPRECIPITATE
4 units · type-specific or O	**4** units	**1** apheresis (~6-pack)	**10** units (or 2 pooled)

- [ ] Prefer **O-negative** for females of childbearing potential and patients with unknown type

TRANSFUSION RATIO TARGET

- [ ] PRBC : FFP ≈ **1:1**
- [ ] PRBC : FFP : Platelets ≈ **1:1:1** during active exsanguination
- [ ] Consider an empiric **1:1:1:1** (PRBC : FFP : Platelets : **Cryo**) once **several rounds** are anticipated — fibrinogen is usually the first factor to fall critically low

Subsequent packs — "MTP Pack 2" and beyond (each)

PRBC 4 | **FFP 4** | **Platelets 1 apheresis** | **Cryo 10**

- [ ] Cryoprecipitate per fibrinogen level — **hold if fibrinogen ≥ 200 mg/dL**
- [ ] Continue sending MTP packs **every ___ minutes** until team lead calls to **HOLD**

03 Laboratory & monitoring orders

BASELINE STAT LABS — NOW, THEN Q30–60 MIN DURING ACTIVE RESUSCITATION

- [ ] Type & screen / crossmatch
- [ ] CBC with differential & platelet count
- [ ] PT/INR, aPTT
- [ ] **Fibrinogen** level
- [ ] BMP (Na, K, Cl, CO_2, BUN, Cr), Ca, Mg, Phos
- [ ] ABG / VBG with **lactate** & **ionized calcium**
- [ ] Co-oximetry if massive hemolysis or ECMO / complex cases
- [ ] POC Hgb/Hct (if available)
- [ ] **TEG / ROTEM** (if available) — now and `q60 min` until hemostasis to guide component therapy

ONGOING MONITORING

- [ ] Vital signs (HR, BP, RR, SpO_2, temp) `q5 min` during active resuscitation, then `q15 min`
- [ ] Continuous ECG; strict I/O with Foley & **hourly UOP**; **core temperature** (esophageal / bladder / PA)
- [ ] Bedside ultrasound (FAST, IVC, cardiac views) as clinically indicated

04 Adjunctive medications

Antifibrinolytic · for hyperfibrinolytic states

INDICATIONS

- [ ] Early traumatic hemorrhage (`< 3 h` post-injury) · obstetric hemorrhage · **TEG LY-30 > ~3%** · cirrhosis with AICF

OPTIONS

- [ ] **TXA** `1 g IV over 10 min`, then `1 g IV over 8 h`
- [ ] OR **aminocaproic acid** `4–5 g load over 1 h`, then `1 g/h` infusion
- [ ] Adjust per local trauma / OB guidelines; consider contraindications (active intravascular thrombosis, uncontrolled DIC)

Calcium replacement · goal $iCa^{2+} \geq 1.1–1.2$ mmol/L

- [ ] **Calcium chloride 1 g IV** (central) or **calcium gluconate 2–3 g IV** (peripheral OK) for $iCa^{2+} < 1.1$, **and preemptively after every 4 units PRBC**

- [ ] Recheck ionized Ca^{2+} **q30–60 min** during active MTP

Acid–base & vasopressors

- [ ] Norepinephrine per ICU protocol to **MAP ≥ 65**
- [ ] Avoid routine bicarbonate; reserve for severe acidosis (pH < 7.1) with instability

Temperature management · prevent the lethal triad

- [ ] Forced-air warming blanket
- [ ] **Fluid / blood warmer for all products**; warm any crystalloid used

05 Targets & goal-directed transfusion

PHYSIOLOGIC GOALS

SBP / MAP	HEART RATE	URINE OUTPUT	PERFUSION
SBP ≥ 90 / MAP ≥ 65 (permissive in trauma until hemostasis if no TBI)	**< 100/min** if feasible	**≥ 0.5 mL/kg/h** (≥ 30 mL/h)	**Lactate ↓**, base deficit improving

LABORATORY GOALS

Hemoglobin	**7–9 g/dL** most patients · **9–10** in ongoing exsanguination / myocardial ischemia / TBI
Platelets	**≥ 50,000/µL** · **≥ 100,000/µL** in CNS / neurosurgical bleeding
Coagulation	**INR ≤ 1.5–1.8** · aPTT < 1.5 × control
Fibrinogen	**≥ 150–200 mg/dL** (≥ 200 in obstetric / CNS bleeding if possible)

> **TIP** Use **TEG / ROTEM** parameters when available to guide FFP, platelets, and cryoprecipitate more precisely.

06 Adjunctive / special components

ORDER AS INDICATED BY LABS / TEG / ROTEM

- [ ] Additional **FFP** if INR > 1.5 or prolonged R-time (TEG) / CT (ROTEM)
- [ ] Additional **platelets** if < 50K or low MA (TEG) / MCF (ROTEM)

- [ ] Additional **cryoprecipitate** if fibrinogen < 150–200, low alpha angle / FIBTEM MCF, or **TEG-6S CFF-MA < 15–20 mm** — `10 units cryo ≈ ↑ fibrinogen 75 mg/dL`

ANTICOAGULANT REVERSAL

- [ ] **Warfarin** — 4F-PCC per institutional policy + **vitamin K 10 mg IV**
- [ ] **Dabigatran** — idarucizumab (per labeling, if available)
- [ ] **Factor Xa inhibitors** — andexanet alfa or 4F-PCC per local protocol

07 Imaging & source control

DEFINITIVE Resuscitation buys time — **definitive hemostasis is the goal.** Coordinate imaging with hemodynamic stability; do not delay the OR / IR for a scan in the unstable patient.

- [ ] STAT CT (head / chest / abdomen / pelvis) or angiography as appropriate, timed to hemodynamic stability

NOTIFY & COORDINATE

- [ ] Surgery (trauma / general / vascular)
- [ ] Interventional radiology
- [ ] Obstetrics
- [ ] Gastroenterology
- [ ] Emergent operative or procedural intervention for definitive hemostasis as indicated

08 Safety checks & documentation

SAFETY / COMPATIBILITY

- [ ] Verify patient identity with **two identifiers** before each product
- [ ] Document product type, unit number, start/stop times, and any reactions
- [ ] Monitor for transfusion reactions — fever, hypotension, respiratory distress, hemolysis, **TRALI / TACO**

FLUID MANAGEMENT

- [ ] **Minimize crystalloid** after MTP activation; prioritize blood products. Prefer balanced crystalloids over normal saline if used

DOCUMENTATION — "MTP ACTIVATED" NOTE

- Time of activation & deactivation
- Estimated blood loss; total products given
- Response to therapy
- Indication
- Interventions (surgery, IR, TXA, PCC, etc.)
- Complications

Massive transfusion protocol — DEACTIVATE

Transition to standard, lab-guided transfusion orders once bleeding is controlled.

CRITERIA — ALL SHOULD BE MET

- [ ] Hemodynamic stability without ongoing resuscitation escalation
- [ ] No evidence of ongoing major bleeding
- [ ] Surgical / procedural hemostasis achieved or bleeding controlled
- [ ] Clear transition plan to standard transfusion orders with lab-guided thresholds

NOTIFY ON DEACTIVATION

- [ ] **Blood bank** — "MTP DEACTIVATED"; return / reconcile unused products
- [ ] ICU nursing & primary team

EDUCATIONAL USE ONLY

Not a substitute for clinical judgement. Verify product compatibility, doses, and contraindications. Pack composition, ratios, and thresholds must match your institutional blood-bank and massive-transfusion policy.

Spreading knowledge
Improving outcomes