MAJOR HAEMORRHAGE

Massive transfusion · damage-control resuscitation

STOP THE *bleeding*

ACTIVATE THE PROTOCOL EARLY: loss of one blood volume in 24 h, 50% in 3 h, bleeding > 150 mL/min, or transfusion needed to stay alive. Call for blood, senior help + haematology.

FIRST MOVES

control the bleeding while you resuscitate

STOP THE BLEEDING

Direct pressure, tourniquet, pelvic binder, haemostatic packing; urgent surgery, endoscopy or interventional radiology.

GIVE TXA EARLY

Tranexamic acid 1 g IV over 10 min within 3 h, then 1 g over 8 h (CRASH-2 / CRASH-3). Earlier = better.

RESTRICT CRYSTALLOID

Permissive hypotension (SBP ~80-90) until control - EXCEPT keep MAP ≥ 80 in TBI. Give blood, not litres of saline.

TRANSFUSE · RATIO THEN GOAL-DIRECTED

start empiric 1:1:1, then use ROTEM / TEG

Target	Aim	If not met
Empiric ratio	RBC : FFP : platelets = 1 : 1 : 1 until labs back	Give in fixed packs; do not wait for results
Haemoglobin	70-90 g/L (7-9 g/dL) during active bleeding	Transfuse red cells
Platelets	> 50 (> 100 if CNS / eye / ongoing)	1 pool / adult dose
Fibrinogen	> 1.5-2.0 g/L	Cryoprecipitate or fibrinogen concentrate
PT / APTT	< 1.5 × normal	FFP 15-20 mL/kg; PCC if on warfarin
Ionised calcium	> 1.1 mmol/L (citrate chelates it)	Calcium chloride / gluconate IV

THE LETHAL TRIAD

each worsens the others

- **Hypothermia -** warm the patient, fluids and blood; forced-air warming
- **Acidosis -** restore perfusion; it impairs clotting and pressors
- **Coagulopathy -** give a balanced ratio + TXA; treat the cause early

MONITOR & ENDPOINTS

- Repeat FBC, coagulation, fibrinogen, gas (lactate, base deficit), Ca every 30-60 min
- Guide by viscoelastic testing (ROTEM / TEG) once available
- Reverse known anticoagulants (see Anticoagulation Reversal, #19)
- De-escalate once bleeding controlled; avoid over-transfusion

MAJOR HAEMORRHAGE BY SETTING

add to the general measures

TRAUMA

Damage-control resuscitation; pelvic binder; permissive hypotension until control; CT / theatre / IR. TXA early.

OBSTETRIC (PPH)

Uterotonics (oxytocin, ergometrine, carboprost) + TXA; bimanual / balloon tamponade; theatre. Involve obstetrics early.

GI / OTHER

Endoscopy or interventional radiology; terlipressin + antibiotics if variceal (see #33). Surgery if uncontrolled.

REVERSE & ADJUNCTS: reverse known anticoagulants urgently (warfarin → PCC + vitamin K; DOAC → idarucizumab / andexanet / PCC - see #19) · give TXA within 3 h · keep the patient warm · target ionised calcium.

PEARLS & PITFALLS

- Give blood in a balanced ratio and get TXA in within 3 hours - crystalloid dilutes clotting factors.
- Keep the patient warm - hypothermia, acidosis and coagulopathy feed each other (the lethal triad).
- Watch ionised calcium: stored blood is citrated and hypocalcaemia stops the heart and the clot.
- Definitive control (surgery / IR / endoscopy) is the treatment; transfusion only buys time.

References: European Trauma Guideline 2023 (6th ed) · CRASH-2 2010 / CRASH-3 2019 · PROPPR 2015.

Educational aid; verify doses against local protocol and patient factors.