Summary of guideline recommendations from the European guideline on management of major bleeding and coagulopathy following trauma.


General Measures

- Measure serum lactate and/or base deficit to monitor the extent of bleeding and shock.
- Low initial Hb is an indicator of severe bleeding associated with coagulopathy.
- Target systolic blood pressure of 80–90 mmHg until major bleeding has been stopped or mean arterial pressure ≥80 mmHg in case of severe TBI (GCS ≤8).
- Restricted volume replacement to achieve target blood pressure until bleeding can be controlled.
- No hypotonic fluids such as Ringers Lactate with severe head trauma.
- Excessive use of 0.9% NaCl solution should be avoided.
- Restricted use of colloids due to the adverse effects on haemostasis.
- For life-threatening hypotension use vasopressors in addition to fluids to maintain arterial pressure.
- Implement a local evidence-based guideline for management of the bleeding trauma patient and a local clinical quality and safety management system that includes parameters to assess key measures of bleeding control and outcome.

Coagulation Support

- Monitoring and measures to support coagulation be initiated immediately upon hospital admission repeated monitoring of coagulation with traditional laboratory methods and/or a viscoelastic method.
- Initial management with either Plasma and RBC in a ratio of at least 1:2 or with Fibrinogen concentrate and RBC according to Hb level.
- After initial management goal-directed strategy guided by standard laboratory coagulation values and/or viscoelastic tests.
- TXA: tranexamic acid should be given as early as possible (loading dose of 1 g over 10 min, and another 1g over 8 h) and not more than 3 hrs after the injury.
- Plasma: plasma should be administered to maintain PT and APTT <1.5 times the normal control. Plasma should be avoided in patients without substantial bleeding.
- Fibrinogen: fibrinogen concentrate or cryoprecipitate if significant bleeding is accompanied by viscoelastic signs of a functional fibrinogen deficit or a plasma fibrinogen level of less than 1.5–2.0 g/l. initially 15–20 single donor units of cryoprecipitate or 3–4 g fibrinogen concentrate. Repeat doses guided by viscoelastic monitoring and laboratory assessment of fibrinogen levels.
- Platelets: keep platelet count above 50 × 10^9/l and in in patients with ongoing bleeding and/or TBI above 100 × 10^9/l. initial dose of four to eight single platelet units or one aphaeresis pack.
- Calcium: calcium is maintained within the normal range during massive transfusion.
- PCC: use early for the emergency reversal of vitamin K-dependent oral anticoagulants. PCC or plasma can be used for delayed coagulation initiation using viscoelastic monitoring providing fibrinogen levels are normal.
- Novo Seven: off-label use of rFVIIa only if major bleeding and traumatic coagulopathy persist despite all other attempts to control bleeding and best-practice use of conventional haemostatic measures.

Management of anticoagulants

- Use platelets for; substantial bleeding or intracranial haemorrhage who are on antiplatelet agents, platelet dysfunction in a patient with microvascular bleeding.
- Measure platelet function in patients treated with antiplatelet agents.
- Desmopressin: (0.3 μg/kg) can be used for platelet-inhibiting drugs or von Willebrand disease. Not indicated for routine use in the bleeding trauma patient.
- NOAC: measure anti-factor Xa level sin patients treated with rivaroxaban, apixaban or edoxaban. For life-threatening bleeding: TXA 15 mg/kg (or 1 g) and highdose (25-50 U/kg) PCC/apCPC until specific antidotes are available.
- NOAC: measure dabigatran levels or if unavailable, thrombin time and APTT to allow a qualitative estimation of the presence of dabigatran. For life-threatening bleeding: idarucizumab (5 g intravenously) or, if unavailable, we suggest treatment with high-dose (25-50 U/kg) PCC/apCPC, in both cases combined with TXA 15 mg/kg (or 1 g).