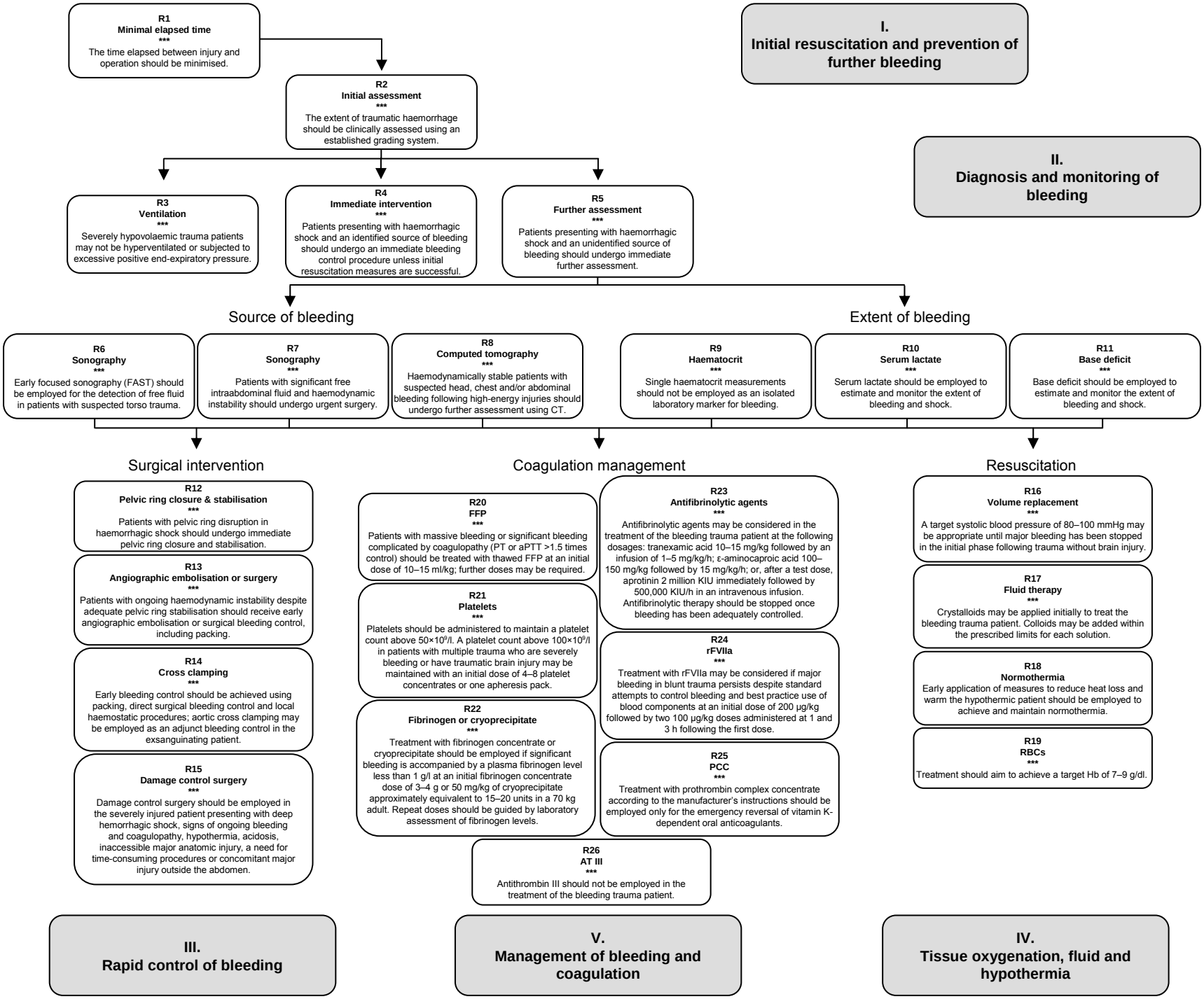
R1
Minimal elapsed time
***
The time elapsed between injury and operation should be minimised.
R2
Initial assessment
***
The extent of traumatic haemorrhage should be clinically assessed using an established grading system.
I.
Initial resuscitation and prevention of further bleeding
II.
Diagnosis and monitoring of bleeding
R3
Ventilation
***
Severely hypovolaemic trauma patients may not be hyperventilated or subjected to excessive positive end-expiratory pressure.
R4
Immediate intervention
***
Patients presenting with haemorrhagic shock and an identified source of bleeding should undergo an immediate bleeding control procedure unless initial resuscitation measures are successful.
R5
Further assessment
***
Patients presenting with haemorrhagic shock and an unidentified source of bleeding should undergo immediate further assessment.
Source of bleeding
Extent of bleeding
R6
Sonography
***
Early focused sonography (FAST) should be employed for the detection of free fluid in patients with suspected torso trauma.
R7
Sonography
***
Patients with significant free intraabdominal fluid and haemodynamic instability should undergo urgent surgery.
R8
Computed tomography
***
Haemodynamically stable patients with suspected head, chest and/or abdominal bleeding following high-energy injuries should undergo further assessment using CT.
R9
Haematocrit
***
Single haematocrit measurements should not be employed as an isolated laboratory marker for bleeding.
R10
Serum lactate
***
Serum lactate should be employed to estimate and monitor the extent of bleeding and shock.
R11
Base deficit
***
Base deficit should be employed to estimate and monitor the extent of bleeding and shock.
Surgical intervention
Coagulation management
Resuscitation
R12
Pelvic ring closure & stabilisation
***
Patients with pelvic ring disruption in haemorrhagic shock should undergo immediate pelvic ring closure and stabilisation.
R13
Angiographic embolisation or surgery
***
Patients with ongoing haemodynamic instability despite adequate pelvic ring stabilisation should receive early angiographic embolisation or surgical bleeding control, including packing.
R14
Cross clamping
***
Early bleeding control should be achieved using packing, direct surgical bleeding control and local haemostatic procedures; aortic cross clamping may be employed as an adjunct bleeding control in the exsanguinating patient.
R15
Damage control surgery
***
Damage control surgery should be employed in the severely injured patient presenting with deep hemorrhagic shock, signs of ongoing bleeding and coagulopathy, hypothermia, acidosis, inaccessible major anatomic injury, a need for time-consuming procedures or concomitant major injury outside the abdomen.
R20
FFP
***
Patients with massive bleeding or significant bleeding complicated by coagulopathy (PT or aPTT >1.5 times control) should be treated with thawed FFP at an initial dose of 10–15 ml/kg; further doses may be required.
R21
Platelets
***
Platelets should be administered to maintain a platelet count above 50×10⁹/l. A platelet count above 100×10⁹/l in patients with multiple trauma who are severely bleeding or have traumatic brain injury may be maintained with an initial dose of 4–8 platelet concentrates or one apheresis pack.
R22
Fibrinogen or cryoprecipitate
***
Treatment with fibrinogen concentrate or cryoprecipitate should be employed if significant bleeding is accompanied by a plasma fibrinogen level less than 1 g/l at an initial fibrinogen concentrate dose of 3–4 g or 50 mg/kg of cryoprecipitate approximately equivalent to 15–20 units in a 70 kg adult. Repeat doses should be guided by laboratory assessment of fibrinogen levels.
R23
Antifibrinolytic agents
***
Antifibrinolytic agents may be considered in the treatment of the bleeding trauma patient at the following dosages: tranexamic acid 10–15 mg/kg followed by an infusion of 1–5 mg/kg/h; ε-aminocaproic acid 100–150 mg/kg followed by 15 mg/kg/h; or, after a test dose, aprotinin 2 million KIU immediately followed by 500,000 KIU/h in an intravenous infusion. Antifibrinolytic therapy should be stopped once bleeding has been adequately controlled.
R24
rFVIIa
***
Treatment with rFVIIa may be considered if major bleeding in blunt trauma persists despite standard attempts to control bleeding and best practice use of blood components at an initial dose of 200 µg/kg followed by two 100 µg/kg doses administered at 1 and 3 h following the first dose.
R25
PCC
***
Treatment with prothrombin complex concentrate according to the manufacturer's instructions should be employed only for the emergency reversal of vitamin K-dependent oral anticoagulants.
R26
AT III
***
Antithrombin III should not be employed in the treatment of the bleeding trauma patient.
R16
Volume replacement
***
A target systolic blood pressure of 80–100 mmHg may be appropriate until major bleeding has been stopped in the initial phase following trauma without brain injury.
R17
Fluid therapy
***
Crystalloids may be applied initially to treat the bleeding trauma patient. Colloids may be added within the prescribed limits for each solution.
R18
Normothermia
Early application of measures to reduce heat loss and warm the hypothermic patient should be employed to achieve and maintain normothermia.
R19
RBCs
***
Treatment should aim to achieve a target Hb of 7–9 g/dl.
III.
Rapid control of bleeding
V.
Management of bleeding and coagulation
IV.
Tissue oxygenation, fluid and hypothermia