Stopařův průvodce galaxií MB/VI.E

Tomáš Henlín

GUIDELINES Open Access

The European guideline on management of major bleeding and coagulopathy following trauma: sixth edition

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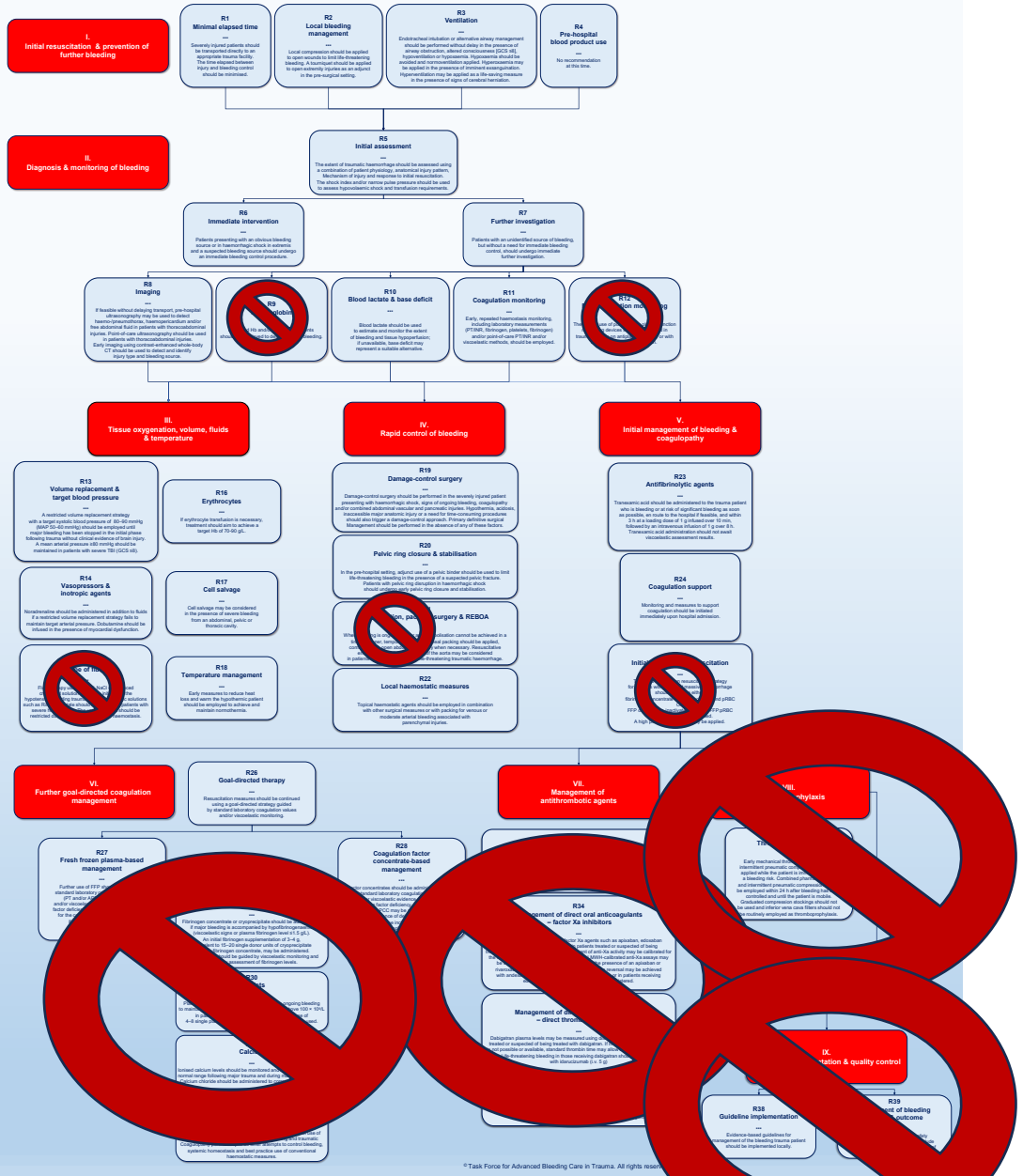
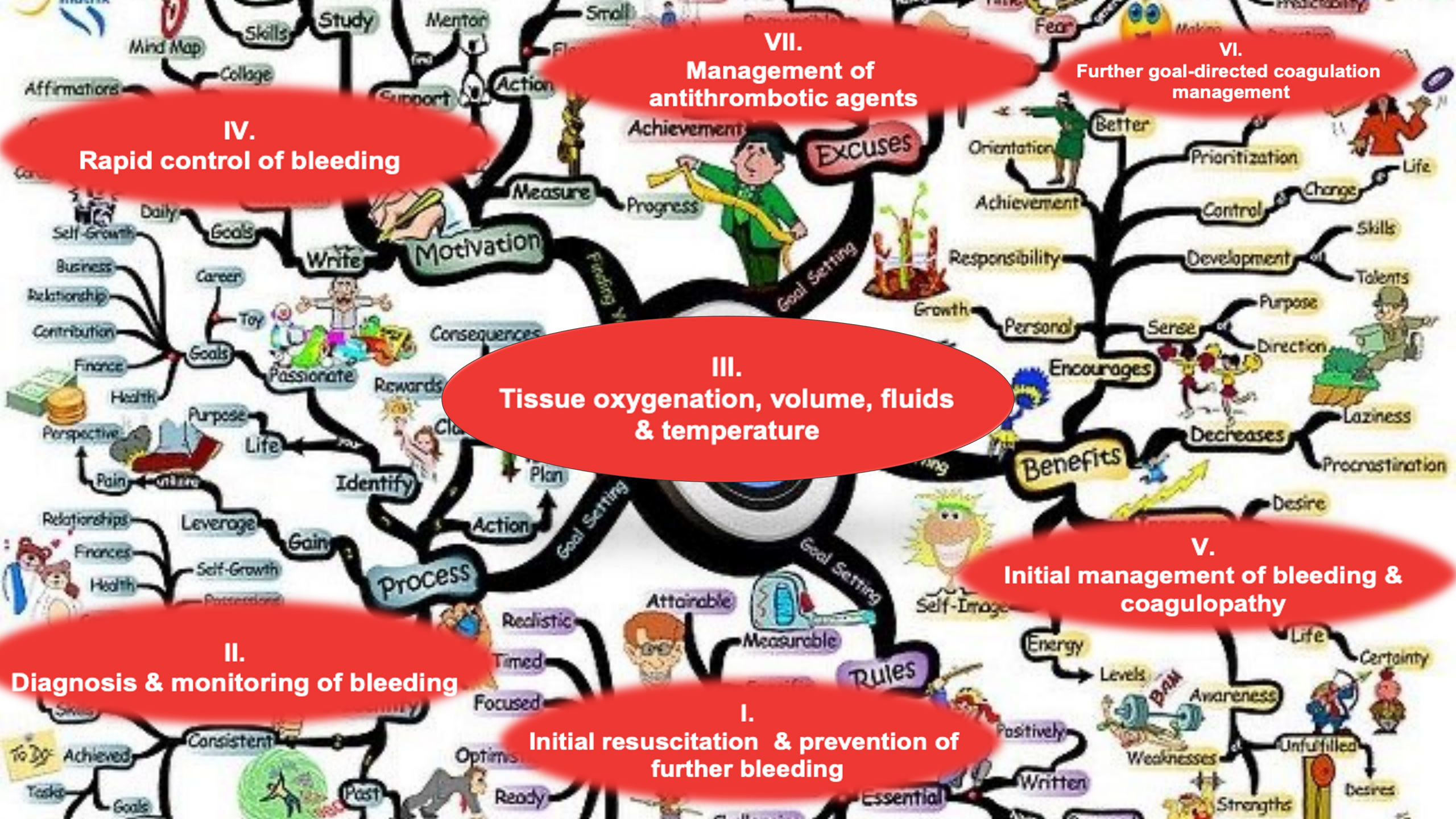
A když jsem jednou potkal.....

The European guideline on management of major bleeding and coagulopathy following trauma: sixth edition (2023)

Rolf Rossaint, Bash[illegible]i, Bertil Bouillon, Vlad[illegible]erny, Diana [illegible]mpos, Nicola Curry, [illegible]gues [illegible]anteau, Dar[illegible] Fill[illegible], Oliver Grottke, Lars Grønlykke[illegible]ole Harrois, Beverley [illegible]nt, Alexander Kaser[illegible]ko Komadina, Mi[illegible]erold Madsen, Mare[illegible]gele, Lidia Mora, Louis Riddez, Carolina S Romero, Charles-Marc Samama, Jean-Louis Vincent, Sebastian Wiberg, Donat R. Spahn

Crit Care 27 (2023)




VII.
Management of antithrombotic agents
VI.
Further goal-directed coagulation management
IV.
Rapid control of bleeding
III.
Tissue oxygenation, volume, fluids & temperature
V.
Initial management of bleeding & coagulopathy
II.
Diagnosis & monitoring of bleeding
I.
Initial resuscitation & prevention of further bleeding
Motivation
Goal Setting
Process
Benefits
Rules
Excuses
Study
Skills
Mentor
Mind Map
Collage
Affirmations
Action
Support
Measure
Progress
Achievement
Daily
Goals
Write
Self-Growth
Business
Relationship
Contribution
Career
Toy
Finance
Health
Passionate
Rewards
Consequences
Plan
Identify
Purpose
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Positively
Written
Essential
Attainable
Measurable
Realistic
Timed
Focused
Consistent
Achieved
Tasks
Goals
Past
Ready

II.
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III.
Tissue oxygenation, volume, fluids & temperature

VI.
Further goal-directed coagulation management

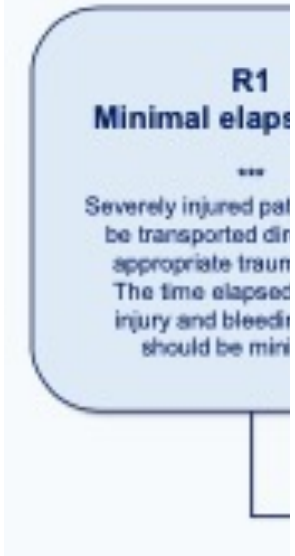
I.
Initial resuscitation & prevention of further bleeding

V.
Initial management of bleeding & coagulopathy

IV.
Rapid control of bleeding

VII.
Management of antithrombotic agents

I.
Initial resuscitation & prevention of further bleeding



CMC TCCC

Module 1: Principles and Application of TCCC

DHA

LEADING CAUSES OF PREVENTABLE DEATH DUE TO TRAUMATIC INJURIES

EXTREMITY HEMORRHAGE

Intervention:
limb tourniquet

JUNCTIONAL HEMORRHAGE

Intervention:
hemostatic dressing and wound packing; junctional tourniquet

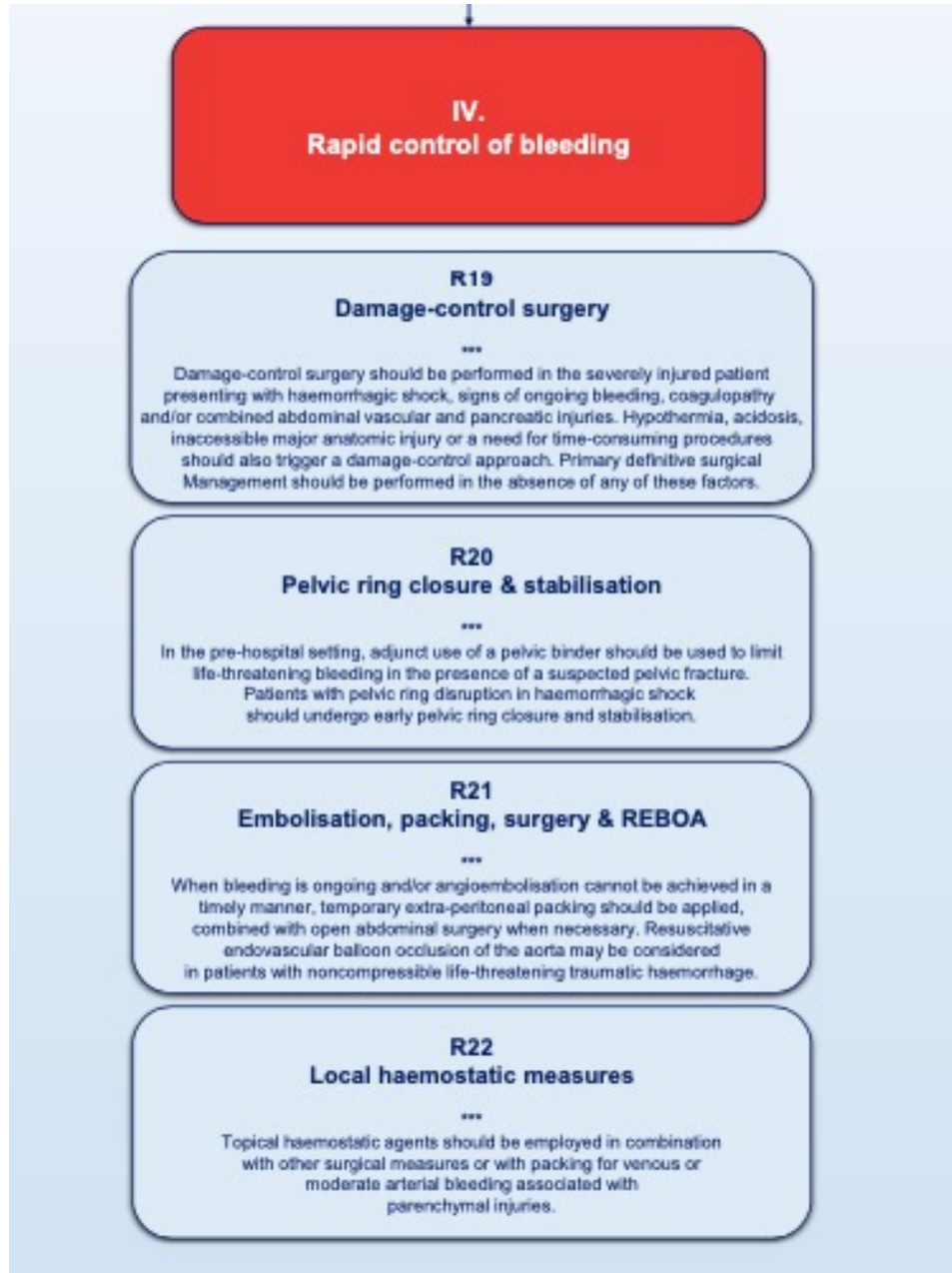
TENSION PNEUMOTHORAX

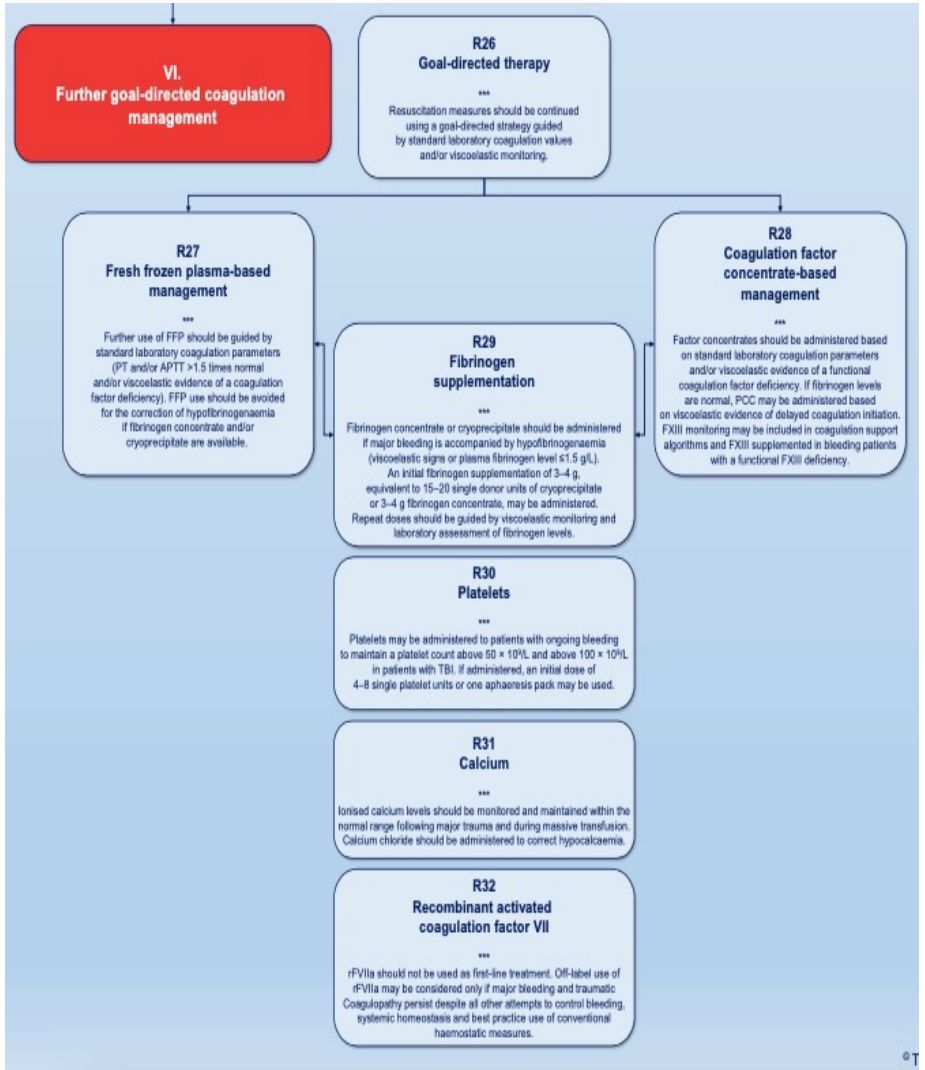
Intervention:
Needle Decompression of the Chest (NDC)

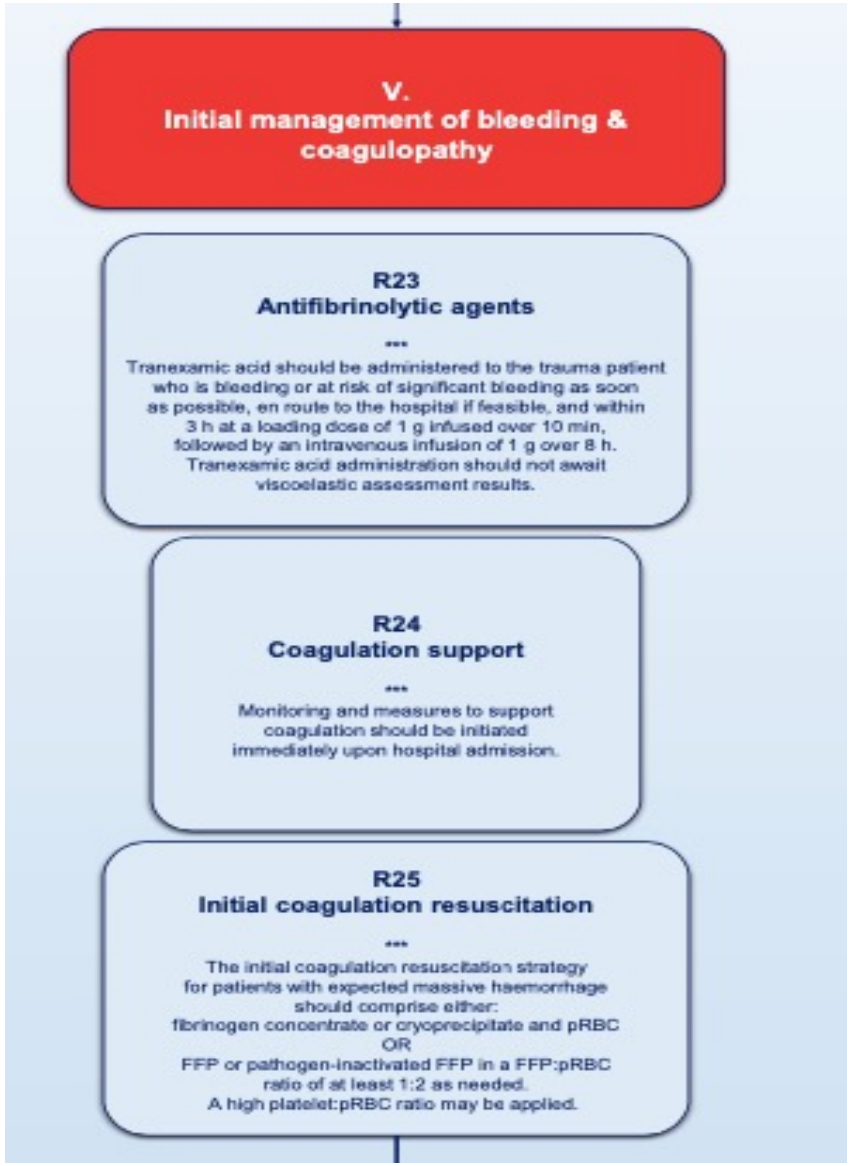
AIRWAY TRAUMA/ OBSTRUCTION

Intervention:
airway maneuvers, nasopharyngeal airway (NPA) or cricothyroidotomy


III.
Tissue oxygenation, volume, fluids & temperature
R13
Volume replacement & target blood pressure
***
A restricted volume replacement strategy with a target systolic blood pressure of 80–90 mmHg (MAP 50–60 mmHg) should be employed until major bleeding has been stopped in the initial phase following trauma without clinical evidence of brain injury. A mean arterial pressure ≥80 mmHg should be maintained in patients with severe TBI (GCS ≤8).
R14
Vasopressors & inotropic agents
***
Noradrenaline should be administered in addition to fluids if a restricted volume replacement strategy fails to maintain target arterial pressure. Dobutamine should be infused in the presence of myocardial dysfunction.
R15
Type of fluid
***
Fluid therapy using a 0.9% NaCl or balanced crystalloid solution should be initiated in the hypotensive bleeding trauma patient. Hypotonic solutions such as Ringer's lactate should be avoided in patients with severe head trauma. The use of colloids should be restricted due to the adverse effect on haemostasis.
R16
Erythrocytes
***
If erythrocyte transfusion is necessary, treatment should aim to achieve a target Hb of 70-90 g/L.
R17
Cell salvage
***
Cell salvage may be considered in the presence of severe bleeding from an abdominal, pelvic or thoracic cavity.
R18
Temperature management
***
Early measures to reduce heat loss and warm the hypothermic patient should be employed to achieve and maintain normothermia.

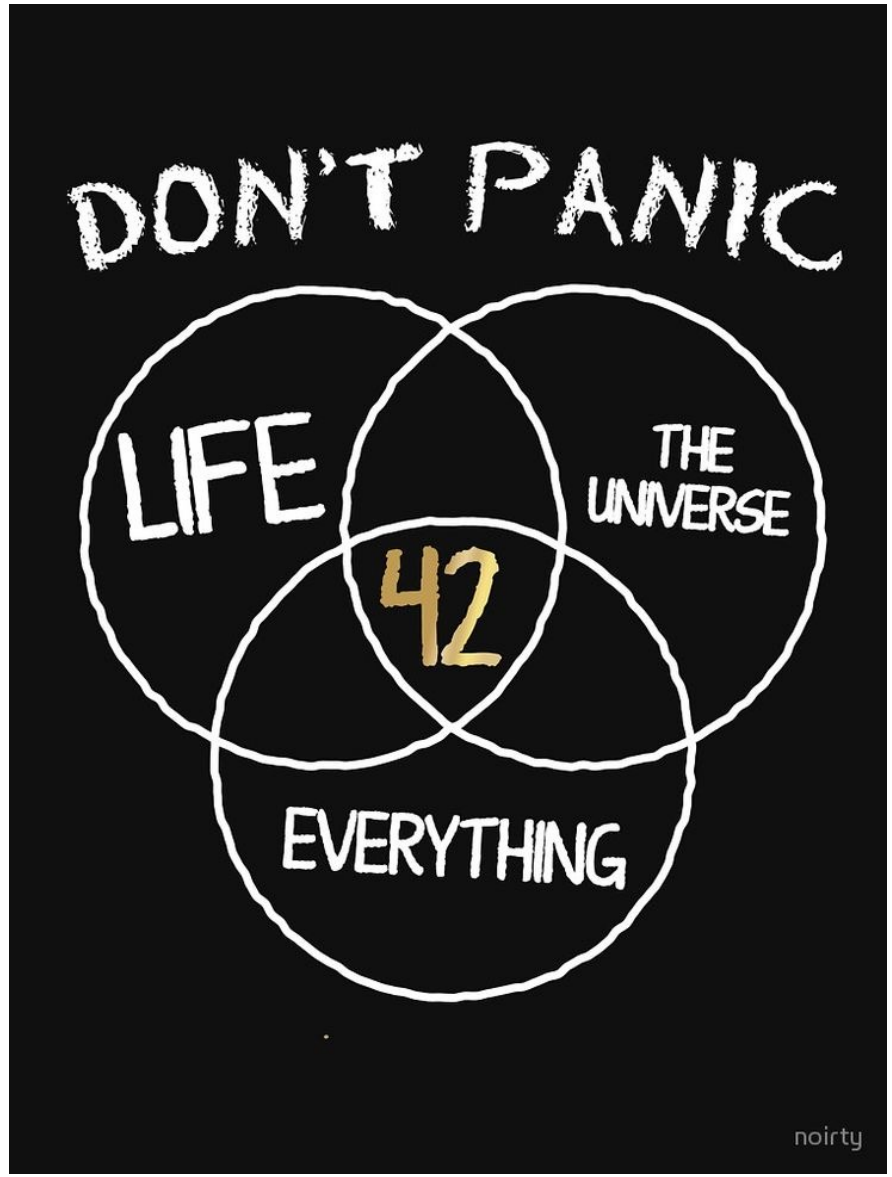

IV.
Rapid control of bleeding
R19
Damage-control surgery
Damage-control surgery should be performed in the severely injured patient presenting with haemorrhagic shock, signs of ongoing bleeding, coagulopathy and/or combined abdominal vascular and pancreatic injuries. Hypothermia, acidosis, inaccessible major anatomic injury or a need for time-consuming procedures should also trigger a damage-control approach. Primary definitive surgical Management should be performed in the absence of any of these factors.
R20
Pelvic ring closure & stabilisation
In the pre-hospital setting, adjunct use of a pelvic binder should be used to limit life-threatening bleeding in the presence of a suspected pelvic fracture. Patients with pelvic ring disruption in haemorrhagic shock should undergo early pelvic ring closure and stabilisation.
R21
Embolisation, packing, surgery & REBOA
When bleeding is ongoing and/or angioembolisation cannot be achieved in a timely manner, temporary extra-peritoneal packing should be applied, combined with open abdominal surgery when necessary. Resuscitative endovascular balloon occlusion of the aorta may be considered in patients with noncompressible life-threatening traumatic haemorrhage.
R22
Local haemostatic measures
Topical haemostatic agents should be employed in combination with other surgical measures or with packing for venous or moderate arterial bleeding associated with parenchymal injuries.


VI.
Further goal-directed coagulation management
R26
Goal-directed therapy
***
Resuscitation measures should be continued using a goal-directed strategy guided by standard laboratory coagulation values and/or viscoelastic monitoring.
R27
Fresh frozen plasma-based management
***
Further use of FFP should be guided by standard laboratory coagulation parameters (PT and/or APTT >1.5 times normal and/or viscoelastic evidence of a coagulation factor deficiency). FFP use should be avoided for the correction of hypofibrinogenaemia if fibrinogen concentrate and/or cryoprecipitate are available.
R29
Fibrinogen supplementation
***
Fibrinogen concentrate or cryoprecipitate should be administered if major bleeding is accompanied by hypofibrinogenaemia (viscoelastic signs or plasma fibrinogen level ≤1.5 g/L). An initial fibrinogen supplementation of 3–4 g, equivalent to 15–20 single donor units of cryoprecipitate or 3–4 g fibrinogen concentrate, may be administered. Repeat doses should be guided by viscoelastic monitoring and laboratory assessment of fibrinogen levels.
R28
Coagulation factor concentrate-based management
***
Factor concentrates should be administered based on standard laboratory coagulation parameters and/or viscoelastic evidence of a functional coagulation factor deficiency. If fibrinogen levels are normal, PCC may be administered based on viscoelastic evidence of delayed coagulation initiation. FXIII monitoring may be included in coagulation support algorithms and FXIII supplemented in bleeding patients with a functional FXIII deficiency.
R30
Platelets
***
Platelets may be administered to patients with ongoing bleeding to maintain a platelet count above 50 × 10⁹/L and above 100 × 10⁹/L in patients with TBI. If administered, an initial dose of 4–8 single platelet units or one aphaeresis pack may be used.
R31
Calcium
***
Ionised calcium levels should be monitored and maintained within the normal range following major trauma and during massive transfusion. Calcium chloride should be administered to correct hypocalcaemia.
R32
Recombinant activated coagulation factor VII
***
rFVIIa should not be used as first-line treatment. Off-label use of rFVIIa may be considered only if major bleeding and traumatic Coagulopathy persist despite all other attempts to control bleeding, systemic homeostasis and best practice use of conventional haemostatic measures.


V.
Initial management of bleeding & coagulopathy
R23
Antifibrinolytic agents
***
Tranexamic acid should be administered to the trauma patient who is bleeding or at risk of significant bleeding as soon as possible, en route to the hospital if feasible, and within 3 h at a loading dose of 1 g infused over 10 min, followed by an intravenous infusion of 1 g over 8 h. Tranexamic acid administration should not await viscoelastic assessment results.
R24
Coagulation support
***
Monitoring and measures to support coagulation should be initiated immediately upon hospital admission.
R25
Initial coagulation resuscitation
***
The initial coagulation resuscitation strategy for patients with expected massive haemorrhage should comprise either:
fibrinogen concentrate or cryoprecipitate and pRBC
OR
FFP or pathogen-inactivated FFP in a FFP:pRBC ratio of at least 1:2 as needed.
A high platelet:pRBC ratio may be applied.


VII.
Management of antithrombotic agents
R33
Reversal of vitamin K-dependent oral anticoagulants
***
Emergency reversal of vitamin K-dependent oral anticoagulants in the bleeding trauma patient should be accomplished with early use of both PCC and 5–10 mg i.v. phytomenadione (vitamin K1).
R34
Management of direct oral anticoagulants – factor Xa inhibitors
***
Plasma levels of oral direct anti-factor Xa agents such as apixaban, edoxaban or rivaroxaban may be measured in patients treated or suspected of being treated with one of these agents. Measurement of anti-Xa activity may be calibrated for the specific agent. If not possible or available, LMWH-calibrated anti-Xa assays may be used. If life-threatening bleeding occurs in the presence of an apixaban or rivaroxaban effect, especially in patients with TBI, a reversal may be achieved with andexanet alfa. If andexanet alfa is not available, or in patients receiving edoxaban, PCC (25–50 U/kg) may be administered.
R35
Management of direct oral anticoagulants – direct thrombin inhibitors
***
Dabigatran plasma levels may be measured using diluted thrombin time in patients treated or suspected of being treated with dabigatran. If measurement of dabigatran is not possible or available, standard thrombin time may allow a qualitative estimation. Life-threatening bleeding in those receiving dabigatran should be treated with idarucizumab (i.v. 5 g)
R36
Antiplatelet agents
***
Routine platelet transfusion should be avoided in patients with ongoing bleeding who have been treated with antiplatelet agents.


TRAUMA HEMOSTASIS & OXYGENATION RESEARCH
THOR


DON'T PANIC
LIFE
THE UNIVERSE
42
EVERYTHING
noirty