I. Preoperative patient evaluation

Reviewing medical records (patient condition).

Observational studies, case reports, or comparisons without pertinent control groups


Laboratory tests.

Hemoglobin or hematocrit to identify preoperative anemia:

Observational studies, case reports, or comparisons without pertinent control groups
Coagulation profile (PT, aPTT, activated coagulation time [ACT], thromboelastogram [TEG]):

Observational studies, case reports, or comparisons without pertinent control groups


II. Preadmission patient preparation

Prevention/reduction of perioperative anemia.

Erythropoietin:

*Randomized controlled trials; erythropoietin vs. placebo*


**Randomized controlled trials: erythropoietin vs. no erythropoietin**


Nonrandomized comparative studies: erythropoietin vs. no erythropoietin


Observational studies, case reports, or non-pertinent comparison groups


Iron:

Randomized controlled trials


*Observational studies, case reports, or non-pertinent comparison groups*


**Discontinuation of anticoagulants.**

*Warfarin:*

*Observational studies, case reports, or non-pertinent comparison groups*


**Discontinuation of antithrombotics.**

*Clopidogrel, Ticagralor, Prasugrel or other thienopyridines:*

*Observational studies, case reports, or non-pertinent comparison groups*


*Aspirin:*

*Observational studies, case reports, or non-pertinent comparison groups*


**Preadmission Autologous Blood Donation (PAD).**

**PAD versus allogeneic blood or blood products:**

**Randomized controlled trials**


**Nonrandomized comparative studies**


Observational studies, case reports, or non-pertinent comparison groups

PAD versus preprocedure acute normovolemic hemodilution (ANH):
Nonrandomized comparative studies
PAD versus intraoperative or postoperative blood recovery:

Randomized controlled trials

Nonrandomized comparative studies

III. Preprocedure patient preparation

Reversal of anticoagulants.

Prothrombin complex concentrates (PCC): Bebulin, Profilnin, Kcentra:

Observational studies, case reports, or non-pertinent comparison groups

Vitamin K:

Nonrandomized comparative studies

Antifibrinolytics for prophylaxis of excessive bleeding.

ε-Aminocaproic acid:

Randomized controlled trials; ε-aminocaproic acid vs placebo:

Randomized controlled trials: e-aminocaproic acid vs no antifibrinolytic therapy:
Nonrandomized comparative studies:


Observational studies, case reports, or non-pertinent comparison groups:


Tranexamic acid:

Randomized controlled trials; tranexamic acid vs placebo:


**Randomized controlled trials; tranexamic acid vs no antifibrinolytic therapy:**


Nonrandomized comparative studies:


Observational studies, case reports, or non-pertinent comparison groups:

Acute Normovolemic Hemodilution (ANH).

**ANH versus no ANH:**

**Randomized controlled trials:**


Nonrandomized comparative studies:


Observational studies, case reports, or non-pertinent comparison groups:


**ANH combined with intraoperative blood recovery (ICSB) versus either ANH or ISCB:**

**Randomized controlled trials:**


Nonrandomized comparative studies


IV. Intraoperative and postoperative interventions

Blood management protocols.

Multimodal protocols or algorithms:

Randomized controlled trials: general or point-of-care protocols or algorithms:

**Randomized controlled trials; thromboelastography (TEG) - guided protocols or algorithms:**


**Randomized controlled trials; thromboelastography (TEG) - guided protocols or algorithms:**


**Nonrandomized comparative studies:**


**Observational studies, case reports, or non-pertinent comparison groups:**


**Liberal versus restrictive transfusion protocol:**

**Randomized controlled trials:**


**Nonrandomized comparative studies:**

Non-transfusion protocol:

Nonrandomized comparative studies:


Observational studies, case reports, or non-pertinent comparison groups


Massive transfusion protocol:

Nonrandomized comparative studies:


Observational studies, case reports, or non-pertinent comparison groups:

Maximum surgical blood ordering schedule for elective procedures:

Randomized controlled trials:


Observational studies, case reports, or non-pertinent comparison groups:


Allogeneic red blood cell transfusion.

Age of stored RBCs:

Nonrandomized comparative studies:


Observational studies, case reports, or non-pertinent comparison groups


Leukocyte reduction:

Randomized controlled trials:


Observational studies, case reports, or non-pertinent comparison groups

1. Blumberg N, Heal JM, Gettings KF, Phipps RP, Masel D, Refaai MA, Kirkley SA, Fialkow LB: An association between decreased cardiopulmonary complications (TRALI and TACO) and implementation of universal leukoreduction of blood transfusions. Transfusion 2010; 50:2738-2744


Autologous red blood cell transfusion.

Intraoperative blood recovery:

Randomized controlled trials:


Nonrandomized comparative studies

Observational studies, case reports, or non-pertinent comparison groups


Postoperative blood recovery:

Randomized controlled trials; cell salvage:


Randomized controlled trials; whole blood:

1. Avall A, Hyllner M, Bengtson JP, Carlsson L, Bengtsson A: Greater increase in cytokine concentration after salvage with filtered whole blood than with washed red cells, but no difference in postoperative hemoglobin recovery. Transfusion 1999; 39:271-276

Nonrandomized comparative studies; cell salvage:


Nonrandomized comparative studies; whole blood:

Observational studies, case reports, or non-pertinent comparison groups; cell salvage


Observational studies, case reports, or non-pertinent comparison groups; whole blood:


Intraoperative and postoperative patient monitoring.

Monitoring for inadequate perfusion and oxygenation of vital organs:

Randomized controlled trials:


Observational studies, case reports, or non-pertinent comparison groups:

8. Ives CL, Harrison DK, Stansby GS: Prediction of surgical site infections after major

**Monitoring for non RBC transfusion coagulopathy:**

**Platelet function monitoring:**

*Observational studies, case reports, or non-pertinent comparison groups:*


**Viscoelastic haemostatic assays (VHA):**

*Randomized controlled trials; Thromboelastography (TEG):*


*Nonrandomized comparative studies; Rotational thromboelastometry (ROTEM):*


*Observational studies, case reports, or non-pertinent comparison groups:*

4. Coakley M, Reddy K, Mackie I, Mallett S: Transfusion triggers in orthotopic liver transplantation: a comparison of the thromboelastometry analyzer, the
thromboelastogram, and conventional coagulation tests. J Cardiothorac Vasc Anesth 2006; 20:548-553


Monitoring (periodic checking) for adverse effects of transfusions:

Transfusion-related acute lung injury (TRALI):

Observational studies, case reports, or non-pertinent comparison groups:


Hemolytic transfusion reactions (ABO incompatibility):

Observational studies, case reports, or non-pertinent comparison groups:

Bacterial contamination:

Nonrandomized comparative studies:

Observational studies, case reports, or non-pertinent comparison groups

Treatment of excessive bleeding.

Platelet transfusion (PLT or A-PLT):

Nonrandomized comparative studies:

Observational studies, case reports, or non-pertinent comparison groups
**Fresh frozen plasma transfusion (FFP or A-FFP):**

**Randomized controlled trials:**


**Observational studies, case reports, or non-pertinent comparison groups**


**Pharmacologic treatments:**

Desmopressin (DDAVP):

**Randomized controlled trials; Desmopressin vs. placebo:**


**Randomized controlled trials: Desmopressin vs. no Desmopressin:**


**Observational studies, case reports, or non-pertinent comparison groups**


**Antifibrinolytics (for treatment of excessive bleeding)**

**Randomized controlled trials: ε-Aminocaproic acid:**


**Topical hemostatics; Fibrin glue:**

**Randomized controlled trials**


Observational studies, case reports, or non-pertinent comparison groups


Topical hemostatics; Thrombin gel:

Randomized controlled trials


Prothrombin complex concentrates (PCC):

Observational studies, case reports, or non-pertinent comparison groups


Coagulation factor concentrates; Recombinant human activated Factor VII, Factor VIIa:

Randomized controlled trials


Nonrandomized comparative studies

**Observational studies, case reports, or non-pertinent comparison groups**


12. Tobias JD: Synthetic factor VIIa to treat dilutional coagulopathy during posterior spinal fusion in two children. Anesthesiology 2002; 96:1522-1525


Treatments for hypofibrinogenemia: Fibrinogen concentrate (Riastap™ or Haemocomplettan™):

**Randomized controlled trials**


**Observational studies, case reports, or non-pertinent comparison groups**