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TABLE 1. Key points from each critical development report

Key points
Duration of RBC storage
1. Fifteen RCTs (total, 31,293 patients) investigating the clinical impact of stored blood provided no evidence that fresh blood is superior to stored RBCs on patient mortality (HR, 1.04; 95% CI, 0.98-1.10).
2. Two studies (SCANDAT data and a secondary analysis of INFORM data) found no association between duration of storage and mortality, and authors from both studies concluded that the current practice of storing RBCs for 42 days does not need to be changed.
3. The consistent finding of a trend toward higher mortality with fresh blood requires further investigation.
Blood donor characteristics and patient outcomes
1. Based on quality-monitoring data from blood suppliers, it is apparent that not all RBC products are equivalent in terms of hemoglobin, hemolysis, or RBC counts; the variability is primarily related to donor sex and age.
2. The following associations between donor demographics and recipient mortality have been reported:
• Sex-mismatched RBC transfusions have been associated with higher mortality in one exploratory study, but not in two others.
• Two large, retrospective studies found significantly increased recipient mortality when RBC donors were female and younger. However, in one of those studies, these associations disappeared after adjusting for nonlinearity.
3. Metabolic and genomic studies on donors may identify biomarkers that predict RBC aging during refrigerated storage and/or post-transfusion RBC survival.
Reversal of bleeding in hemophilia and for patients on direct oral anticoagulants
1. Emicizumab is a recombinant, humanized monoclonal antibody that bridges Factors IX and X to restore the function of the missing Factor VIII. Prophylaxis with emicizumab is effective in decreasing bleeding event rates in patients with hemophilia A and inhibitors.
2. A single intravenous dose of ciraparantag demonstrated full reversal of the anticoagulant effects of edoxaban within 10 minutes of administration, and the effect was sustained for 24 hours. There was no evidence of procoagulant activity, adverse events, or dose-limiting side effects after ciraparantag.
3. After the bolus administration of andexanet α to reverse rivaroxaban or apixiban in acute major bleeding, anti-Factor Xa activity decreased by 89% in patients who received rivaroxaban and by 93% in those who received apixiban; but, by 4 hours, the effect began to diminish. However, at 12 hours, clinical efficacy was adjudicated as good or excellent in 79% of patients. The rate of thrombotic events within 30 days was 18%.
4. An intravenous dose of idarucizumab immediately reverses the anticoagulant effects of dabigatran in middle-aged, elderly, and renally impaired volunteers. Efficacy of idarucizumab was observed in renally impaired individuals, as was an increase in exposure and reduced clearance.
5. Two sequential bolus infusions of intravenous idarucizumab rapidly, durably, and safely reversed the anticoagulant effects of dabigatran in patients who had uncontrolled bleeding or were about to undergo an urgent procedure.
Transfusion approach to hemorrhagic shock
1. "Every minute counts": A randomized controlled trial involving MT at 12 Level I trauma centers showed that, independent of the product ratios, every "minute" of delay from the time of MT protocol activation to the time of initial cooler arrival increased the odds of mortality by 5%.
2. A secondary analysis of the PROPPR study concluded that the addition of traumatic brain injury to hemorrhagic shock is associated with worse coagulopathy before resuscitation and increased mortality.
3. The use of PCC in patients receiving vitamin K antagonists with intracranial hemorrhage resulted in improved normalization of the INR within 3 hours and less hematoma expansion at 3 hours and 24 hours compared with the use of plasma.
4. The use of fibrinogen concentrate in patients undergoing high-risk, complex cardiac surgery complicated with bleeding and normal fibrinogen levels did not result in a decrease in bleeding compared with a placebo group.
5. The use of tranexamic acid in patients with postpartum hemorrhage decreased the mortality rate without increasing the risk of thrombosis.
6. A meta-analysis on viscoelastic testing (TEG/ROTEM) found growing evidence that use of these technologies may reduce the need for blood products and improve morbidity.
Pathogen inactivation
1. PI platelets mitigate the residual risk of septic transfusion reactions and reduce the risk of other transfusion-transmitted diseases and the need for irradiation to prevent transfusion-associated graft-versus-host disease.
2. PI platelet transfusions increase the risk of platelet refractoriness and platelet transfusion requirements, yield lower corrected count increments, but do not affect all-cause mortality or increase the risk of clinically significant or severe bleeding.
3. Average coagulation factor levels in PI-treated plasma were from 73% to 87% of those in untreated plasma.
4. PI cryoprecipitate units had lower average fibrinogen levels than untreated units but met US regulatory requirements.
5. Compared with untreated RBCs, riboflavin plus UV light-treated and amustaline-treated RBCs had shorter projected storage times and shorter half-lives.
Pediatric transfusion medicine
1. Young blood donors, 16-18 years old, may have a significantly higher risk of iron deficiency, shown by the "Comparison of the History of Donation and Iron Levels in Teen Blood Donors" (CHILL) study.
2. A systematic review and meta-analysis of adverse effects of RBC transfusions in neonates showed that a liberal strategy was not superior to restrictive transfusion practice in the pooled, randomized studies.
3. The British Committee for Standards in Haematology published comprehensive guidelines for transfusions in children and neonates.
Therapeutic apheresis and extracorporeal photopheresis
1. An RCT evaluated caplacizumab, a monoclonal anti-von Willebrand factor antibody, in the treatment of TTP. Caplacizumab-treated patients showed a more rapid normalization of platelet count and reduced exacerbation episodes compared with controls; however, after cessation of caplacizumab, relapse episodes at 1 and 12 months were higher than in the control group.
2. TPE has been evaluated in the treatment of Alzheimer's disease to remove amyloid-β protein bound to albumin. Final results from two clinical trials are pending.
3. The UK Photopheresis Society published an updated, evidence-based consensus statement on the use of extracorporeal photopheresis, including guidelines for patient selection and treatment schedules.