Research questions for the update of the Patient Blood Management Guidelines

| Theme # | Theme | Active question | Population  *Subgroups* | Intervention(s) | Critical outcome(s) |
| --- | --- | --- | --- | --- | --- |
|
| **1** | **Effect of a PBM program** | **U1-GQ01**  In (all) patients, what is the effect of a patient blood management program on patient outcomes and red blood cell (RBC) or blood component transfusion? | All patients   * *Perioperative* * *Medical* * *Critical care* * *Obstetrics and maternity* * *Neonatal and paediatrics* | PBM program | * Mortality * Transfusion |
| **2** | **Effect of RBC transfusion** | **U1-GQ02**  In (all adult) patients, what is the effect of red blood cell (RBC) transfusion on patient outcomes? | All adult patients   * *Perioperative* * *Medical* * *Critical care* | RBC transfusion | * Mortality |
|  |  | **U1-Q25**  In neonates/paediatric patients, what is the effect of red blood cell (RBC) transfusion on patient outcomes? | Neonatal and paediatric patients | RBC (allogeneic) transfusion | * Mortality * Composite of mortality and severe morbidity * Neurodevelopmental disability * Necrotising enterocolitis |
| **3** | **Restrictive vs. liberal transfusion strategies** | **U1-GQ03**  In (all) patients at risk of red blood cell (RBC) transfusion, what is the effect of a restrictive transfusion threshold compared to a liberal transfusion threshold on patient outcomes and transfusion? | All patients   * *Perioperative* * *Medical* * *Critical care* * *Obstetrics and maternity* * *Neonatal and paediatrics* | Restrictive vs. liberal RBC transfusion | * Mortality * Transfusion * Neurodevelopmental disability *(neonatal only)* * Necrotising enterocolitis *(neonatal only)* |
| **4** | **Optimal Hb threshold for transfusion** | **U1-Q20**  In chronically transfused patients, at what haemoglobin (Hb) threshold should patients be transfused to avoid adverse outcomes? | Chronically transfused patients   * *Paediatrics* * *Myelodysplasia* | RBC transfusion (at different Hb thresholds) | * Mortality/survival * Functional/performance status |
| **5** | **Effect of blood component therapy** | **U1-GQ06**  In patients receiving anti-platelet medication, what is the effect of platelet transfusion? | Patients receiving anti-platelet medication   * *Perioperative* * *Medical* * *Critical care* | Platelet transfusion | * Mortality * Blood component utilisation * Bleeding into critical sites/organs * Major bleeding |
|  |  | **U1-Q22**  In patients with critical bleeding, what is the effect of cryoprecipitate compared with fibrinogen concentrate on patient outcomes and blood component utilisation? | Patients with critical bleeding   * *Perioperative* * *Obstetrics* * *Paediatric patients* | Cryoprecipitate  vs.  Fibrinogen concentrate | * Mortality * Blood component utilisation |
|  |  | **U1-Q26**  In neonates/paediatric patients, what is the effect of fibrinogen concentrate, and/or platelet transfusion on patient outcomes and blood component utilisation? | Neonatal and paediatric patients   * *Surgical* * *Trauma* * *Critical illness* | 1. Platelet transfusion *(preterms and newborns)*  2. Fibrinogen concentrate *(paediatric surgical and trauma patients)* | * Mortality * Major bleeding * Intraventricular haemorrhage *(neonatal only)* * Blood component utilisation |
| **6** | **Trigger for blood component therapy** | **U1-GQ04**  In (all) patients, at what platelet count should patients be transfused platelet concentrates to avoid adverse outcomes? | All patients   * *Perioperative* * *Medical* * *Critical care* * *Obstetrics and maternity* * *Neonatal and paediatrics* | Platelet transfusion | * Mortality * Bleeding in previously non-bleeding patients (including intracranial haemorrhage for neonates) * Bleeding into critical sites/organs * ischaemic/thromboembolic events * Blood component utilisation |
|  |  | **U1-GQ05**  In (all) patients with acquired abnormalities of haemostasis, what is the effect of blood component therapy on patient outcomes and blood component utilisation? | Patients with acquired abnormalities of haemostasis   * *Perioperative* * *Medical* * *Critical care* * *Obstetrics and maternity* * *Neonatal and paediatrics* | 1. Plasma transfusion or prothrombinex (at an INR threshold)  2. Cryoprecipitate or fibrinogen concentrate (at a specific fibrinogen level)  3. Platelet transfusion (at a specific platelet count) (included in GQ04)  4. Blood component therapy based on viscoelastic testing | * Mortality * Major bleeding * Intracranial haemorrhage *(neonatal only)* * Ischaemic or thromboembolic events * Blood component utilisation |
| **7** | **Effect of cessation of medications that affect haemostasis** | **U1-Q17**  In patients undergoing invasive procedures, what effect does the cessation and timing of cessation of medications that affect haemostasis, have on patient outcomes and red blood cell (RBC) or blood component transfusion? | 1. Surgical patients  2. Patients undergoing invasive procedures | Anti-coagulants and anti-platelet therapy, including aspirin, clopidogrel, direct-acting anti-coagulants, warfarin | * Mortality * Transfusion * Procedure-related bleeding * Reoperation for bleeding * Ischaemic or thromboembolic events |
| **8** | **Effect of non-transfusion interventions** | **U1-Q16**  In surgical patients, what is the effect of perioperative iron therapy on patient outcomes and red blood cell (RBC) transfusion? | Surgical patients   * *Preoperative* * *Intraoperative* * *Postoperative* | Iron therapy (oral and/or parenteral) | * Mortality * RBC transfusion |
|  |  | **U1-Q19**  In medical patients, what is the effect of non-transfusion interventions on patient outcomes and red blood cell (RBC) transfusion? | Medical patients   * *Haematology oncology* * *Renal* * *Congestive heart failure* | 1. ESAs  2. Iron therapy (oral or parenteral IV or IM)  3. Combination of these | * Mortality * RBC transfusion * Ischaemic or thromboembolic events |
|  |  | **U1-Q21**  In critically ill patients, what is the effect of non-transfusion interventions on patient outcomes and red blood cell (RBC) transfusion? | Critically ill patients | 1. Iron therapy (parenteral IV)  2. ESAs  3. Combination of these | * Mortality * RBC transfusion * Ischaemic or thromboembolic events |
|  |  | **U1-Q23**  In maternity patients, what is the effect of iron therapy on patient outcomes and red blood cell (RBC) transfusion? | Obstetrics and maternity patients | Iron therapy (oral and/or parenteral IV) | * Mortality (maternal) * Transfusion * Measures of fetal outcome |
| **9** | **Effect of blood conservation strategies** | **U1-Q18**  In surgical patients, what is the effect of perioperative strategies that minimise blood loss on patient outcomes and red blood cell (RBC) or blood component transfusion? | Surgical patients  Patients undergoing invasive procedures (TXA only)   * *Obstetrics* | 1. Cell salvage (perioperative)  2. Deliberate induced hypotension  3. POC testing for coagulation status and Hb  4. Restrictive sampling  5. Administration of antifibrinolytics (TXA, aprotinin) and DDAVP | * Mortality * Transfusion |
|  |  | **U1-Q24**  In maternity patients, what is the effect of non-obstetric strategies that aim to minimise maternal blood loss in the peripartum period on patient outcomes and red blood cell (RBC) or blood component transfusion? | Obstetrics and maternity patients   * *Bleeding patients (postpartum/antepartum haemorrhage, placenta problems, ectopic pregnancy, miscarriage)* | 1. Viscoelastic testing  2. Administration of antifibrinolytics (TXA only)  3. Cell salvage (intraoperative)  4. Interventional radiology (iliac balloon catheters or embolisation only) | * Mortality (maternal) * Transfusion |
|  |  | **U1-Q27**  In neonates/paediatric patients, what is the effect of strategies that minimise blood loss and/or reduce the need for red blood cell (RBC) transfusion on patient outcomes? | Neonatal patients  Paediatric patients   * *Surgical (cardiac, burns, transplantation, orthopaedic)* * *Critical illness (ECMO/ECLS, trauma)* | Preterm and newborn  1. Placental transfusion  Infant/child/ adolescent – surgical  1. Deliberate controlled/induced hypotension  2. Cell salvage (intraoperative)  3. Viscoelastic testing  4. Administration of antifibrinolytics (TXA, aprotinin)  Infant/child/ adolescent – critical illness  1. Viscoelastic testing | Preterm and newborn   * Composite death and/or major morbidity * Transfusion * Mortality * Neurodevelopmental outcomes   Infant/child/adolescent – surgical/critical illness   * Mortality * Transfusion * Neurodevelopmental outcomes * Major bleeding * Intraventricular haemorrhage (neonatal only) |

Abbreviations: DDAVP, desmopressin; ECLS, extracorporeal life support; ECMO, extracorporeal membrane oxygenation; ESA, erythrocyte-stimulating agents; Hb, haemoglobin; IM, intramuscular; IV, intravenous; IVIg, intravenous immunoglobulin; LBW, low birth weight; NSAID, non-steroidal anti-coagulant; POC, point-of-care; RBC, red blood cell; TXA, tranexamic acid.