

# Patient Blood Management Guidelines

## Module 2: Perioperative

### Role of the anaesthetist.

Active involvement in the multidisciplinary patient blood management program, including following pillars:

- preoperative optimisation of red cell mass and coagulation status
- meticulous attention to surgical haemostasis  $\Rightarrow$  minimise blood loss
- minimisation of perioperative blood loss (e.g. by optimising venous and arterial pressures at the site of surgery both during and after the procedure)
- optimise physiological reserve of anaemia

### 1. In patients undergoing surgery, what is the effect of a multidisciplinary, multimodal, programmatic approach to perioperative patient blood management on patient outcomes?

-Health-care services should establish a multidisciplinary, multimodal perioperative patient blood management program (Grade C).

-This should include preoperative optimisation of red cell mass and coagulation status; minimisation of perioperative blood loss, including meticulous attention to surgical haemostasis; and tolerance of postoperative anaemia.

### 4. In patients undergoing surgery, is anaemia an independent risk factor for adverse outcomes?

Preoperative anaemia is independently associated with an increased risk of morbidity and mortality.

Preoperative anaemia is associated with an increased likelihood of red blood cell (RBC) transfusion.

### 5. In patients undergoing surgery, what is the effect of RBC transfusion on patient outcomes?

Preoperative anaemia should be identified, evaluated and managed to minimise RBC transfusion, which may be associated with an increased risk of morbidity, mortality, ICU length of stay and hospital length of stay.

All surgical patients should be evaluated as early as possible to coordinate scheduling of surgery with optimisation of the patient's haemoglobin and iron stores.

RBC transfusion should not be dictated by a haemoglobin 'trigger' alone, but should be based on assessment of the patient's clinical status. In the absence of acute myocardial or cerebrovascular ischaemia, postoperative transfusion may be inappropriate for patients with a haemoglobin level of  $>80$  g/L.

Patients should not receive a transfusion when the haemoglobin level is  $\geq 100$  g/L.

In postoperative patients with acute myocardial or cerebrovascular ischaemia and a haemoglobin level of 70–100 g/L, transfusion of a single unit of RBC, followed by reassessment of clinical efficacy, is appropriate.

### 6. In patients undergoing surgery, what is the effect of non-transfusion interventions to increase haemoglobin concentration on morbidity, mortality and need for RBC blood transfusion?

Where preoperative anaemia is identified, it is important to determine its aetiology, so that appropriate therapy can be given.

IRON:

Preoperative oral iron therapy is associated with an increase in haemoglobin and a reduction in transfusion requirements.

The effect of postoperative oral iron was investigated in patients found to be anaemic - the effect on haemoglobin concentration was minimal.

Surgical patients with, or at risk of, iron-deficiency anaemia, preoperative oral iron therapy is recommended

ERYTHROPOETIN:

In patients with preoperative anaemia, where an ESA is indicated, it must be combined with iron therapy.

In patients with preoperative iron-deficiency anaemia or depleted iron stores, treatment should be with iron alone. In patients with anaemia of chronic disease ESAs may be indicated.

### 2. In patients undergoing surgery or invasive procedures, what effect does the cessation and timing of cessation of medications that affect haemostasis have on morbidity, mortality and RBC transfusion?

-In patients undergoing CABG either with or without CPB (OPCAB), clopidogrel therapy should be stopped, where possible, at least 5 days before surgery. In patients undergoing cardiac surgery, aspirin may be continued until the time of surgery.

-In patients undergoing noncardiac surgery, it is reasonable to continue low dose aspirin therapy. This may require specific evaluation in neurosurgery and intraocular surgery

-In patients receiving clopidogrel who are scheduled for elective noncardiac surgery or other invasive procedures, a multidisciplinary approach should be used to decide whether to cease therapy or defer surgery, balancing the risk of bleeding and thrombotic events. Specific evaluation is required for patients who had a recent stroke, or received a drug-eluting stent within the last 12 months or a bare metal stent within the last 6 weeks. If a decision is made to cease therapy preoperatively, this should occur 7–10 days before surgery.

-In patients undergoing elective orthopaedic surgery, NSAID therapy should be ceased preoperatively to reduce blood loss and transfusion. The timing of the cessation should reflect the agent's pharmacology.

-In patients receiving warfarin who are scheduled for elective noncardiac surgery or other invasive procedures specific management according to current guidelines is required

-In patients undergoing minor dental procedures, arthrocentesis, cataract surgery, upper gastrointestinal endoscopy without biopsy or colonoscopy without biopsy, warfarin may be continued.

### 3. In patients undergoing surgery, what is the effect of perioperative strategies that minimise blood loss on morbidity, mortality and blood transfusion?

Preoperative autologous donation- PAD decreases the incidence of allogeneic RBC transfusion, it increases the overall incidence of RBC transfusion

Hypothermia - measures to prevent hypothermia should be used

Excessive venous pressure at the site of surgery should be avoided by appropriate patient positioning, both during and after the procedure.

Induced hypotension: In patients undergoing radical prostatectomy or major joint replacement, if substantial

blood loss (blood loss of a volume great enough to induce anaemia that would require therapy) is anticipated, deliberate induced hypotension (MAP 50–60 mmHg) should be considered, balancing the risk of blood loss and the preservation of vital organ perfusion

**Acute normovolaemic haemodilution:** In adult patients undergoing surgery in which substantial blood loss (blood loss of a volume great enough to induce anaemia that would require therapy) is anticipated, the use of ANH should be considered

**Cell saver:** In adult patients undergoing surgery in which substantial blood loss (blood loss of a volume great enough to induce anaemia that would require therapy) is anticipated, intraoperative cell salvage is recommended

**Point of care monitoring:** In adult patients undergoing cardiac surgery, the use of TEG should be considered

**Antifibrinolytics:** In adult patients undergoing cardiac surgery, the use of intravenous tranexamic acid is recommended. In adult patients undergoing noncardiac surgery, if substantial blood loss (blood loss of a volume great enough to induce anaemia that would require therapy) is anticipated, the use of intravenous tranexamic acid is recommended eg NICE license for use in all surgery with blood loss expected >500ml

**Desmopressin:** In adult patients undergoing surgery in which substantial blood loss (blood loss of a volume great enough to induce anaemia that would require therapy) is anticipated, the routine use of desmopressin is not supported, due to uncertainty about the risk of stroke and mortality.

**Postoperative cell salvage:** Adult patients undergoing cardiac surgery or total knee arthroplasty, in whom significant postoperative blood loss is anticipated, postoperative cell salvage should be considered.

**9. In patients undergoing surgery, at what INR (PT/APTT) for FFP, fibrinogen level for cryoprecipitate and platelet count for platelet concentrates should patients be transfused to avoid risks of significant adverse events?**

In general, patients with a platelet count  $\geq 50 \times 10^9/L$  or an INR  $\leq 2$  can undergo invasive procedures without any serious bleeding; however, lower platelet counts and higher INRs may be tolerated.

Specialist guidelines or haematology advice should be sought for at-risk patients undergoing intracranial, intraocular and neuraxial procedures, and for patients with severe thrombocytopenia or coagulopathy.

**8. In patients undergoing surgery, what is the effect of FFP, cryoprecipitate, fibrinogen concentrate, and/or platelet transfusion on patient outcomes?**

The prophylactic administration of FFP following cardiopulmonary bypass does not reduce perioperative blood loss.

Administration of FFP to a post-surgical population in intensive care is associated with an increase in the rate of infection.

In patients undergoing cardiac surgery, platelet transfusion may be associated with an increase in mortality.

**7. In patients undergoing surgery, what is the effect of rFVIIa (prophylaxis or treatment) on morbidity, mortality and transfusion rate?**

The prophylactic or routine therapeutic use of rFVIIa is not recommended because concerns remain about its safety profile, particularly in relation to thrombotic adverse events

The administration of rFVIIa may be considered in the perioperative patient with life-threatening haemorrhage after conventional measures, including surgical haemostasis, use of antifibrinolytics and appropriate blood component therapy have failed.

**Volatile or total intravenous general anaesthesia?**

Propofol-based TIVA has been associated with reduced blood loss in several settings, possibly due to the effects propofol has on haemodynamics and uterine tone.

**Neuraxial and other major regional techniques compared with general anaesthesia**

A systematic review found that neuraxial block reduced requirement for transfusion of two or more units of RBCs by about 50%, and that there was a similar reduction for postoperative bleeding that needed transfusion Orthopaedics is the specialty in which there is the most reliable evidence for neuraxial block in reducing surgical bleeding.

Choice of anaesthesia technique for total hip arthroplasty should take account of the potential benefit of regional techniques with regard to blood conservation. Blood loss for total hip joint replacement (THJR) can be reduced by an average of 275 mL<sup>281</sup> or 30–40%. Neuraxial block also reduced blood loss during hip fracture repair by 85 mL

Although there is less evidence for the choice of anaesthesia having a significant effect on perioperative bleeding in other types of surgery, anaesthetists should be aware of the possible benefits of regional anaesthesia, TIVA and spontaneous ventilation in reducing blood loss.

**Type of ventilation**

Positive pressure ventilation has been associated with increased intraoperative blood loss compared with spontaneous ventilation during THJR under general anaesthesia. The impact that spontaneous ventilation has on reducing transfusion seems to be unclear.

