Royal United Hospitals Bath
NHS Foundation Trust

Postoperative transfusion
when, how much and how to avoid.

Sarah Wexler, Consultant Haematologist, November 2018

PBM: Specific recommendations

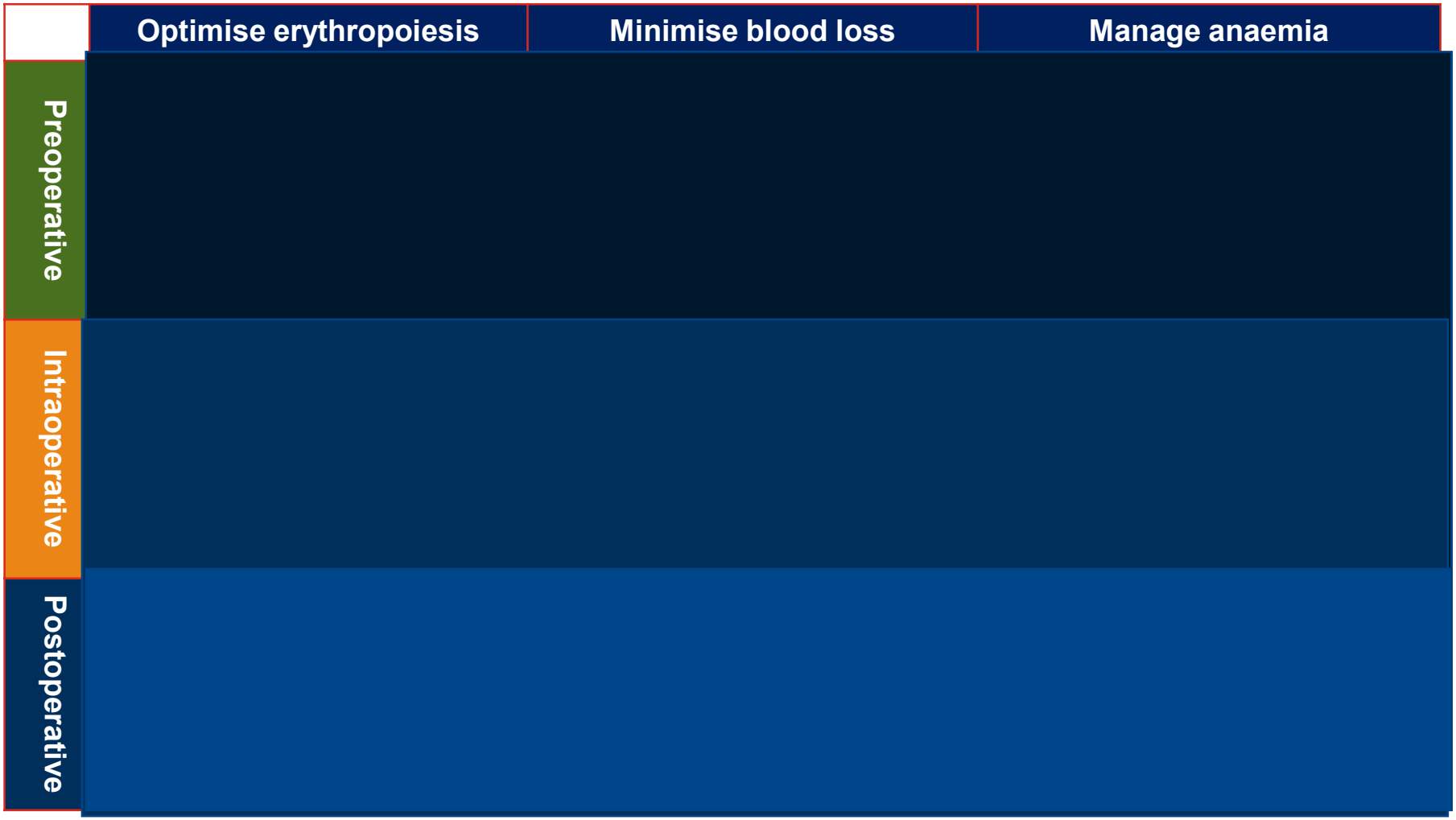
Surgical – '3 Pillars'

- Preop management of anaemia and haemostasis
- Intraoperative
- **Postoperative**

Medical

- Management of abnormal haemostasis
- Management of anaemia

The three pillars of surgical PBM



1. Increased length of hospital stay
2. Increased rate of discharge to ongoing inpatient care
3. Worse surgical and medical outcomes
4. Allergic reactions
5. Transfusion-related acute lung injury
6. Transfusion-associated circulatory overload
7. Venous thromboembolism
8. Graft versus host disease
9. Immunosuppression
10. Postoperative infections

Kumar A. Perioperative management of anemia: limits of blood transfusion and alternatives to it. Cleve Clin J Med. 2009;76:s112-s118. 15.
Saleh A et al.Allogenic blood transfusion following total hip arthroplasty:
results from the nationwide inpatient sample, 2000 to 2009. J Bone Joint Surg Am. 2014;96:e155.

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Journal of Medicine

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A MULTICENTER, RANDOMIZED, CONTROLLED CLINICAL TRIAL OF TRANSFUSION REQUIREMENTS IN CRITICAL CARE

PAUL C. HÉBERT, M.D., GEORGE WELLS, PH.D., MORRIS A. BLAJCHMAN, M.D., JOHN MARSHALL, M.D., CLAUDIO MARTIN, M.D., GIUSEPPE PAGLIARELLO, M.D., MARTIN TWEEDDALE, M.D., PH.D., IRWIN SCHWEITZER, M.SC., ELIZABETH YETISIR, M.SC., AND THE TRANSFUSION REQUIREMENTS IN CRITICAL CARE INVESTIGATORS FOR THE CANADIAN CRITICAL CARE TRIALS GROUP*

Hebert PC, Wells G, Blajchman MA, et al. *A multicenter, randomized, controlled clinical trial of transfusion requirements in critical care*. N Engl J Med 1999;340:409-417.

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 DECEMBER 29, 2011 VOL. 365 NO. 26

Liberal or Restrictive Transfusion in High-Risk Patients after Hip Surgery

Jeffrey L. Carson, M.D., Michael L. Terrin, M.D., M.P.H., Helaine Noveck, M.P.H., David W. Sanders, M.D., Bernard R. Chaitman, M.D., George G. Rhoads, M.D., M.P.H., George Nemo, Ph.D., Karen Dragert, R.N., Lauren Beaupre, P.T., Ph.D., Kevin Hildebrand, M.D., William Macaulay, M.D., Courtland Lewis, M.D., Donald Richard Cook, B.M.Sc., M.D., Gwendolyn Dobbin, C.C.R.P., Khwaja J. Zakriya, M.D., Fred S. Apple, Ph.D., Rebecca A. Horney, B.A., and Jay Magaziner, Ph.D., M.S.Hyg., for the FOCUS Investigators*

Carson JL, Terrin ML, Noveck H, et al. *Liberal or restrictive transfusion in high-risk patients after hip surgery.* N Engl J Med. 2011;365:2453-62.

Despite numerous guidelines on the management of anaemia in surgical patients, there is no pragmatic guidance for the diagnosis and management of anaemia and iron deficiency in the postoperative period.

This is a series of best-practice and evidence-based statements to advise on patient care with respect to anaemia and iron deficiency in the postoperative period.

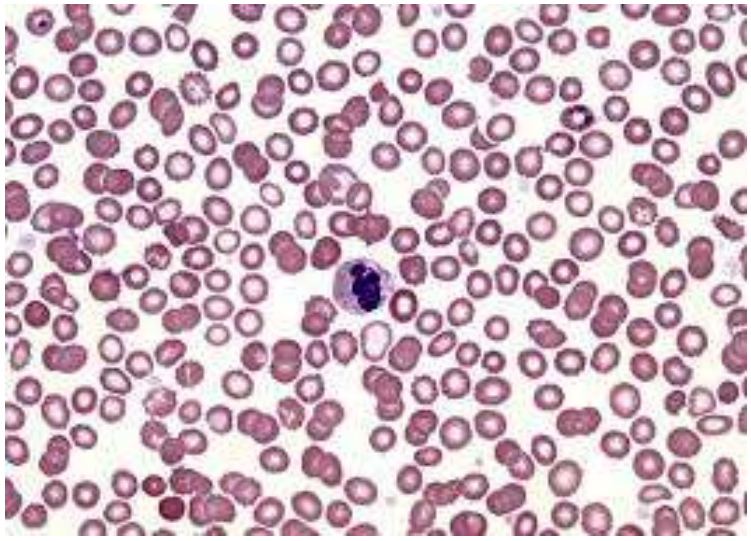
An international consensus statement on the management of postoperative anaemia after major surgical procedures
M. Munoz et al Anaesthesia 2018 Nov;73(11):1418-1431

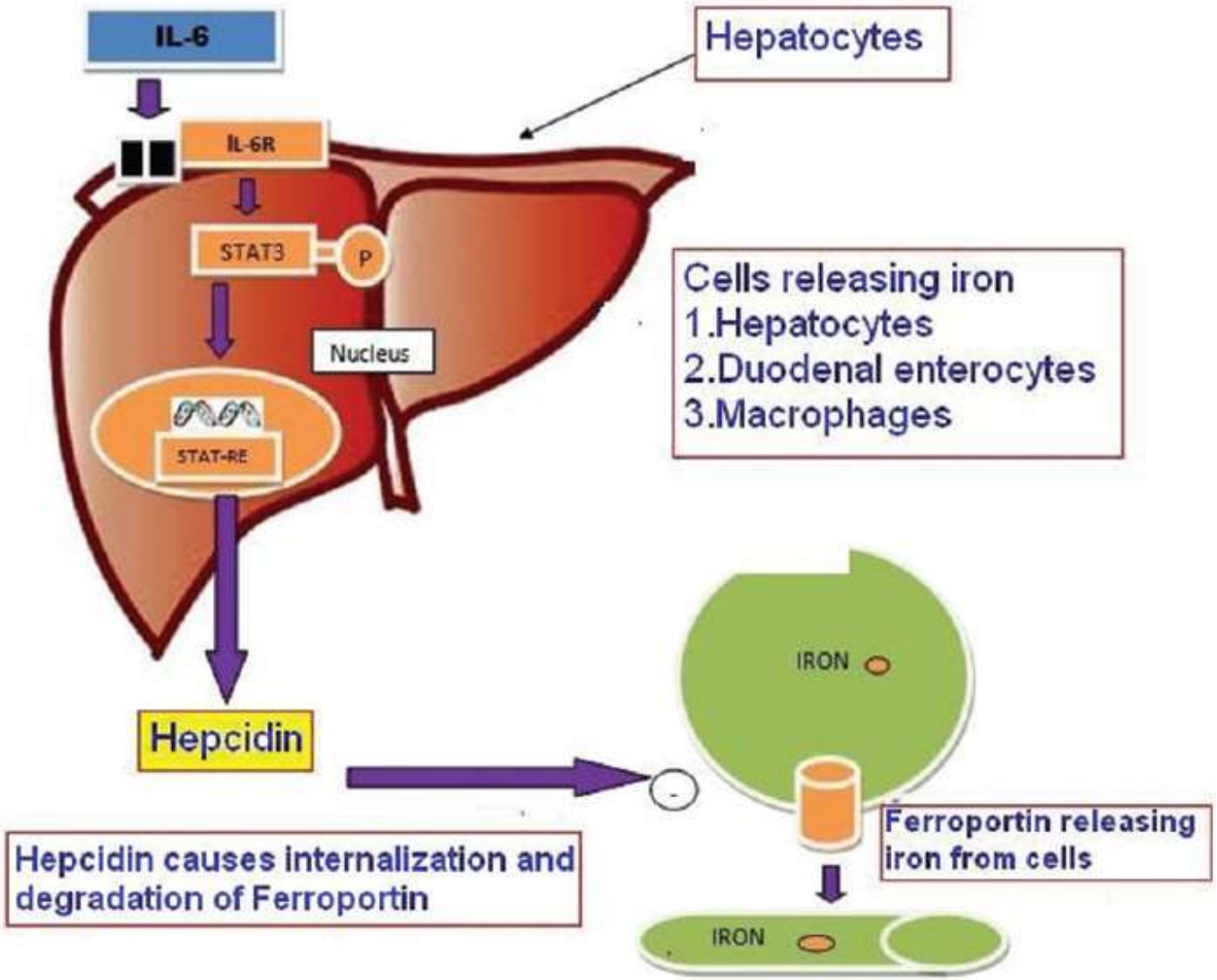
All patients who have undergone major surgery (defined as blood loss > 500 ml or lasting > 2 h) and who had preoperative anaemia or
moderate to severe
blood loss during surgery
must be screened for
anaemia after surgery.

During recovery from uncomplicated major surgery, haemoglobin concentrations should be monitored, either by standard laboratory or point-of-care testing, on a regular daily basis, at least until the third postoperative day, to detect anaemia (haemoglobin < 130 g/l for men, < 120 g/l for women)

Postoperatively, iron deficiency should be defined by ferritin concentration < 100 mg/l, ferritin <100–300 mg/l and transferrin saturation < 20%, or reticulocyte haemoglobin content < 28pg.

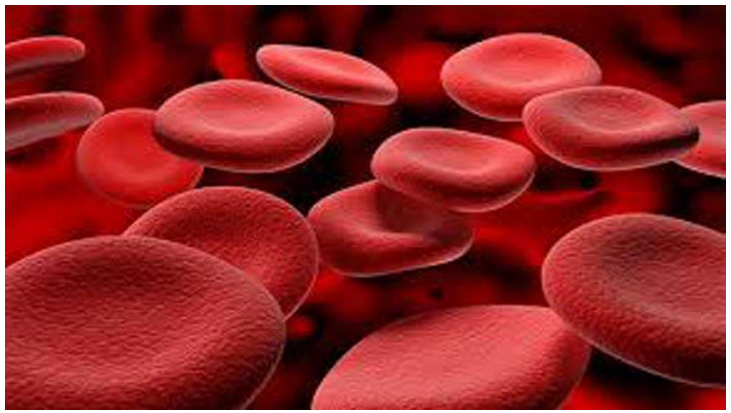
High blood loss during surgery may also indicate the need for iron replacement in anaemic patients.




IL-6
Hepatocytes
IL-6R
STAT3
P
Nucleus
STAT-RE
Cells releasing iron
1.Hepatocytes
2.Duodenal enterocytes
3.Macrophages
Hepcidin
IRON
Ferroportin releasing iron from cells
Hepcidin causes internalization and degradation of Ferroportin
IRON

In the postoperative period, when the administration of iron is necessary, early intravenous iron therapy is recommended, after considering contraindications.
Where possible, it should be administered using a single high-dose preparation.

For non-cancer patients with severe postoperative anaemia and inflammation-induced blunted erythropoiesis, or those declining blood transfusion, we suggest considering additional treatment with an erythropoiesis stimulating agent



If PBM measures did not prevent the development of severe postoperative anaemia, the adoption of a restrictive transfusion threshold is recommended in most adult, clinically stable hospitalised patients.

Red cell concentrates

Dose – For a single transfusion episode in adult patients with a potentially reversible cause of anaemia e.g. after surgery, consider transfusing one unit only with a further Hb estimation before further units are given. Neonates and small children require doses calculated in ml of blood and require separate consideration.

R1. *Acute blood loss*

In patients with haemorrhage and haemodynamic instability, estimation of blood loss may be difficult and Hb is a poor indicator of the need for transfusion. Empirical decisions about the immediate use of red cell transfusion are required by clinicians experienced in resuscitation, for example:

- <30% loss of blood volume (<1,500ml in an adult): transfuse crystalloid. Red cell transfusion is unlikely to be necessary.
- 30-40% loss of blood volume (1,500-2,000ml in an adult): rapid volume replacement is required with crystalloid. Red cell transfusion will probably be required to maintain recommended Hb levels.
- >40% loss of blood volume (>2,000ml in an adult): rapid volume replacement including red cell transfusion is required.

When normovolaemia has been achieved/maintained, frequent measurement of Hb (for example, by near patient testing) should be used to guide the use of red cell transfusion – see suggested thresholds below.

Surgery/medical/critical care

R2. Hb <70g/l can be used to guide the use of red cell transfusion if the patient is normovolaemic. Most patients undergoing elective surgical operations will not require transfusion support if their Hb is normal before surgery.

R3. If the patient has cardiovascular disease transfusion should be considered at a Hb of <80g/l or for symptoms e.g. chest pain; hypotension or tachycardia that is unresponsive to fluid resuscitation; or cardiac failure.

R4. If the patient has severe sepsis, traumatic brain injury and/or acute cerebral ischaemia Hb <90g/l can be used to guide the use of red cell transfusion.

Radiotherapy

R5. Limited evidence for maintaining Hb >100g/l in patients receiving radiotherapy for cervical and possibly other tumours.

Chronic anaemia

R6. Transfuse to maintain the Hb to prevent symptoms of anaemia. Many patients with chronic anaemia may only have minor symptoms with a Hb >80g/l. Haemoglobinopathy patients frequently require individualised Hb thresholds for transfusion depending on their age and the precise indication; discussion with a haematologist is advised.

R7. *Exchange transfusion*

Indications for Transfusion

Symptomatic Anaemia

- Fatigue
- Breathless at rest
- Chest pains/Palpitations
- Faint

National Blood Transfusion Committee - Indication codes for Transfusion

NHS
Blood and Transplant

SINGLE Unit Blood Transfusions reduce the risk of an adverse reaction

Don't give unit two without review

Before you transfuse your patient:

- What is your patient's current haemoglobin level?
- Do you know your patient's weight?
- What is your patient's target haemoglobin level and would this be achieved by transfusing one unit?

Each unit transfused is an independent clinical decision

Clinically re-assess your patient after each unit is transfused.

- ✓ Is your patient still symptomatic?
- ✓ Is further transfusion appropriate?

Only order one unit at a time for non-bleeding patients.

Document the reason for the transfusion.

Further copies are available from NHSBT.CustomerService@nhsbt.nhs.uk

1. Robinson, S. et al. on behalf of the British Society for Haematology (BSH) (2017) The administration of blood components
2. National Institute for Health and Care Excellence (2015) Blood transfusion. NICE guideline (NG24)

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