Patient Blood Management

Resource Guide
November 2016
PATIENT BLOOD MANAGEMENT GUIDELINES

Patient Blood Management improves patient outcomes by improving the patient’s medical and surgical management in ways that boost and conserve the patient’s own blood. As a consequence of better management, patients usually require fewer transfusions of donated blood components thus avoiding transfusion-associated complications.

To support the adoption of Patient Blood Management across Australia, governments sponsored the National Blood Authority to coordinate input from clinical experts across the blood sector to develop a set of contemporary evidence-based PBM Guidelines, approved by the National Health and Medical Research Council (NHMRC). The PBM Guidelines consist of six modules that provide recommendations in relation to best PBM clinical practice.

The PBM Guidelines have been divided into six modules for the following patient populations:

Module 1 - Critical Bleeding/Massive Transfusion
Module 2 - Perioperative
Module 3 - Medical
Module 4 - Critical Care
Module 5 - Obstetrics and Maternity
Module 6 - Neonatal and Paediatrics

Hard copies and electronic copies of each published module are available free of charge from the NBA website. A pocket sized ‘Quick Reference Guide’ is also published in these two formats.

SUPPORTING MATERIALS

To support the implementation of the PBM Guidelines, the NBA will facilitate activities and development of materials at a national level to support implementation at a health provider level. The approach will be to draw on existing best practice to develop a range of reference tools and collaboration mechanisms to enable health providers to examine their own practice and choose from the suite of tools for local customisation, branding and adoption where appropriate.

Activities for implementation of the PBM Guidelines are grouped into four main elements:

1. PBM Tools
2. Education and Training
3. Promotion/Communication
4. Data
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PATIENT BLOOD MANAGEMENT GUIDELINES

MODULE 1: CRITICAL BLEEDING MASSIVE TRANSFUSION
This module provides two recommendations, 10 practice points to assist and guide health-care professionals in making clinical decisions when managing ‘patients with critical bleeding requiring massive transfusion’. For this module, ‘critical bleeding’ has been defined as major haemorrhage that is life threatening and likely to result in the need for massive transfusion. In adults, ‘massive transfusion’ has been defined as a transfusion of half of one blood volume in 4 hours, or more than one blood volume in 24 hours.

The Module includes a ‘Massive Transfusion Protocol (MTP)’ template which can be locally adapted, (and/or modified for obstetric patients) and also provides advice on activation and cessation.

>Overview

- An MTP should be developed and used by a multidisciplinary team to coordinate the management of patients with, or at risk of, critical bleeding including the dose, timing and blood component therapy for use in trauma patients with, or at risk of critical bleeding requiring massive transfusion (Recommendation 1).

- There is a lack of evidence to support the routine use of recombinant activated factor VII (rFVIIa) in trauma patients with critical bleeding (Recommendation 2).

- In patients with critical bleeding requiring massive transfusion, the use of RBC and other blood components may be life-saving. However, transfusion of increased volumes of RBC and other blood components may be independently associated with increased mortality and acute respiratory distress syndrome (ARDS) (Practice Point 6).

For more information visit www.blood.gov.au/pbm-module-1
MODULE 2: PERIOPERATIVE

Preoperative haemoglobin assessment and optimisation template

*This template is for patients undergoing procedures in which substantial blood loss is anticipated such as cardiac surgery, major orthopaedic, vascular and general surgery. Specific details, including reference ranges and therapies, may need adaptation for local needs, expertise or patient groups.*

**Ferritin <30 mcg/L**
- **NO**
- **YES**

**Ferritin >100 mcg/L**
- Possible anaemia of chronic disease or inflammation, or other cause
- Consider clinical context
- Review renal function, MCV/MCH and blood film
- Check B12/folate levels and reticulocyte count
- Check liver and thyroid function
- Seek haematology advice or, in the presence of chronic kidney disease, renal advice

**Possible iron deficiency**
- Consider clinical context
- Consider haematology advice or, in the presence of chronic kidney disease, renal advice
- Discuss with gastroenterologist regarding GI investigations and their timing in relation to surgery
- Commence iron therapy

**Iron deficiency anaemia**
- Evaluate possible causes based on clinical findings
- Discuss with gastroenterologist regarding GI investigations and their timing in relation to surgery
- Commence iron therapy

**No anaemia: ferritin <100 mcg/L**
- Consider iron therapy if anticipated postoperative Hb decrease is ≥30 g/L
- Determine cause and need for GI investigations if ferritin is suggestive of iron deficiency <30 mcg/L

**CRP**
- **Raised**
- **Normal**
This module provides 22 recommendations and 20 practice points to assist and guide health-care professionals in making clinical decisions when managing ‘patients undergoing surgery or invasive procedures’ including groups such as cardiac, non-cardiac and orthopaedic surgery.

The Module includes a ‘Preoperative haemoglobin assessment and optimisation’ template which is a tool that can be used prior to surgery to identify, diagnose and make treatment decisions for anaemia.

**Overview**

- Diagnosis and treatment of anaemia before surgery reduces risks and improves patient outcomes. A patients’ own blood can be conserved through medical, pharmacological, anaesthetic and surgical strategies which can reduce the need for transfusion.

- Patients who are better prepared for surgery (such as with anaemia management and optimisation of coagulation status) have improved rates of recovery.

- Preoperative oral iron is recommended for patients with, or at risk of iron-deficiency anaemia (Recommendation 4).

- Health care services should establish a multidisciplinary, multimodal Patient Blood Management Program (Recommendation 1).

PATIENT BLOOD MANAGEMENT GUIDELINES

MODULE 3: MEDICAL
This module provides eight recommendations and 24 practice points to assist and guide health-care professionals in making clinical decisions when managing ‘patients with acute or chronic medical conditions requiring haematological intervention’ including groups such as acute coronary syndrome (ACS), heart failure, cancer, and upper gastrointestinal (GI) blood loss.

>Overview

- Anaemia is an independent risk factor for poorer patient outcomes. In medical patients, many factors can cause anaemia; where appropriate, reversible causes should be identified and treated.

- In patients with iron deficiency anaemia, iron therapy is required to replenish iron stores regardless of whether a transfusion is indicated (Practice Point 4).

- RBC transfusion should not be dictated by haemoglobin (Hb) concentration alone, but should also be based on assessment of the patient’s clinical status (Practice Point 1).

- Where indicated, transfusion of a single unit of RBC, followed by clinical reassessment to determine the need for further transfusion, is appropriate (Practice Point 2).

This module provides four recommendations and 15 practice points to assist and guide health-care professionals in making clinical decisions when managing ‘patients requiring critical care’ including groups such as acute coronary syndrome (ACS) cancer, renal, heart failure and the elderly.

>Overview

- A precautionary approach to the use of red cells using a restrictive transfusion strategy is preferred (Recommendation 1) because liberal transfusion may carry increased risk without delivering equivalent levels of improvements in patient outcomes.

- ESAs should not be routinely used in critically ill anaemic patients (Recommendation 2).

- In acutely bleeding critically ill trauma patients, TXA should be administered within three hours of injury, (Recommendation 3) and considered in patients with upper gastrointestinal (GI) bleeding (Recommendation 4).

For more information visit www.blood.gov.au/pbm-module-4
MODULE 5: OBSTETRICS AND MATERNITY
This module provides four recommendations and 33 practice points to assist and guide health-care professionals in making clinical decisions when managing pregnant and postpartum women. For this module, maternity patients are defined as women who are pregnant or postpartum (within 6 weeks of the end of pregnancy), whereas the term pregnant women relates to the antenatal period.

>Overview

- In maternity patients who are not actively bleeding, RBC transfusion should not be dictated by a Hb concentration alone, but should also be based on assessment of the patient’s clinical status (e.g. the risk of further haemorrhage). Most maternity patients are otherwise healthy and can generally tolerate moderate degrees of anaemia while medical therapies take effect (Practice Point 4).

- The administration of iron to pregnant women with iron deficiency anaemia is recommended; IV iron is preferred when rapid restoration of Hb and iron stores is required (Recommendation 2).

- In maternity patients, cell salvage should be considered if anticipated blood volume loss is likely to result in transfusion (Practice Point 23).

- It is strongly advised that maternity services develop an MTP that includes access to RBC and the dose, timing and ratio of blood component therapy, for use in maternity patients with critical bleeding requiring massive transfusion (Expert Opinion Point 8).

MODULE 6:
NEONATAL AND PAEDIATRICS
This Module provides 12 recommendations, 40 practice points and 38 expert opinion points to assist and guide health-care professionals in making clinical decisions when treating neonatal and paediatric patients, including pre-term and newborn babies, infants, children and adolescents.

The Module includes six appendixes intending to guide clinical practice, including a haemoglobin assessment and optimisation template (Appendix H) and the Critical Bleeding Protocol template (Appendix K). These appendixes are designed to be adapted locally to suit the patient population and health-care setting.

> Overview

- Transfusion should not be a default decision. Specific patient circumstances, preferences, and the full range of available therapies should be considered, balancing the evidence for efficacy and improved clinical outcome against the potential risks.
- In paediatric patients, including those who are critically ill, a restrictive transfusion strategy is suggested (Recommendation 1).
- In surgical paediatric patients with or at risk of iron deficiency anaemia, preoperative iron therapy is recommended (Recommendation 5).
- In preterm infants with low birth weight (<2500 g), the routine use of ESAs is not advised. (Recommendation 3).
- Guidance on the use of antifibrinolytics in specific surgical settings is provided in Recommendations 9, 10 and 11.
- The expert Clinical/Consumer Reference Group suggests the use of a critical bleeding protocol in neonatal and paediatric patients with critical bleeding requiring massive transfusion (Practice Point 12). An adaptable protocol template is provided within the module at Appendix K.

For more information visit www.blood.gov.au/pbm-module-6
SUPPORTING MATERIALS

PATIENT BLOOD MANAGEMENT GUIDELINES: COMPANIONS
The PBM Guidelines: Companions are a series of short information sheets on PBM topics relating to pharmaceutical, perioperative, medical and transfusion practices and management approaches referred to in the PBM guideline. The PBM Guidelines: Companions will help health care professionals to gain an appreciation of the various approaches that can be used to better manage an individual patient's circulating blood.

>Overview  

- The companions

- provide supporting information aimed at improving knowledge and understanding of the guidelines and how they can be used to achieve better patient care and outcomes. If transfusion is clinically indicated, details of risks and benefits to support this process are also outlined in this document.

- are set out with a PBM strategy or technique as a separate topic, generally one to two pages short. Each topic starts with key messages, followed by clinical implications, then the detailed information and links to resources.

- include a great summary of the PBM modules recommendations and practice points

- are available as separated chapters to download

For more information visit www.blood.gov.au/patient-blood-management-guidelines-companions
Single Unit Blood Transfusion

Only **ONE unit of blood** should be ordered if the inpatient does not have clinically significant bleeding

Each unit transfused is an independent clinical decision

Second unit can be requested after patient has been assessed and remains symptomatic

Indications for a second unit:
- Active blood loss
- Ongoing symptoms of anaemia

The National Blood Authority (NBA) has developed a guide to single unit transfusion based on the national Patient Blood Management Guidelines. The guide describes reasons why single unit transfusion is beneficial to patients and includes resources to assist with its implementation.

>Overview

- The single unit transfusion guide and accompanying resources have been designed with the intention that they can easily be adapted to accommodate the local policies and practice of individual hospitals. They are available as generic baseline material to download, alter, and adapt as applicable to their local requirements.

- Implementation of a single unit transfusion guideline by health providers is encouraged as a patient quality improvement measure, but is not mandatory.

- The aim of this initiative is to assist local champions to implement a single unit transfusion guideline in their hospital setting.

GUIDANCE FOR THE PROVISION OF INTRAOPERATIVE CELL SALVAGE
Guidance for the Provision of Intraoperative Cell Salvage is intended to inform health-care practitioners, health educators, health service managers and policy makers about Intraoperative Cell Salvage (ICS) use for patients undergoing surgery or invasive procedures, particularly those in which blood loss is anticipated. It is aimed at supporting hospitals to develop and implement an intraoperative cell salvage program.

>Overview

- The Guidance aims to improve clinical practice and patient outcomes through alignment with the Patient Blood Management (PBM) Guidelines.

- The intraoperative collection and re-infusion of the patient’s own red blood cells provides an important contribution to reducing the demand for allogeneic blood. However, it is only one aspect of a strategic approach to safe and appropriate transfusion practice.

- The guidance document and accompanying resources in the appendixes, such as patient education materials, business case study and education competency workbook have been designed with the intention that they can easily be adapted to accommodate the local policies and practice of individual hospitals. They are available as generic baseline material to download, alter, and adapt as applicable to their local requirements.

SUPPORTING MATERIALS

PREOPERATIVE ANAEMIA CASE STUDY
The preoperative anaemia identification, assessment and management case study is intended to inform healthcare practitioners, health educators, health service managers and policy makers about preoperative anaemia screening. This resource provides a wealth of ideas and links to help hospitals use clinical practice improvement methods to implement an anaemia screening clinic based on evidence-based recommendations in the Patient Blood Management Guidelines: Module 2 – Perioperative.

>Overview

- The case study of preoperative iron deficiency anaemia is presented to demonstrate how a hospital has implemented anaemia management strategies outlined in the National Patient Blood Management Guidelines: Module 2 – Perioperative.

- The pathway illustrated was developed by the hospital using clinical practice improvement methodology (CPI). Use of CPI methodology is recommended for successful implementation to suit local processes and available resources and expertise.

- Whilst the case study illustrates a number of potential strategies, implementation of preoperative anaemia management may vary significantly across hospitals, between patient groups and with the urgency of the surgery.

For more information visit 
SUPPORTING MATERIALS

IRON DEFICIENCY ANAEMIA TREATMENT GUIDES
The Iron deficiency anaemia treatment guides have been developed to assist clinicians determine the appropriate formulation and dosage of iron replacement therapy for both adult and paediatric populations.

>Overview

- These guides give practical advice on the choice and route of administration for replacement iron products and how to calculate the correct dose.
- The appendixes contain tables comparing, oral preparations, Intravenous iron preparations and further information resources for treatment of iron deficiency anaemia (IDA) in Australia.
- A Paediatric and Neonatal Iron deficiency anaemia guide is now available. This guide has been developed to assist clinicians determine the appropriate formulation and dosage for addressing Paediatric and Neonatal Iron Deficiency Anaemia (IDA). The information contained in this guide has been sourced from Patient Blood Management Guidelines: Module 6 Neonatal and Paediatrics - Background question 5 and Appendix I.

SUPPORTING MATERIALS

PREOPERATIVE BLEEDING RISK ASSESSMENT AND INTERVENTION RESOURCE
Preoperative bleeding risk assessment and intervention resource is intended to assist healthcare professionals in assessing and managing the risk of bleeding in a preoperative patient. Assessment of bleeding risk is a key component of patient blood management strategies to minimise blood loss. Patients may be at increased risk of bleeding for a number of reasons, including hereditary or acquired bleeding disorders, medical conditions such as liver disease, and medications including complementary medicines.

>Overview

♦ The evaluation of bleeding symptoms is a well-recognised challenge for both patients and physicians because the reporting and interpretation of bleeding symptoms is subjective. Mild bleeding events are commonly reported by patients both with and without inherited bleeding disorders. As a result, bleeding assessment tools (BATs) have been developed and studied in a variety of clinical settings in an attempt to standardise and quantify bleeding symptoms.

♦ The preoperative bleeding risk assessment and intervention resource contains:
  » a flowchart for assessing preoperative bleeding risk
  » advice on medication assessment
  » application of available bleeding assessment tools
  » links to additional resources.

SUPPORTING MATERIALS

CLINICAL AUDIT TOOLS

RED BLOOD CELL CLINICAL AUDIT TOOL
Guidance for Australian Health Providers
October 2014

MASSIVE TRANSFUSION PROTOCOL CLINICAL AUDIT TOOL
Guidance for Australian Health Providers
October 2014
The Massive Transfusion Protocol Clinical Audit tool and Red Blood Cell Clinical Audit tool are standards-based audits that can assist in identifying gaps and measuring current practice against best available evidence, in a continuous quality cycle. The purpose of the audit tools is to improve patient outcomes by collecting data to develop a knowledge base of current activities. The audit tools have been designed to be user-friendly documents which focus on key quality elements of transfusion safety, whilst eliminating the need for collection of copious amounts of data that may serve of little value to improving patient outcomes.

>Overview

- The Audit methods cover
  - Patient Selection
  - Data collection
  - Data analysis
  - Recommendations/actions
  - Evaluation
  - Feedback

- It is intended that the RBC / MTP Audit tools can be easily adapted to accommodate the local policies and practice of individual hospitals. They are available as generic baseline material to download, alter and adapt as applicable to local requirements.

- The Audit Tool has two parts:
  1. The Audit Tool
  2. The Audit Tool Database.

- Download both files and save them in the same location before conducting audits. Please be advised that the tool has been developed using Microsoft® Excel 2010 and the macros may not work if other versions of this software are used.

SUPPORTING MATERIALS

POINT OF CARE COAGULATION TESTING CASE STUDY
This case study illustrates an example of a hospital that has implemented a Bleeding Management Treatment Protocol supported by Point of Care Coagulation Testing (POCCT) to detect, manage and monitor critical bleeding in cardiac surgery patients. It demonstrates the systems and tools used to assist with implementation within the cardiac surgery population based on available evidence, developing local expertise and resources.

>Overview

- Improved patient outcomes were the core objective of implementing bleeding management supported by POCCT as part of The Prince Charles Hospital’s wider PBM program. Patient Blood Management improves patient outcomes by improving the patient’s medical and surgical management in ways that boost and conserve the patient’s own blood. Using a structured bleeding management protocol supported by POCCT demonstrated fewer patients required transfusions of donated blood components thus avoiding transfusion associated complications.

“We really must change transfusion medicine practice, there is no other alternative and there is a sense of urgency. This change will be from a product focus to a patient focus, and this is what we are referring to as patient blood management.”

PROFESSOR JAMES ISBISTER

For more information visit www.blood.gov.au/patient-blood-management
SUPPORTING MATERIALS

NATIONAL BLOOD AUTHORITY YOU TUBE CHANNEL
The National Blood Authority YouTube channel is an online space to view informative videos such as educational tools and NBA events.

>Overview

The NBA YouTube channel includes the following videos:

- Blood, Still Saving Lives - Highlights the benefits and risks of red blood cell transfusion
- Launch of MyABDR - Launch of the patient interface, MyABDR into the Australian Bleeding Disorders Registry
- National Blood Symposium - September 2013
- Blood Inventory Management Case Studies
  - BloodMove | Hunter Area Pathology Service | Pathology Queensland | SAN Pathology
- Iron Deficiency: Treatment in General Practice - A series of eight videos on iron deficiency treatment in primary care

To subscribe to the National Blood Authority YouTube channel visit [http://www.youtube.com/user/bloodauthorityau](http://www.youtube.com/user/bloodauthorityau)
Many people undergoing surgery may need a blood transfusion. Blood transfusions are an important and necessary part of medical practice. However, they should not be used lightly.

**WHY IS IRON IMPORTANT?**

Your body needs a certain amount of red blood cells to carry oxygen to all your tissues. Haemoglobin carries oxygen from your lungs to your body. Not having enough iron may make you feel tired and your muscles store oxygen around your body. Iron is also needed to make myoglobin which helps your muscles store oxygen.

**IRON DEFICIENCY: THE FACTS**

Iron deficiency is the most common type of anaemia and affects about 3 in 10 people having elective surgery. It is also important to find out if you are at a higher risk of needing a blood transfusion.

If left untreated low iron levels and anaemia can:

- increase your chance of needing a blood transfusion.
- slow down your recovery after surgery.
- delay your surgery.
- increase your chance of complications.
- mean you have low levels of red blood cells, which significantly increases the risk of needing a red blood cell transfusion.

**MY IRON PLAN**

<table>
<thead>
<tr>
<th>Name</th>
<th>GP Name</th>
<th>Preparing for surgery</th>
<th>Treatment</th>
<th>Surgery</th>
<th>Date</th>
<th>Reassessment Date</th>
</tr>
</thead>
</table>

Now that you are on the waiting list for surgery there are actions you should be taking to make sure you are as fit as possible. This will help you achieve the best outcomes.

Getting fit for surgery means assessing your risks of complications and treating any that can be treated. If you have a history or current medical conditions the type of surgery may also carry an increased risk of complications.

It's important to get tested and start treatment early to ensure that there are no delays to your surgery.

**FACT SHEET**

- legumes, eggs
- iron-fortified breakfast cereals
- leafy green vegetables, wholemeal bread

Try to keep up a good intake of iron-rich foods as they are mostly absorbed than non-haem iron, however both types can be used by the body. You need iron to make haemoglobin.

**TREATMENT OPTIONS**

- Include vitamin C-rich foods such as citrus fruit in your diet as it will help your body absorb iron.
- There are many iron supplements available. Look for supplements that have 60 mg or more of iron to treat iron-deficiency anaemia.

**RESOURCES AVAILABLE**


**FIT FOR SURGERY**

**FIT FOR LIFE**
Anaemia management in primary care contributes to better patient outcomes.

>Overview

Anaemia Management

- NPS MedicineWise and the National Blood Authority have collaborated to develop a set of tools and resources to support health professionals. The tools being developed are designed to support General Practitioners in the management of anaemia in primary care. These tools include practical advice for patients on anaemia treatment including the risks and alternative therapies to blood transfusion, as well as advice and decision tools for GPs regarding the preparation of patients for surgery where blood loss is anticipated, and anaemia has been identified as a modifiable risk factor.

- The tools include:
  - My Iron Plan
  - Patient information leaflets
    - Managing my iron
    - Fit for surgery
    - Blood Transfusions
  - GP decision aid
  - Fit for surgery: fit for life
  - Patient referral letter

EDUCATION AND TRAINING

BLOODSAFE eLEARNING AUSTRALIA

Access for FREE at www.bloodsafelearning.org.au

updated 12/15
BloodSafe e Learning Australia is jointly funded by all Australian Governments. The eLearning courses on this site have been developed for health professionals, including medical, nursing and midwifery, as well as students to improve the participant’s knowledge of safe clinical transfusion practice and effective patient blood management.

>Overview

BloodSafe eLearning Australia currently has fifteen courses and one app. As of June 2016 there were more than 375,000 users from over 1300 Australian organisations that have registered with BloodSafe eLearning Australia. On average there are 14,200 course completions per month.

- Courses available include
  - Clinical transfusion Practice incorporating Collecting Blood Specimens and Transporting Blood Modules
  - Patient Blood Management
  - Critical Bleeding
  - Postpartum Haemorrhage
  - Perioperative
  - Iron Deficiency anaemia (and app)
  - Medical and Specialities incorporating Medical, Cancer, Cardiac, Chronic Kidney Disease, Chronic Transfusion and Gastrointestinal Modules
  - Critical care

For more information visit [www.bloodsafelearning.org.au](http://www.bloodsafelearning.org.au)
EDUCATION AND TRAINING

KEY LEARNING AREAS FRAMEWORK
The purpose of the National Blood Sector Key Learning Areas (KLA) Framework is to outline the essential, minimum skills and knowledge that stakeholders in the blood sector need to acquire in order to practice effectively with respect to patient blood management; and use of blood and blood products.

>Overview

♦ The framework will identify:
  » All audiences in the blood sector who provide and use education and training, including resources for patients and carers and healthcare professionals
  » The KLAs that are assumed to be basic knowledge or minimum standards (provided as normal training such as basic haematology and ABO grouping for clinicians)
  » The key learning priorities (KLPs) for the next three years based on a defined set of criteria
  » An action plan for how the NBA can assist in the development of resources and tools to support implementation.

♦ The KLAs suggested in the framework are not mandatory but are provided as guidance for those education providers who are considering developing educational resources for learners in all fields of practice.

For more information visit www.blood.gov.au