AMPATHCHAT no. 97

PATIENT BLOOD MANAGEMENT: A COLLABORATIVE APPROACH TO SAVING LIVES

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Patient Blood Management (PBM) is a multidisciplinary team approach that aims to improve patient outcomes by prioritising the patient's own blood as "a precious resource to be safeguarded & optimised wherever possible" throughout the journey of medical care.[1] Numerous global studies have shown that PBM significantly reduces transfusion-related complications, shortens hospital stays and ICU admissions, and lowers serious morbidity and mortality.[2,3]

DEFINING PBM

The concept of PBM was first introduced by Professor James Isbister in 2005. Later, in 2022, the definition was formalised as follows: "Patient blood management is a patient-centred, systematic, evidence-based approach to improve patient outcomes by managing and preserving a patient's own blood, while promoting patient safety and empowerment".[4]

THE NEED FOR PBM

The World Health Organisation (WHO) describes anaemia as a silent epidemic and a public health concern of significance. Anaemia affects up to a third of the world's population, with iron deficiency remaining the most common cause.[1]

Against this backdrop, the emergence of HIV in donated units in the early 1980s was a turning point. The putative benefits of blood transfusion were scrutinised leading to the conclusion that allogenic transfusion is a tissue transplant with significant risk. [5]

Furthermore, evidence began to accumulate regarding a triad of independent but modifiable risk factors that negatively impact clinical outcomes:

- anaemia
- blood loss
- blood transfusion

The net result was a shift from blood products back to the patient and a revival in blood conservation modalities, endorsed by a WHO Assembly Resolution in 2010. Subsequently, in October 2021, the WHO issued a policy brief entitled "Urgent Implementation of Patient Blood Management," which reinforces the practice of PBM in daily medical care. According to the policy, nearly every individual can benefit from PBM throughout their lifetime.[1]

THE PRACTICE OF PBM

The application of PBM is underpinned by 3 pillars presented in the following graphic:

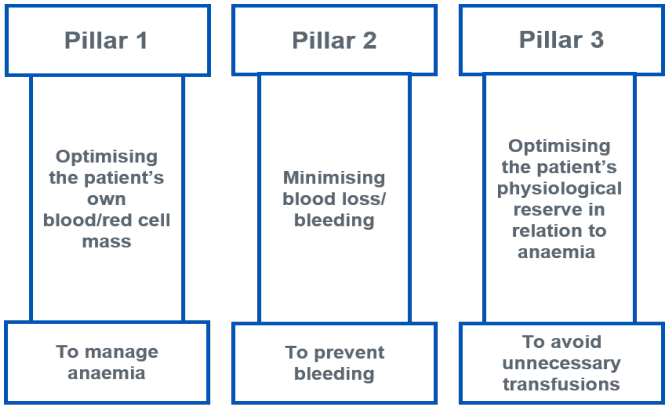

FIGURE 1: ADAPTED GRAPHICS FROM PATIENT BLOOD MANAGEMENT SUBGROUP OF ISBT

The pillars of PBM are not applied as isolated concepts. In clinical practice, they are often intertwined to varying degrees, depending on the individual patient's clinical scenario. In the surgical discipline, it's crucial to apply PBM principles throughout pre-operative, intra-operative, and post-operative stages of the patient's care.

These pillars are also applicable to all other categories of patients requiring a blood transfusion, including medical, paediatric and obstetric patients, - whether the need is emergent or elective.
The overall intention is to optimise the patient's own red cell mass and physiological reserve whilst curtailing blood loss. This is best achieved by proactive, multimodal care bundles that are evidence based and result in more durable effect as opposed to single interventions.[6] These measures will obviate or reduce the need for allogenic transfusions, which remain one of the top 5 overused therapies globally.

Applying PBM measures to secure best outcomes for the individual patient requires a coordinated multidisciplinary approach that includes the haematologist and considers the wishes of the patient. The goal is a documented treatment plan curated for the patient rather than a one size fits all approach. Follow-up of post-surgical patients must also ensure that blood health has been restored.

Central to the practice of PBM is a detailed clinical history that will:

- Guide further investigations to identify the underlying cause of anaemia, allowing for targeted and patient-specific treatment considerations
- Assess the impact of anaemia on the patient's quality of life and any existing comorbid conditions.
- Determine the presence of any bleeding tendency.

PERTINENT HISTORY[7]

1. **Symptoms** of fatigue, irritability, headache, palpitations, of heart failure; hair loss, pica, dry mouth and difficulty in swallowing.
2. **Overt blood loss** from genitourinary, gastrointestinal tract or mucocutaneous and involve the relevant discipline for targeted investigation. Determine whether the cause is inherited or acquired (age of onset & family history).
3. **Restricted diet:** high tea, coffee and cereal intake.
4. **Family history** of blood disorders (bleeding; haemoglobinopathies) and gastrointestinal malignancies.
5. **Medication review** e.g. metformin, antiplatelet medication (aspirin and NSAIDS), antacids, proton pump inhibitors, anticoagulants, herbal and homeopathic products.
6. **Surgical history:** especially gastric surgery or blood loss requiring transfusion.
7. **Gynaecological and obstetric history:** parity, antenatal care, meno- or metrorrhagia.

FIRST LINE INVESTIGATIONS

Anaemia	Bleeding tendency
FBC & reticulocyte count; reticulocyte production index	FBC and peripheral smear
Peripheral smear	Coagulation profile (PT, APTT and fibrinogen
Vitamin B12; serum or red cell folate levels	PFA200 (screening for platelet disorder)
Iron studies; +/-soluble transferrin receptor level	Screen for von Willebrand's disease

Haematinic assays should be performed prior to an indicated transfusion. Further judicious testing will be determined by the history, clinical findings and abnormalities detected on first line investigations.

IRON MATTERS

Iron deficiency is defined as "a health-related condition in which iron availability is insufficient to meet the body's needs and which can be present with or without anaemia". The latter state is referred to as non-anaemic iron deficiency (NAID). Anaemia is a late stage of a stepwise iron depletion in the body.

Any of the symptoms below, even in the absence of anaemia, should prompt iron studies, ideally on a fasting sample (fasting should not exceed 12 hours).

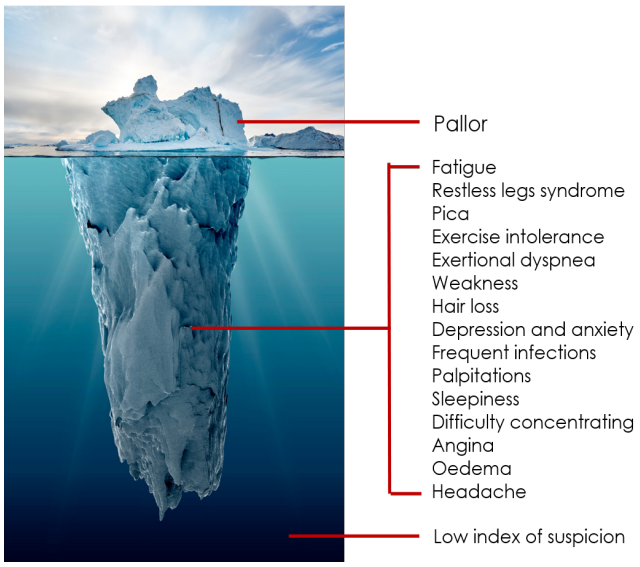

FIGURE 2: PBM FOR DOCTORS (ADAPTED GRAPHICS: WITH THANKS TO UFS)

SPECIFIC CLINICAL SCENARIOS FOR THE APPLICATION OF PBM

PERIOPERATIVE MANAGEMENT

WHO prescribes the ideal preoperative haemoglobin level in adults as above 13 g/dl. Age specific cutoff values apply to pregnant women and children. It is important to note that surgical procedures with a moderate or high risk of blood loss will worsen any degree of pre-existing anaemia and contribute to depletion of iron stores. Preoperative anaemia, even when mild, is an independent risk factor that can increase perioperative morbidity and mortality.[9;10] Even in the absence of overt anaemia, laboratory tests to evaluate iron stores can play an important role in patients with comorbidities that are known to be associated with depletion of iron stores or that can be exacerbated by iron deficiency.

Early pre-operative screening for anaemia in an elective setting is necessary to allow adequate time for diagnostic evaluation and aetiology specific management. A time frame of at least three to four weeks should be allowed prior to elective surgery.[11;12]

The need for haemostatic testing will be guided by the bleeding history. Identifying any defect in haemostasis will require careful perioperative management to minimise bleeding.

Patients with pre-operative anaemia who are on oral anticoagulation therapy facing major surgery may be at higher risk of intra- and post-operative complications and may need to have their surgery postponed until all correctable factors are addressed.

PBM protocols should cater for individuals at risk in both the elective and emergency settings.

Wherever feasible, surgical blood conservation techniques suitable for the individual patient should be employed. These methods include surgical techniques to reduce blood loss, the use of blood salvage systems and acute normovolaemic haemodilution ensuring that a patient's blood resources are effectively managed throughout treatment.[6]

PREGNANCY

Ideally pregnancy planning must ensure normal iron stores and folate levels before conception. It is especially important to address iron deficiency throughout pregnancy. Iron deficiency in the first and second trimesters is associated with increased maternal morbidity and a higher risk of adverse pregnancy outcomes such as low birth weight, prematurity or intrauterine growth restriction.[13] Maternal conditions associated with compromised foetal iron delivery in iron sufficient mothers include hypertension, smoking, diabetes mellitus and twinning posing the same risks to the developing foetus.[13]

Insufficient foetal iron results in three major risks to the developing foetus:[13]

- immediate risk to foetal brain development
- risk to long-term brain development
- postnatal iron deficiency in infancy and toddlerhood with attendant neurodevelopmental, sequelae

ROLE OF TRANSFUSION IN TREATING A LOW Hb

A blood transfusion is considered a "liquid organ transplant" and is associated with several adverse effects. The risks to the patient are per unit transfused, thus transfusions should not be administered as a quick fix. Restrictive transfusion triggers are an effective method of reducing this risk to the patient. Transfusion with red cell concentrate should not be dictated by a haemoglobin value alone but rather based on assessment of the patient's clinical status.[7] The haemoglobin transfusion trigger is therefore a patient specific value, rather than the generic level of 10 g/dl.

Where indicated, transfusion of a single unit of RCC, followed by clinical reassessment to determine the need for further transfusion, is appropriate. The attending doctor is ethically and medicolegally bound to discuss the need for transfusion, the benefits and risks, the alternatives to transfusion and possible impact of refusal with the patient or the family.The benefit of transfusion must outweigh the risks, as with any other medical treatment.

CONCLUSION

As Professor Denton Cooley, considered the Father of Bloodless Medicine, succinctly summarised: "Patient blood management is a compelling concept to pre-empt anaemia, correct bleeding disorders, and minimise blood loss. This evidence based, multidisciplinary approach not only leads to reductions in use of blood and blood products, and therefore to considerable cost savings, but more importantly, it also improves patient outcomes and patient safety. Patient Blood Management has evolved into a widely accepted holistic treatment concept that is a must have for all modern health care systems."

Hence in recognition of the impact of PBM in patient care, Ampath is visionary in increasing the numbers of PBM certified medical and nursing staff to support the clinical domain and raise awareness of blood health. The clinical laboratory must form an integral part of the multi-disciplinary team approach and should be included in the Hospital's PBM committee.

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