

# Transfusion Medicine Update

## Professor James P. Isbister

Royal North Shore Hospital, and Clinical Professor of Medicine, University of Sydney, Australia

### Patient Blood Management: How should it be defined, communicated and progressed?

*"A modern battle plan is like nothing so much as a score for a musical composition, where the various arms and units are the instruments, and the tasks they perform are their respective musical phases. Each individual unit must make its entry precisely at the proper moment and play its phase in the general harmony."*

General Sir John Monash.

When making blood transfusion decisions there has been a tendency to ask the wrong question. Clinical practice guidelines, especially for blood component therapy, have been falling into the common trap of starting with an answer before the question (ie diagnosis) has been clearly defined. This is a similar error to that which is commonly made in marketing when a business does not clearly identify the sector in which it is operating, known as marketing myopia. The point is emphasized and illustrated in the classic Harvard Business Review article by Levitt in 1960. In the early history of railroads the tycoons considered they were in the business of making railroads, when in fact they were in the transport business. As a result they were not able to adapt appropriately when other means of transport became available.

By analogy, transfusion medicine is in the business of improving clinical outcomes, not primarily collecting donor blood for transfusion into patients. Patient's clinical outcomes are improved by evidence-based diagnosis and therapy of diseases in which blood component therapy may have a role to play with the risks understood and accepted.

The history of blood transfusion is dotted with resistance to the implementation of new therapies and changes in clinical practices despite their being based on sound evidence. In many cases it is not new evidence that should have changed practice, but rather a reconsideration of the basic sciences, pathophysiology and soundly based clinical decision making.

Patients think blood transfusion is special and beneficial, but have difficulty accepting small risks they can't control. Blood Donors believe their contribution is a gift to the community that will be used appropriately and safely. Clinicians think blood is ordinary, take blood transfusion for granted, benefit is assumed and risks regarded as minimal. Governments view blood as a commodity and transfusion medicine as an expensive support service which should be regulated and funded in a "McDonaldised" manner.

### Challenges to blood transfusion practices

- Why is anaemia not regarded as an important diagnosable and manageable clinical problem?
- How is that >20% of elective hip and knee replacement patients on long waiting lists can come to surgery with untreated iron deficiency anaemia and receive red cell transfusions?
- Why can there be a variation of 0% to 90% red cell transfusion rates for comparable standard-risk hip and knee replacement cases in different institutions?
- Why do Jehovah's Witnesses, declining blood transfusion have better clinical outcomes for many elective surgical procedures compared with case-controlled benchmark patients?
- Why is allogeneic blood transfusion commonly regarded as one of the safest medical interventions?
- Why are many elective haemodynamically stable surgical patients exposed to a medical intervention (ie red cell transfusions) that probably has the greatest potential for harm, but has not been proven to improve clinical outcomes?

- Why do EBM experts demand randomised controlled trials to prove the “safety” of allogeneic red cell transfusion when there is virtually no evidence of “efficacy” of red cell transfusions in improving clinical outcomes for anaemic haemodynamically stable patients?
- Why do most surrogate endpoints for transfusion “efficacy” (eg Haemoglobin rise) not correlate with improved clinical outcomes?
- Why is the primary focus of transfusion medicine on the role and use of donated allogeneic blood (product focus) rather than appropriate management of the patient’s own blood (patient focus)?
- Why does the precautionary principle dictate decisions on the supply side of transfusion medicine, but the opposite applies on the patient (demand) side?

### **What is patient blood management?**

Patient Blood Management (PBM) is an evidence-based bundle of care to optimise medical and surgical patient outcomes by clinically managing and preserving a patient's blood. Patient blood management is not an ‘intervention’, not an alternative to transfusion, it is good scientifically-based clinical medicine. Blood transfusion is a major medical ‘intervention’ and its use should be based on good clinical medicine. PBM is a good news story for patients and bureaucrats. Advocating PBM can be hard work, requiring engagement of clinician’s grey matter to be implemented and successful in the long-term. To the media PBM is probably viewed as; *“What’s new, PBM is boring, why aren’t all doctors practicing PBM as standard of care?”*

If the following are the core elements of PBM that need coordinating, managing and auditing, what is the story those passionate about PBM should be trumpeting?

- diagnosing and treating reversible preoperative anaemia if time permits
- tolerating mild anaemia
- taking a preoperative/pre-procedure history for potential bleeding
- advocating meticulous surgical haemostasis
- involving patients in decisions regarding their clinical care

PBM is not primarily about reducing blood transfusion, but improving patient care. A positive corollary is avoiding inappropriate blood transfusion, ensuring appropriate use and availability of altruistically donated blood and respecting what donors expect when they donate blood. Further down the corollary line is saving of the health dollar. There is a good news or bad news story here for the media depending on one’s view. There is the risk of adversely impacting on the blood donor base that is already under challenging pressures. There is also the issue that the blood sector in general is coming under threat from the success of PBM, especially in countries where there are significant commercial interests. Various conspiracy theories can be proposed in this respect. We are fortunate in Australia that we have achieved a relatively seamless connection from patient care to the highest levels of State and Federal Government. There have been some concerns about some pushback in the US and Europe to PBM that appears due to successes of PBM impacting on commercial interests of the blood sector.

Anaemia is commonly not regarded as a significant clinical problem and not taken seriously by many clinicians. It is uncommon to observe patients primarily dying from anaemia, except in Africa and other developing malarial countries. However, from a more global perspective anaemia is a significant risk factor for morbidity and mortality in numerous clinical settings if not addressed appropriately. For many clinicians anaemia receives a “simple” knee jerk solution with blood transfusion. Somebody else does the work, donor blood has been regarded as free, promoted as safe and a valuable community service. Many surgeons in the past have regarded transfusion as being available as a substitute for poor perioperative haematological management and poor surgical technique. Early in my career I was “pressured’ by surgical mentors to embark on a surgical career. I knew in my own mind this would not and should not be my career path. This decision was solidly imbedded in my thinking during my surgical and anaesthetic intern jobs. I was fortunate to observe several great surgeons passionately caring for their patients overall medical well-being, not to also mention their meticulous surgical technique and attention to surgical haemostasis.

I recently asked the health reporter of one of our leading broadsheet papers why there is so much interesting in negative stories about PBM and nobody wants to write the positive story. I told her that I have been involved in

haematology, transfusion medicine and PBM as a clinician and a blood donor for 50 years from my early medical student days when doing an elective research term in Papua New Guinea and have seen it all, the good and bad news stories. I pointed out that surely a health reporter should be interested in a story that results in improving patient care, improved patient safety, saving of health dollars and ensuring stewardship of the donor blood supply from altruistic blood donors.

I was not surprised at the answer I received. The reporter admitted that she was more interested in writing a story about the "conflicts of interest" of various members of the PBM guideline development committees than what good initiatives all these assumed "unethical" clinically practicing health professionals, patient advocates, health administrators and community representatives are trying to achieve.

The story and core elements of PBM we are trying to get over to our colleagues, and the media I suspect, may appear complex and sometimes it is forgotten that the foundations of modern scientifically evidence-based medical management presuppose an understanding of the structure and function of the normal, pathophysiology of disease, diagnosis and indicators for severity of disease as well as understanding the natural history and consequences of untreated disease. These principles are implicit in the three pillars of PBM, and at risk of stating the obvious, it is worthwhile outlining **the logic and core elements of PBM from basic principles through to clinical practice.**

**PRINCIPLES** Essential characteristics of health care, the adherence to cannot be ignored

- Patient blood and haemopoiesis, whether normal or diseased should be managed appropriately in all clinical settings.
- Donor blood is a unique and costly resource held in trust that should only be used when there is evidence for potential benefit, potential harm will be minimized and there are no reasonable alternatives.

**AXIOMS** That which is self-evident

- Evidence-based medical practice has its foundations in science, ethics and economics.

**THEOREMS** Conclusions deduced from axioms

- PBM is standard of care with the aim of achieving the best clinical outcomes for individual patients.

**COROLLARIES** Conclusions that inevitably follow-on from the theorem

- PBM results in avoiding or minimizing unnecessary allogeneic blood transfusions.

**PRACTICE** The application, ongoing pursuit and monitoring of outcomes of clinical decisions

- Individualized patient management by multidisciplinary teams with multimodal interventions addressing the three pillars of PBM to:

1. Optimize haemopoiesis.
2. Minimize blood loss.
3. Tolerate haemopoietic deficiencies.

This might all be too much for some health professionals or regarded as boring. However, we must have a clear idea in our own minds as to how we define PBM and the language we use. We know PBM is a "simple" concept, but its communication and implementation can be complex.

The three-pillar matrix of PBM:

**1st Pillar:** Optimize erythropoiesis

**2nd Pillar:** Minimize blood loss & bleeding

**3rd Pillar:** Tolerate anaemia by harnessing & optimising physiological reserves

Clinical practice of the three-pillar matrix is determined by:

- medical or surgical context
- age and sex of the patient
- time frame for managing the primary clinical problem, ie. urgent, emergent or elective
- reversibility and treatability of the primary disease
- presence of comorbidities
- availability and costs of alternatives to blood transfusion
- specific patient preferences

### **Definitions, evidence, questions, “no brainers” and challenges**

#### **Allogeneic Blood Transfusion**

A therapeutic intervention for which there is evidence of efficacy and safety in improving a patient’s clinical outcome AND there is no alternative clinical management “available”.

#### **Patient Blood Management**

Clinical management based in sound medical science that improves patient outcomes.

#### **Why is management of a patient’s blood in the perioperative setting regarded differently from managing other systems of the body?**

- There is an excess focus on blood transfusion rather than diagnosis.
- Transfusion is usually a default and easy discretionary decision.
- The patient does not have a “blood advocate”.
- Haematologists have a limited role/interest in perioperative medicine.
- Anaemia is not regarded as important.
- Surrogate endpoints are used for determining efficacy of transfusion.
- There is a false sense of donor blood safety.
- Donor blood has been promoted as “The safest pharmaceutical”.
- Many clinicians don’t acknowledge stewardship responsibilities towards altruistic blood donors.

#### **Relevant PBM questions**

- Why manage the Haemopoietic System differently than other systems?
- Why do elective surgery on patients with reversible anaemia?
- Why not pre-empt and prevent excessive haemorrhage?
- Why not tolerate mild anaemia?
- Why administer potentially hazardous blood transfusions for which there is no good evidence for benefit or improved patient outcomes?
- How do you explain to an altruistic blood donor that their gift caused a serious complication in a patient in whom there was no evidence the patient would have benefited from the blood transfusion?
- What is the cost of not giving a red cell transfusion to a patient in whom it was not indicated?

### The no brainers

- Why manage the haemopoietic system differently than other systems?
- Why do elective surgery on patients with reversible anaemia?
- Why not pre-empt and prevent excessive haemorrhage?
- Why not tolerate mild anaemia?
- Why administer potentially hazardous blood transfusions in circumstances in which there is no sound evidence for benefit or improved patient outcomes?
- How do you explain to an altruistic blood donor that their gift caused a serious complication in a patient in whom there was no evidence the patient would have benefited from the blood transfusion?
- What is the cost of not giving a red cell transfusion to a patient in whom it was not indicated?
- Iron deficiency should and can be treated
- What is the best for the patient may not appear to be the cheapest, but may be the most cost-effective on the basis of full activity based costing
- Whenever possible the patient should be involved in decision making

### The PBM challenges

- Awareness in relevant stakeholder groups
- Information to the public and patients at large
- Undergraduate and postgraduate education for nurses, physicians and other health professionals
- Patient empowerment and advocacy
- Incentives/disincentives for health care providers
- Perspectives/incentives for clinicians
- Monitoring of transfusion outcomes
- Transfusion/PBM benchmarking

## WHAT ARE THE REAL ALLOGENEIC BLOOD TRANSFUSION ALTERNATIVES?

### Transfusion Alternatives

- Erythropoietic stimulating agents ± IV Iron therapy
- Autologous salvage and intraoperative haemodilution

### ? Transfusion Alternatives

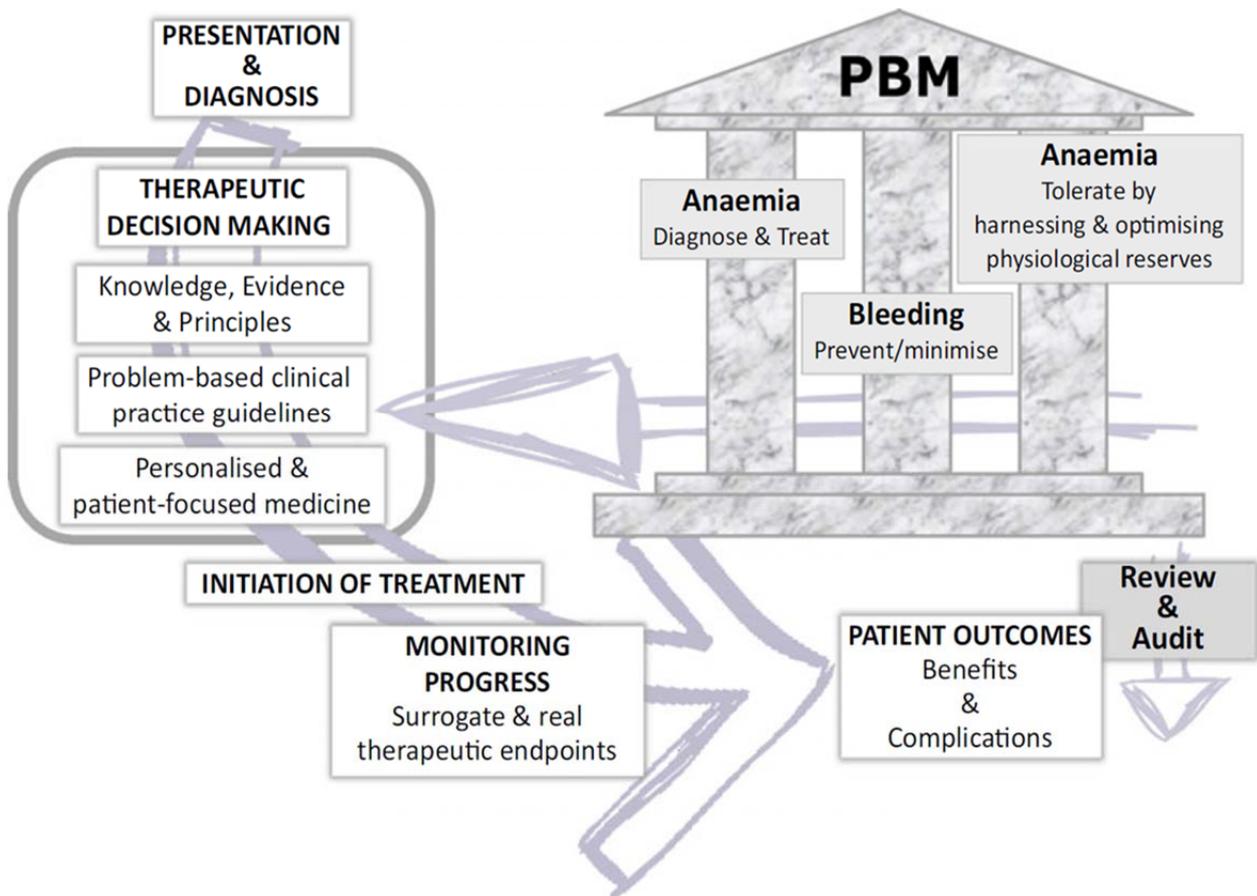
- Pharmacological interventions to minimize blood loss
- Special Anaesthetic/Surgical techniques to minimize blood loss
- Additional interventions in anaemia to improve oxygen transport
- Pre-emptive iron therapy

### ~~Transfusion Alternatives~~

- Pre-operative anaemia clinics
- Treating reversible anaemias
- Minimizing blood loss
- Tolerating mild anaemia

## The application of the three pillars of patient blood management

Isbister JP ISBT Science Series (2015) 10 (Suppl. 1), 286–294



Approaches to PBM in many clinical settings continue to evolve. It is elective surgery where the most evidence for achieving practice changes and the greatest benefits have been demonstrated in improving patient outcomes and reducing exposure to allogeneic blood transfusion. However, similar principles apply to patients with blood loss. Anaemia and iron deficiency are commonly not regarded as significant clinical problems and frequently not taken seriously by many clinicians. Iron deficiency anaemia (IDA) and iron depletion/deficiency (ID) in women with abnormal uterine bleeding (AUB) is common and well documented, but poorly addressed. Anaemia in the elderly is also a relatively poorly addressed. PBM in its broadest application includes the management of any quantitative or qualitative deficiencies in the haemopoietic system and the role of allogeneic blood components or plasma products as therapy on a sound evidence-base. Increasingly, there are recombinant plasma proteins available as true alternatives to blood donor-based plasma products.

*Our main business is not to see what lies dimly at a distance, but to do what lies clearly at hand.*

Thomas Carlyle (1795 – 1881)

### **PBM of haemodynamically and haemostatically stable patients**

It is in the haemodynamically and haemostatically stable patients in which PBM has a great deal to offer in terms of minimizing or avoiding allogeneic blood components. This group is largely made up of the uncomplicated elective surgical patients and patients with chronic anaemia usually related to marrow suppression secondary to cancer chemotherapy and patients with myelodysplastic syndromes.

### **PBM in critical haemorrhage and massive transfusion**

It is with the critical haemorrhage and massive transfusion category of patients that the focus is on a better understanding of underlying causes and pathophysiology. In this group the clinician is commonly faced with an urgent clinical problem in which any pre-insult or disease assessment of the three pillars is not possible, or at best assessed retrospectively from the patient's clinical history or the current clinical context. The focus is on rapid assessment of the underlying cause/s and the presenting 'status' of the three pillars of PBM, especially in relationship to the haemostatic system. This is where point of care testing and real time management of the three pillars is increasingly being shown to lead to minimising allogeneic blood transfusion and better clinical outcomes. In many of these circumstances minimising allogeneic blood transfusion results in better clinical outcomes in terms of less lung injury and multi-organ failure, reduced assisted ventilation, lower infection rates, fewer and shorter ICU admissions as well as shorter lengths of hospital stay. In other words, transfusions can be a two-edged sword in saving lives, but with them may come unintended adverse consequence that need to be minimised as far as possible. The two most challenging clinical settings in this respect are trauma and obstetric haemorrhage.

### **PBM in congenital bleeding disorders, immunodeficiency, and immunotherapy management**

In the group with clearly categorized and specific haemopoietic deficiencies, including immune disorders, the underlying pathophysiology is understood and therapy usually has a sound evidence-base, enunciated in clinical practice guidelines. Additionally, the therapeutic blood products, human derived or recombinant, have proven efficacy and safety profiles and their manufacture is highly regulated and controlled.

### **Patient empowerment and personalised medicine**

With greater empowerment of patients by involvement in determining their own clinical management there are complex issues surrounding consent as to what information about PBM and blood transfusion should be provided, how should it be communicated and documented to confirm that it has been validly achieved. In view of recent evidence implicating transfusion of labile blood components as an independent risk factor for adverse clinical outcomes, reconsideration of product information is warranted and wider dissemination of this information is important. Transfusions of allogeneic labile blood components are tissue transplants and have the widest and most heterogeneous potential hazards, probably greater than any other medical intervention, but this is not the message that is currently being communicated to clinicians, patients and the community. Evidence for benefit in improving clinical outcomes is increasingly a challenge and a reassurance patients and blood donors can reasonably expect.

Theodor Billroth (1829 – 1894), one of the fathers of modern surgery, had this advice to doctors as apposite today as it was over a century ago.

*“A person may have learned a good deal and still be a very bad doctor who earns no trust from patients. The way to deal with patients, win their confidence, listen to them (patients are more eager to talk than to listen) and help them; console them, get them to understand serious matters: none of this can be read in books. A student can learn it only through intimate contact with his teacher, whom he will unconsciously imitate ... The patient longs for the doctor's visit; his thoughts and feelings circle around that event. The doctor may do whatever is necessary with speed and precision, but he should never give the impression of being in a hurry, or of having other things on his mind.”*

#### Links to references and further reading

1. Patient Blood Management Bundles to facilitate implementation  
[https://www.researchgate.net/publication/315115941\\_Patient\\_Blood\\_Management\\_Bundles\\_to\\_facilitate\\_implementation](https://www.researchgate.net/publication/315115941_Patient_Blood_Management_Bundles_to_facilitate_implementation)
2. The three-pillar matrix of patient blood management  
<https://onlinelibrary.wiley.com/doi/abs/10.1111/voxs.12135>
3. Cornerstones of patient blood management in surgery  
<https://onlinelibrary.wiley.com/doi/pdf/10.1111/tme.12476>
4. *Building national programmes of Patient. Blood Management (PBM) in the EU. A Guide for Health Authorities*  
[https://ec.europa.eu/health/sites/health/files/blood\\_tissues\\_organs/docs/2017\\_eupbm\\_authorities\\_en.pdf](https://ec.europa.eu/health/sites/health/files/blood_tissues_organs/docs/2017_eupbm_authorities_en.pdf)
5. *Supporting Patient. Blood Management (PBM) in the EU. A Practical Implementation Guide for Hospitals.*  
[https://ec.europa.eu/health/sites/health/files/blood\\_tissues\\_organs/docs/2017\\_eupbm\\_hospitals\\_en.pdf](https://ec.europa.eu/health/sites/health/files/blood_tissues_organs/docs/2017_eupbm_hospitals_en.pdf)
6. National and International Guidelines for Patient Blood Management in Obstetrics: A Qualitative Review  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5161642/>
7. Patient Blood Management: the new standard  
<https://onlinelibrary.wiley.com/doi/epdf/10.1111/trf.14095>
8. Drivers for change: Western Australia Patient Blood Management Program  
[http://www.haemoview.com.au/uploads/2/5/4/9/25498232/simon\\_towler\\_2013.pdf](http://www.haemoview.com.au/uploads/2/5/4/9/25498232/simon_towler_2013.pdf)
9. Improved outcomes and reduced costs associated with a health-system-wide patient blood management program: a retrospective observational study in four major adult tertiary-care hospitals  
<https://onlinelibrary.wiley.com/doi/epdf/10.1111/trf.14006>
10. Australian National Blood Authority: Best Practice  
<https://www.blood.gov.au/best-practice>
11. Australian National Blood Authority: Patient Blood Management Guidelines  
<https://www.blood.gov.au/pbm-guidelines>
12. At the end there are some infographic PBM resources.

## A bit of history

In the early days of Patient Blood Management the main driver for change in transfusion medicine practices was the recognition that allogeneic blood transfusion may be an independent risk factor for adverse clinical outcomes, especially in contexts in which there was a questionable evidence-base for efficacy. Allogeneic blood transfusion had grandfathered its way into medical therapeutics and become culturally imbedded into clinical practice, with benefit being assumed and risks regarded as minimal. Blood transfusion had become the default decision in the context of clinical uncertainty. Of even more concern was perioperative red cell transfusions being administered in non-urgent clinical circumstances in which haematological deficiencies, usually anaemia, were correctable without blood transfusion.

It is only in recent years that there has been a concerted effort to establish a sounder evidence base for the benefits and hazards of allogeneic blood transfusion in the wide range of clinical settings in which it is, may be, or is not, appropriate therapy. Few would doubt the role of blood transfusion in the management of haemorrhagic shock, critical life-threatening anaemia and to enable the development of newer major medical and surgery therapies. The provision of blood component therapy for specific cellular or plasma deficiencies and the development of haematological supportive care for the management of haematological malignancies has become essential and generally on a good evidence base.

There has been a gradual awakening over the last 30 years throughout the blood sector, clinical practice, bureaucracies, governments, the community and the legal profession that, as Bob Dylan would have expressed, *"the times they are a changin."* There have been several drivers for change. The reassessment of the safety of transfusion in the context of questionable efficacy in improving clinical outcomes has been high on the agenda. Additionally, governments have become more focused on the blood sector leading to national reviews, economic evaluations and, in some circumstances, criminal proceedings against individuals. Lastly, altruistic blood donors can reasonably expect that their blood will be used to benefit the greatest number of patients with minimal chances of adverse impacts.

Patients being exposed to risk without evidence for benefit is a "bad news" story. The continuing resistance to acceptance of evidence questioning the efficacy and safety of transfusions in many circumstances should have resulted in an overwhelming case for adopting the precautionary principle to the use of allogeneic blood transfusion. This is especially the case in uncomplicated elective surgery and in haemodynamically stable patients with anaemia. Of even greater concern was the promotion by some European blood services that allogeneic blood was the 'safest pharmaceutical', implying commodification of an altruistically donated human resource.

The paradigm shift to a patient-focus returned clinicians to managing a patient's own blood. This was no different than the management of any other body system, normal or dysfunctional. A sound understanding of physiology and pathophysiology is a *sine qua non* in providing optimal patient care and ensuring the best clinical outcomes. This is a good news story, a no brainer, so what's new?

The following extracts from the British Medical Journal (1945) and the New England Journal of Medicine (1936) says it all, especially in the follow up letter by Major General Ogilvie after WWII.

# BRITISH MEDICAL JOURNAL

LONDON SATURDAY MAY 5 1945

## SOME APPLICATIONS OF THE SURGICAL LESSONS OF WAR TO CIVIL PRACTICE

BY

W. H. OGILVIE, M.Ch., F.R.C.S.

*Major-General*

Now that the European phase of the second world war appears to be entering its final stages, it may be well to consider briefly what war has taught surgery and what it has taught surgeons, and how the lessons learned in the field can be applied to the teaching and practice of surgery in civil life.

The surgery of wounds in this war has passed through three phases. In the first, treatment by the closed plaster method was the rule; in the second, which was a period of long communications and poor supplies, wounds were excised and drained, the limb was immobilized in a padded plaster case or some form of plaster box splint, and closure by secondary suture or skin grafting was attempted about the third week, or as soon as the surface was covered with healthy granulations; in the third phase, which has been helped by the advent of penicillin, the wounds are excised by the forward groups and closed by delayed primary suture at the base between the fourth and the sixth day.

of purely surface injuries, war wounds can never be rendered entirely healthy and entirely sterile by surgical toilet. The limits of tissue damage cannot be decided with any accuracy, and bacteria, blasted in by the cushion of air that precedes the projectile or displaced along tissue planes by movements of the limb, may lie well outside the visible confines of the wound track. Where the bacteria are few and the remaining damaged tissues small in amount, the defences of the body will soon turn out the invaders unless they are hindered by tension. In a sutured wound the hyperaemia which should give protection is limited by the unyielding surroundings and finally replaced by ischaemia, and the outpouring of defensive fluids is brought to a standstill when the interstices of the wound are filled; the bacteria, on the other hand, find in the trapped discharges an ideal pabulum and in the anoxic tissues an easy prey.

The wounds of road and industrial accidents are, like those

852 JUNE 16, 1945

BRITISH  
MEDICAL JOURNAL

## Correspondence

### Blood Transfusion

I am unrepentant in condemning the giving of blood during straightforward operations.

a smooth operation should lead to smooth convalescence without biochemical assistance.—I am, etc.,

London, N.W.8.

W. H. OGILVIE.

# The New England **1936** Journal of Medicine

VOLUME 215

SEPTEMBER 3, 1936

NUMBER 10

## The Massachusetts Medical Society

### SECTION OF MEDICINE

Lower Section Room, Municipal Auditorium, Springfield,  
Tuesday, June 9, 1936, 2 p. m.

#### PRESIDING:

Dr. William D. Smith, Boston, Chairman.  
Dr. Laurence B. Ellis, Boston, Secretary.

CHAIRMAN SMITH: Will the meeting please come to order.

The first duty of the Section is the selection of the Chairman and the Secretary for the coming year, and, in accordance with the usual custom, the Chair will appoint as the Nominating Committee to suggest names Dr. Dwight O'Hara, Chair-

man, Dr. George R. Minot and Dr. Chester M. Jones. They will report later and abide the pleasure of the Section.

I do not see Dr. Hamilton here. Apparently she is delayed, so we will pass on to the second paper. To those of us who have had our moments of indecision whether to transfuse or not to transfuse in some of our medical problems, Dr. Bock's paper should be of interest. His subject is "The Use and Abuse of Blood Transfusions."

### THE USE AND ABUSE OF BLOOD TRANSFUSIONS\*

BY ARLIE V. BOCK, M.D.†

THE mass of literature on the subject of blood transfusions accumulated during the past twenty-five years is so great and most of it so readily available that one shows lack of temerity at least to attempt a discussion of the subject before this audience. The transfusion of blood may be a life-saving procedure under certain circumstances, it may be a necessary supportive measure under others, but it is too often undertaken when the doctor can think of nothing else to do after all other therapy has failed. My objective today is to discuss briefly the common surgical and medical conditions for which transfusion of blood is indicated, in which we can expect good physiological results, and to point out those conditions in which it is little more than a gesture, done, as it were, to satisfy the urge to do something.

#### SURGICAL INDICATIONS

1. *Shock*. Many theories of the cause of primary and secondary shock have been offered by able investigators, most of them recently reviewed briefly by Blalock.<sup>1</sup> Because of the complexity of the events no theory yet proposed can be considered the final answer as to the etiology of shock. We know that if treatment of the condition is to be successful it must accom-

plish two things, restoration of diminished blood volume and elevation of low blood pressure. Blood volume may be reduced by gross hemorrhage or it may be reduced by blood lost in the periphery of the body, as suggested by Freeman,<sup>2</sup> or by extravasation of serum through damaged capillaries. If hemorrhage has occurred, transfusion of blood, together with such supportive measures as heat, is the immediate indication. No other therapy is so successful. In shock without much or any hemorrhage, 6 per cent gum acacia in normal saline may be just as effective as blood, and has the advantage of greater availability. Repeated transfusions of blood or infusions of acacia may be necessary but, are usually not, if no delay has occurred in the first instance. Acacia may be used as a supportive measure until transfusion can be arranged. Prolongation of the shock state results in tissue asphyxia, capillary damage, petechial hemorrhages, and rapid change in general to an irreversible state.

One of the common accompaniments of shock is dehydration, a state associated with loss of water, base, chloride and increase of nonprotein nitrogen. When such a state exists, transfusion alone is not adequate therapy but normal salt solution, often in large quantities, should be administered intravenously, or it may be given in eight-ounce quantities by rectum every half hour. When facilities permit, serum chloride

\*Read at the Annual Meeting of the Massachusetts Medical Society, Section of Medicine, Springfield, June 9, 1936.

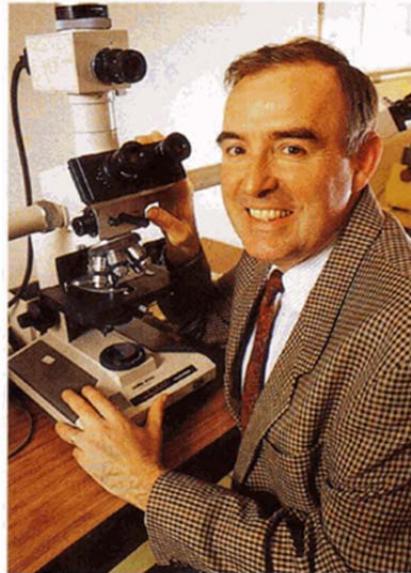
†Bock, Arlie V.—Physician, Massachusetts General Hospital. For record and address of author see "This Week's Issue," page 463.

# Vein glory

*The AIDS epidemic has changed attitudes towards transfusions. GLENNYS BELL reports on the crisis facing the Australian Red Cross, which is fighting for its reputation and the confidence of donors – those who give blood as well as those who give money*

**I**n a rare turnaround, the Australian Red Cross Society is coming under fire on its home front. The reputation of its blood transfusion service is being questioned in the courts where it is being sued by people who were infected with the AIDS virus. Behind the scenes, its operations and the way that it ensures the safety of the country's blood supply are to be evaluated by Australia's health ministers.

Dr James Isbister, head of the department of haematology at Sydney's Royal North Shore Hospital, believes that standards in Australia are high but advocates reform of the blood transfusion service. He is one of the few experts in the field who has been vocal on the service's deficiencies. The last thing he wants to see is a loss of confidence as happened in the US. "It's in no one's interest," he says. "We don't want the same thing to happen here." But he is concerned because there is no co-ordinated approach to making blood transfusion services safe and effective.



Dr James Isbister: an advocate of reform

Isbister sees the service as a product of its past. It was born in crisis in the 1940's to help victims of war and conflict and depends on the altruism of donors to give blood for the benefit of others. It is the others, the patients, who may be forgotten by a centralised service. It is time, he believes, for a blood transfusion service which focuses on the people who receive blood as much as – if not more than — those who donate it.



I reference the above media article from 1991 published in the now defunct Australian Bulletin magazine. This was one of my early attempts at shifting the paradigm back to a patient's blood focus and not donor blood product focused. I was approached by the Bulletin when the AIDS crisis surrounding blood transfusion was regularly in the media. The main responses the article received related to "shooting the messenger". I should emphasise that this article was 27 years ago and a lot has changed since then. The last paragraph of the article is probably the first media reference to what was to become "Patient Blood Management" many years later. At a 2005 board meeting of the International Foundation for Blood Management I proposed the terms "Patient Blood Management" and "Donor Blood Management" as the more generic term "Blood Management" was resulting in some confusion. The term "Patient Blood Management" first appeared in the title of an article in the peer reviewed literature in 2008.

## *Patient Blood Management*

### *The Pragmatic Solution for the Problems with Blood Transfusions*

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 Hospital of Sydney, St. Leonards, New South Wales, Australia.

**Back to the future: What's old is new**

<https://archive.org/details/b28083593>

The following was the year before Karl Landsteiner discovered the ABO blood groups

## INTERCOLONIAL MEDICAL CONGRESS OF AUSTRALASIA.

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FIFTH SESSION.

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**BRISBANE, QUEENSLAND.**

SEPTEMBER, 1899.

SECTION OF MIDWIFERY AND GYNÆCOLOGY.

THE SAVING OF BLOOD IN GYNÆCOLOGICAL OPERATIONS.

BY ARCHIBALD WATSON M.D. PARIS, F.R.C.S. ENG.,  
 Professor of Anatomy and Physiology in the Adelaide University.

MR. PRESIDENT,—

Dr. Byrne, the courteous secretary of your Section, has paid me the compliment of inviting me to make some remarks on the saving of blood in gynæcological operations within the pelvis, on the principle, I presume, that "spectators see most of the game." Often, however, I have only appeared on the scene after the game was quite over, and in my opinion this latter factor should make any comments from one outside of your ranks appear less trivial than they otherwise might.

FIFTH SESSION.

BRISBANE, QUEENSLAND.

FIRST DAY—MONDAY, 18<sup>TH</sup> SEPTEMBER, 1899.

SECTION OF MIDWIFERY AND GYNÆCOLOGY.



POST-PARTUM HÆMORRHAGE: ITS TREATMENT—  
ANTICIPATORY AND ACTUAL.

By ED. LUTHER, B.A., M.D. (B.CH., ETC., DUB. UNIV.),  
Hon. Surgeon to the Lady Musgrave Hospital; and Hon. Physician, Wide  
Bay and Burnett Hospital, Maryborough, Queensland.

The first requisite against hæmorrhage from the post-partum uterus is the maintenance of its firm uniform contraction and tonic retraction (Lusk).

In my experience the chief cause of post-partum hæmorrhage amongst Queensland women is the want of this muscular tone, for amongst our women one meets with a large number suffering from inanition and anæmia, especially during the summer months. Whether this anæmia is caused by malaria, anchylostoma, or just the enervating heat, it matters not for the purpose of this paper. But, whenever I am engaged to attend at the confinement of a woman anæmic in appearance, I always anticipate having some post-partum hæmorrhage, for with the anæmia you will certainly have uterine inertia and flaccid abdominal muscles, that may have just sufficient stamina to expel the fœtus, but none left for the expulsion of the placenta, or for keeping the uterus contracted afterwards.

Now, what I wish to bring before you to-day is that by a preparatory treatment we can ward off this evil, dreaded by most accoucheurs.

My method of treatment is first to try and cure the anæmia and debility by tonics of iron and strychnine, and during the last fortnight or three weeks of gestation to place the patient on the following mixture:—Extractum ergotæ, 22 gr.; liquor strychninæ, 1 dr.; acid sulphuric dilut, 1 dr.; glycerin, 1 oz.; aq. anisi, 8 oz.; a tablespoonful to be taken three times a day. I have now been adopting this treatment for the past four or five years in all cases that have a history of having had post-partum hæmorrhage at their former confinements, or where the patient seemed debilitated or a likely subject for hæmorrhage, and in every case with satisfactory results.

**JAMA**  
The Journal of the American Medical Association

February 25, 1899, Vol XXXII, No. 8, Pages 395-450

1899.] METHODS OF BLOOD EXAMINATION.

SIMPLIFIED METHODS OF BLOOD EXAMINATION. THEIR PRACTICAL APPLICABILITY TO GENERAL DIAGNOSIS.

BY ALFRED C. CROFTAN, M.D.

Late Assistant Professor of General Diagnosis, College of Physicians and Surgeons, Chicago.  
PASADENA, CAL.

Laboratory aids to diagnosis, to be universally employed by the practicing physician, should be simple and rapid of execution, should require no costly or complicated paraphernalia, and should yield quicker and more positive results than purely clinical methods.

No period in the history of medicine has been free from attempts to find diagnostic clues in the examination of the blood; it was tried to interpret the rapidity of coagulation, the *crusta phlogistica* of eighteenth century physicians, the appearance of the blood as it flowed from the incised vein. With the development of microscopic technic and an insight into the truths of cellular pathology, valuable data relating to the morphology of the corpuscular elements of the blood in health and disease were discovered. During the last decade, especially through the efforts of German and American investigators—at their head Ehrlich of Berlin and Neusser of Vienna—a mass of purely empiric data on the appearance of the blood in a variety of morbid conditions has been gathered and the recurrence of a characteristic blood-picture in certain diseases verified; inversely, diagnostic clues have been gathered from the appearance of the blood.

# NO WOMAN NEED BECOME ANAEMIC

Most women are anaemic at some time in their lives, though it is not nearly so common as it used to be. Gone are the wan, romantic maidens of Queen Victoria's time.

There is no need now for any Australian to go without the essentials of normal blood formation, but many still do — some through ignorance, some because they prefer rich things as alcohol, but most through carelessness.

The housewife often feeds her family, then settles down to a cup of tea and a slice of bread and jam, poor stuff for making good red blood!

Besides, anaemia is twice as common in women and adolescent girls as in men.

Anaemia really means a shortage in the red blood cells of the red pigment, haemoglobin, which carries oxygen all over the body. There may be insufficient red blood cells or insufficient red pigment in each.

The red cells are manufactured in the bone marrow from a variety of substances, some of which are made in other parts of the body, while others are taken in the diet.

## Difficulties

There can be difficulties in manufacture, and absence of certain essentials can stop production.

Even if the manufacturing side is perfect, many things can happen to the cells; certain germs, drugs, and chemicals may destroy blood, and a common problem is blood loss from ulcers in the stomach or duodenum, from piles, and even heavy periods.

There are also times in our lives when there are greater demands on our blood, and it becomes extremely important that our bodies should be supplied with the right materials.

If I tell you something about these times and about the right materials, you will be better off than if I give you a long list of symptoms

and say, "Go to the doctor if you get one."

After all, lots of very pale women have quite red lips, even without their lipstick, and are not anaemic at all.

And quite a lot of women who feel a bit tired and short of wind, and secretly imagine that they "have a heart," are suffering from anaemia that could be easily treated by attention to their diet.

You may be rather shocked to hear it, but liver injections are no good as a tonic.

Recent research work has established that liver and vitamin B<sub>12</sub> injections, which were once considered to have a general tonic effect, really have none.

Patients who were given injections of water did just as well as those who had liver injections or B<sub>12</sub>, provided they all got a diet containing the essentials and believed they were getting the tonic.

The periods in life that make special demands on blood supplies include those of most active growth—infancy and adolescence.

The baby grows very fast from birth to two years, and anaemia is common, particularly in premature babies, twins, and children who have had a lot of infections, even just colds.

Milk, with its low iron content, is often their main article of diet, so you must be alert to the results of infections and the need for the dietary extras.

At puberty bodies demand extra iron and calcium and proteins for growth, and there's actually a big increase in the quantity of their blood.

All girls from puberty onwards lose blood regularly with their monthly periods; not a great deal of blood, and nothing that a normal girl can't cope with.

However, the blood has to be replaced, and the girls who are overworking or careless with their diet, and harassed

## HELP FOR HOUSEWIVES by Clair Isbister,



Australian doctor and housewife. This is our third extract from her book, "What is Your Problem, Mother?"

young mothers may not always get the essentials.

Then there is pregnancy and lactation. Babies get all their body-building substances from their mothers.

During birth the mother loses more blood, and while she feeds the baby at the breast she passes sufficient iron into the milk to give her baby enough.

Artificially fed babies, on cow's milk for five months without extra food, often get anaemic because nature didn't arrange for a cow to add this extra iron to milk. Her calf goes out and chews grass at a very tender age.

It is estimated that the process of carrying, bearing, and feeding a child needs a third of the mother's iron and she has to supply it to the baby.

The baby of an anaemic mother is not anaemic at birth, because nature sees that it gets its requirements, but it soon becomes anaemic later on owing to a lack of reserves of iron.

What do we need for making blood? I've mentioned

iron several times, but the research chemists have identified many other substances that the body itself cannot make but which are needed.

They include vitamin B<sub>12</sub>, folic acid, unknown factors that occur in yeast and liver, certain fats, and metals such as iron, copper, and cobalt.

Don't think you should suck pennies, or have vitamin B<sub>12</sub> injections. Most of these substances are needed in very small quantities and a good diet of meat, eggs, liver, cheese, and wholemeal cereals contains them all.

In certain illnesses, when food is not being properly absorbed from the bowel, folic acid or vitamins, for instance, may have to be added.

If the anaemia has already developed, single essential substances may have to be replaced in bigger quantities than the diet can supply.

But that is the doctor's job; just now I am talking about prevention.

Other substances are needed for the body to be able to use the essential materials.

You need vitamin C and the vitamin B group, and certain proteins.

To supply vitamin B, Vegemite, Marmite, and wholemeal bread are easy to get; oranges and tomatoes provide vitamin C.

Blood-making isn't just a matter of chemistry. Hormones are very important; thyroid, ovaries, pituitary, and adrenal glands all work together in harmony, and a discord can cause anaemia.

Many middle-aged women have a mild thyroid deficiency and the strange anaemia of Victorian times, which used to affect young girls so severely that they died, was partly due to iron deficiency, but also to some ovarian disturbance at puberty.

## Not silly

It may sound silly, but it is true that happiness and emotional balance matter probably as much as balanced diet in preventing anaemia.

I must sound a funny doctor warning people against pills and potions, but I am talking about preserving health and preventing anaemia.

I prescribe iron pills for iron-deficiency anaemia, and injections for pernicious anaemia just the same as other doctors.

And I don't disapprove of those extra vitamins in hot milk at examination time or some extra iron and vitamins during pregnancy.

I'm pointing out that there are still many essential substances in the good food provided by nature that the scientists don't know about yet, so don't pin your faith on pills and tonics and refined foods.

July 23, 1958

PRICE

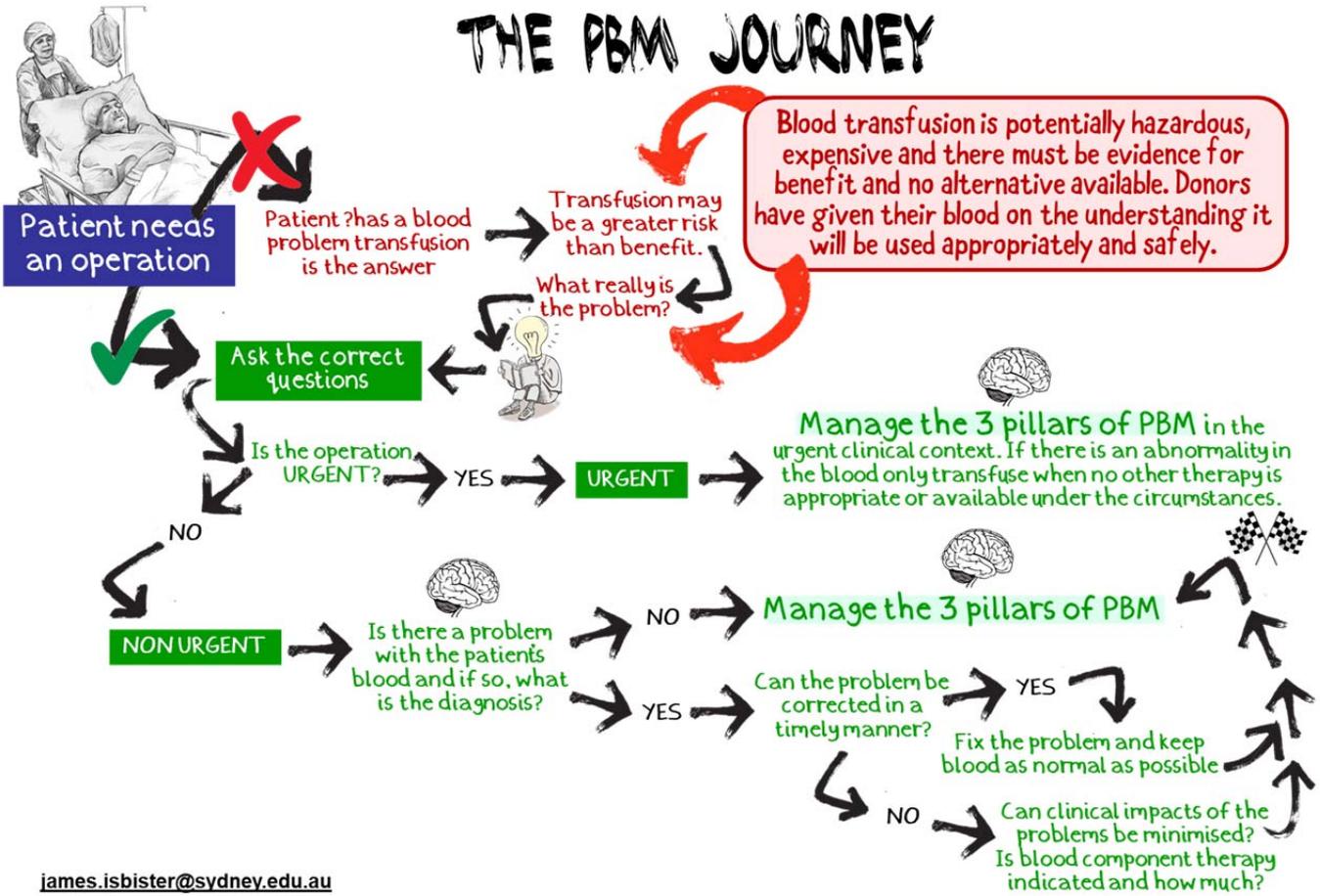


THE AUSTRALIAN Women's Weekly

# A Generic Approach to Patient Blood Management

Primary disease & PBM	EVIDENCE	ECONOMICS	ETHICS	RISKS
<b>Epidemiology &amp; Diagnosis</b> Clinical/Laboratory	The nature and extent of the 1° condition and relevance of the blood and possible deficiencies that may have consequences for PBM Standard of care for managing the 1° condition.	Is knowledge of 1° condition and any haematological deficiencies complex or "simple" and the economics understood? ?Educational challenges	Responsibility of clinicians and bureaucrats to understand the issues surrounding the 1° condition and PBM  Equity of access to clinical care and pathology services	Adverse epidemiological data Indicative of gaps Geographical isolation Limited laboratory services
<b>Interpretation of pathology results</b>	Are reliable pathology testing methodologies available and being reviewed and interpreted correctly?	Are diagnostic methods for 1° condition and PBM readily available and cost-effective?	Equity of access to specialist clinical expertise and interpretation of diagnostic pathology results when necessary	Lack of local expertise Lack of specialist expertise Incorrect interpretation of laboratory results
<b>Clinical decision making and therapy</b>	Is there an integrated approach to management of the 1° condition and PBM? Are established and feasible guidelines available?	Is standard of care of the 1° condition and PBM cost-effective for individuals and the health system	Ensuring implementation of a standard of care for the 1° condition and PBM Allogeneic blood transfusion is only used when indicated and stewardship of the donor blood supply is respected	Clinical practice variation and failure to follow guidelines Availability and therapy delays Inappropriate blood transfusion Timely and logistic availability of appropriate therapy
<b>Monitoring &amp; ongoing care</b>	Are healthcare implementation methodologies and guidelines available and known to be effective?	Blood transfusions are expensive and risky and only indicated if no alternative	Patient empowerment, informed consent and follow up is an integral component of clinical management	Failure to appropriately address patient engagement and informed consent.
<b>OUTCOME</b>	1° condition and PBM can be managed resulting in optimal outcomes	Monitoring and ongoing management of 1° condition and PBM should be cost-effective.		
<b>OTHER DRIVERS</b>  <b>DATA</b> →	Evidence improving patient outcomes Variations in clinical practice and adherence to guidelines Default management decisions	Contain/reduce health costs The problem of excessive and inappropriate use of health resources	Appropriate Transfusion Stewardship of donor blood Patient informed consent and advocacy	Variable clinical contexts Wastage of donor blood  <a href="mailto:james.isbister@sydney.edu.au">james.isbister@sydney.edu.au</a>

# THE PBM JOURNEY



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# Patient Blood Management

**Pillar 1: Abnormalities**  
Diagnose &  
Treat or Tolerate

**Pillar 2: Bleeding**  
Prevent or Minimise

**Pillar 3: Tolerate abnormalities**  
by Harnessing & Optimising  
Physiological Reserves

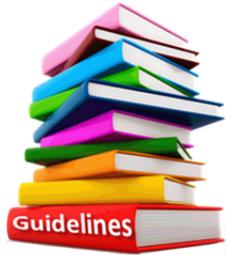
3 Pillar matrix

TOTAL PATIENT CLINICAL MANAGEMENT: Urgency, Diagnosis & Timeline [before → during → after]

<b>Evidence Base</b>	Haematological pathophysiology poorly understood and better evidence-base needed for therapy	Non-transfusion default unless evidence for transfusion benefit > risk	Good evidence-based Indications and guidelines for blood component therapy
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Good  
??  
Poor

## CLINICAL PATIENT BLOOD MANAGEMENT CATEGORIES



PERSONALISED MEDICINE → Monitor progress → Patient's clinical outcome

