SPECIAL ARTICLE

A Global Definition of Patient Blood Management

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While patient blood management (PBM) initiatives are increasingly adopted across the globe as part of standard of care, there is need for a clear and widely accepted definition of PBM. To address this, an expert group representing PBM organizations, from the International Foundation for Patient Blood Management (IFPBM), the Network for the Advancement of Patient Blood Management, Haemostasis and Thrombosis (NATA), the Society for the Advancement of Patient Blood Management (SABM), the Western Australia Patient Blood Management (WAPBM) Group, and OnTrac (Ontario Nurse Transfusion Coordinators) convened and developed this definition: "Patient blood management is a patient-centered, systematic, evidence-based approach to improve patient outcomes by managing and preserving a patient's own blood, while promoting patient safety and empowerment." The definition emphasizes the critical role of informed choice. PBM involves the timely, multidisciplinary application of evidence-based medical and surgical concepts aimed at screening for, diagnosing and appropriately treating anemia, minimizing surgical, procedural, and iatrogenic blood losses, managing coagulopathic bleeding throughout the care and supporting the patient while appropriate treatment is initiated. We believe that having a common definition for PBM will assist all those involved including PBM organizations, hospital administrators, individual clinicians and policy makers to focus on the appropriate issues when discussing and implementing PBM. The proposed definition is expected to continue to evolve, making this endeavor a work in progress. (Anesth Analg 2021;00:00–00)

GLOSSARY

AABB = Association for the Advancement of Blood & Biotherapies; **ABC** = Anemia, Blood loss and Coagulopathy; AMsect = American Society of Extracorporeal Technology; **ANH** = acute normovolemic hemodilution; **ASA** = American Society of Anesthesiologists; **ASPBM** = Asia-Pacific Society for Patient Blood Management; **AWGE** = Anemia Working Group Spain; **BMS** = Bloodless Medicine and Surgery; **COX2** = cyclooxygenase-2; **CSPBM** = Chinese Society for Patient Blood Management; **DOACs** = direct oral anticoagulants; **FIO_2** = fraction of inspired oxygen; **GI** = gastrointestinal; **Hb** = hemoglobin; **IFPBM** = International Foundation for Patient Blood Management; **KPBM** = Korean Society for Patient Blood Management; **KSA** = Korean Society of Anesthesiologists; **MSH** = Malaysian Society of Haematology; **NAS PBM** = National Association of Patient Blood Management Specialists Russia Federation; **NATA** = Network for the Advancement of Patient Blood Management, Haemostasis and Thrombosis; **NSAID** = nonsteroidal anti-inflammatory drug; **ONTraC** = Ontario Nurse Transfusion Coordinators; **PBM** = patient blood management; **PCC** = prothrombin complex concentrate; **PPI** = proton-pump inhibitor; **RCT** = randomized controlled trial; **SABM** = Society for the Advancement of Blood Management; **SANBS** = South African National Blood Service; **SCA** = Society of Cardiovascular Anesthesiologists; **SOP** = standard operating procedure; **WAPBM** = Western Australia Patient Blood Management; **WBC** = white blood cell; **WHO** = World Health Organization

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Several patient blood management (PBM) initiatives are being developed and implemented across the globe. While most tend to agree on the general principles governing PBM, lack of a clear, widely accepted definition may affect consistent implementation of PBM in different clinical settings. A definition is "a statement expressing the essential nature of something." This is important because it enables us to have a common understanding of the subject; and for all to be on the same page when discussing or reading about an issue. The purpose of a definition is to explain the meaning of a term that may be obscure or difficult, using terms that are commonly understood and whose meaning is clear. Definitions and terms serve as descriptors of care, and can help shape practice, education, and research. They also provide a framework for practice and a basis for collaboration and growth. As a diverse group with a common interest in PBM, our efforts in the field of interest have been hampered by the use of various terms and definitions, often used to emphasize one aspect in particular of PBM or a specific therapeutic intervention. Such intervention-focused definitions are limited in contributing to improved practice and patient outcomes. Therefore, an inclusive but concise definition will provide exact statements that can be used to define practice and lead to benchmarking and performance enhancement.

To address this, an expert group representing PBM organizations, from the International Foundation for Patient Blood Management (IFPBM), the Network for the Advancement of Patient Blood Management, Haemostasis and Thrombosis (NATA), the Society for the Advancement of Patient Blood Management (SABM), the Western Australia Patient Blood Management (WAPBM) Group, and ONTraC (Ontario Nurse Transfusion Coordinators), convened under the Global Definition Group, have been working to develop a global definition of PBM. SABM and NATA produced an initial draft that was discussed in person and by e-mail with the IFPBM and WAPBM groups. Once all had submitted suggestions and agreed on the proposed definition, endorsement by other relevant PBM organizations was sought.

BACKGROUND AND EVOLUTION OF PBM

Before the advent of allogeneic blood transfusion as a widely available and commonplace procedure, clinicians faced with patients at risk of bleeding and anemia often utilized effective strategies to manage and preserve a patient's own blood by treating anemia and giving meticulous attention to preventing and stopping bleeding.[1,2] Anemia had to be prevented and mitigated as transfusion was not an option.

With the emergence of transfusion medicine in the early 20th century, physicians found a quick and easy treatment that seemed to make the prior strategies of treating anemia and bleeding obsolete. Allogeneic blood transfusions were described as "life-saving" and became one of the most common but also overused invasive procedures performed in hospitals. Use of the term "life-saving" illustrates how terminology can influence practice.[3]

In the early 1960s, in what would become a paradigm shift in practice,[4] renowned cardiovascular surgeon Dr Denton Cooley pioneered what would come to be known as "bloodless surgery" to accommodate Jehovah's Witness patients' request for treatment without allogeneic transfusion. In doing so, his team applied one of the fundamental elements of evidence-based medicine, namely, "the integration of best research evidence with clinical expertise and patient values and preferences."[5] At a time when cardiovascular surgeries were notorious for their dependence on large volumes of allogeneic blood, Cooley et al[6] team adopted a 3-step approach: optimizing the patient's red cell mass preoperatively, utilizing surgical, anesthetic, and pharmacological techniques to minimize blood loss, and tolerating postoperative anemia. These would later evolve into the "three pillars of PBM."[7] Cooley[6,8,9] reported on over 12,000 surgeries without transfusion with positive patient outcomes.

Other clinicians adopted this approach, expanding modalities and techniques, some old, some new,[10,11] to manage and preserve the patient's own blood and accommodate patient choice. Modalities included erythropoietic support to increase hemoglobin (Hb) level, blood loss (related to surgical, procedural, and laboratory sampling as well as coagulopathies) minimized, and hemostasis optimized.[12–18] In time, bloodless medicine and surgery (BMS) programs emerged.[4,19,20] The key clinical "innovation" was combining different strategies and providing them in a coordinated peritreatment manner by a multidisciplinary team.[4,21–23] By the mid-1990s, there were already over 100 hospital-based programs or centers reported to exist across the globe (with over half of them in the United States).[24,25]

In time, all forms of complex surgery and medical conditions were being treated without resorting to blood transfusion. The outcomes were equivalent or better than matched patients with transfusion.[26–37] This led clinicians involved in these programs to extend the principles to their total patient populations.

The fundamental idea that medical care with little or no allogeneic blood is a possibility and does not necessarily lead to death or disability opened many doors. At the same time, mounting evidence has shown that allogeneic transfusion is independently associated in a risk-adjusted, dose-dependent relationship with increased morbidity, mortality, and

hospital length of stay.[38–55] There are also ongoing safety, health care cost, and supply challenges.[13,14,56–61]

Thus there is a strong driving force and duty (given the precautionary principle in medicine) to avoid or reduce transfusion whenever possible.[62,63] BMS programs provided the proof of concept that effective strategies can be used to reduce the dependency on allogeneic blood, even in acute severely anemic patients and in high blood loss procedures.[64–68]

However, there was resistance to the term "bloodless medicine and surgery" and the more generic term "blood conservation" became popular to communicate broader application.[10] Under the blood conservation concept, a patient's own blood is considered a highly valuable and limited resource that must be "conserved and managed appropriately."[69,70] While the term "blood conservation" is still commonly used,[71] the expanding list of modalities utilized (particularly those addressing the management of anemia and bleeding) go beyond the confinements of simple "conservation." This expanded thinking made the case for the more inclusive term "blood management."

Blood management appeared sporadically in the medical literature in the 1970s, primarily to refer to the supply management of blood from altruistic or paid donors. However, since then, it has reemerged as a concept related to the optimal management of the patient's own blood. Accordingly, "patient" was added to the term to underscore the "patient-centered" versus "product-centered" approach,[69,72] creating the term "patient blood management," which is increasingly in use today and seen as the new standard of care for all patients (Figure).[72–75] The original concept of the term was to focus attention on good clinical management of the patient's own blood, just like any other organ or organ system, and it was not about a specific intervention.

Good clinical medicine starts with a question (problem) not an answer (therapeutic management). For example, treating anemia alone without considering its mechanisms and underlying cause would not be expected to improve outcomes.[76–79] Although transfusion can be an effective therapy for the acute management of life-threatening blood loss, efforts should be made to preemptively identify the risks of blood loss and implement preventive strategies to reduce this risk.[80] Accordingly, PBM is not an intervention per se: It is not about transfusion thresholds, appropriate transfusion, intravenous iron, or any other specific therapeutic intervention. Rather, it is the application of the principles of good clinical medicine, which include, first of all, diagnosis, followed by the consideration of appropriate patient-specific therapeutic options for management of that patient's diagnosis, with patient engagement, shared decision-making, informed consent, and clinical follow-up. This overall approach is most likely to improve patient satisfaction and clinical outcome.

WHY PBM SHOULD NOT BE CENTERED ON TRANSFUSION

Beginning with a landmark randomized controlled trial (RCT) published in 1999,[81] almost 70 clinical trials

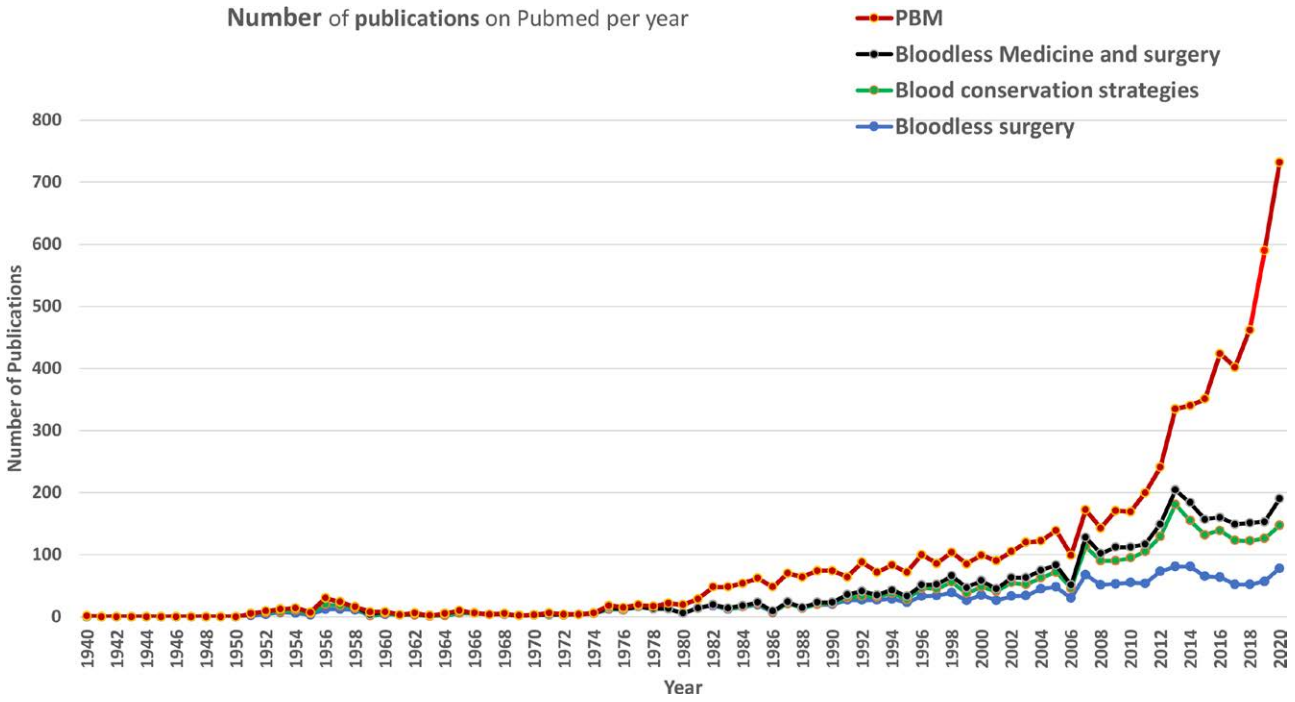

Figure. Growth in the annual number of publications indexed in PubMed focusing on PBM and related disciplines. PBM indicates patient blood management.

have been conducted comparing liberal versus restrictive transfusion strategies in various patient populations.[82–84] A 2020 overview of the evidence found that, in meta-analyses with high- to moderate-quality evidence, a restrictive transfusion strategy had a similar or superior outcome compared with a liberal transfusion strategy.[85]

However, a focus on appropriate transfusion and transfusion strategies can result in a practice that forgets that PBM is much more than a single therapeutic option. It has been demonstrated that appropriate transfusions can often be avoidable with PBM.[63] It is important to note that transfusion is a therapy administered to acutely treat an anomaly without addressing the underlying etiology. Even in the context of acute surgical blood loss, blood transfusions are only a supportive therapy with limited effectiveness and established safety concerns in the absence of surgical control of the source of bleeding. PBM, however, is an integrated and comprehensive strategy to provide patient care that aims to assess and address the etiology of those anomalies, when possible, rather than promoting a short-term therapy (transfusion) without addressing the underlying cause.[86]

Transfusion trials have been predominantly focused on comparing various transfusion thresholds, based on arbitrary Hb levels, without regard to the underlying etiology or the patient's tolerance to the low Hb level.[86,87]

While PBM has incorporated the concept of restrictive transfusion strategy from these trials as a guide to determine when a transfusion may be clinically indicated, PBM offers far more for the medical and surgical management of patients.[88–91]

Anemia has many causes, and it is often acquired or worsened during hospital stay.[76,92] Good clinical practice dictates that the underlying problem and mechanisms should be identified, diagnosed and, where possible, managed and treated appropriately. Iron deficiency and iron deficiency anemia require iron therapy.[93–96] Noniron deficiency anemia and anemia of inflammation require more nuanced management including identifying and addressing the underlying cause.[97–99] Here, an inflammatory response leads to an iron problem, an erythropoietin problem, a hemolysis problem, and possibly a hematinic problem. Accordingly, therapeutic options include intravenous iron, erythropoietin, and where appropriate, hematinics.[100,101]

Blood loss and bleeding are independently associated with adverse patient outcomes and have several possible causes.[13,76,102–104] Blood loss can result from surgical and medical interventions, laboratory blood draws, and bleeding due to coagulopathy. There are multiple logistical, surgical, anesthetic, pharmacological, and coagulation management (ie, the balance between clotting to death and bleeding to death)[105] strategies/therapies to minimize these blood losses as part of good clinical management and preservation of the patient's blood which improve patient outcomes.[17,106,107] When clinically indicated, and with the informed consent of the patient, the use of allogeneic blood components may also be considered an option.[108]

There are some 100 measures[109] making up this approach. They can be grouped under the problem-based "ABC Toolbox of PBM"—anemia, blood loss, and coagulation (Table 1).[110]

PAST AND PRESENT DEFINITIONS OF PBM: THEIR STRENGTHS AND WEAKNESSES

Simply stated, the end point of PBM is patient-centered, rather than blood product-centered, to achieve improved clinical outcomes and higher quality of care by consistently applying principles of patient safety.[111,112] The reduction or avoidance of transfusion can be viewed as a secondary or corollary effect of PBM and a surrogate measure of its effectiveness.[17]

The definition and application of PBM is a dynamic process and continues to evolve (Table 2).[17,113–120] One of the first formal definitions was put forward by SABM in 2007 and revised by SABM in 2012 to lessen the emphasis on the use of a product (blood), instead focusing on the patient or disease process by underscoring the key preemptive management strategies utilized under PBM. SABM currently defines PBM as "the timely application of evidence-based medical and surgical concepts designed to maintain Hb concentration, optimize hemostasis, and minimize blood loss in an effort to improve patient outcome."[113] A similar concept is captured in a consensus-developed definition used by the world's first health-system-wide PBM program in Western Australia and by IFPBM, "an evidence-based bundle of care that optimizes medical and surgical patient outcomes by clinically managing and preserving a patient's blood."[17,114] The SABM and WAPBM/IFPBM definitions have several elements in common. They do not include any specific intervention or modality, they are patient-focused, they include both medical and surgical patients, and the fundamental aim is to improve patient outcomes. Another deliberate key element is they include "evidence-based." As described earlier, the definition of evidence-based medicine includes "patient values and preferences." Patient engagement, shared decision-making, and informed consent are key components of modern health care. However, this important element of the definition is probably too subtle in these 2 definitions and is lost on many, as the common misconception is that evidence-based medicine refers to practice based on the latest evidence from clinical

Table 1. The ABC Toolbox for PBM

Tools	Anemia and iron deficiency	Blood loss and bleeding	Coagulopathy
1. Program implementation methodology	• Change culture across your institution • Disseminate evidence-based PBM guidelines/recommendations and detect and discourage nonevidence-based practices • Translate evidence-based guidelines/recommendations into clinical practice • Identify practice areas that need improvement		
2. Diagnostic devices	• Point-of-care hemoglobin analyzers • Point-of-care testing for iron deficiency if available	• Point-of-care coagulation and platelet function testing and goal-directed treatment • Rapid diagnostic tests for the presence of DOACs if available	• Point-of-care coagulation and platelet function testing and goal-directed treatment • Rapid diagnostic tests for presence of DOACs if available
3. Treatment devices		• Pre- and postoperative cell recovery (cell saver) • ANH	
4. Pharmaceuticals	• Oral/intravenous iron • Folic acid • Vitamin B12 • Erythropoiesis-stimulating agents • Educate physicians on indications and dosage	• Antifibrinolytics (tranexamic acid, aminocaproic acid) • Topical hemostatic agents • Local vasoconstrictive agents • WBC and platelet-stimulating agents where appropriate • Consider high F_{IO_2} (1.0) in patients with life-threatening anemia	• Fibrinogen concentrate • PCC • Other clotting factors • Vitamin K intravenously
5. Vigilance with nutritional and pharmacological interactions	Identify and manage drug therapies and/or nutrition that: • Can contribute to anemia and hematinic deficiencies (eg, PPIs) • Can increase iron absorption (eg, ascorbic acid) • Can impair absorption (eg, some vitamin and herbal supplements, tea, coffee, or dairy products)	Identify and manage drug therapies and/or nutrition thatincrease the bleeding risk, for example: • NSAIDs (including COX2 inhibitors), antidepressants, statins, antiarrhythmics • Vitamin and herbal supplements including vitamin E, vitamin K, garlic, ginger, Ginkgo biloba, fish oil, chamomile, dandelion root, etc	
6. General principles	Identify, evaluate, and manage anemia and iron deficiency: • Evaluate and manage underlying disorders causing anemia and iron deficiency • Be aware of drugs associated with red blood cell disorders • Anemia management program for prehospital, hospital, and postdischarge patients • Focus on patients with comorbidities (diabetes, chronic kidney disease, and congestive heart failure)	• Meticulous surgical hemostasis • Optimize surgical technique • Patient positioning • Efforts to stop bleeding immediately Minimally invasive surgical techniques Restrictive fluid administration and permissive hypotension until bleeding is controlled Achieving euvolemia once bleeding controlled Deliberate induced hypotension Careful blood pressure and fluid management Prevent hypothermia, hypoperfusion, and acidosis Maintaining normal circulating volume (euvolemia) • Minimize iatrogenic blood loss, minimize number of blood draws and volume, minimize volume of blood wasted (microtainers/small phlebotomy tubes) • Staging and packing • Interventional radiologic embolization • Restrictive transfusion strategy (reduce volume of transfusion, adhere to restrictive transfusion thresholds) • Watch for signs of postoperative bleeding • Monitor throughout withholding/bridging/recommencement of DOACs and antiplatelet agents • Prevent GI bleeding (enteral feeding/food, GI acid-lowering agents) • Avoid/treat infections promptly	• Address clinically significant coagulopathy early by identifying the source and/or coagulation defect
	• Identify patients and surgical procedures at increased risk for blood loss, anemia, and coagulopathy • Refer high-risk patients immediately to PBM program • Preoperative surgical planning to minimize extent and the time of surgery including preoperative embolization or noninvasive techniques • Postpone or cancel elective surgery to allow time to optimize blood health		

(*Continued*)

Table 1. Continued

Tools	Anemia and iron deficiency	Blood loss and bleeding	Coagulopathy
7. SOP and procedural guidelines	• SOPs for detection, evaluation, and management of anemia and iron deficiency for specific settings: • Pre- and postsurgery• Cancer • Heart failure• Chronic kidney disease • Pregnancy and postpartum • Pediatrics • Hospital-acquired anemia • Patients with iron-restricted erythropoiesis • Anemia of inflammation	• Management of anticoagulants and antiplatelet agents before interventions • Bleeding history-taking• Bleeding management algorithms • Procedural guideline for cell salvage • Procedural guideline for ANH • Maintaining normothermia • Major hemorrhage protocol • Guidelines on oral versus intravenous iron, iron preparations, and dosing • Establish "single-unit transfusion policy"	
8. Data collection, benchmarking, and reporting systems	• Patient-centered and data-driven decision-making • Measure the change with respect to patient outcomes/cost savings • Report the change		
9. Continuous education and training	• Multidisciplinary and multiprofessional programs organized and led by local champions • Regular updating of curricula/learning content • Ensuring introductory courses for new and junior staff		
10. Patient education, information, and consent	• Develop a simplified education management plan • Establish procedures for communicating with patients retreatment plan, risks/benefits, and obtaining consent • Communicate plan to all members of the team		
11. Infrastructure	• Appoint PBM staff and allocate/reallocate funds accordingly • Create job descriptions for PBM-dedicated staff• Install necessary medical devices and equipment • Re-engineer clinical pathways and infrastructure to allow appropriate preoperative/preintervention patient assessment and optimization • Ensure appropriate waiting zones and treatment areas particularly for preoperative/preintervention patient optimization • Form a multidisciplinary PBM committee		

From the IFPBM-SABM Workgroup; Shander et al.[26]

Abbreviations: ABC, Anemia, Blood loss and Coagulopathy; ANH, acute normovolemic hemodilution; COX2, cyclooxygenase-2; DOACs, direct oral anticoagulants; Fio_2, fraction of inspired oxygen; GI, gastrointestinal; IFPBM-SABM, International Foundation for Patient Blood Management-Society for the Advancement of Blood Management; NSAID, nonsteroidal anti-inflammatory drug; PBM, patient blood management; PCC, prothrombin complex concentrate; PPI, proton-pump inhibitor; SOP, standard operating procedure; WBC, white blood cell.

trials. Accordingly, this is a deficiency with these 2 definitions of PBM.

The strength of the WAPBM definition is that it highlights a bundle of care, not a bundle of interventions. Many of the strategies of PBM relate to evaluation, diagnosis, and monitoring. However, the term bundle of care is commonly seen as being quite prescriptive, confined to a small straightforward set of practices. PBM is broader and more nuanced. The SABM definition seeks to define the framework of care by including the important concept that PBM is a multiprofessional team approach. An important element in the WAPBM/IFPBM definition is "clinically managing and preserving a patient's blood." Clinically speaking, management has always included diagnosis, treatment, and follow-up[78] which are key components of the PBM concept.

Other definitions have emerged (Table 2) that variously include some of the elements of these 2 definitions. Some add the concept of a "multidisciplinary approach," a key element of PBM. However, several definitions retain a single intervention or product focus, which is not consistent with the concept of PBM. Additionally, definitions that include limiting terms such as "patients who might need blood" excludes many other patients who would benefit from PBM modalities, not only those about to undergo an invasive procedure with high risk for transfusion. For example, an estimated 2.4 billion people across the globe are anemic.[121] Of these, it is estimated that 1.2 billion have iron deficiency anemia.[100,121–123] While difficult to determine, it is suggested that those suffering from iron deficiency without anemia could be at least double those with iron deficiency anemia.[124] If correct, it may mean that up to 2.4 billion people globally suffer the debilitating effects of iron deficiency and iron deficiency anemia. Many of these patients are probably not "in need of a transfusion" but they are definitely in need of PBM. Iron deficiency and iron deficiency anemia are major issues in women's health, including in relation to heavy menstrual bleeding and pregnancy.[125] No country is on target to meet the World Health Organization (WHO) global target of a 50% reduction in the percentage of women with anemia by 2025.[126] This is an unmet need that PBM can address.

A product-focused definition also excludes patients in low-income countries where blood is simply not available or, if it is, has a high risk of

Table 2. Current Definitions of Patient Blood Management[24,96–103]

Organization	Definition	Date first published
SABM (early)[96]	"Appropriate provision and use of blood, its components and derivatives, and strategies to reduce or avoid the need for a blood transfusion, with the ultimate goal of improved patient outcome"	2007
SABM (current)[96]	"The timely application of evidence-based medical and surgical concepts designed to maintain Hb concentration, optimize hemostasis, and minimize blood loss in an effort to improve patient outcome"	2012
Western Australia PBM Group[24]	"An evidence-based bundle of care that optimizes medical and surgical patient outcomes by clinically managing and preserving a patient's own blood"	2016
IFPBM[97]	"An evidence-based bundle of care that optimizes medical and surgical patient outcomes by clinically managing and preserving a patient's own blood"	2016
WHO[98]	"A set of evidence-based practices to optimize medical and surgical patient outcomes through preservation of the patient's own blood	2020
AABB[99]	"An evidence-based, multidisciplinary approach to optimizing the care of patients who might need transfusion. PBM encompasses all aspects of patient evaluation and clinical management surrounding the transfusion decision-making process, including the application of appropriate indications, as well as minimization of blood loss and optimization of patient red cell mass. PBM can reduce the need for allogeneic blood transfusions and reduce health care costs, while ensuring that blood components are available for the patients who need them"	2021
Joint UK Blood Transfusion and Tissue Transplantation Services Professional Advisory Committee[100]	"A multidisciplinary, evidence-based approach to optimising the care of patients who might need a blood transfusion. PBM puts the patient at the heart of decisions made about blood transfusion to ensure they receive the best treatment and avoidable, inappropriate use of blood and blood components is reduced"	2021
National Blood Authority (Australia)[101,102]	"PBM aims to improve clinical outcomes by avoiding unnecessary exposure to blood components. It includes the three pillars: optimisation of blood volume and red cell mass; minimisation of blood loss; and optimisation of the patient's tolerance of anaemia"	2021
Australia Commission on Safety and Quality in Health Care[103]	"PBM takes an individualised, multidisciplinary approach to the management of a patient's blood, through assessment and the development of a management plan to: Optimise a patient's own blood (identify and address the health conditions that might lead to a blood transfusion such as anaemia or iron deficiency); minimise blood loss (such as surgical techniques that reduce blood loss); and optimise tolerance of anaemia (with appropriate management, the body may tolerate anaemia without resorting to blood transfusion"	2021

Abbreviations: AABB, Association for the Advancement of Blood & Biotherapies; IFPBM, International Foundation for Patient Blood Management; PBM, patient blood management; SABM, Society for the Advancement of Blood Management; WHO, World Health Organization.

transfusion-transmitted disease. As such, a definition that is tied to a single intervention (such as transfusion, or to those who may be in need of transfusion) cannot accurately represent the globally applicable PBM practice framework.

Nor is PBM narrowly confined to putting "the patient at the heart of transfusion decisions" as suggested by one definition (Table 2). Such a definition confines PBM to a single intervention and reduces it to an "appropriate transfusion"–based concept.

Finally, almost all current definitions fail to include the key element of patient empowerment and informed consent. It is included in the description of PBM in the Australian Patient Blood Management Guidelines, but is not part of a formal definition of PBM and can easily be overlooked. Given the wide variety of definitions proffered, and the strengths and weaknesses of all, a clear, all-encompassing definition that captures the true concept of patient-focused PBM is needed. Such a definition is likely to contribute to improved clinical practice and patient outcomes as demonstrated by PBM programs based on these multidisciplinary multimodal concepts.[17,127]

PROPOSED KEY CONCEPTS TO BE INCLUDED IN A GLOBAL DEFINITION OF PBM

- A patient-centered approach. First and foremost, PBM aims to improve patient outcomes while adhering to the principles of patient safety and good clinical medicine. All efforts made by all personnel are centered on the patient and not on the process. The patient is given the power to intervene. Patient values, preferences, and choices are central to the process. Accordingly, informed consent is also central to PBM. To quote Sir William Osler, "The good physician treats the disease, the great physician treats the patient who has the disease."
- A comprehensive approach to anemia and blood homeostasis. This includes the diagnosis and management of all patients with anemia of any cause (eg, iron deficiency, acute and chronic inflammation) as well as deficiencies of other components of the patient's blood, minimization of blood losses and preserving the patient's own blood before (eg, cessation of anticoagulant or antiplatelet therapy, correction

of a coagulopathy), during (eg, blood-sparing techniques and drugs, correction of a coagulopathy), and after (eg, blood-sparing techniques and drugs, correction of a coagulopathy) any treatment, and the optimal management of post-treatment anemia (optimizing the patient's and provider's tolerance of anemia, correcting anemia when required, minimizing iatrogenic losses, etc). It includes application of these principles to the health and wellness of the general population even when no hospital admission is contemplated.

- An evidence-based approach. This approach emphasizes the integration of the best available research evidence with clinical expertise and patient values and preferences.[5]
- A multidisciplinary approach. PBM is an integrated, institutional (hospital or other health care setting) approach to blood homeostasis. Physicians, nurses, perfusionists, respiratory therapists, pharmacists, administrators, governments, etc, are all involved in the implementation of PBM.
- A preventive approach. PBM underscores the importance of giving precedence to prevention over treatment whenever possible (eg, preventive measures for anemia, coagulopathy, blood losses).
- A focus on patient outcomes rather than choice of treatments. Finally, focus on a default treatment modality/option such as transfusion or any other single intervention should be precluded from a global definition of PBM. Treatment modalities are only intermediate variables that will vary in different settings and with time, while improved patient outcomes (quality of life and reduced morbidity and mortality) are the essence of PBM.[128]

THE PROPOSED GLOBAL DEFINITION OF PBM

In view of the above, the Global Definition of PBM as endorsed by NATA, SABM, IFPBM, WAPBM, the American Society of Anesthesiologists' (ASA) Committee on PBM, the Asia-Pacific Society for Patient Blood Management (ASPBM), the Chinese Society for Patient Blood Management (CSPBM), the Korean Society for Patient Blood Management (KPBM), the Korean Society of Anesthesiologists (KSA), the Malaysian Society of Haematology (MSH), the Canadian Ontario Nurse Transfusion Coordinator (ONTraC) Program, the South African National Blood Service (SANBS), National Association of Patient Blood Management Specialists Russia Federation (NAS PBM), the American Society of Extracorporeal Technology (AmSECT), the Anemia Working Group Spain (AWGE), and the Society of Cardiovascular Anesthesiologists (SCA) reads as follows:

> Patient blood management is a patient-centered, systematic, evidence-based approach to improve patient outcomes by managing and preserving a patient's own blood, while promoting patient safety and empowerment.

A glossary of the terms used in the definition is provided in Table 3. The definition emphasizes the critical role of informed choice. PBM involves the timely, multidisciplinary application of evidence-based medical and surgical concepts aimed at (1) screening for, diagnosing and appropriately treating anemia, (2) minimizing surgical, procedural, and laboratory sampling blood losses and managing coagulopathic bleeding throughout the care episode, and (3) supporting the patient while appropriate treatment is initiated. We believe the proposed definition captures all these concepts and more with comprehensive brevity.

Table 3. Glossary of Terms and Definitions

Term	Definition
Patient	Includes both surgical and medical patients
Blood management	An extensive list of options and measures for PBM should be considered and employed to proactively manage and preserve the patient's own blood
Patient-centered	Providing care that is respectful of and responsive to individual patient preferences, needs, and values, and ensuring that patient values guide all clinical decisions
Systematic	An organized uniform approach should be employed acting methodically according to an organized multidisciplinary team plan or system
Evidence-based	The integration of the best available research evidence with clinical expertise and patient values and preferences
Outcomes	The desired patient-centered outcomes, for example, decreased morbidity and mortality, shorter length-of-stay, should be clearly delineated
Managing	Includes diagnosis, treatment, and follow-up. Diagnose any blood failures such as anemia, deficiencies, coagulopathies, thrombocytopenia, etc; treat/correct, where possible, underlying conditions and deficiencies, monitor and follow-up
Preserving the patient's own blood	All appropriate measures to preserve the patient's blood should be applied, including surgical, procedural, iatrogenic, and coagulopathic blood losses and patient-specific tolerance of anemia when consistent with patient safety
Safety	The patient's safety, including avoidance of preventable harm, and benefit/risk calculation should be paramount
Patient empowerment	Patients should be preemptively informed of their diagnosis, prognosis, treatment options, and alternatives, including benefits and risks of receiving or declining therapies; they should actively participate in decision-making and informed consent should be obtained and documented

Abbreviation: PBM, patient blood management.

Emanating from this medically oriented, comprehensive definition, we further propose a shorter version for use by laypersons:

> Patient blood management is a patient-centered and organized approach in which the entire health care team coordinates efforts to improve results by managing and preserving a patient's own blood.

Patient values, preferences, and choices are central to the process. PBM involves the application of the best therapies (and at times, withholding unwarranted interventions) to manage and preserve a patient's own blood through the timely management of anemia and the prevention or control of any source of blood loss.

CONCLUSIONS

The expansion of PBM worldwide has been gaining momentum over the past few years. With the current ongoing pandemic, it is likely that the role of PBM will become even more
important given the heightened attention on the potential risks of transfusion and possible constraints on blood supply. PBM is endorsed by the WHO and PBM strategies are being implemented in many countries around the globe. This is why IFPBM, NATA, SABM, WAPBM, ASA, ASPBM, CSPBM, KPBM, KSA, MSH, ONTraC, SANBS, NAS PBM, AmSECT, AWGE, and SCA have formed the "Global Definition Group."

We believe that having a common definition for PBM will assist all those involved (PBM organizations, hospital administrators, individual clinicians including primary care physicians, etc) focus on the appropriate issues when discussing, teaching, and implementing PBM, thereby contributing to improved patient care and outcomes. The definition emphasizes a patient-centered, global, evidence-based, multidisciplinary, and interprofessional approach. Prevention must be given precedence over treatment whenever possible, and emphasis on a single treatment modality such as transfusion is not part of the definition. The definition will evolve with time as science, medical practice, and patient preoccupations, priorities, and preferences evolve. Accordingly, those involved in the preparation of this definition call upon all stakeholders including other PBM organizations to join them and reconvene to review and revise the definition over the coming years.

DISCLOSURES

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