

WSHA/COAP Patient Blood Management Cardiac Surgery Best Practice Initiative

Implementation Tool

BEST PRACTICE PATIENT BLOOD MANAGEMENT IMPLEMENTATION TOOL

The following are minimum indicators recommended by international multidisciplinary specialists in the field of Patient Blood Management. Your hospital may already have implemented many of these measures in your daily practice. They are provided in the following tables as recommendations to complete your PBM development as well as a validation by expert professional networks. When these indicators or measures are incorporated into a hospital based PBM program, improved patient outcomes and transfusion reduction are realized. No single measure alone produces these outcomes; but in coordination with all measures.

PREOPERATIVE/INTRAOPERATIVE AND POSTOPERATIVE: Best Practice Patient Blood Management Implementation tool

The following document is intended for the use of the MULTIDISCIPLINARY **SURGICAL** professionals associated with the **adult** cardiac surgery patient. The indicators primarily used in this document come from the Society for the Advancement of Blood Management Administrative and Clinical Standards Edition 4. The indicator validation is confirmed from the leading professional organizations identified in the columns to the right of the indicators. The authors of this document strongly emphasize that although the **infrastructure** of a Patient Blood Management hospital based program are not mentioned in this document or the following table, they **are essential for the support** and delivery of effective PBM care in all disciplines, including cardiac surgery. Some of this infrastructure includes but is not limited to the following concerns:

- 1 Leadership and Program Structure**
- 2 Consent Process and Patient Directives**
- 3 Blood Administration Safety**
- 4 Review and Evaluation of the Patient Blood Management Program**
- 5 Transfusion Guidelines and Peer Review of Transfusions Standard**
- 6 Preoperative Anemia Evaluation and Readiness for Surgery**
- 7 Perioperative Autologous Blood Collection for Administration (NOTE: this is NOT preoperative autologous donation)**
- 8 Phlebotomy Blood Loss**
- 9 Minimizing blood loss associated with surgery, procedures, coagulopathy or antiplatelet/antithrombotic medications**
- 10 Massive Hemorrhage Protocol**
- 11 Management of Anemia in Hospitalized Patients**
- 12 Management of Anemia in Non-surgical Outpatients**
- 13 Patient Blood Management for Pediatric Patients**

Although you will succeed in reducing variance in transfusion rates for cardiac surgery programs throughout the state if adopting the following indicators; by incorporating the above standards for all patients in your hospitals as a standard of care, you will see measurable change in delivery of care and outcomes as the culture of your institution shifts into Patient Blood Management. Refer to <https://www.sabm.org/publications> and download the “Administrative and Clinical Standards for Patient Blood Management Programs” for more information on the above standards.

PREOPERATIVE/INTRAOPERATIVE AND POSTOPERATIVE: Best Practice Patient Blood Management Implementation tool

The following documents are identified in the COLUMNS.

NOTE: “+” indicates confirmation that this indicator is positively identified as a recommendation in the document listed

The following documents were selected due to the level of expert endorsement by internationally recognized professionals and societies (multidisciplinary experts in their field). These columns of validation for the indicators listed are a fraction of what is available in profession publications over the past 20 years.

- **SABM:** Society for the Advancement of Blood Management Administrative and Clinical Standards (Edition 3 available, Edition 4 in print 2017)
<https://www.sabm.org/publications#adminstandards>
- **ASA:** American Society of Anesthesiology
 - American Society of Anesthesiologists Task Force on Perioperative Blood Management.. ***Practice guidelines for perioperative blood management: an updated report by the American Society of Anesthesiologists Task Force on Perioperative Blood Management****. Anesthesiology. 2015 Feb; 122(2):241-75.
- **STS:** Society of Thoracic Surgeons and The Society of Cardiovascular Anesthesiologists
 - Society of Thoracic Surgeons Blood Conservation Guideline Task Force., Ferraris VA, Brown JR, Despotis GJ, Hammon JW, Reece TB, Saha SP, Song HK, Clough ER; Society of Cardiovascular Anesthesiologists Special Task Force on Blood Transfusion., Shore-Lesserson LJ, Goodnough LT, Mazer CD, Shander A, Stafford-Smith M, Waters J; International Consortium for Evidence Based Perfusion., Baker RA, Dickinson TA, FitzGerald DJ, Likosky DS, Shann KG. ***2011 update to the Society of Thoracic Surgeons and the Society of Cardiovascular Anesthesiologists blood conservation clinical practice guidelines***. Ann Thorac Surg. 2011 Mar; 91(3):944-82.
- **AABB:** AABB PBM Standards (2ND Edition 2018)
 - <https://marketplace.aabb.org/ebusiness/Marketplace/Standards-for-a-Patient-Blood-Management-Program-1st-edition/ProductDetail/2003925>
- **NBA:** Patient Blood Management Guidelines: National Blood Authority Australia (2010-2016)
 - <https://www.blood.gov.au/pbm-guidelines>
- **JC PBM:** Implementation Guide for The Joint Commission Patient Blood Management Performance Measures 2011
 - http://www.jointcommission.org/assets/1/6/pbm_implementation_guide_20110624.pdf
- **PBM BUN:** Meybohm P, Richards T, Isbister J, Hofmann A, Shander A, Goodnough LT, Muñoz M, Gombotz H, Weber CF, Choorapoikayil S, Spahn DR, Zacharowski K. ***Patient Blood Management Bundles to Facilitate Implementation***. Transfus Med Rev. 2017 Jan; 31(1):62-71.
- References are found below each table

PREOPERATIVE: Best Practice Patient Blood Management Implementation tool

INDICATOR	“#.#” indicates location in document the indicator is referenced “+” indicates the document confirms the indicator						
	SABM	ASA	STS	AABB	NBA	JC PBM	PBM BUN
The hospital has a document readily available for competent adult patients to sign that functions as a directive establishing the decision to decline transfusion	2.3			5.2			
The document declining transfusion clearly delineates which competing clinical strategies or alternatives to allogeneic transfusion are acceptable to the patient. Alternatives include, but are not limited to, autologous transfusion modalities, human derived growth factors, essential cofactors (e.g. iron, B12, and folic acid) for red cell production, recombinant products, factor concentrates, and blood derivatives and fractions	2.4			5.2			
Processes allow clinical staff involved in the care of patients to quickly and easily identify competent adult patients who have declined blood transfusions.	2.6			5.4-5			
There is a list of elective surgical procedures for which preoperative anemia management screening is required	6.1	+				PBM-06	B-2
Patients who are having a procedure for which preoperative screening is required are identified and assessed at least three to four weeks prior to surgery to allow sufficient time to diagnose and manage anemia, unless the surgery is of an urgent nature and must be performed sooner	6.2	+	+	5.4-5	Module 2	PBM-06	B-2
Screening and subsequent laboratory testing is performed to detect anemia and allow diagnosis of the common causes of anemia including iron deficiency anemia, anemia of inflammation (functional iron deficiency), anemia of chronic renal disease, and folate or vitamin B12 deficiency	6.3	+	+	5.4-5	Module 2		B-2
A process is in place to ensure that laboratory data have been reviewed. Additional clinical evaluation and laboratory testing is conducted and a referral to a specialist is made as necessary for patients with moderate to severe anemia or anemia of unclear etiology.	6.4	+	+	5.4-5	Module 2		B-2
Pre-operative evaluation should include review of the patient’s medical history, medications including anticoagulant and anti-platelet medications, and co-morbidities, especially those associated with anemia, iron deficiency, or increased risk of bleeding	6.5	+	+	5.4-5	Module 2		B-2
Guidelines for treatment of preoperative anemia and iron deficiency without anemia are defined and available	6.6	+	+	5.4-5	Module 2		B-2
Outpatient treatment with parenteral iron and/or erythropoiesis-stimulating agents occurs when clinically Indicated. Timing of treatment is appropriate to the scheduled surgery date	6.7	+	+	5.4-5	Module 2		B-2
Elective surgery is deferred and rescheduled in anemic patients when the anemia is reversible if insufficient time is available to correct the anemia before surgery unless the need for surgery is urgent. This decision is the responsibility of the surgeon in consultation with the medical director of the anemia management program.	6.10	+	+		Module 2		B-2

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The results of preoperative anemia screening and the management plan are communicated to the referring surgeon and the primary care physician on a timely basis	6.8	+	+	5.4-5	Module 2		B-2
Patients treated for preoperative anemia are followed in the postoperative period to ensure continued management of their anemia during their hospital admission and after discharge.	6.9						
There is a mechanism to identify patients at increased risk for transfusion, or who refuse transfusions. Additional measures such as use of microtainers and/or point of care testing and reduction in daily or routine labs orders are considered in order to further minimize blood loss in these patients.	8.2	+	+	5.4-5	Module 2		B-2
There should be appropriate referral and consultation protocols in place to assist in the management of patients on anticoagulant and antithrombotic medications or with a history of significant bleeding or coagulation abnormalities.	9.6	+	+		Module 2		B-2
Guidelines exist for bridging or reversal of therapeutic anticoagulant and antiplatelet therapy that balance bleeding risk against the need for ongoing antithrombotic therapy.	9.7	+	+		Module 2		B-2
Clinical leaders of the patient blood management program have knowledge and experience in the recognition, diagnosis, and management of anemia	11.1						
There is a policy requiring that anemia be documented as part of the early clinical assessment of all patients	11.2						
Hospital protocols facilitate appropriate diagnosis, evaluation, and management of anemia Management strategies help minimize the likelihood of transfusion	11.3	+	+				
Clinical consultation is available to provide recommendations for evaluation and treatment of anemia	11.4	+	+				B-2
There are guidelines for the use of intravenous iron for treatment of iron deficiency with or without anemia	11.5	+	+				B-2
There are guidelines for the use of erythropoietic stimulating agents	11.6	+	+				B-2
The program has defined treatment guidelines and protocols for managing iron deficiency anemia, anemia of chronic inflammation and anemia associated with chronic kidney disease. These protocols are evidence-based and reviewed at regular intervals and accepted by the patient blood management or other suitable committee	12.5	+	+	5.4-5			B-2

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INTRAOPERATIVE: Best Practice Patient Blood Management Implementation tool

INDICATOR	“#.#” indicates location in document the indicator is referenced “+” indicates the document confirms the indicator						
	SABM	ASA	STS	AABB	NBA	JC PBM	PBM BUN
There is a written mission, vision and values statement that describes the purpose of the program and how it fits the institution’s mission and values	1.1						
The scope of service defines the clinical areas affected by the program	1.2		+				+
Written interdepartmental policies and procedures guide practice and process	1.4						+
Clinical protocols and guidelines approved by the medical director and program manager, and appropriate medical staff or other hospital committees are written, followed and available to the staff at all times.	1.5		+	5.1			+
There is a comprehensive education program targeting physicians, mid-level providers, nurses, pharmacists and other ancillary health care staff regarding the blood management program’s goals, structure, and scope. Educational activities occur at least annually.	1.6		+	5.1	Module 2		+
There is education of new clinical personnel regarding the patient blood management program’s goals, structure, and scope as part of the hospital’s orientation program for newly hired personnel.	1.7			5.1			+
Quality and outcome measures are identified and defined by the medical director and program manager, with data collection and reporting to the hospital quality improvement committee as scheduled	1.8		+	5.1; 5.10			+
Processes allow clinical staff involved in the care of patients to quickly and easily identify competent adult patients who have declined blood transfusions.	2.6			5.2; 5.5		+	+
For those competent adult patients entering the hospital with a previously executed blood refusal advance directive, confirmation of that patient’s continued desire to refuse transfusion is obtained and documented. If the competent adult patient is unconscious or incapacitated, the advance directive is honored	2.7					+	
Education on religious proscriptions against blood transfusion is available to all providers	2.9						
Policies and procedures for ordering, dispensing, and transfusing blood are in compliance with applicable College of American Pathologists (CAP) requirements, AABB standards (see reference), applicable state regulations, and standards of The Joint Commission or other regulatory or accrediting agency. (NOTE: The hospital blood bank is not required to be CAP or AABB accredited to be in compliance with this indicator)	3.1	+		1.3; 5.4		+	+

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Individuals working in areas that require skills in administration of allogeneic blood transfusions for patient care will satisfy the requirements of an education process defined by the hospital prior to independent administration of blood products. These individuals will demonstrate appropriate transfusion skills while working with a preceptor before acting independently	3.2			2.1			
Transfusion administration policies and procedures are followed and are consistent with safe transfusion practices as defined by REGULATORY agencies (eg AABB, CAP, JC, DOH)	3.3			2.1	Module 2	+	+
Only individuals qualified by means of education, training, or experience administer blood transfusions. Competency of all such individuals is reviewed at defined intervals.	3.5			2.1			+
Written policies and procedures address all perioperative autologous blood collection/recovery modalities offered at the hospital. These documents are approved by the chair of anesthesiology and the patient blood management medical director (NOTE: this is NOT preoperative autologous donation)	7.1	+	+	3.2; 5.6	Module 2		+
Available methods for autologous blood collection/recovery are described in detail	7.2	+	+	5.6	Module 2		+
Indications and contraindications for the use of perioperative autologous blood collection/recovery are described (NOTE: this is NOT preoperative autologous donation)	7.3	+	+	5.6	Module 2		+
There is a list of procedures for which perioperative autologous blood collection/recovery is recommended (NOTE: this is NOT preoperative autologous donation)	7.4	+	+	5.6	Module 2		+
There are written exclusion criteria for patients who are not candidates for acute normovolemic hemodilution	7.5	+	+	5.6	Module 2		+
The hemodynamics of patients undergoing acute normovolemic hemodilution are monitored during collection	7.6	+	+	5.6	Module 2		+
A procedure for reinfusion of collected/recovered autologous blood is defined	7.7	+	+	5.6	Module 2		+
The volume of autologous blood collected/recovered, processed, and reinfused is documented.	7.8	+	+	5.6	Module 2		+
Labeling and storage requirements of perioperative autologous blood collections are defined and consistent with local, state and federal requirements. Any deviation is documented, including the rationale for the deviation (NOTE: this is NOT preoperative autologous donation)	7.9	+	+	5.6	Module 4		+

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There is a quality assurance program to ensure that perioperative autologous blood collection is indicated, cost-efficient, effective, and safe (NOTE: this is NOT preoperative autologous donation)	7.10	+	+	5.6	Module 4		+
Personnel involved in the collection, processing and administration of perioperative autologous blood are qualified on the basis of education and training. Competency is documented and evaluated at least annually (NOTE: this is NOT preoperative autologous donation)	7.12		+	5.6	Module 4		+
Equipment and supplies used in the perioperative program are validated before initial use, properly maintained, and revalidated after any major service or repair	7.13			4.0	Module 4		+
If perioperative autologous blood recovery is carried out as a contracted service from an outside provider, the outside provider is in compliance with this standard (NOTE: this is NOT preoperative autologous donation)	7.14	+		4.2	Module 2		+
Policies and procedures are defined that minimize intraoperative blood loss and blood loss associated with invasive procedures.	9.1		+		Module 2		+
There are guidelines for intraoperative use of pharmacologic agents such as factor concentrates, antifibrinolytic agents, topical sealants and other systemic and topical hemostatic agents and medications to minimize blood loss.	9.2		+	5.5	Module 2		+
The patient blood management program medical director is actively involved in selection of clotting factor concentrates, topical hemostatic agents, tissue adhesives, and pharmacologic agents, including anti-fibrinolytic and pro-hemostatic agents that limit blood loss	9.3		+	1.1	Module 2		+
Hospital coagulation testing services have the capability to adequately assess and characterize a patient’s hemorrhagic risk factors, assess the level of therapeutic anticoagulation and platelet inhibition and assist in the rapid diagnosis of the likely etiology of coagulopathy in an actively bleeding patient. Results are available in a clinically useful timeframe	9.4	+	+	5.5	Module 2		+
Guidelines exist for bridging or reversal of therapeutic anticoagulant and antiplatelet therapy that balance bleeding risk against the need for ongoing antithrombotic therapy.	9.7	+	+	5.5	Module 2		+
Where available and clinically appropriate, peri-procedural autologous blood collection and administration is used to minimize the need for allogeneic red cells	10.9	+	+	5.5	Module 2		+
Clinical strategies to optimize hemodynamics and oxygenation are followed before red cell transfusion is considered	11.8	+	+	5.5	Module 2		+
Transfusion of blood and/or components is never used for volume repletion, or to treat anemia that can be treated with specific hematinic medications	11.9				Module 2		+

FOR MTP ISSUES SEE POSTOPERATIVE STANDARDS

INTRAOPERATIVE: Best Practice Patient Blood Management Implementation tool

ADDITIONAL SIGNIFICANT INTRAOPERATIVE REFERENCES Primary citations noted on page 2

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POSTOPERATIVE: Best Practice Patient Blood Management Implementation tool							
INDICATOR	“#.#” indicates location in document the indicator is referenced “+” indicates the document confirms the indicator						
	SABM	ASA	STS	AABB	NBA	JC PBM	PBM BUN
There is a comprehensive education program targeting physicians, mid-level providers, nurses, pharmacists and other ancillary health care staff regarding the blood management program’s goals, structure, and scope. Educational activities occur at least annually.	1.6			5.1			
A hospital-wide policy requires written informed consent for transfusion that documents a discussion about the risks, benefits and competing clinical strategies or alternatives to transfusion	2.1			5.2		+	+
A hospital-wide policy supports and respects the right of competent adult patients to decline blood transfusion. The policy addresses the rights of patients who are minors	2.2			5.2		+	
The hospital has a document readily available for competent adult patients to sign that functions as a directive establishing the decision to decline transfusion	2.3					+	
The document declining transfusion clearly delineates which competing clinical strategies or alternatives to allogeneic transfusion are acceptable to the patient. Alternatives include, but are not limited to, autologous transfusion modalities, human derived growth factors, essential cofactors (e.g. iron, B12, and folic acid) for red cell production, recombinant products, factor concentrates, and blood derivatives and fractions	2.4		+			+	
All patients have access to information regarding the risks and benefits of blood transfusion as well as the risks and benefits of refusing a transfusion. The information includes those competing clinical strategies or alternatives to blood transfusion that are available and applicable to that patient	2.5			5.2		+	
Patients treated for preoperative anemia are followed in the postoperative period to ensure continued management of their anemia during their hospital admission and after discharge.	6.9			5.5	Module 2	+	
Hospital policies and processes that pertain to phlebotomy for diagnostic laboratory samples address the importance of obtaining only the minimum volume of blood necessary to carry out the ordered laboratory tests and ordering the minimum number of tests needed to manage the patient clinically	8.1		+	5.4	Module 2		+
There is a mechanism to identify patients at increased risk for transfusion, or who refuse transfusions. Additional measures such as use of microtainers and/or point of care testing and reduction in daily or routine labs orders are considered in order to further minimize blood loss in these patients.	8.2		+	5.5	Module 2		+
The initial volume of blood withdrawn from an in-dwelling line or catheter if unsuitable for laboratory testing due to dilution or contamination by medications or intravenous fluids, is returned to the patient whenever possible	8.3		+		Module 4		

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If it is not possible to reinfuse blood unsuitable for laboratory testing, processes are in place to minimize the amount of blood that must be discarded	8.5		+		Module 4		
Individuals who reinfuse blood that is unsuitable for laboratory testing are trained and deemed competent according to policy and procedure guidelines. Aseptic technique is used to ensure sterility	8.4		+		Module 4		
The laboratory selects the smallest collection tube size that is practical for the test that is ordered and the instrumentation in the laboratory	8.6		+		Module 2		+
The Patient Blood Management Program in coordination with the laboratory and clinical leadership reviews the frequency of inadequate and mislabeled samples in addition to test ordering patterns and sample requirements to decrease the need to resample, reduce unnecessary tests and minimize sample volume.	8.7			5.4	Module 4		
Hospital coagulation testing services have the capability to adequately assess and characterize a patient’s hemorrhagic risk factors, assess the level of therapeutic anticoagulation and platelet inhibition and assist in the rapid diagnosis of the likely etiology of coagulopathy in an actively bleeding patient. Results are available in a clinically useful timeframe	9.4	+	+	5.5	Module 2		+
Guidelines encourage early definitive intervention and treatment of acute hemorrhage. Where clinically appropriate, this includes early return to the operating room for correction of a surgical source of bleeding, early referral for interventional radiology and embolization, and early use of Endoscopy/colonoscopy and cystoscopy for gastrointestinal hemorrhage or genitourinary hemorrhage.	9.5	+	+	5.5; 5.9	Module 2		+
There should be appropriate referral and consultation protocols in place to assist in the management of patients on anticoagulant and antithrombotic medications or with a history of significant bleeding or coagulation abnormalities.	9.6	+	+		Module 2		+
Guidelines exist for bridging or reversal of therapeutic anticoagulant and antiplatelet therapy that balance bleeding risk against the need for ongoing antithrombotic therapy.	9.7	+	+		Module 2		+
Criteria are defined for initiating and discontinuing the massive transfusion protocol	10.1	+		5.9	Module 1		+
Responsibility for management of coagulopathy is defined	10.3	+	+		Module 1		+
The massive transfusion protocol includes guidelines for management of acidosis, hypocalcemia and hypothermia	10.5	+		5.9	Module 1		+
The massive transfusion protocol includes guidelines for transfusion of red blood cells, plasma, platelets, cryoprecipitate, and factor concentrates	10.6	+		5.9	Module 1		+

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There is a mechanism for multi-disciplinary quality review of complex cases involving massive transfusion	10.10	+		5.9	Module 1		+
Hospital protocols facilitate appropriate diagnosis, evaluation, and management of anemia Management strategies help minimize the likelihood of transfusion	11.3		+		Module 2	+	+
There is a policy requiring that anemia be documented as part of the early clinical assessment of all patients	11.2		+		Module 2	+	+
Clinical consultation is available to provide recommendations for evaluation and treatment of anemia	11.4		+		Module 2		+
There are guidelines for the use of intravenous iron for treatment of iron deficiency with or without anemia	11.5		+		Module 2		+
There are guidelines for the use of erythropoietic stimulating agents	11.6		+		Module 2		+
Clinical strategies to optimize hemodynamics and oxygenation are followed before red cell transfusion is considered	11.8	+	+		Module 4		+
Transfusion of blood and/or components is never used for volume repletion, or to treat anemia that can be treated with specific hematinic medications	11.9	+	+	5.10	Module 4		
When red cell transfusion is clinically indicated in the non-bleeding patient, only a single unit of red cells is prescribed, followed by clinical reassessment of the patient	11.10	+	+		Module 4		
At the time of discharge, there is a plan for post-discharge management of anemia identified or acquired during the hospital admission	11.11		+		Module 2		
There is a mechanism for notifying the primary care provider that their patient has been treated for anemia while hospitalized and requires follow up to help ensure completion or continuation of treatment initiated in the hospital	12.2		+				
Prior to discharge recommendations							
<ul style="list-style-type: none"> If iron deficiency and anemia had been diagnosed prior to surgery, assure there is a nutritional consult follow up either prior to discharge or recommendation for follow-up including nutritional assessment done with first primary care doctor visit post op Assure iron saturation prior to discharge is >20% with intravenous iron (if replacement is necessary; intravenous iron not oral supplementation) 							

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ADDITIONAL SIGNIFICANT POSTOPERATIVE REFERENCES

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