

Manitoba Transfusion Best Practice Resource Manual

Introduction

The Manitoba Transfusion Best Practice Resource Manual (MTBPRM) has been developed and maintained by Blood Management Service and approved by the Provincial Nurses Working Group for Transfusion Practice. This is the fourth version of the original MTBPRM.

The purpose of the MTBPRM is to have current, standardized, and evidenced based resources for health care providers involved in the administration of blood, blood components, and blood products.

The MTBPRM is available on the [Transfusion Manitoba](#) website and is available for print from the print shop.

Printed versions of any document may not be the most current version. Although every effort is made to ensure that all information is accurate and complete, documents and policies are regularly under review and in the process of being amended. Blood product information/inserts may change. The most current version of the document applies. This would apply to the guidelines in this resource manual and especially the Product Monographs. Users should verify that any policy is the most current policy before acting on it. Contact the Transfusion Medicine Physician (TM) on call if required. To contact the TM on call, use your local paging service. If no paging service exists, use HSC paging at 204-787-2071.

Acknowledgements

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Introduction Chapters

1. Blood System in Manitoba

Canadian Blood Services (CBS) provides blood and blood products as a vendor regulated by Health Canada. They perform the collection, testing, and processing of blood into components and other blood products.

In Canada, blood is a national resource and is moved between cities and provinces as needed to ensure national supply. CBS and Hema-Quebec (HQ) serve each other in times of shortages.

In Manitoba, hospital Blood Banks are governed and operated by Shared Health. The primary purpose of Blood Bank is to distribute blood products to the transfusion sites; in addition, they perform an important role in the investigation and follow up of transfusion reactions.

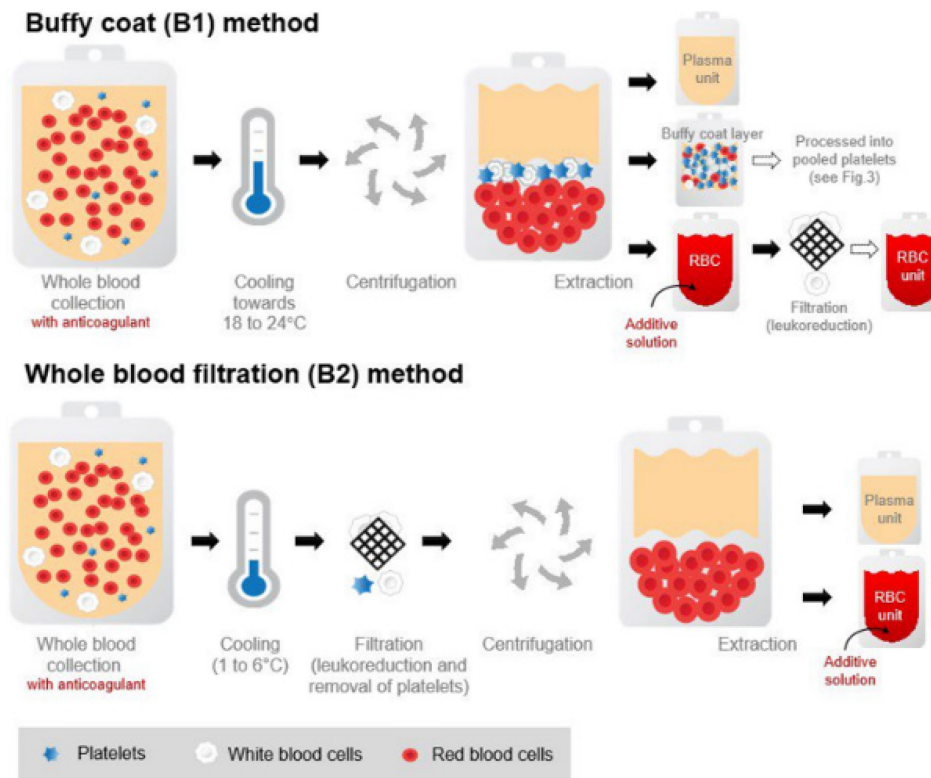
Transfusion sites include health care facilities and professionals who order, transfuse, monitor, and evaluate the use of blood, blood components, and blood products. Their monitoring and recognition of transfusion reactions is integral to the safety of the whole blood supply. When a reaction is reported, the donor(s) that contributed to the product the patient received can be identified as part of the vein to vein tracking.

Transfusion Practice Committees (TPCs) oversee the safe administration of blood, blood components and blood products. There are currently seven active TPCs in Manitoba that report through the Provincial Transfusion Practice Committee to Manitoba Health.

Choosing Wisely Canada was launched in 2014 with recommendations that identify tests and procedures commonly used that are not supported by evidence. The current top [ten things patients and physicians should question](#) in Transfusion Medicine are important to understand. These recommendations can be found at choosingwiselycanada.org.

2. Definition of blood, blood components and blood products

When whole blood is collected from donors at CBS, it is centrifuged or spun to create three layers: plasma, the buffy coat (contains platelets), and red blood cells. Each layer is then further processed to manufacture blood components and blood products.



Blood:

RBC (red blood cell): The main function of RBCs is to carry oxygen from the lungs and deliver it to the rest of our body.

Blood Components:

Platelets: Platelets are the first responders in the clotting process.

Plasma: Plasma is the liquid part of the blood containing proteins such as immunoglobulins, clotting factors, albumin, and fibrinogen.

Blood products (previously referred to as plasma protein products (PPP) or plasma derivatives):

Albumin: The most abundant protein in the plasma responsible for stabilizing blood volume.

Fibrinogen: Fibrinogen is a plasma protein that aids in the formation of blood clots.

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Intravenous Immunoglobulin (IVIG): IVIG is a manufactured solution of human immunoglobulin proteins. Several different brands are available.

Subcutaneous Immunoglobulin (SCIG): SCIG is a manufactured solution of immunoglobulin proteins. Several different brands are available.

Prothrombin Complex Concentrate (PCC): PCC is a blood product containing essential coagulation factors.

Rh (D) Immune Globulin (RhIG): RhIG is a gamma globulin fraction of plasma containing antibodies specific to the Rh (D) antigen.

3. ABO and Rh(D) blood group systems

The ABO blood group reflects the antigen(s) present on the surface of a person's red blood cells. ABO antibodies are naturally acquired in a person's plasma. If the antigens are absent from the red cell surface, the antibody will be present in the plasma.

Patient blood group	Antigens on red cell	Antibodies in plasma
A	A	Anti-B
B	B	Anti-A
O	none	Anti-A and Anti-B
AB	A and B	none

All blood and blood components should be ABO compatible except in an emergency when non-ABO specific products can be substituted.

People with **blood type O** are considered **universal donors**. Type O blood contains no antigens and is compatible with all ABO types. Blood type **AB** is considered **universal recipients** as they can receive any type of blood since there are no antibodies present.

The Rhesus, Rh(D), is another important blood group system. If a person has the D antigen present on their RBC surface they are considered Rh(D) positive. If the Rh(D) antigen is absent, they are Rh(D) negative. The anti-D antibody only develops if a Rh(D) negative person is exposed to Rh(D) positive red blood cells. Exposure can occur through transfusion or pregnancy.

Apart from the A and B antigens on red blood cells, there are more but less common antibodies that can develop as a result of transfusion or pregnancy. Testing of a patient specimen to determine the presence of ABO and RH type and screening for the presence of atypical red cell

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antibodies in the plasma is known as type and screen (T&S). The presence of these antibodies makes crossmatch more difficult.

4. Special Considerations for Pediatrics

Children under the age of three months have little or no antibodies present in the plasma. A pre-transfusion sample is collected to conduct ABO and Rh blood grouping and to detect clinically significant red cell antibodies. Please see [guideline 11](#) for additional details.

5. Irradiation

Irradiation is performed on cellular products prior to transfusion to certain patients at risk of developing Graft VS Host disease. Irradiated products are selected for immunocompromised patients. Examples include bone marrow transplant patients, neonatal population, and severe immunodeficiency. The patient's medical history must be taken into consideration by the physician when requesting irradiated products. This type of request must be clearly communicated from the ordering practitioner to the Blood Bank by indicating the need for irradiated product on the Request for Release form. If ordering practitioners are unsure if irradiated products are required call the Transfusion Medicine Physician on call. Once a patient has been ordered irradiated products, the data is stored in e-Traceline where additional transfusions will be flagged by the Blood Bank to include irradiation in the future. Prior to administration, the transfusionist should ensure that if a patient requires irradiated product, that it is stated on the request for release and appears on the Transfusion Medicine Results Report.

6. Standards for Accreditation

Standards are norms of practice that are used by regulating bodies to enhance safety and quality. They define a core set of requirements to attain a defined level of quality in the service being provided. They apply to all nurses regardless of their role. Compliance with them is voluntary but necessary to meet and maintain accreditation.

In contrast, **regulations** are mandatory; they are legislated. Regulations apply the standards through the force of law and potentially could include judicial penalties for non-compliance.

Standards	Regulations
<p>CAN/CSA Z902-15 Standard for Blood and Blood Components; this set of standards are referenced by the national hospital accreditation body, Accreditation Canada.</p> <p>American Association of Blood Banks (AABB) MANQAP has adopted the AABB Standards for Transfusion Medicine Services.</p>	<p>Health Canada Blood Regulations</p> <p>The Blood Regulations contain safety requirements with respect to blood for transfusion or for further manufacture and apply to all persons or establishments who perform any of the following activities related to blood:</p> <ul style="list-style-type: none">• processing (donor suitability assessment, collection, testing, and blood component preparation)• transforming (washing, pooling, and irradiating blood intended for transfusion)• labeling• storing

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[College of American Pathologists \(CAP\)](#)

St. Boniface General Hospital, Health Sciences Centre, and the Canadian Blood Services-Winnipeg Centre are all accredited according to CAP standards.

- record keeping
- importing (for transfusion)
- distributing
- error, accident, and adverse reaction investigation and reporting

Guidelines address practice related issues, help nurses to understand their responsibilities, and how to make safe decisions regarding their practice. Best practice guidelines offer some flexibility and are suggested to be the most effective and efficient way of attaining safe practice. These are suggestions but may not be absolute requirements.

Accreditation is about quality improvement and patient safety. It looks at how well an institution or facility meets national standards of excellence to provide the best possible care and service to patients and clients.

Manitoba receives its accreditation through Accreditation Canada. Blood Banks at St. Boniface Hospital and Health Sciences Centre receive accreditation through the College of American Pathologists (CAP).

The guidelines in the MTBPRM are based on the standards of the relevant accrediting bodies and are meant to translate to nurses what is expected in regard to safe and efficient administration of blood, blood components, and blood products. They have been written to offer flexibility and encourage critical thinking. In case of discrepancy between the guidelines in this resource manual and the site or regional policy, the site policy shall prevail.

The use of the term “shall” in this document implies that the statement is mandated in the standards. Failure to comply with these guidelines means that the facility does not meet current acceptable accreditation standards.

The use of the term “should” in this document implies that the guideline appears to be scientifically valid or useful and it is recommended that this practice be implemented.

7. Definition of a Qualified Transfusionist

A qualified transfusionist is a trained health care professional working within their scope of practice according to the **Regulated Health Professionals Act**. Examples of a qualified transfusionist are registered nurse, licensed practical nurse, nurse practitioner, respiratory therapist, physician, physician assistant, and medical residents.

Student nurses and Undergraduate Nurse Employees (UNE) are not considered to be a qualified transfusionist. Student nurses and UNEs do not hold professional liability protection and cannot be delegated to perform this activity as they are not accountable nor yet competent.

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Students and UNE's should be encouraged to observe the process of administering any blood, blood product, and blood component. That is, two qualified transfusionists are responsible for the 2-person check and the student/UNE may observe. Student nurses may participate in monitoring of patients receiving blood products but cannot be the sole person providing direct observation during the first 15 minutes of transfusion. The qualified transfusionist is ultimately responsible for monitoring patients for transfusion reactions.

Graduate Nurses are authorized to perform the two-provider verification along with a qualified transfusionist (i.e. graduate nurse and registered nurse can complete the 2-person check). However, two graduate nurses cannot be responsible for the 2-person check. Graduate nurses are able to monitor patient during the transfusion.

8. Patient Blood Management

Patient Blood Management (PBM) is the timely application of evidence-based medical and surgical concepts designed to maintain hemoglobin concentration, optimize hemostasis, and minimize blood loss in an effort to improve patient outcome.¹ It also seeks to minimize the need for avoidable blood transfusions.

Framework for PBM programs may vary:

- Surgical setting (pre-operative, intra-operative, and post-operative)
- By goal (stop/minimize blood loss and diagnostic phlebotomy, diagnose and treat coagulopathy, manage anemia, and improve tolerance of anemia)
- Obstetrical anemia

The aim, regardless of framework, is to improve patient outcomes and make patients the center of care.²

Three Pillars of Surgical Patient Blood Management³

1. Optimize Patient (Preoperatively)
 - correct bleeding disorders
 - correct anemia (example: through hematinic or erythropoiesis-stimulating agents)
2. Minimize Blood Loss (Intraoperatively)
 - Drugs that minimize bleeding (example: tranexamic acid)
 - Minimally invasive technology
 - Blood salvage (example: cell saver)
3. Maximize and Conserve (Postoperatively)
 - Minimize blood sampling (iatrogenic loss)
 - Monitor and correct bleeding
 - Maximize tolerance of anemia

¹ <https://nacblood.ca/en/resource/nac-patient-blood-management-statement>

² <https://nacblood.ca/en/resource/nac-patient-blood-management-statement>

³ Society for the Advancement of Patient Blood Management

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The National Advisory Council (NAC) on Blood and Blood Products has both Systemic Recommendations as well as Clinical Recommendations for a successful Patient Blood Management (PBM) Program:

NAC's Systemic Recommendations

1. All hospitals should work with their provincial Ministry of Health and health sector partners to implement PBM as a best practice that improves patient outcomes and system efficacy. A multimodal perioperative PBM program should be instituted in all surgical programs to address preoperative, intraoperative, and postoperative anemia.
2. Provinces should encourage hospitals to participate in initiatives including Choosing Wisely and Using Blood Wisely which align with patient blood management principles. Providing order sets, screening for single unit transfusions, and restrictive transfusion thresholds (less than 70g/L in all patients except those at risk of ischemia where the threshold is less than 80g/L) reduces blood utilization without adding cost.
3. Educational resources should foster the development of local patient blood management leaders and champions. All health care practitioners should be aware that anemia (hemoglobin less than 130g/L in males and 120g/L in females in peri-operative patients) increases morbidity and mortality. This is true of pre-existing anemia and hospital acquired anemia. Hospitals should recognize that routine or avoidable diagnostic blood draws can result in hospital acquired anemia and prolong patient recovery. Stopping and minimizing blood loss requires interdisciplinary efforts and should be a primary pillar for PBM programs.

Please see NAC's website for a full description of Clinical Recommendations [NAC Patient Blood Management Statement | National Advisory Committee on Blood and Blood Products \(NAC\) \(nacblood.ca\)](#)

There are many reasons for patients to be anemic. The chart below can help to determine if there is an alternative to transfusion for your patient.

Classification of Anemias

Red Cell Indices	Laboratory Investigations	Findings	Differential Diagnosis	Treatment Examples
MCV <80fL Microcytic Anemia	Serum ferritin Serum iron TIBC RDW	Ferritin <30mcg/L Ferritin >30mcg/L	-Iron deficiency anemia -Blood Loss -Anemia of chronic disease (~25%) - Hemoglobinopathy (i.e. Thalassemia) -Lead overload	Oral or Parenteral Iron -Oral or Parenteral Iron -Erythropoiesis stimulating agents (ESAs) -RBC transfusion

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MCV 80-100fL Normocytic Anemia	Reticulocyte count	Blood Loss Hemolysis No Blood Loss	-Anemia of chronic disease -Aplastic anemia -Mixed deficiency anemia -Endocrine disorders - Hemoglobinopathy (i.e. Sickle Cell)	Treat cause of blood loss -Oral or Parenteral Iron -Erythropoiesis stimulating agents (ESAs) -RBC transfusion
MCV >100fL Macrocytic Anemia	Reticulocyte count Vitamin B12/folate levels Blood Smear LFTs TSH	Blood Loss No Blood Loss	-Vitamin B12/Folate deficiency -Liver Disease -Alcoholism -Myelodysplasia -Hemolytic anemia	Treat cause -Oral/SC/IM Vitamin B12 -Oral folate

Manitoba is one of the few provinces in Canada that has a Patient Blood Management program. Referral forms for both obstetrical and surgical can be found here:

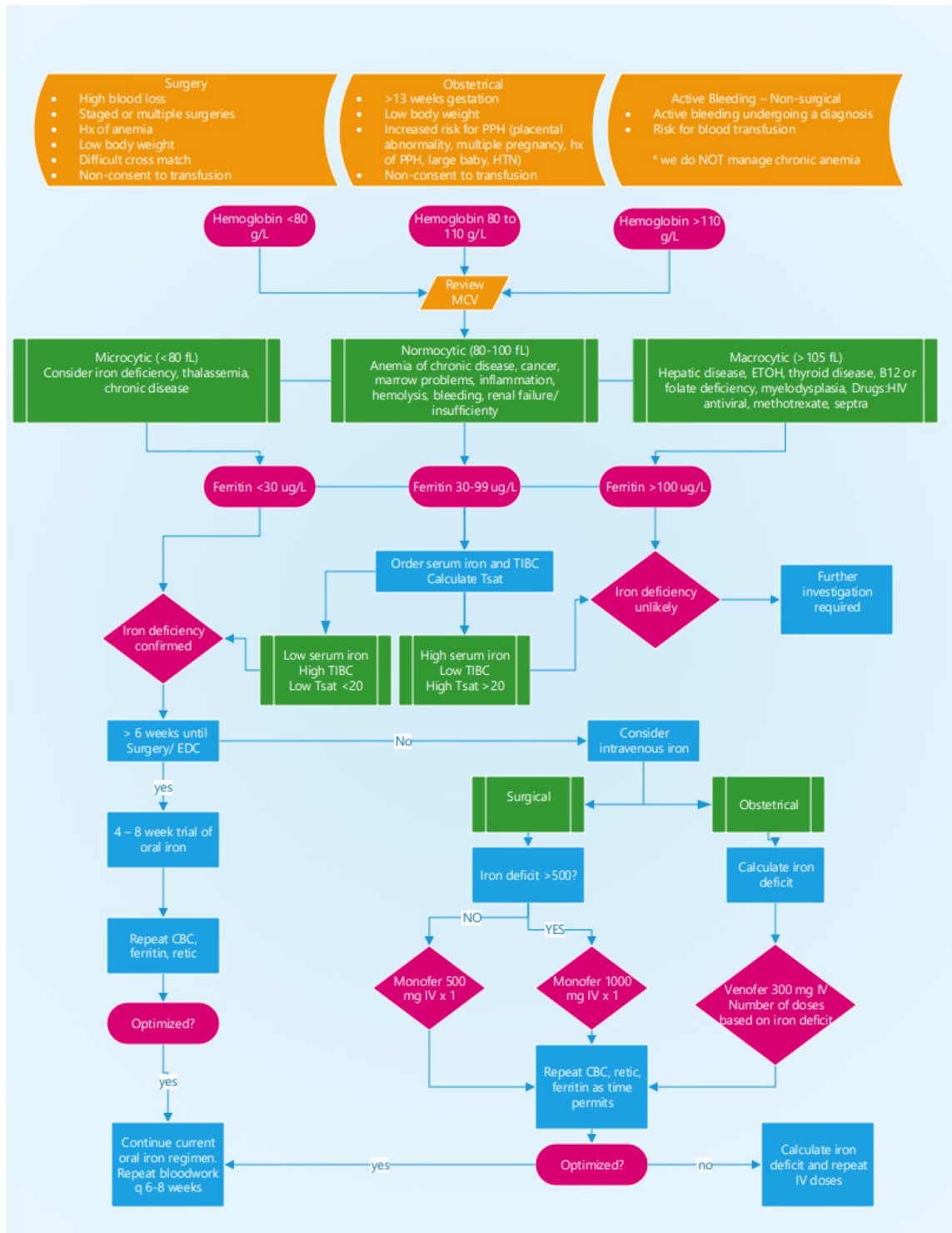
<https://healthproviders.sharedhealthmb.ca/files/bms-request-for-consult.pdf>

[bms-request-for-consultation-obs.pdf \(sharedhealthmb.ca\)](https://healthproviders.sharedhealthmb.ca/files/bms-request-for-consultation-obs.pdf)

The Transfusion Manitoba website has a lot of resources related to blood, blood products, and blood components.

<https://healthproviders.sharedhealthmb.ca/services/diagnostic-services/transfusion-manitoba/>

Table 1.0



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9. Additional resources

[CBS Clinical guide to transfusion | Professional Education](#)

[Bloody Easy for Healthcare Professionals](#)

[Bloody Easy - Blood Administration](#)

[Choosing Wisely Canada](#)

[Transfusion Manitoba](#)

10. Glossary

Term	Definition
Adolescent	Adolescence is the phase of life between childhood and adulthood, from ages 10 to 19.
Adverse Reaction	Undesirable and unintended response to the transfusion of blood components of plasma protein products that is considered to be definitely, probably or possibly related to the transfusion.
Alloimmunization	An immune response to foreign antigens after exposure to genetically different cells or tissues. Can be a complication of receiving incompatible blood.
Ancillary equipment	Mechanical equipment used to support or assist a primary item of equipment in meeting its functional duties.
Antibody	A protein substance produced in the blood or tissues in response to a specific antigen, as a bacterium or a toxin that destroys or weakens bacteria and neutralized organic poisons, thus forming the basis for immunity.
Antigen	Any of various substances, including toxins, bacteria, foreign blood cells, and the cells of transplanted organs, that when introduced into the body stimulate the production of antibodies.
Apheresis	The removal of blood plasma from the body by the withdrawal of blood, its separation into plasma and cells, and the reintroduction of the cells, used especially to remove antibodies in treating autoimmune diseases.
Aseptic technique	Strict procedures that healthcare providers use to prevent the spread of infection.
Authorized Health Care Provider	A person trained, licensed, and authorized to provide health care in Manitoba. May also be referred to as an authorized health professional or authorized provider.
Authorized Prescriber	Prescriptive authority is the ability of healthcare providers to prescribe specific medication and/or treatments.

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Blood Component	A therapeutic part of blood intended for transfusion (red cells, platelets, plasma).
Blood Product	Any therapeutic substance derived from human blood. Previously known as plasma protein product or derivative.
Buffy Coat	The fraction of an anticoagulated blood sample that contains most of the leukocytes and thrombocytes following centrifugation.
Cell Saver	Intraoperative process of harvesting red cells shed during surgery, processing and preparing them to return to the patient.
Coagulopathy	Condition which the blood's ability to coagulate is impaired.
Competency	Knowledge, skills, abilities, and behaviors that contribute to individual and organizational performance.
Cord Blood Specimens	Sample of blood collected from the umbilical cord.
Crossmatch	A method used to ensure compatibility between donor and recipient blood.
Discrepancy	Unexpected difference.
Donation Number	Unique number identifying the unit of blood or blood component.
Erythropoiesis Stimulating Agents	A substance that stimulates the bone marrow to make more red blood cells.
Graft VS Host Disease	A systemic disorder that occurs when the graft's immune cells recognize the host as foreign and attack the recipient's body cells. "Graft" refers to transplanted, or donated, tissue and "host" refers to tissues of the recipient.
Guidelines	Written principles that guide actions or decisions. By definition a guideline is not mandatory.
Hematinics	Substances that are essential to the proper formation of the components of blood (example: folic acid, vitamin B12, and iron)
Hemolysis	Lysis of red blood cells with liberation of hemoglobin
Hemostasis	Mechanism that leads to the cessation of bleeding from a blood vessel.
Hypothermia	Below normal body temperature.
Iatrogenic Blood Loss	Unintentionally induced anemia during medical treatment or diagnostic procedures (example: frequent blood draws)
Intrauterine Transfusion	Provides blood to a Rh-positive fetus when fetal red blood cells are being destroyed by the Rh-sensitized mother's immune system.
Irradiated Products	Blood components that have been exposed to gamma radiation. Prevents transfusion associated graft vs host disease.
Lot Number	The unique number assigned by the manufacturer when preparing blood products. This number is located on both the box and the vial.
Transfusion Medicine Physician	Provincially licensed physician who is responsible for all clinical and laboratory policies, processes, and procedures related to transfusion practices within their jurisdiction.

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Membrane oxygenation	A form of life support for people with life threatening illness or injury that affects the function of their heart or lungs.
Morbidity	Suffering from a disease or medical condition.
Mortality	State of being subject to death.
Neonatal	Relating to newborn children.
Normothermia	Normal body temperature.
Pediatric	Relating to the branch of medicine dealing with children.
Phlebotomist	Person drawing the specimen of blood for laboratory tests. This may be a nurse, physician, medical laboratory technologist, or technician trained in phlebotomy.
Policy	Non-negotiable, clear, formal and authoritative statements that enable informed decision making.
Quality Assurance	Actions that are planned and performed to verify that all systems and elements that affect the quality of products and services are functioning as expected.
Quality improvement	Framework used to systematically improve processes and systems.
Rapid Infusion Systems	Designed to warm and actively administer large fluid volumes quickly.
Regulations	Implies prescription by authority in order to control an organization or system.
Record of Transfusion (RoT)	A document that comes with a unit of blood, blood component, or blood product and must be signed, dated and returned to the Blood Bank after start of the transfusion.
Request for Release Form	Request for preparation or transfusion of a blood, blood component, or blood product generated in response to an order written by a physician.
Substitute Decision Maker	A designated person authorized to make decisions on behalf of a patient who is unable to make important decisions about their own personal care.
SDO	Service delivery organization.
Shall	To say that something certainly will or must happen.
Should	Used to express obligation, duty, propriety, or desirability.
Standards	Set up by, or established by, an authority as a rule for the measure of quality, weight, extent, value, or quality.
eTraceline®	An electronic laboratory information system that is capable of electronic crossmatch. It supports the vein to vein traceability of blood products in Manitoba.
Transfusion	The transfer of blood, blood components, and/or blood products from one person (the donor) into the bloodstream of another person (the recipient).
Transfusionist	The qualified person who initiates the transfusion of blood, blood components and/or blood products. See <i>Qualified Transfusionist</i> in the introductory chapters.
Type and Screen (T&S)	Testing to determine the patient's ABO and Rh type, and screening for the presence of atypical red cell antibodies in the plasma.

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Transfusion Medicine Results Report (TMRR)	A report generated by CBS that indicates the ABO group, Rh type, presence of antibodies, and expiry date of crossmatch (if applicable). This report is faxed to the patient care area and should accompany patients on transfer.
Unit Number	See donation number.
Unique Identifier	An alphanumeric identifier that confidentially links to the client's personal health information. Some examples of a Unique Identifier are: PHIN, Military Number, RCMP Number, Treaty Number, or Unique Client Identification Number. For Manitoba residents, the PHIN is the preferred unique identifier.
Washed red cells	Red blood cells separated from whole blood that undergoes a washing process before transfusion.
Wrong Blood in Tube (WBIT)	Where the blood in the sample is not that of the patient identified on the label, and may lead to catastrophic outcomes, such as death from ABO-incompatible red cell transfusion.