A PHYSICIANS GUIDE TO TRANSFUSION OPTIONS

New York State Council on Human Blood and Transfusion Services

New York State Department of Health

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Adapted from materials prepared by the New York Blood Center

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Disclaimer: The New York State Council on Human Blood and Transfusion Services has attempted to provide you with the most current information on the use of autologous and directed blood services. The circular of information for the use of human blood and blood components should be consulted for current information.

INTRODUCTION

The mission of the New York State Council on Human Blood and Transfusion Services is to set standards and develop guidelines for transfusion-related products and services in New York State.

This booklet is provided to assist you in your discussions with your patients regarding their transfusion options, particularly to emphasize autologous transfusion possibilities.

TRANSFUSION OPTIONS SUMMARY

OPTION	DEFINITION	ADVANTAGE	DISADVANTAGE
Pre-operative Autologous Donation	A patient's blood is collected and stored until needed	Disease transmission and allergic reactions are eliminated	Must be planned in advance May delay surgery Certain medical conditions disqualify the patient as donor Hemodilution - may cause fluid overload
Perioperative Autologous Blood	Blood is collected during or near the	Disease transmission and	Intraoperative or postoperative recovery - cannot be used if cancer or infection is present,

Recovery	time of surgery*	allergic reactions are eliminated	risk of air embolism Small, but possible, risk of disease transmission and allergic reaction
Volunteer Homologous (Allogeneic) Blood Donation	Blood voluntarily donated to a community blood center	Availability in emergencies	May carry higher risk of disease transmission and allergic reaction
Directed Donor Blood Donation	Patient selects blood donor	Patient feels safe with donors selected	Blood group must be compatible Must be planned in advance

*Blood may be collected from the patient immediately preoperatively, or collected intraoperatively from the operative site or from extracorporeal circuit. Under postoperative and posttraumatic situations, shed blood may be collected from body cavities, joint spaces and other closed operative or trauma sites. *Preoperative hemodilution* - Blood is collected preoperatively with isovolemic fluid replacement and blood is reinfused at the end of surgery. *Intraoperative* and *postoperative recovery* - Blood is collected from surgical or trauma sites, processed and returned after surgery.

ALL BLOOD IS TESTED

New York State regulations require testing of homologous (allogeneic) blood donors for eight markers associated with an increased risk for transmissible disease, in addition to blood group determinations. When autologous donations are not possible or are insufficient, blood for your patient's transfusion can be provided by homologous blood donors who meet strict medical eligibility guidelines. Blood from such donors found positive for any of these markers may not be used for transfusion.

THE TESTS

<u>All</u> allogeneic donations are tested for:

- ABO group
- Rh type
- Antibody to human immunodeficiency virus, type 1 and type 2 (HIV-1/HIV-2)
- Hepatitis B surface antigen (HBsAg)
- Antibody to Hepatitis C (HCV)

- Antibody to human T-cell lymphotropic virus, type I (HTLV-I) Syphilis
- Antibody to hepatitis B core antigen (anti HBc)
- Acceptable level of alanine aminotransferase (ALT)
- Tests for unexpected antibodies against red cell antigens.

Careful Donor Screening

Before giving blood, all homologous (allogeneic) blood donors must answer extensive questions concerning their health histories. The questions are designed to identify and eliminate prospective donors who may be at risk of transmitting infectious diseases.
All the materials used for donation (including the needle) are new, sterile, disposable, used only once and discarded.

Autologous Donations

For autologous (autogeneic) blood collected by blood centers, donors undergo the same tests as for community donations. Such testing must be performed at 30-day intervals, at a minimum. You or the patient will be informed if an autologous donation is found positive for any of the standard tests. Authorization for release may be needed from you as the attending physician and from the hospital's blood bank director. If the blood is collected by a blood center, the hospital blood bank director may be notified. Once a unit is found to be positive for any of the tests, the patient may be ineligible for further autologous donations. Such testing is not required by regulation for collections performed by hospitals for use at that hospital, but may be performed voluntarily.

Intraoperative Autologous Transfusion and Post-operative Cell Recovery

Blood recovered through these procedures do not require testing provided it is collected, processed and returned during or within six hours of the patient's surgery.

PREPARING YOUR PATIENT FOR AN AUTOLOGOUS DONATION

Informing Your Patient

Discuss with your patient how transfusion needs can be met, the advantages and risks. See Transfusion Options Summary and Summary Chart of Blood Components, pages 1 and 6.

Share any available pamphlets on blood transfusion options with your patients who may need blood.

Make an appointment: Most transfusion options and services begin with an appointment for blood donation.

Pre-donation interview: It is advisable to instruct your patient to call the blood collection facility as soon as possible. Staff will interview your patient, usually over the phone, to gather pre-donation information needed to ensure your patient's comfort and safety during

the autologous donation. Staff will answer any questions your patient may have and provide guidance through the donation process.

Notify hospital blood bank: If blood is to be collected by a blood center, it is advisable to notify the hospital's blood bank that autologous blood will be delivered for your patient.

AUTOLOGOUS BLOOD DONATION

A Physician's Order Form Is Required.

Your careful attention in completing and signing this prescription will help ensure the most efficient and comfortable donation experience, and the safest blood possible for your patient. **Regulations require a completed and signed form on file.**

The Form: Critical Points

Most blood banks require that the patient submit completed forms before the first donation appointment.

If the patient has a history of:

- cardiovascular disease, especially history of angina, myocardial infarction, bypass surgery
- cerebrovascular disease, especially history of stroke
- cardiac valvular disease, especially aortic stenosis
- seizure disorders, especially if not well-controlled by medication, or
- any other medical condition for which a prolonged vasovagal reaction or rapid (within 5 minutes) loss of 500 ml of blood would be dangerous for the patient,

the patient's attending specialist or personal physician must describe details of the medical problem and must certify that the patient may safely undergo phlebotomy.

To ensure proper labelling of the unit, the order form should be complete with:

- patient's full legal name
- patient's social security number
- date of birth
- date of anticipated transfusion
- full name **and** address of hospital where transfusion will be performed.

AUTOLOGOUS DONOR ELIGIBILITY

Autologous blood donors do not need to meet the standard eligibility guidelines set for community volunteer donors. However, certain criteria must be reviewed:

Cardiac Fitness

The patient's physician should be sure the patient's cardiovascular status can tolerate the withdrawal of up to 500 ml of whole blood (for adults) within five minutes before requesting

autologous blood collection.

Hemoglobin Concentration

Hemoglobin readings are measured before each donation to determine the donor's continued eligibility. A minimum hemoglobin concentration of 11 g/dL is required for autologous donors unless otherwise approved by the medical director of the blood collection facility.

Iron Supplements

Oral iron supplements are recommended for patients making more than one autologous blood donation. The usual adult dosage is ferrous sulfate, 325 mg, three times daily beginning one week before the first donation.

History of Hepatitis, HIV or AIDS

Patients with positive test results may be ineligible for autologous blood donation at some blood banks; such units may not be acceptable for use in certain hospitals.

Patients with known histories of HIV or AIDS are ineligible for autologous donation at most blood banks.

Is the Patient Under 17 Years Of Age?

Special arrangements may be required. The blood bank should be notified so that special arrangements may be made. A parent or legal guardian must accompany the minor. If the child weighs less than 110 pounds, less than a full unit may be collected at one time.

BLOOD DONATION PROCEDURE

The patient should send the completed and signed physician's order form to the blood collecting facility before the first appointment.

The patient will be asked to complete a medical history questionnaire, and have temperature, blood pressure, pulse, and hemoglobin readings measured. Should any of these values fall outside standard autologous criteria ranges, the patient will be ineligible for donation at that visit. The entire process takes about an hour. The donation itself takes about 5 to 7 minutes.

Autologous donors may generally give blood twice each week over the five-week period preceding the transfusion date. Donations can generally be made up to three working days before transfusion. **(Note: If the blood is to be shipped out of state, the last donation generally needs to be made no later than 10 working days before transfusion.)**

SUMMARY CHART OF BLOOD COMPONENTS

COMPONENT	MAJOR INDICATIONS	ACTION	NOT INDICATED FOR*
Whole Blood	Symptomatic anemia with large volume deficit	Restoration of oxygen-carrying capacity, restoration of blood volume	Conditions responsive to specific component
Red Blood Cells	Symptomatic anemia	Restoration of oxygen-carrying capacity	Pharmacologically treatable anemia; coagulation deficiency
Red Blood Cells, Leukocytes Removed	Symptomatic anemia; febrile reactions from leukocyte antibodies	Restoration of oxygen-carrying capacity	Pharmacologically treatable anemia; coagulation deficiency
Red Blood Cells, Adenine-Saline Added	Symptomatic anemia with volume deficit	Restoration of oxygen-carrying capacity	Pharmacologically treatable anemia; coagulation deficiency
Fresh Frozen Plasma	Deficit of labile and stable plasma coagulation factors and TTP	Source of labile and nonlabile plasma factors	Conditions responsive to volume replacement
Liquid Plasma and Plasma	Deficit of stable coagulation factors	Source of nonlabile factors	Deficit of labile coagulation factors or volume replacement
Cryoprecipitated AHF	Hemophilia A; von Willebrand's disease; hypofibrinogenemia; factor XIII deficiency	Provides factor VIII; fibrinogen; von Willebrand factor; factor XIII	Conditions not deficient in contained factors
Platelets, Platelets by Pheresis	Bleeding from thrombocytopenia or platelet function abnormality	Improves hemostasis	Plasma coagulation deficits and some conditions with rapid platelet destruction (e.g. ITP)

Granulocytes	Neutropenia with infection	Provides granulocytes	Infections responsive to antibiotics

*Applies to allogeneic blood. May not apply to autologous blood.

SUMMARY CHART OF BLOOD COMPONENTS continued

COMPONENT	SPECIAL PRECAUTIONS*	HAZARDS*	RATE OF INFUSION
Whole Blood	Must be ABO-identical; labile coagulation factors deteriorate within 24 hours after collection	Infectious diseases; septic/toxic, allergic, febrile reactions; circulatory overload	For massive loss, as fast as patient can tolerate
Red Blood Cells	Must be ABO -compatible	Infectious diseases; septic/toxic, allergic, febrile reactions	Generally 2 hours, as tolerated by the patient; no more than 4 hours
Red Blood Cells, Leukocytes Removed	Must be ABO -compatible	Infectious diseases; septic/toxic, allergic reaction (unless plasma is also removed, *eg*., by washing)	Generally 2 hours, as tolerated by the patient; no more than 4 hours
Red Blood Cells, Adenine-Saline Added	Must be ABO -compatible	Infectious diseases; septic/toxic, allergic, febrile reactions; circulatory overload	Generally 2 hours, as tolerated by the patient; no more than 4 hours
Fresh Frozen Plasma	Should be ABO -compatible	Infectious diseases; allergic reactions; circulatory overload	Generally 2 hours (no more than 4 hours)
Liquid Plasma and Plasma	Should be ABO -compatible	Infectious diseases; allergic reactions	Generally 2 hours (no more than 4 hours)
Cryoprecipitated AHF	Frequent repeat doses may be necessary	Infectious diseases; allergic reactions	Generally 2 hours (no more than 4 hours)
Platelets, Platelets	Should not use some	Infectious diseases;	Generally 2 hours

by Pheresis	microaggregate filters (check manufacturer's instructions)	septic/toxic, allergic, febrile reactions	(no more than 4 hours) (Set of platelet concentrates or 1 pheresis unit)
Granulocytes	Must be ABO -compatible, do not use depth-type micro-aggregate filters	Infectious diseases; allergic reactions; febrile reactions	One pheresis unit over 2-4 hour period-closely observe recipient for reactions

*Applies to allogeneic blood. May not apply to autologous blood.

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BLOOD COMPONENTS AND PRODUCTS

Blood May Be Stored up to 42 Days

Whole blood is collected in one of several approved anticoagulant solutions. Depending on solution used, blood may be stored in liquid form from 21 to 42 days. The most common solution allows liquid-packed red blood cells to be stored 42 days before expiration.
If surgery is postponed, frozen storage may be available.

Other Autologous Blood Components and Products

Autologous blood components and products are presenting new possibilities for improving patient care. Options available in some areas include **autologous cryoprecipitate**. When used with thrombin, autologous cryoprecipitate creates a hemostatic agent or "fibrin glue." Services needed to prepare **autologous platelets** and **autologous plasma** may also be available.

PERIOPERATIVE CELL RECOVERY SERVICES

Perioperative Cell Recovery

Collection of autologous blood in the perioperative period is a safe transfusion alternative for patients who may require a volume of blood not possible to provide by autologous donation or for those who cannot donate autologous blood prior to surgery. This blood may be collected using perioperative blood recovery techniques or isovolemic hemodilution.

Pre (or Intra-)operative Hemodilution

Acute isovolemic hemodilution is the withdrawal of one or more units of blood from the patient at the beginning of the surgical procedure, for reinfusion at the end. The patient's blood volume is maintained isovolemically with crystalloid or colloid solutions. Hemodilution

lowers autologous red cell loss by lowering the patient's hematocrit; therefore the patient suffers a loss of fewer red cells in a given volume of surgical blood loss. In addition, the autologous units collected contain viable platelets and coagulation factors which may improve postoperative hemostasis.
Careful management of fluid balance and cardiac status is essential during this procedure. Detailed procedures and monitoring of the patient are necessary during the procedure. The patient must have an adequate hemoglobin at the beginning of the procedure and the use of hemodilution usually results in a lower hematocrit than that found in control patients during surgery.

Perioperative Blood Recovery

Perioperative blood recovery or blood salvage is the collection and reinfusion of blood lost during and immediately after surgery. Patients most likely to be candidates for *intraoperative* blood recovery are those in which substantial surgical blood loss is anticipated, as in cardiac, vascular, orthopedic, neurosurgical and complex gynecologic procedures. Blood recovery may reduce the use of homologous (allogeneic) blood in trauma and in liver transplantation. Intraoperative collection is usually contraindicated if the operative field is contaminated with bacteria, such as with spilled intestinal contents or osteomyelitis, or by malignant cells.
Blood recovered intraoperatively may be transfused directly after collection (unwashed blood) using a disposable suction system, often a canister system, or may be processed (washed) prior to infusion using a semiautomated cell washer. Procedures which include the washing step are more complex, requiring specialized equipment and training, and careful coordination of operating room personnel. Return of washed products may enable the red cells to be more concentrated, and eliminates contaminants and procoagulants. Because of the lack of clotting factors in the washed product, use of recovered blood may not reduce donor exposure to plasma and platelets. Reinfusion of unwashed recovered blood is less complex and costly, but usually has a much lower hematocrit and may include contaminants, so that most hospitals limit the quantity of collected blood that can be reinfused without washing.
Intraoperative blood recovery requires the anticipated loss of a significant amount of blood, but the processing time is only 3 to 5 minutes so that the procedure **does not** prolong surgery or anesthesia time and **does not** intrude on the surgical team's tasks.

Post-operative Cell Recovery

Post-operative cell recovery may use the same procedures and equipment as intraoperative recovery in the immediate postoperative period. Use of a semiautomated cell washer may

be appropriate if postoperative drainage is expected to be brisk. More often, postoperative blood recovery uses simpler equipment which does not process (wash) the blood. Blood is collected directly from surgical drains, especially chest tubes, then filtered and returned to the patient. Postoperatively recovered blood must be infused within six hours of collection, whereas washed intraoperatively collected blood may be stored up to 24 hours prior to transfusion.

The availability of any of these options may depend on the type of surgery being performed, the hospital policies and procedures, and the availability of staff and equipment.

DIRECTED BLOOD DONATIONS

No Safer

Your patients may want to meet their transfusion needs with blood donations made by relatives and friends. However, there is some evidence that directed donations are less safe than those of volunteer blood donors.

Directed donors under pressure and in response to a desire to "help" may give inaccurate information about their health. Often, directed donors are first-time donors. The risk of diseases that cannot be detected by laboratory tests can be higher in first-time donors.

There are times when use of blood from close relatives is not advised, especially if the patient is facing a future bone marrow transplant, and husband-to-wife donations are not advisable during the child-bearing years because of the risk of immunization. Opportunities for such donations are, however, available in New York State.

FEES

Why Are Fees Charged?

Processing fees are generally charged whether the patient receives blood from autologous, volunteer or directed donations. The processing fee covers the expenses incurred to prepare blood for transfusion and is customarily charged directly to the hospital and passed on to the patient.

Special Handling Fees

In addition, autologous and directed blood donations require special handling. Each unit is labelled specifically for the patient's use and tracked through processing and test procedures. The units are packed and shipped with special instructions to the hospital. Because of this, processing fees are ordinarily charged whether or not the patient's autologous or directed blood is transfused.

QUESTIONS

Any questions should be directed to the blood bank of the hospital where the blood will be transfused.

Requests for copies of this publication may be directed to:
Blood Resources Program
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