Transfusion Products Requests & Specimen Collection

Only physicians are authorized to request blood or blood products for patient infusion.

Order must be placed into Powerchart or on order requisition properly. It should have the patient’s full name, identification number (medical record no.), location, age, sex, and attending physician. It should state the quantity and type of blood products requested and clinical information.

Orderable options for blood bank:

- **Band & Hold**—The patient is banded and a specimen drawn that can be used for compatibility testing if needed, but no testing is performed at this time.
- **Type & Screen**—The patient is banded and a specimen drawn. The patient's ABORh type is determined and an antibody screen performed, but no blood products are crossmatched or assigned.
- **Transfusion/Non-Active Bleeding (Single Unit)**—The patient is banded and a specimen drawn. The patient’s ABORh type is determined and an antibody screen is performed. A single unit is ordered by default and crossmatched to the patient.
- **Transfusion/Active Bleeding (Multiple Units)**—The patient is banded and a specimen is drawn. The patient’s ABORh type is determined and antibody screen is performed. The number of units to be crossmatched to the patient should be indicated on the order by the ordering personnel.
- **Transfusion/Platelets**—The patient is banded and a specimen is drawn. The patient’s ABORh type is determined. The number of units of platelets needed should be indicated on the order and those platelets will be assigned to the patient. *Note:* Platelets are kept in limited quantities in the blood bank, so allow additional time for products to be available.
- **Transfusion/Fresh Frozen Plasma**—The patient is banded and a specimen is drawn. The patient's ABORh type is determined. The number of units of fresh frozen plasma should be indicated on the order and those units will be assigned to the patient. *Note:* Fresh Frozen Plasma requires approximately 30 minutes of thawing time so allow additional time for products to be available. Fresh Frozen Plasma expires 24 hours after it is thawed.
- **Transfusion/Cryoprecipitate**—The patient is banded and a specimen is drawn. The patient’s ABORh type is determined. The number of units of cryoprecipitate should be indicated on the order, generally 5-10 units, and those units will be assigned to the patient. *Note:* Cryoprecipitate expires 6 hours after thawing. For that reason we do not thaw units to “hold”.
- **Other Blood Bank orders**—Rhogam300mcg, Direct Coombs, ABORh on cord blood, Rh typing (with or without ABO type), Quantitative (Kleinhauer Betke).

Physicians, designated laboratory phlebotomists, clinical laboratory scientists, and registered nurses in the Cancer Center and Surgery who are trained in FRH banding procedures only are authorized to collect specimens for compatibility testing. Refer to the Blood Bank Arm Banding/Patient Identification procedure for instructions on properly and positively identifying patients who are possible blood product recipients. *The person collecting the specimen must...*
Initial the specimen to indicate that the patient has been positively identified at the bedside by the procedures noted below.

Specimens collected by unauthorized individuals and/or improperly labeled tubes WILL NOT BE PROCESSED by Blood Bank technologists because of the danger to the recipient of receiving blood crossmatched with the wrong patient specimen. There are NO EXCEPTIONS.

Patient (recipient) specimens for compatibility testing (crossmatch), type & screen, transfusion investigation, or transfusion of any blood product must be precisely and positively identified upon collection at the patient's bedside by a handwritten label. Patients must be "banded" with a red barcoded band, and the blood bank ID number with barcode must be attached to specimens for the transfusion of any blood product, non-prenatal type & screen, or band & hold. The specimen containers must be labeled with the following information:

a) Patient’s full name
b) Identification number (medical record no.)
c) Patient’s date of birth
d) Date and time of collection
e) Initial of person collecting specimen
f) Blood bank ID number

In order to avoid serious transfusion reactions due to clerical errors, this policy must be rigidly enforced. Guidelines for acceptance and rejection of specimens are defined below.

a) Positive patient identification must be made upon collection at the patient's bedside. Evidence that the specimen container was not immediately labeled at the time of venipuncture will be cause for rejection; specimens will not be returned for corrections or additions under any circumstances.

b) In all cases, the patient's hospital armband is to be employed as the source of information for filling out the recipient blood tube identification label. Information must be complete and legible.

c) First names must be spelled correctly and in full. Initials or nickname will be cause of rejection of specimen.

d) The identity of the authorized person collecting or verifying the specimen must appear on the specimen container.

e) Any incomplete, incorrect, or missing information is cause for rejection

**Guidelines for Identification of Patient and Blood Product**

1. The administration of blood or blood products is the responsibility of the physician. The responsibility can be delegated to the licensed and authorized hospital employee.

2. Blood may be added to an open IV line containing only normal saline (0.9%) by a registered nurse or a Feather River Hospital IV-certified licensed vocational nurse. Blood is never to be given through the same line that is being used for anything other than normal saline (0.9%)

3. Prior to the infusion of blood products, verification of donor unit and recipient identity is essential in order to assure that the unit of blood infused is the blood intended for the recipient (patient). Errors associated with identification of crossmatch specimens
and unit/recipient identity account for the majority of serious immediate transfusion reactions and must be avoided.

4. Refer to Administration/Complications of Transfusion of Blood, Blood Products for a detailed explanation of Feather River Hospital Transfusion policy.

Verification of Donor Unit - Recipient Identity

1. Only hospital personnel may accept blood or blood products from the lab. Two people must check the physician's order.
2. The person hanging the unit of blood shall be an RN, M.D., or a hospital IV-certified LVN. The unit of blood must be checked with another RN or M.D.
3. The two persons shall check all of the following:
   a. Blood Product Identification
      i. Check the ABO group and Rh type on the blood container label and compare it with the Blood Bank transfusion tag to assure agreement.
      ii. Check the donor unit number on the blood container and compare it with the Blood Bank transfusion tag to assure agreement.
      iii. Verify the crossmatch interpretation on the transfusion tag.
      iv. Read the blood container for expiration date - it must be in-date.
   b. Identification of Patient
      i. Check the name, date of birth, hospital identification number and blood bank ID number on the patient's wrist identification band against the information on the blood bank compatibility form.
      ii. If possible, ask the patient to identify himself. Never ask, "are you Mr. Jones".
      iii. The persons who identify that the correct blood product is being administered to the patient should scan the unit and perform documentation in Cerner Bridge.
      iv. If Cerner Bridge is not being utilized, the persons who identify that the correct blood product is being administered to the patient should sign and complete the duplicate transfusion form, and the form should be placed in the patient's chart at the end of the transfusion. The pink unit tag is to remain attached to the blood unit.
   c. Each Time a unit of blood is started; this complete check must be completed. Do not begin transfusion until any discrepancy in the above information is resolved.

4. A transfusion record must be completed for each unit of blood infused. Vital signs must be recorded before, during and after infusion, and recorded in the patient's chart. The recipient must be closely observed for signs and symptoms of adverse reactions (see adverse transfusion reaction procedure).

Guidelines for the Infusion of Blood and Blood Products

1. Packed red blood cells, platelets, fresh frozen plasma and cryoprecipitate must be administered through a filter to remove fibrin clots and other particulate matter. Infusion sets are issued with a built-in filter. Blood tubing and filter should be changed after four
(4) hours have elapsed. However, a one-unit transfusion should be completed within four (4) hours.

2. Infusion must be initiated within thirty (30) minutes of release from the Blood Bank. For this reason, only one unit of blood will be issued at a time (emergencies are an exception if there is more than one I.V. open). Blood which has been out of the Blood Bank refrigerator longer than thirty (30) minutes or has already been spiked cannot be returned for re-issue. Under no circumstances is it permissible to place blood products in any refrigerators on any nursing unit. If blood cannot be started within thirty (30) minutes, return it immediately, unopened, to the Blood Bank.

3. All red blood cell infusions must be completed within four (4) hours to minimize bacterial proliferation and red cell hemolysis, which occur at room temperature.

4. Baseline values for temperature, pulse, respiration and blood pressure should be obtained no more than 30 minutes before beginning transfusion. Vital signs should be recorded 15 minutes after blood reaches the patient and when the transfusion is complete. During the first fifteen (15) minutes, the rate of infusion of products containing red blood cells should be very slow. This will minimize the volume of red cells infused if the patient experiences an immediate hemolytic or febrile reaction. The Nurse should observe the patient during at least the first fifteen (15) minutes of transfusion to see that it is proceeding uneventfully. If so, the rate of infusion can be increased to that ordered by the physician. The optimum rate of infusion is dependent upon the clinical status of the recipient. In the absence of fluid overload or congestive heart failure, the infusion of one unit over 1.5 - 2 hours is usually well tolerated.

5. The infusion of warm blood may be indicated in massive transfusion when the infusion rate exceeds 50ml/minute, in exchange transfusions of the newborn, and when the recipient has a potent cold agglutinin. In all cases, the use of a blood warmer must be documented on the transfusion record.

6. **Type & Screen:**
   a. Samples will be ABO Grouped; Rh typed and screened for unexpected red cell antibodies when a type and screen is ordered. By performing these tests in advance of blood needs, 99% of the potential transfusion problems may be detected and identified. Blood requirements of those with less common blood types or particular antibody problems may then be met with fewer delays.
   b. Those patients in whom transfusions are unlikely but may be required during surgical or medical treatment should have a type and screen. Upon receipt of the sample the Blood Bank will group, type, and antibody screen the sample and hold it for possible use in the subsequent 3-day period.
   c. Should a transfusion become necessary, a crossmatch must still be performed and shall be ordered, as the type and screen does not replace crossmatch compatibility testing.

**Guidelines to the Use of Uncrossmatched or Incompletely Crossmatched blood—Emergency Transfusion**

1. The infusion of uncrossmatched blood is associated with considerable risk and therefore should be avoided whenever clinically possible. However, circumstances requiring immediate transfusion do occur and decisions to bypass all or part of the usual compatibility testing are sometimes needed. In this situation, uncrossmatched O negative red blood cells will be issued. In all cases, a properly identified (including the Blood Bank band label) patient blood sample must be immediately submitted to the Blood Bank. Appropriate compatibility testing will be initiated and completed as soon as possible. The physician ordering uncrossmatched blood **must** sign a special Emergency Transfusion
Request form indicating the clinical situation requiring release of blood without completion of compatibility tests.

2. If a patient has received the equivalent of his/her blood volume (approximately 10 units/24 hrs. for adults) and had a negative antibody screen on the pre-transfusion specimen, appropriate ABO and Rh compatible blood may be released for transfusion. Notify the Blood Bank Director or the on-call pathologist of massive transfusion.

3. In some cases, a fictitious name such as “John Doe” may be used. As soon as possible after admitting has identified the patient and issued a hospital band to the patient, a second blood bank sample will be drawn and the patient will be re-banded with the proper identification. All testing will be repeated as needed.

**Investigation of Adverse Transfusion Reaction**

1. Definition:
   Any unfavorable event occurring during or following transfusion of blood or blood products

2. Immediate Reaction:
   Hemolytic, allergic, febrile, anaphylactoid, circulatory overload, transfusion related acute lung injury

3. Delayed Reaction:
   Hemolytic, transmission of disease (e.g. viral hepatitis), Sepsis

4. Symptoms and Signs:
   a. Chills
   b. Urticaria
   c. Elevated Temperature
   d. Rise in pulse rate
   e. Tightness of chest
   f. Dyspnea
   g. Rales
   h. Nausea
   i. Vomiting
   j. Flank pain
   k. Hematuria
   l. Shock

All adverse reactions (immediate and delayed) must be reported to the Blood Bank. The clinical manifestations of serious (hemolytic) reactions may not be distinguishable from insignificant reactions. In all cases, the infusion of blood must be stopped and the responsible physician notified.

**Acute adverse effects of transfusion:**

**Acute Hemolytic Transfusion Reactions**

An Acute Hemolytic Transfusion Reaction is triggered by an antigen-antibody reaction that activates the complement and coagulation systems and prompts endocrine responses. Catastrophic clinical events that may occur include shock, disseminated intravascular
coagulation, and acute renal failure. Life threatening HTRs are almost always due to ABO Incompatibility attributable to an identification error that results in the recipient receiving the wrong blood.

**Febrile Non-Hemolytic Reactions**
A febrile non-hemolytic (FNH) reaction is usually defined by a temperature increase of 2°F/1°C or more occurring in association with transfusion and without any other explanation. Some FNH reactions are caused by antibodies in recipient's plasma reacting against antigens present on the cell membranes of transfused lymphocytes, granulocytes or platelets. Transfusion of leukocyte-reduced components may minimize the occurrence of febrile reactions.

**Anaphylactic Reactions**
Features that distinguish anaphylactic reactions from other immediate reactions are:
- Occurrence after infusion of only a few milliliters of plasma
- Absence of fever

**Transfusion Related Acute Lung Injury (TRALI)**
TRALI is defined as an acute lung injury that is temporarily related to a blood transfusion; specifically it occurs within the first six hours following a transfusion.
- All plasma-containing components, including RBCs, platelets, cryoprecipitated AHF, and fresh frozen plasma (FFP) have been implicated in TRALI, however FFP collected from females who have become leukocyte alloimmunized from pregnancy are more frequently associated with TRALI.

**Cutaneous Hypersensitivity Reactions**
Urticarial reactions are commonly encountered, second in frequency only to febrile non-hemolytic reactions.

**Transfusion Associated Circulatory Overload (TACO)**
Rapid increases in blood volume are poorly tolerated by patients with compromised cardiac or pulmonary status and/or chronic anemia with expanded plasma volume. The circulatory system becomes overwhelmed by additional volumes of blood products, or a high infusion rate of blood products.

**Delayed Adverse Effects of Transfusion**

**Delayed Hemolytic Transfusion Reactions**
There are two different types of delayed Hemolytic Transfusion Reactions--primary immunization and anamnestic response. The first is mild, occurs several weeks after transfusion. Antibodies are detectable no earlier than 7-10 days after transfusion and usually weeks or months later. The second type occurs in a previously immunized recipient who experiences an anamnestic or secondary response to transfused red cell antigens.

Pretransfusion testing reveals no unexpected antibody and no serologic incompatibility, but within 3-1 week after transfusion, an anamnestic response leads to high level of antibodies that react with the transfused cells.
Infectious Complications of Transfusions
The most common and feared infectious complications of blood transfusions are diseases transmitted by viruses (hepatitis, cytomegalovirus infection and AIDS). CMV negative units are available for infants and the immunocompromised.

Graft-vs.-Host Disease
Graft-vs-Host disease is a rare complication following transfusion to patients who are severely immuno-suppressed.

Post Transfusion Purpura
Post transfusion purpura is a rare event, occurring almost exclusively in multiparous women. A precipitous fall in platelet count produces generalized purpura about a week after a blood transfusion.

Iron Overload
Every unit of red cells contains approximately 200 mg of iron. For chronically transfused patients such as those with thalassemia, progressive and continual accumulation of iron in the mitochondria of cells can be hazardous.

Whenever A Suspected Reaction Occurs:
1. Stop transfusion immediately by clamping the line. Keep the IV open with 50 cc normal saline.
2. Check patient identification on the hospital ID wristband and Blood Bank wrist band with that on the transfusion form attached to the blood unit. Compare blood type and unit # on blood unit with donor number and blood type on transfusion form.
3. Notify physician, and the Unit Supervisor or Nursing Supervisor.
4. Vital signs are to be taken STAT and every fifteen (15) minutes until stable and symptoms subside.
5. Notify Blood Bank immediately. Indicate a transfusion reaction in Cerner Bridge or fill out a "Transfusion Reaction Workup" form and send it to Blood Bank as soon as possible.
6. Return blood bag with attached unit tag and tubing (without needle) to the laboratory in a biohazard bag.
7. If reaction symptoms are limited to “Urticarial Reaction”, investigation is complete. Refer to attending physician for instructions on whether or not to continue transfusion, notify lab, and document in patient chart or Cerner Bridge.
8. Send the first urine (50 - 100cc) passed after reaction to Blood Bank.
9. A physician must decide whether or not a transfusion reaction has occurred and determine whether or not continued infusion is desirable, however, the workup will still be completed by the laboratory and reviewed by the pathologist.
10. Blood Bank will report the investigated results as soon as possible.

Transfusion Reaction Consultation:
Blood Bank notification of a transfusion reaction, with the exception of urticarial reactions, will be regarded as an emergency request for consultation and an investigation will be immediately initiated to include following:
1. Lab phlebotomist will draw immediate post-transfusion EDTA blood sample.
2. The first urine passed after reaction will be evaluated as appropriate.
3. A check of clerical information will be performed on the transfused blood unit, request form, transfusion form records with patient results, and blood pickup form.
4. Inspection of pre and post-transfusion patient specimens for evidence of hemolysis and for confirmation of serological compatibility including Direct Antiglobulin test and ABO and Rh type will be completed.

5. Additional tests including clinical, serological and bacteriological studies are to be done according to Medical Director's direction.

6. Blood Bank will report the investigated results as soon as possible.

7. A report of the transfusion reaction investigation will be placed on the patient's chart. All transfusion reactions are reviewed by the laboratory pathologists.

8. The Blood Bank Medical Director or pathologists will communicate directly with the patient's physician when appropriate.

**Blood and Blood Components**

1. Blood components currently available are:
   Leuko-reduced red blood cells, fresh frozen plasma, cryoprecipitated AHF, plateletpheresis (single donor), irradiated products, CMV negative red cells and 300 µg Rho(D) immune globulin.

2. Many of the components have special requirements or properties. These are listed below:
   a. **Red Blood Cells**
      i. This component increases the oxygen-carrying capacity of the blood by increasing the circulating red blood cell mass. Immediately before infusion, 60 - 100ml of 0.9% sodium chloride, injection (USP), may be added to red blood cells, when diluted in this manner, the flow rate approximates that for whole blood.

   b. **Platelets, Pheresis (Single Donor)**
      i. These have a 5 day dating period (shelf life) when drawn from the donor. For this reason, it is imperative that the Blood Bank be informed regarding the time the platelets are to be infused. If this is done, the FRH Blood Bank and BloodSource can coordinate the delivery of the platelets to prevent the expiration and loss of the component. Platelet products should be administered through a platelet infusion set or blood component recipient set according to the rate of infusion, which is dependent upon the clinical status of the patient.
      ii. The volume of plasma in plateletpheresis units may vary between 200 and 500 ml (see the label). Plateletpheresis units are supplied in a large plastic pack or in two connected packs to improve platelet viability during storage by providing more surface area for gas exchange. This component is especially useful if HLA-matched for patient’s refractory to platelets from unmatched donors.

   c. **Fresh Frozen Plasma**
      i. This component is kept as an inventory of frozen units in the Blood Bank. This component must be thawed by the Blood Bank at 30°C to 37°C with constant agitation. Once this component has been thawed, it is a source of labile coagulation factors, which diminishes after 6 hours and cannot be used after 24-hours and therefore coordination between Nursing and the Blood Bank is essential.
      ii. Fresh frozen plasma should be administered through a proper filter as soon as possible to maintain the coagulation factors. The usual unit contains 225-275 ml of anticoagulated plasma and all stable coagulation
factors, including 350 mg of fibrinogen, and 200 units of Factor VIII. FFP contains plasma proteins including all coagulation factors.

d. **Cryoprecipitated AHF**
   i. This product contains the antihemophiliac factor obtained from a single unit of blood. It is prepared and frozen within 8 hours of donation. Each unit of cryoprecipitate will normally contain an average of 80 units of factor VIII and 200 mg of fibrinogen in 5-15 ml of plasma. The product should be given intravenously through a standard blood filter within 6 hours of the time thawed (4 hours if pooled).

e. **Irradiated Blood Components (Red Blood Cells or Platelets)**
   i. Any lymphocyte containing blood product can be treated with approximately 2,500 rads prior to use, i.e. red cells, granulocytes and platelets.
   ii. Irradiated blood components are indicated for: 1) blood from blood relatives of recipients, 2) blood for exchange transfusion, 3) patients with congenital immuno deficiencies, 4) bone marrow transplant patients, 5) intrauterine transfusions, 6) premature newborn infants and 7) patients with Hodgkin's disease.
   iii. Feather River Hospital will order irradiated products from Blood Source.

f. **Cytomegalovirus (CMV) Negative Components**
   i. CMV Negative products are supplied by Blood Source. CMV Negative components are indicated for infant recipients weighing less than 1200 grams at birth, when either the infant or the mother is CMV-antibody negative or when that information is unknown, and for transplant patients.

g. **Frozen Red Blood Cells and Saline Washed Red Blood Cells**
   i. Frozen red cells are delivered to FRH upon the request of the Blood Bank. It takes several hours to process frozen washed red cells for delivery. Saline washed red blood cells are prepared with a special order. This demands a certain amount of advance notification to the Blood Bank. Once these two components are prepared, they have a 24-hour period in which they must be used.

## Autologous Blood Transfusion

Autologous blood is blood donated by a patient for their own use. This requires careful planning and forethought. Autologous blood is not "crossed over" to the general donor pool. Autologous transfusion avoids the risks associated with homologous blood use, such as disease transmission, alloimmunization and hemolytic and non-hemolytic transfusion reactions.

## Criteria for Blood and Blood Component Transfusion

### General Criteria for Transfusion
1. Was there a doctor's order to give blood or blood component?
2. Was record signed by M.D.?
3. Was there a signed consent?

### General Medical Indication
These are general conditions for which blood is administered.
1. Oxygen requirement
2. Blood loss replacement
3. Volume expansion
4. Bleeding disorder

**Indication for Single and Multiple Unit pRBC Transfusions**
In general, there should be an expectation that one unit of pRBC will increase the hemoglobin 1.0 - 1.5 gm/dl. The least number of units, which is often only one unit, should be given to obtain the desired hemoglobin level.

**Massive Transfusion Protocol**
1. A massive transfusion is defined as the infusion of 10 units or more packed RBCs within a 24-hour period and 8ml/kg for pediatric, (the actual loss of this much blood does not necessarily have to occur before the judgment is made that such loss is imminent).
2. A Massive Transfusion Protocol (MTP) is the process for expediting availability and issue of blood products when a patient is severely hemorrhaging and requires massive transfusion and/or is at high risk for such an event.
3. Refer to the Feather River Hospital Massive Transfusion Protocol for complete guidelines.

**References**