Adverse Effects of Blood Transfusion

The time that elapses between suspicion of a transfusion reaction and initiation of appropriate therapy should be as short as possible. The necessary first steps in suspecting a reaction fall to the transfusionist, who is often a nurse or other member of the clinical team. Any adverse symptoms or physical signs should be considered part of a potentially life-threatening reaction.

A. Signs and Symptoms:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
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<tbody>
<tr>
<td>Abdominal cramps</td>
<td>Fever</td>
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<tr>
<td>Abnormal bleeding/oozing</td>
<td>Flushing</td>
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<tr>
<td>Anuria</td>
<td>Headache</td>
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<tr>
<td>Bronchospasm</td>
<td>Hemoglobinuria</td>
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<td>Burning sensation at infusion site</td>
<td>Hives</td>
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<tr>
<td>Cardiac arrest</td>
<td>Hypotension</td>
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<tr>
<td>Chest or back pain</td>
<td>Increased pulse rate</td>
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<tr>
<td>Chill</td>
<td>Itching</td>
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<td>Congestive heart failure</td>
<td>Jaundice</td>
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<td>Clammy perspiration</td>
<td>Loss of consciousness</td>
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<tr>
<td>Coughing</td>
<td>Muscle pain</td>
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<tr>
<td>Cyanosis</td>
<td>Nausea</td>
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<tr>
<td>Diarrhea</td>
<td>Oliguria</td>
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<tr>
<td>Difficulty breathing</td>
<td>Renal failure</td>
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<tr>
<td>Dyspnea</td>
<td>Respiratory distress</td>
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<tr>
<td>Edema, peripheral</td>
<td>Shock</td>
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<tr>
<td>Erythema</td>
<td>Vomiting</td>
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**NOTE:** In the event of a suspected transfusion reaction, the personnel attending the patient shall notify immediately a responsible physician and the Blood Bank. **IF HIVES ONLY OCCUR,** notify the physician and the Blood Bank (only a clerical check will be done).

B. Transfusion Reactions:

Symptoms of major transfusion reactions include local pain or tightness of the chest and flanks, a “hot” sensation at the injection site, flushing, shortness of breath, shaking chills, dramatic changes of vital signs, or decreased renal output. Rarely, delayed transfusion reactions up to several days after transfusion may occur. Development of hives with no other symptoms is not an absolute indication of a serious problem, and the transfusion may be continued if the attending physician desires.

C. Procedure:

1. Stop the transfusion.
2. Document the time, the patient’s vital signs and symptoms on the computer generated transfusion reaction form.
3. Contact the attending physician if there is any doubt, i.e., hives only.
4. A post-transfusion blood specimen should be drawn before any treatment is initiated.
5. If evidence of a major transfusion reaction is found by the lab, the attending physician will be notified immediately by the pathologist.

D. Notes on Transfusion Reactions:

Transfusion reaction work-up is initiated in any suspected reaction, no matter how trivial, as soon as the laboratory is notified. The basic work-up is a screening procedure to rule out a hemolytic reaction. If there is any suspicion that this has occurred, a complete work-up, including repeat crossmatching is done. The incidence of hemolytic reactions is extremely low, but because of their serious nature, all of the reactions are investigated.

The two common types of reactions seen at Boulder Community Hospital Laboratory are febrile and allergic. Febrile reactions are generally related to antibodies directed against antigens on leukocytes and/or platelets, usually the antibody being in the patient’s plasma and the antigens in the donor blood, although the reverse can occur. The time sequence of this type of reaction is variable, the febrile response occurring anywhere from soon after the start of the transfusion up to 1 or 2 hours following the transfusion. The patient’s symptoms usually respond to aspirin or other antipyretics. Allergic reactions are believed to be related to prior sensitization to foreign immunoglobulins. These reactions generally occur early in the course of the transfusions, and the clinical symptoms respond well to the use of the various antihistamines. Pretreating the patient with an antihistamine may enable him/her to receive the entire unit without difficulty. Washed red blood cells may be of help in individuals who have repeated allergic reactions, as the washing procedure eliminates most of the plasma proteins.
Rare reactions, other than hemolytic, include acute pulmonary edema (usually related to antileukocyte antibodies), anaphylactoid reactions (due to anti-IgA in persons lacking IgA) and serum sickness.

Occasionally, delayed hemolytic transfusion reactions may occur, ranging from 3-14 days post-transfusion. These reactions are usually subclinical, resulting in a slight drop in hemoglobin, mild transient hyperbilirubinemia, elevated reticulocyte count, and positive direct Coombs’ test. The delay in the reaction is due to the fact that the recipient has only an extremely low titer of antibody and the transfusion initiates a secondary immune response which takes a few days to build up.

E. Transfusion Reaction Flow Sheet for Nursing:

**CLINICAL JUDGEMENT OF A TRANSFUSION REACTION**

**STOP BLOOD**

**KEEP LINE OPEN**

**NOTIFY ATTENDING PHYSICIAN AND BLOOD BANK**

**DO CLERICAL CHECKS**

**OBTAIN AND RECORD**

PRE- AND POST-TRANSFUSION
BLOOD PRESSURE, PULSE, AND TEMPERATURE

**KEEP FOR LAB:**

TRANSFUSION
BLOOD BAG, SECTION
ADMINISTRATION SET, ATACHED SOLUTIONS, AND ALL RELATED FORMS AND LABELS

**FILL OUT**

REACTION ON SLIP

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**Blood Administration**

A. Identifying Recipient and Donor Unit:

Accurate identification of the donor’s blood and the intended recipient may be the single most important step in ensuring transfusion safety. The final steps in safe transfusion practice occur when blood is issued for transfusion and at the patient’s bedside when blood is administered.

1. **At the time of issue:**

   Both the transfusion service personnel who issue the blood and the clinical representative who receives the unit have responsibility for identifying blood.

   The clinical representative (whether asking that blood products be tubed to the patient nursing area or coming to the Blood Bank to pick up the blood products) must send or bring a Blood Component Request Card to the Blood Bank. This card shall have the patient’s full name, and date of birth (a hospital patient skicker is adequate). The Medical Record number or Social Security number should be used only for John/Jane Does or physician office draws, respectively. Also, on the card, the date, ordering physician, requesting RN, and tube station should be filled in. Check which component is required, and on the back of the card, check the indication for transfusion.

   The Blood Bank technologist will check that the patient’s name, date of birth (Medical Record number or Social Security number when appropriate), unique Blood Bank identifier (Bloodloc™ or Fenwall), patient’s blood type and Rh, unit’s blood type and Rh, unit number, and unit expiration date are accurate and consistent on the Blood Component Request Card, the Unit XM card, and the patient label attached to the blood bag. The Blood Bank technologist will also check the color and appearance of the blood or component and record that these as well as the expiration date were checked and are acceptable. Any discrepancies in these checks must be thoroughly investigated and resolved prior to issuing the unit of blood or component.
If the unit is to be transported through the tube system, the Blood Bank technologist will record his/her initials or employee number, date/time of issue, blood product unit number, and component on the Blood Component Request Card. The Blood Bank technologist will issue the component in the computer. The component will be inserted into a baggie and a lock with a three letter code will seal this baggie. The three letter code corresponds to the three letter code on the patient armband. This will then be bagged and with the card sent to the designated nursing unit via a secured transaction in the tube system.

The clinical representative receiving the component from the tube system in the nursing unit must check that the patient and unit information on the Blood Component Request Card, the Unit XM card, and the patient label on the component match. They must then put their employee number, the component unit number, and date/time of receipt in the designated areas on the Blood Component Request Card and return the card, lock, and baggies to the lab via the tube system.

Blood should be administered as soon as possible after issue. Blood must not be stored in unmonitored refrigerators of the sort commonly found in nursing stations. If transfusion cannot be initiated within a short time, the blood should be returned to the Blood Bank. If more than 30 minutes has transpired, the unit will not be accepted back into inventory.

If it appears that more than 3 or 4 hours will be needed to complete the transfusion, it may be wise to administer the blood in several aliquots. All aliquots must be used within 24 hours. A new crossmatch specimen is needed if more than 3 days elapse after administration of the first unit of red cells. It is not admissible to add medication to blood or components.

2. At the time of infusion:
Verify that a consent form has been signed by the patient. The transfusionist who administers the blood is the last point at which identification errors can be detected before the patient is subjected to transfusion. Remove the blood from the bag by verifying it with the patients armband and dialing the three letter code into the locked system. If these match, the lock will come apart. If the lock will not open, call the Blood Bank after verifying the code on the patients armband. The lock and bag are to be sent back to the Blood Bank. Do not throw them away. Before administering the blood or component, two persons are required to check all identifying information at the patient’s bedside and record on the Blood Product Administration Record that this information has been checked and found to be correct. Items to be checked are:
   a. The name, and identification number, on the patient’s wristband must be identical with the name, and number, on the unit crossmatch card and the patient label on the component.
   b. The ABO and Rh groups of the patient and of the donor unit must be recorded on the Blood Product Administration Form. The ABO and Rh groups on the primary label of the donor unit must be the same as those noted on the unit XM card. These must be ABO and Rh compatible with patient’s ABO and Rh groups.
   c. The same donor unit identification number must be on the primary label of the bag and the unit XM card. The expiration date of the donor unit should be verified before infusion.
   d. The unit label must indicate the identity of the person performing the compatibility tests and interpretation of the results. If blood was issued before compatibility tests were completed, this must be conspicuously indicated on the label or slip.
   e. The blood or component should be checked against the physician’s written order to be sure the correct component is being given.

Before administering the blood, positive identification of the patient must be made. Checking the wristband is the best method of identification. In addition to the wristband, identification should be checked in a second way:
   a. Ask the patient to state his/her name if he/she is able to respond. If the patient is responsive, it is important to explain what the transfusion procedure involves and how long it is likely to take. The patient should be encouraged to ask questions about the procedure. Also, inquire whether the patient has experienced adverse affects from previous transfusions and warn of symptoms that should prompt the patient to call for clinical assistance.
   b. Ask a relative to state the patient’s name.

3. Starting the transfusion:
After checking all the identifying information, two persons (nurses, unit assistants or physicians) must sign the Blood Component Administration Record. Note date and time of transfusion on this copy. The date and time of transfusion, the patient’s condition at the start of transfusion, and the type and volume of the component and its identification number must be recorded.

The transfusionist should observe and record the patient’s pretransfusion temperature, pulse, and blood pressure before administering the blood.

4. Care during transfusion:
The transfusionist should remain with the patient for the initial 15 minutes of the infusion. If no problems occur at this time, the risk of life-threatening complications declines sharply, although the possibility of adverse effects continues throughout and after the entire process. After the first 15 minutes, the patient’s vital signs should be recorded and, if there is no evidence of impending reaction, the rate of infusion can be increased to that specified in the physician’s order. Patient-care personnel should observe the patient frequently throughout the transfusion.
5. **Rate of Infusion:**
The desirable rate of infusion varies with the patient’s blood volume, hemodynamic condition, and cardiac status. Infusion of a single unit of blood or component should take no more than 4 hours. The maximum time limit for use of a blood filter is 4 hours. Filters can ordinarily be used for two to four units of blood if within the 4-hour limit.

If blood flows more slowly than is wished, the filter or the needle may be obstructed or the component may simply be too viscous for rapid flow through the administration set. Steps to investigate and correct the problem include the following:

a. Elevate the blood container to increase gravitational pressure.
b. Check the patency of the needle.
c. Examine the filter of the administration set for excessive debris.
d. If red blood cells are flowing too slowly and there is an order permitting addition of saline, add 50-100 mL normal saline.

**Components**
Platelet concentrate should be infused at a rate of about 10 minutes per unit or as fast as tolerated.

Fresh frozen plasma should be infused at a rate of about 10 mL per minute.

Cryoprecipitate can be infused in 5-10 minutes.

6. **Discontinuing the transfusion:**
After each unit of blood has been infused, patient-care personnel should record the time, volume, and type of component given, the patient’s condition, if there was a reaction, and the identity of the person who stopped the transfusion and observed the patient. Post-transfusion vital signs should be taken and written on the Blood Component Administration Record. The copy of the slip should be charted. The empty blood bag should be put in a plastic baggie and discarded into a biohazard container. The empty blood bag is not to be sent back to the laboratory.

Part of good transfusion practice is post-transfusion observation to ensure that the desired clinical goal has been achieved. This includes obtaining a post-transfusion hematocrit, platelet count, or coagulation factor level, as indicated for the component transfused. The possibility of delayed hemolytic reactions, usually occurring 3-14 days post-transfusion, should also be kept in mind. Post-transfusion hepatitis can develop as early as 2 weeks or as late as 6 months after transfusion, and there should be some form of follow-up to determine whether liver damage has occurred.

**NOTE:** If after blood or components are issued to the floor, there is any reason they will not be infused in an expedient manner, they should be returned to the Blood Bank within the 30-minute time limit. At no time should they be stored on the floor.

**Components**
The Blood Bank attempts to keep on hand a practical selection of the common blood types of packed cells. It is stored in the Blood Bank at 1-6° C.

Fresh frozen plasma is stored in the Blood Bank at -20 to -35° C.

All components come from Bonfils Blood Center (BBC) in Denver. Approximately 2 hours may be required to obtain and crossmatch blood or components not on hand for an emergency. Please alert the lab immediately to any unusual situation or need. An uncomplicated crossmatch requires 45 minutes. The presence of “irregular antibodies” may result in unpredictable delays. Fresh blood must be delivered from Denver and is available only after being specifically ordered for transfusion.

**Crossmatches**
Specimens for blood banking must be drawn by laboratory personnel or personnel trained in the approved methods of phlebotomy and specimen labeling. The phlebotomist must assure that all inpatients have a hospital armband on and there is a sticker with a three letter code attached to the armband. This code is transferred onto the tube for Blood Bank and should be underlined. All outpatients (drawn outside the hospital) have a unique Blood Bank armband. All pre-surgery outpatients are positively identified at the time of draw and their armband, which is attached at the time of admission contains the three letter code sticker for the Blood Bank.

A. **Routine Crossmatch, Non-surgical:**
Routine orders are drawn with the morning pick-ups. These are crossmatched during the day, and blood will be routinely held for 3 days. After that time, a crossmatch must be reordered.

B. **Surgical Patients:**
All requests for transfusion of blood products for surgical patients should arrive as early as possible before surgery. If the patient signs a BB preadmission form which states they have not been transfused and/or pregnant in the last 3 months, they may be drawn as early as 7 days before surgery. The specimen is good for 3 days post surgery date. Late requests may pose problems in
acquiring blood for patients with rare blood types or antibodies. There is an extra delivery charge for the patient after 6:00 p.m. to obtain rare type blood or components.

When a series of transfusions are to be given over a period of several days, a new specimen must be drawn from the patient after 3 days have elapsed since the first transfusion. We must receive a new request every 3 days if a certain number of units are to be kept on hold for a patient.

C. Emergency Transfusions:
Transfusions of uncrossmatched blood can rarely be justified. Type-specific blood without a crossmatch may be obtained in about 5 minutes. It is necessary for the attending physician to sign the “Emergency Blood Request Form,” which is obtained from the Blood Bank.

The blood is then crossmatched immediately after issue. Proper identification of the patient is mandatory.

D. Incompatible Crossmatch:
If a patient’s condition is serious enough to warrant transfusion of blood which is serologically incompatible (i.e., in the case of patients with warm auto-antibodies, or before the patient’s antibody can be identified and the donor blood typed for the respective antigen), the physician must sign the “Incompatible Release Form” before the units are issued.

E. Autologous Units or Directed Donor Units:
These units can be drawn with a doctor’s order. The patient must go to BBC. The unit(s) will be well labeled and sent to Boulder Community Hospital Laboratory before the patient’s surgery. For further information, see p. 427, “Autologous Donors” and p. 428, “Directed Donors.”

F. Pediatric Crossmatches:
1. Newborns:
   Newborns are crossmatched using the mother’s blood. When the clot is drawn from the mother, the phlebotomist must ID the mother with the hospital armband and with the mother/baby armband system. The mother/baby armband system has a unique identifying number, family name, mother’s given name, baby’s date and time of birth, and the delivering physician’s name. One armband is placed on the mother and another identical armband is placed on the baby. The unique identifying number, mother’s full name, and the baby’s date of birth must be recorded on the mother’s specimen. The unique number from the mother/baby armband must be recorded on the unit XM card and the patient label on the components requested for the baby. Please notify the lab 24 hours in advance so that blood <5 days old, aliquots, cytomegalovirus-negative, and if required hemoglobin S-negative may be obtained.

2. Boarder babies:
   Boarder babies are crossmatched using their own blood. The baby must have on a hospital armband at the time the blood is drawn for crossmatching. The following information must be on the specimen label: infant name, date of birth, Bloodloc™ code, medical record number, date/time of draw, and the initials or employee number of the phlebotomist.

   Please notify the lab 24 hours in advance, or as soon as possible, so that <5 day old blood may be obtained from BBC.

3. Transfusions:
   Please follow the procedure in the nursing manual, including instructions for patient identification.

   If fresh frozen plasma is requested to be infused with packed red cells, they are to be mixed to the specified hematocrit by the lab.

Donor Programs
BBC draws volunteer donors only. BBC has a donor station in Boulder: Boulder Valley Blood Center, which is open Tuesday through Saturday. Interested donors should make appointments by calling 442-8270.

Physicians and the nursing staff are encouraged to suggest replacement of units by family and friends of transfusion recipients.

Autologous Donors
A. Charges:
   When the lab receives the autologous blood from BBC, it will be clearly marked with the patient’s name, date of surgery, physician, and date of donation. Please order ARBC’s for that patient so that the Blood Bank can do the necessary workup to enable that patient to receive that unit of blood.

B. Questions:
   If a patient asks about the possibility of getting autologous blood, relay the following information:
   1. They need a physician’s order.
2. They need to contact the BBC, phone 363-2330. The central scheduling desk at BBC is open Monday through Friday from 8:00 a.m. to 4:30 p.m.

3. Donations may be made only at the Lowry location in Denver. Arrangements must first be made through BBC at 363-2330.

**Directed Donors**

Occasionally, blood donations are directed for use in specific patients other than the donor. These donations are called directed donor units. Each request for directed donor transfusion shall be evaluated on an individual basis. The Blood Bank may perform the blood typings on the potential donors at the request of the physician to ensure the donor and recipient are of compatible ABO and Rh types. However, arrangements for the donations must be made by the recipient and/or donor with BBC. The donor must have a physician’s order or BBC will not draw the unit for a particular patient. Conditions to be met are the same as for autologous donors. The directed donor will have to pay for the unit processing at the time of donation.

In addition to the regular and directed donor labels on the blood bag, a separate label will be attached giving the donor number and patient names, the expected date and place of transfusion, and the patient’s physician.

Directed Donations should be scheduled one to two weeks in advance of a scheduled surgery.

A. Testing of donated units may take 5 business days depending on when the unit is drawn. If retesting is necessary an additional day may be needed to complete this process.

B. Women of child-bearing age should not be recipients of blood donated by: their children, their husbands, or their husband’s blood relatives, as this could cause red-cell alloimmunization in future pregnancies. Although it is unlikely that most patients will face future organ transplantation therapy, prior transfusion from immediate family members could prevent their use as organ donors.

These units are to be typed and crossmatched with the patient for which they were drawn according to the established protocol.

BBC needs at least 5 days notice for directed donors to be drawn and processed.

**Armbands**

Armbanding is a very important part of positive patient identification which is required by the Blood Bank for safe transfusion practices.

A. *Who Gets Blood Bank Armbands?*

   All patients with orders for “Any blood component;” “Type, Rh and Antibody Screen, Blood;” and “Draw Clot and Hold, Blood” must be armbanded in some way. Stickers with three letter codes will be available on the floors or call the Blood Bank if not available. These codes are attached to all inpatient armbands when there is a Blood Bank order. The code is then written on the tube drawn for Blood Bank. All tubes received without this code will not be used.

   1. Inpatients: all inpatients must have a hospital armband on with the sticker that has a three letter code for the Blood Bank.
   2. Outpatients: all outpatients must have a unique Blood Bank armband on.
   3. Pre-surgery patients: when these patients check into the hospital, they must have a hospital armband put on with the sticker that has a three letter code for the Blood Bank.

B. *Unique Blood Bank Armbands:*

   The unique Blood Bank armbands are used for outpatients and when a hospital armband is not available for an inpatient. When drawing blood for crossmatches use the Fenwal Typenex ID Band.

**Returning Blood to the Blood Bank**

If there is any delay in starting a transfusion, return the unit to the Blood Bank as soon as possible. If the unit is not going to be transfused, it must be returned to the Blood Bank within 30 minutes.

If blood is returned within the 30-minute limit and the container closure has not been disturbed, the unit may be used for other patients. If not, discard the unit.

The American Association of Blood Banks requires that the blood be stored only in monitored refrigerators. The only monitored refrigerators are in the Blood Bank. Do not store blood in any other refrigerator.

**Safety Measures for Personnel Infusing Blood and/or Components**

Treat the entry area on the bag as a sterile area following the same procedure as for entering a sterile IV solution with a spike.
After blood and/or component is infused and the empty bag is discontinued and pulled off the spike, put the bag into a plastic “baggie” and tape shut. Discard the empty blood bag into a biohazard container.

**Sign Out of Blood and Components from the Blood Bank**

Both the Transfusion Service personnel who issue the blood and the clinical representative who receives the unit have responsibility for identifying blood.

The clinical representative (whether asking that blood products be tubed to the patient nursing area or coming to the Blood Bank to pick up the blood products) must send or bring a Blood Component Request Card to the Blood Bank. This card shall have the patient’s full name, and date of birth on it (a hospital sticker is adequate). A Medical Records number or Social Security number are used for John/Jane Does or physician office draws only (a hospital sticker is adequate). Also on the card, the date, ordering physician, requesting RN, and tube station should be filled in. Please check which component is required, and on the back of the card, please check the indication for transfusion.

The Blood Bank technologist will check that the patient’s name, date of birth, unique Blood Bank identifier (Bloodloc™ or Fenwall), patient’s blood type and Rh, unit’s blood type and Rh, unit number, and unit expiration date are accurate and consistent on the Blood Component Request Card, the unit XM card, and the patient label attached to the blood bag. The Blood Bank technologist will also check the color and appearance of the blood or component and record that these as well as the expiration date are checked and are acceptable. Any discrepancies in these checks must be thoroughly investigated and resolved prior to issuing the unit of blood or component.

If the unit is to be transported through the tube system, the Blood Bank technologist will record his/her initials or employee number, date/time of issue, blood product unit number, and component on the Blood Component Request Card. The Blood Bank technologist will then issue the component in the computer. The component and the card will be bagged with a lock with a three letter code, sealed in another bag, and sent to the designated nursing unit via a secured transaction in the tube system.

The clinical representative receiving the component from the tube system in the nursing unit must check that the patient and unit information on the Blood Component Request Card, the unit XM card, and the patient label on the component match. They must then put their employee number, the component unit number, and date/time of receipt in the designated areas on the Blood Component Request Card and return the card, and Blood Loc, and bags to the lab via the tube system.

Blood will be issued for only one patient at a time and only one unit at a time. Exceptions for blood will be considered for the operating room, intensive care, emergency room, and dialysis.

Upon completion of the transfusion, finish filling out the transfusion portion of the Blood Component Administration Record. Pull off spike, put the empty blood bag into a “baggie” or plastic bag, tape shut, and place in a biohazard container. The Blood Component Administration Record is put on the patient’s chart. Do not return the empty blood bags to the Blood Bank.

**Staffing**

The Blood Bank is open 24 hours a day. A full-time Blood Bank technologist is on duty from 6:30 a.m. until 10:30 p.m., Monday through Friday, and on weekends and holidays from 7:00 a.m. until 3:30 p.m. Routine crossmatches, cord bloods, RhoGAM™, and antibody identification are done at these times. The Blood Bank is covered by the evening and night staff for some pre-op crossmatches and emergencies (STAT crossmatches and cord bloods).

**Transfusion Devices**

An increasing number of mechanical devices are available to facilitate administration and storage of blood and components. Individuals involved in transfusion practice should know the proper use of these products.

A. **Blood Warmers:**

   Routine warming of blood is not necessary. RBCs or whole blood should not be subjected to warming devices or water baths that warm the entire unit.

   Warming of blood toward body temperature may be appropriate in situations such as rapid or massive transfusion, exchange transfusion, or in patients with potent cold agglutinins. At such times, warming of blood should be accomplished during its passage through the transfusion set. The warming system must be equipped with a visible thermometer, and with an audible warning system. Blood must not be warmed above 42° C. Record temperature of the warmer on the patient’s chart.

B. **Electromechanical Infusion Devices:**

   Mechanical pumps that facilitate infusion at controlled rates are useful, especially for the very slow rate of transfusion to
pediatric or neonatal patients. When using these pumps for blood transfusion, the transfusionist must ensure that hemolysis does not occur.

C. **Filters:**

Blood and components must be administered through a filter designed to retain blood clots and other debris. Standard blood filters have a pore size of 170-260 microns and can trap large clots. Platelets and cryoprecipitate should be administered using a blood component infusion set stocked by the Blood Bank. Microaggregate filters have an effective pore size of 20-40 microns and trap microaggregates composed of degenerating platelets, white cells, and fibrin strands which form in blood after 5 or more days of storage. No published data support the routine use of microaggregate blood filters for low-volume transfusions.

D. **Platelet Storage:**

Platelet concentrates must be gently agitated during room temperature (20-24°C) storage. They have a shelf life of 5 days.

E. **Cell Washers:**

These machines effectively remove plasma, platelets, and most white cells, but they increase the cost of transfusion and impose a 24-hour expiration for the washed unit.

F. **Needles:**

For infusing whole blood or RBCs, an 18- or 19-gauge needle gives good flow rates without excessive discomfort for the patient. For patients with small veins, much smaller needles must be used.

G. **Compatible Fluids:**

No medication or intravenous solutions other than normal saline may be added to blood or components. Diluting RBCs to reduce viscosity is the circumstance to which this most often applies. Normal saline is the only acceptable crystalloid fluid that may be used to rinse cryoprecipitate out of the bag.

**Alternative Blood Bank Labeling**

If the hospital Admissions Computer Module is not functioning, the patient may be armbanded with information that includes their name and date of birth. The Bloodloc™ system may be used. If an admission armband is unavailable, an alternative Blood Bank Identification will be used. This system consists of the Fenwall Typenex Identification Band. Please follow this procedure for all patients receiving blood or blood components.

1. Verify the patient’s name, SS# and date of birth.
2. Write the patient’s name, SS# and/or date of birth, date, time and the phlebotomist’s initials on the label located near clip. Press hard so information will go through both layers.
3. Remove the completed self-sticking label and press onto blood sample tube.
4. Wrap band once around patient’s wrist or ankle, number side out, so that the tape lies between both front and rear guides.
5. Firmly close clip. Band becomes tamper-proof when clip is closed.
6. To separate the 14 numbered labels from patient’s armband, hold clip firmly and tear label portion of band to one side without raising band above the level of the clip.
7. Place one coded self-sticking label from band and attach to crossmatch request form and send to the laboratory. Also send a copy of the patient’s Information Sheet.
8. When requesting blood for transfusion, this alternative Blood Bank number will be required as will the patient SS# and/or date of birth.
9. This armband is to remain on the patient until the clot expires (3 days). If it is removed, the patient will need to be redrawn and the work repeated.
<table>
<thead>
<tr>
<th>Mnemonic</th>
<th>Product Ordered</th>
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| PRBC     | Packed Red Blood Cells  
          | Packed Cells  
          | RBCs  
          | Units of Blood |
| FLP      | Filtered LeukopenoRBCs  
          | LeukopenoRBCs  
          | LeukopenoPacked Red Blood Cells  
          | Leukopeno Blood |
| FLPI     | LeukopenoRBCs Irradiated |
| FFP      | Fresh Frozen Plasma  
          | Plasma |
| CRYO     | Cryoprecipitate |
| PLCO     | Platelet Concentrate  
          | 10 Units Platelets  
          | Leukopeno Platelets  
          | Single Donor Platelets  
          | (all of our single donor platelets are Leukopeno) |
| PLCOI    | Leukopeno Platelets, Irradiated |
| ARBC     | Autologous Red Blood Cells  
          | Autologous Blood  
          | Autologous RBCs |
| DRBC     | Directed Red Blood Cells  
          | Directed Blood  
          | Directed RBCs |

**Note:** Specify in comments special requirements such as CMV negative, irradiated, etc.