

EIGHTEEN

BLOOD BANK AND TRANSFUSION SERVICES

KEY CONCEPTS you will learn in this chapter include:

- Why provision of transfusions is unsafe in many settings
- What the special risks to patients receiving transfusions are
- What the indicators for transfusion are
- How complications and the risk of infection from transfusions can be prevented

BACKGROUND

Blood bank and transfusion services collect, process, store and provide human blood intended for transfusion, perform pretransfusion testing and, finally, infusion into a patient. Although these processes may take place in a single hospital department, often they are performed in two separate places. For example, in many countries most blood for transfusion is collected in blood centers, which then process, store and transport it for use by a hospital's transfusion service. The transfusion service in turn is responsible for maintaining an adequate supply of needed blood and blood products, blood-typing and cross-matching patients, and releasing the blood for transfusion.

In many respects, the infusion of blood or blood products is equivalent to the use of any other intravenous therapeutic agent (e.g., antibiotics). There are, however, additional, specific risks to patients receiving transfusions. For example, because of the potential risk of patients receiving transfusions being exposed to serious infections (HBV, HCV or HIV), guidelines for competently and safely performing various screening and testing processes and procedures have been developed. These guidelines are very specific, allow little room for variation in practice and need to be followed by staff at all times if transfusion services are to be safely provided.¹ As a consequence, in developed countries, blood bank and transfusion services are highly regulated, and the quality of services is monitored daily (AABB 2002).

Staff working in blood banks and transfusion services also are at risk of accidental injury (e.g., needlestick) or exposure to contaminated blood or blood products. To protect themselves, staff need to know and understand the importance of handwashing, use of gloves and personal protective

¹ Although there are a number of books that deal with transfusion, the *Standards for Blood Banks and Transfusion Services*, prepared by the American Association of Blood Banks (AABB 2002), is the only manual that provides uniform codes of practice for use in the United States.

equipment such as face shields or masks and plastic aprons, where appropriate.

In this chapter, the guidelines for the safe provision of blood bank and transfusion services are summarized from the perspective of:

- screening the blood donor,
- ensuring the safety of the donor,
- testing to make sure the blood or blood product is safe for use,
- protecting the patient receiving the transfusion, and
- ensuring the safety of laboratory and clinical staff.

Adherence to these guidelines can reduce the risk of transfusion-related complications and hospital-acquired (nosocomial) infections in patients and exposure to and subsequent laboratory-acquired infections in staff (Harding et al 1995).

DEFINITIONS

- **Blood bank.** Facility or hospital unit that performs the collection, processing, storage and distribution of human blood or blood products.
- **Clinically significant antibody.** An antibody capable of producing an adverse reaction to transfused blood or blood product obtained from a donor (allogenic antibody) or recipient (autologous antibody).
- **Closed system for obtaining blood.** System in which the blood is not exposed to air or outside elements during collection and processing, including separation of components (e.g., platelets) if required prior to transfusion. It is the safest way to collect, process and store blood.
- **Donor-Patient.** Person whose blood is collected for possible transfusion to another person (allogenic transfusion).
- **Donor-Recipient.** Person whose own blood is collected for possible transfusion to her/himself (autologous transfusion).
- **Lookback system.** Process of identifying persons who have received blood transfusions from donors who are subsequently found to have infections with HCV, HIV (and often HBV), and notifying them if appropriate.
- **Recipient transfusion reaction.** Adverse reaction to infusing blood or blood products into a patient (recipient). It may occur at any time during the transfusion but often happens shortly after starting it. The reaction may be mild or severe and rarely is fatal. Types of reactions include allergic (from mild itching and hives to serious breathing problems) and hemolytic (destruction of red cells) reactions as well as fever, chills, rapid heart rate (tachycardia), hyperventilation, fainting and, rarely, cardiac arrest. Delayed reactions several days or weeks

after the transfusion may occur and may be due to serum sickness (antigen-antibody reaction).

- **Transfusion service.** Facility or hospital unit that provides storage, pretransfusion testing and cross-matching, and infusion of blood or blood products to intended patients (recipients).
- **Unit of blood.** Sterile plastic bag in which a fixed volume of blood is collected in a suitable amount of anticoagulant. (The collection system should be a closed system, usually consisting of a sterile hypodermic needle connected by tubing to a collection bag or bottle that has one or two sterile ports for inserting a sterile blood administration set.)
- **Urticarial reaction.** Allergic reaction consisting of itching (pruritis), hives, skin rash and/or similar allergic condition occurring during or following a transfusion of blood or blood products.

WHY TRANSFUSION SERVICES ARE UNSAFE IN MANY SETTINGS

Transfusing patients with blood and blood products is one of the oldest medical and surgical remedies. In resource-poor countries, it is one of the few procedures available to practitioners. As a result, it is overused and provided for a myriad of reasons, many of which are not appropriate. Moreover, all too often blood is obtained from paid, high-risk donors such as commercial sex workers and intravenous drug users who are minimally screened for infectious diseases or other conditions (e.g., anemia) that normally should disqualify them as donors. For example, it is estimated that less than half of the world's blood supply used for transfusions is safe.

In addition, staff working in these units, as well as health workers giving the transfusions, often have received little training and are not aware of the risks to their patients and themselves. As a consequence, even if rapid test kits for infectious disease testing are available, staff working in the blood bank or transfusion service may not know how to use them or interpret the results. In addition, a common problem expressed by many transfusion service staff is that physicians demand release of the blood before testing is completed even in nonemergency situations—and in some emergency situations even before cross-matching is done. Because most transfusion services lack lookback record keeping capability, patients who are transfused with blood or blood products that are subsequently found to be seropositive for HBV, HCV or HIV are seldom notified.

PROVISION OF SERVICES

Blood bank and transfusion services involve:

- selecting donors and assuring that they are informed;
- collecting blood from screened donors;
- testing for blood components, antibodies and infectious diseases;

- storing and transporting blood;
- pretransfusion testing of patient (recipient) blood; and
- transfusing patients.

Donor Selection and Informed Consent

To attract volunteer donors and encourage their continued participation, the place where blood is collected should be kept clean and be as pleasant, safe and convenient as possible.

Donor Selection

The donor selection process is one of the most important steps in protecting the safety of the blood supply. The process is intended to identify medical problems, behaviors (e.g., IV drug use) or events that put a person at risk of being infected and transmitting a serious disease to the person receiving the transfusion. To accomplish this, donors should be questioned about their medical history, be given a limited physical examination (e.g., pulse and blood pressure checked and heart and lungs listened to with a stethoscope) and have their hemoglobin or hematocrit determined. In general, potential donors should be at least 17 years old, unless there are special circumstances requiring a minor to give blood. They should be in good health, not severely anemic (Hgb > 11 g/dL or Hct > 33%) and not be infected (carrier or seropositive) for HBV (if not vaccinated), HCV or HIV/AIDS.²

Informed Consent

Prior to collection of blood, the elements of the donation process should be explained in simple, easily understandable terms using the patient's primary language if possible. The explanation should include information about the risks of venipuncture (phlebitis or local infection and rarely bacteremia or septicemia) and potential adverse responses to having 400–500 mL of blood removed (tachycardia, hyperventilation, feeling light-headed and occasionally fainting). It also should include mention of the tests performed to reduce the risk of transmission of infectious diseases, such as syphilis and serious bloodborne viruses, to patients (recipients). In addition, the donor should have an opportunity to ask questions about the procedure and to refuse consent. In particular, the donor should clearly understand exactly how donors will be notified about any medically important abnormality found during the predonation evaluation or as a result of laboratory testing (e.g., a positive rapid test for HIV) and followup. Appropriate education, counseling and referral should be offered as well.

² For the most current Uniform Donor History Questionnaire, check the AABB website (www.aabb.org).

Blood Collection

The donor as well as the future recipient should be protected by proper collection of the blood. Careful skin preparation using an aseptic technique is a critical component of donor and recipient safety. Several studies suggest that fewer than two or three blood units per thousand will contain bacteria if aseptic technique is used and blood is collected in a closed system (Abrutyn, Goldman and Scheckler 1998). To minimize the risk of contamination:

STEP 1: Make sure all items are available:

- Blood collection set (closed system) consisting of a sterile plastic bag containing a sufficient amount of anticoagulant for the quantity of blood to be collected, IV tubing and large-gauge #18 or #19 hypodermic needle)
- Pair of sterile or high-level disinfected surgical gloves
- Clean tourniquet or blood pressure cuff
- Antiseptic solution (e.g., 2% chlorhexidine gluconate, 60–90% alcohol or 10% povidone iodine) and sterile or clean gauze squares (2 x 2) or cotton swabs
- Surgical tape
- Towel to place under patient’s hand or forearm
- Basin of clean warm water, soap, face cloth and clean dry towel to wash it.³ (Only needed if patient’s arm is visibly soiled.)
- Plastic bag or leakproof, covered waste container for disposal of contaminated items
- Puncture-resistant sharps containers (within arm’s reach if possible)

Note: In 1991, Maki, Ringer and Alvarado reported that the infection rate with chlorhexidine was 84% lower than with povidone-iodine (PVI) or alcohol for skin antisepsis.

STEP 2: Explain procedure to the patient.

STEP 3: Identify the best veins for inserting the IV needle. (Blood should be drawn from a large, firm vein—usually the antecubital space—that is free of skin lesions or rashes. Both arms should be checked.)

STEP 4: Put the tourniquet or blood pressure cuff on the upper arm about 9 cm (3–4 inches) above the antecubital space to confirm that the vein is visible and then release the tourniquet or cuff.

STEP 5: If the venipuncture site is visibly soiled, first wash it with soap and clean water and dry with a clean cloth.³

STEP 6: Wash hands with soap and clean water and dry with a clean, dry towel or air dry.³ (Alternatively, if hands are clean, apply 5 mL,

³ If tap water is contaminated, use water that has been boiled for 10 minutes and filtered to remove particulate matter (if necessary), or use chlorinated water—water treated with a dilute bleach solution (sodium hypochlorite) to make the final concentration 0.001% (see **Chapter 26**).

about 1 teaspoonful, of a waterless, alcohol-based antiseptic handrub to both hands and vigorously rub hands and between fingers until dry.)

STEP 7: Place the donor's arm on a clean towel and cleanse an area about 3 cm (1.5 inches) in diameter with antiseptic solution. Use a circular motion outward from the proposed needle insertion site over the vein.

If using polyvidone-iodine or other iodophor, allow it to dry (about 2 minutes) because PVI only releases free iodine, the active antiseptic agent, slowly (see **Chapter 6**).

STEP 8: Do not touch the area after applying the antiseptic solution.

STEP 9: Put the tourniquet or blood pressure cuff on the upper arm again.

STEP 10: Put sterile or high-level disinfected gloves on both hands.

STEP 11: Insert the hypodermic needle into the vein without touching the skin if possible, release the tourniquet or cuff and then secure the needle by placing a short piece of tape across the blood collection tubing below the area cleansed with antiseptic.

Note: If a blood pressure cuff is used, collect the blood under about 40 to 60 mm Hg pressure, but if a tourniquet is used it should be applied just tight enough to keep the vein full and firm, but not so tight as to cause discomfort to the donor.

STEP 12: When the required amount of blood has been obtained, remove the needle without touching the barrel or tip of the needle and place it in a puncture-resistant sharps container.

STEP 13: Cover the insertion site with a 2 x 2 gauze square, and apply pressure until the bleeding stops. (The donor can be shown how to apply pressure as it may take several minutes before all bleeding stops.)

STEP 14: Check the arm. If the bleeding has stopped, secure the gauze squares using 1 or 2 short pieces of surgical tape.

STEP 15: Prior to removing gloves, place any blood-contaminated waste items (cotton or gauze squares) in a plastic bag or leakproof, covered waste container.

STEP 16: Remove gloves by inverting and place them either in a plastic bag or waste container.

STEP 17: Wash hands or use an antiseptic handrub as above.

STEP 18: Have the patient remain resting on a bed or in the donor chair for several minutes.

STEP 19: Provide the donor with something to drink and a piece of bread, a cookie or a biscuit.

STEP 20: Tell the donor to drink more fluids during the next 4 hours and avoid alcohol or smoking until more food has been eaten. Also, tell her/him that if there is bleeding apply pressure and raise the arm over the head. Finally, if the donor becomes dizzy or sick to the stomach

(nauseated), tell her/him to sit down, bend forward and rest her/his head between the knees until the dizziness or nausea passes.⁴

Once the blood is collected, contamination can be avoided by:

- maintaining appropriate storage conditions,
- testing the blood unit without entering the closed collection system, and
- infusing or discarding the blood unit within a short period once the closed system has been opened (AABB 2002).

Blood Component and Infectious Disease Testing

The tests generally required to be performed on all blood or blood products that are intended for transfusion to patients include the following:

- ABO blood group is determined by testing the donor's red cells with anti-A and anti-B reagents and by testing the donor's serum or plasma A₁ and B red cells.
- Rh type is determined by testing with anti-D reagent. If the initial test with anti-D is negative, the blood should be additionally tested using a method designed to detect weak D.
- Blood from donors with a history of transfusions or pregnancy should be tested for unexpected antibodies to red cell antibodies using methods to demonstrate clinically significant antibodies.

Note: When either test is positive, the blood unit shall be labeled as Rh POSITIVE. If both tests are negative, then it is labeled as Rh NEGATIVE.

In addition, donor blood should be tested for several infectious diseases. Blood should not be released for transfusion unless the results are negative for all tests, with the exception of the test for syphilis that has been shown to be a biologic false positive.⁵ The recommended tests include:

- syphilis by screening with a standard antibody test such as the rapid plasma reagent (RPR) test,
- hepatitis B virus by testing for the hepatitis B surface antigen (HbsAg) and HBV core antigen (anti-HBc),
- hepatitis C virus by testing for anti-HCV, and
- human immunodeficiency virus by testing for type 1(HIV-1) antigen and antibodies to HIV-1 and HIV-2 antigens.⁶

⁴ Rarely, donors may have convulsions or experience irregular or rapid heartbeats—occasionally even cardiac arrest.

⁵ Persons with untreated syphilis most often have antibodies that can be detected by tests such as the RPR, but false positive antibodies can also develop, usually lasting for only a few weeks after bacterial or viral infections or after immunization procedures. In some patients with autoimmune diseases, especially lupus, these false positive antibodies persist indefinitely.

⁶ A combination test for anti-HIV-1/2 may be used.

Blood Storage and Short Distance Transport

Blood units must be stored in a refrigerator that can be maintained at temperatures between 1–6°C (34–46°F). There must be a system to monitor temperatures continuously and record them at least every 4 hours.⁷ In addition, the refrigerator should have an alarm system that signals by sound before the blood reaches unacceptable storage temperatures.

Blood units exposed to a temperature above the accepted level for an unknown period should be discarded. To do this:

Remember: After removing gloves, wash hands or use a waterless, antiseptic handrub.

- Wear examination or utility gloves and protective eyewear.
- Pour contents down a utility sink drain, into a flushable toilet or latrine.
- Place empty blood bags and tubing in a plastic bag or leakproof, covered waste container.
- Dispose of plastic bags or contents of the container according to hospital or facility waste management guidelines.

Blood units transported short distances (e.g., from the blood bank or transfusion service to the ward or operating room) require no special handling. Blood should not, however, be allowed to reach temperatures outside the acceptable range.

Pretransfusion Testing and Cross-matching

Note: If a discrepancy in ABO group is detected and transfusion is necessary before the problem can be solved, only group O red cells should be used.

The purpose of pretransfusion testing is to select blood or blood products that will not cause harm to the patient (recipient), and to ensure that the red cells will survive (not be destroyed too rapidly) when transfused. When performed properly, pretransfusion tests will confirm the ABO group of the red cells, Rh status, the presence of clinically significant red cell antibodies in the recipient's blood and compatibility between selected samples of donor blood with the recipient's blood (cross-matching).

The **first step** is to test a sample of recipient blood using the same methods and recommended infection prevention practices used to test donor blood.⁸ (Recipient plasma or serum, however, need only be tested with anti-D reagent, as the test for weak anti-D is not necessary.)

Note: For repeat testing, only anti-D reagent needs to be used.

To avoid the 80% chance of Rh sensitization, Rh-positive blood should not be given to a patient who is Rh negative. Occasionally, however, ABO compatible Rh-negative blood is not available. In this case, the alternatives are either to postpone the transfusion until Rh-negative ABO compatible blood is available or, if circumstances warrant, to give Rh-positive blood. If the patient is a woman, and depending on her childbearing potential and

⁷ A thermometer placed inside the refrigerator and checked at regular intervals can be used if an automated system for monitoring and recording the interior temperature is not available or not working.

⁸ It is acceptable to take the blood sample for blood typing and cross-match from an existing IV line if the patient has one in place.

the volume of the blood transfused, it may be desirable to give Rh immune globulin within 24 hours of the transfusion of Rh-positive blood.

Note: A negative red cell antibody screen does not guarantee that the recipient's serum is free of clinically significant antibodies, however, or that there will be normal survival of the red cells transfused.

The **second step** is repeat testing of the donor blood to confirm the ABO group and Rh.

The **third and final step** is to crossmatch the red cells of selected donor(s) against the serum or plasma of the recipient to be sure there are no ABO and clinically significant antibody problems. If antibodies are detected in the recipient's blood, the number or type of tests needed to ensure compatibility varies from case to case. (Most samples tested, however, have a negative screen for antibodies and are crossmatch-compatible with all selected donor units of blood.)

If no clinically significant antibodies were detected in the recipient's blood, and there is no prior record of antibodies, serologic cross-matching, which is quicker and less difficult to perform, is acceptable.

Note: If the patient's ABO group and Rh status are unknown, use O-negative blood, especially if the patient is a woman of childbearing age.

When blood is urgently needed, the physician must decide whether to transfuse with uncrossmatched or partially crossmatched blood or to delay the transfusion. The risk of transfusing blood without cross-matching is that a serious reaction may occur, including the rapid breakdown (hemolysis) of transfused red cells.

TRANSFUSION OF BLOOD OR BLOOD COMPONENTS

Like any other medical treatment, the decision to transfuse a patient should be based on the need (indications) for transfusion of blood or blood components in comparison with the risks, potential benefits and alternatives. In addition, before receiving a transfusion, the patient should be told the reason(s) for needing a transfusion, clearly understand and accept the risks and have any questions answered regarding the procedure. (If the patient is unconscious or incapable of giving consent, when possible a spouse, relative or adult friend should give consent.)

Indications

The main reason for transfusion of whole blood or packed red blood cells is to increase the oxygen-carrying capacity to meet the tissue demands for oxygen. The two primary conditions are:

Note: In situations of acute bleeding, the transfusion threshold is 30–40% blood loss for otherwise healthy adults, provided blood volume is maintained (ASATF 1996).⁹

1. actively bleeding patients (acute blood loss), and
2. patients with chronic or symptomatic anemia.

For the former, the objectives of initial treatment are to stop the bleeding and to restore intravascular volume in order to prevent hypovolemic shock (shock due to decreased fluid in the circulation). Thus, the immediate need

⁹ If the blood volume is maintained, healthy resting adults are able to tolerate an acute decrease in red cells to a hemoglobin of 5 g/dL without evidence of lack of tissue oxygenation (Weiskopf et al 1998).

is to give IV fluids that will help restore the circulation, and then restore oxygen-carrying capacity.

The generally accepted hemoglobin level for transfusing patients with acute blood loss is 7 g/dL, with those patients having a level of 6 g/dL almost always requiring transfusion but those with a level of 10 g/dL rarely needing it (ASATF 1996).

For chronic anemia, the objective should be to prevent patients from being symptomatic—weakness, dizziness, breathlessness, heart palpitations or rapid heart rate (Hebert 1999). Generally this means keeping the hemoglobin levels between 7 and 9 g/dL.

Transfusing Patients

Note: Transfusion of packed red cells increases oxygen-carrying capacity with less expansion of blood volume per unit. This can be important in patients who are at risk of volume overload (e.g., newborns and patients with congestive heart failure).

Note: Patients who have had blood transfusion reactions may have greater fear of transfusion, and certain types of reactions may increase the chance of recurrence.

Note: With the exception of sterile isotonic (0.9%) saline, **no drugs or medications should be added to whole blood units or blood components.**

Transfusion with donor whole blood (allogenic transfusion), which provides red cells to increase oxygen-carrying capacity, has stable coagulation factors and contains plasma to expand blood volume, is seldom done anymore in the US and other developed countries because there are more reactions with whole blood than with blood products. Thus, for most cases of active bleeding (acute blood loss), packed red cells (plasma removed) plus volume-expanding IV fluids have become the standard. In countries with limited resources, however, whole blood is still the standard, except in large hospitals or referral centers. In a typical adult, one unit of whole blood or packed red cells will raise the hemoglobin about 1 g/dL, or the hematocrit about 3%.

Before starting the transfusion:

STEP 1: Explain the procedure to the patient, determine if s/he has ever had a transfusion and record adverse reactions, if any.

STEP 2: With another health worker, correctly identify the blood product and patient:

- Confirm patient's name and check armband if available.
- Check compatibility tag attached to blood bag, including date blood is out of date and should not be used.
- For whole blood, check ABO group and Rh type, which should be on the patient's chart.
- Double check blood or type of blood product with the physician's order.
- Check blood for clots.
- Record baseline pulse and blood pressure.

Note: If a reaction is suspected, **stop** the transfusion, flush the line with sterile isotonic saline solution and infuse slowly to keep the IV line open, and notify the blood bank or transfusion service and physician.

STEP 3: Ask the patient to report chills, headaches, itching or rash immediately.

(The detailed steps for starting a peripheral intravenous line with a large-gauge needle or plastic catheter [#18 or #19] and setting up the blood administration set are described in **Chapter 24**.)

STEP 4: Once the transfusion has begun:

- take the patient's pulse and blood pressure every 5 minutes for the first 15 minutes of transfusion, and hourly thereafter.
- Observe the patient for flushing (red face or cheeks), itching, difficulty breathing, hives (clear fluid filled lesions on the skin) or other rash when checking vital signs.

STEP 5: When the transfusion is completed, record administration of the blood or blood product in patient's chart.

(The detailed steps for removing and disposing of the blood administration set, IV tubing and needle as well as any blood-contaminated waste items, are described in **Chapter 24**.)

PREVENTING COMPLICATIONS AND NOSOCOMIAL INFECTIONS

The collection, processing, storage and transfusion of blood and blood products is an essential service that all acute care hospitals and ambulatory surgical centers must be prepared to provide with high standards of quality. In addition, the safety of blood donors, patients (transfusion recipients), health workers and fellow staff requires that blood bank and transfusion service staff are qualified to perform the required tasks and follow recommended infection prevention practices consistently.

Preventing complications and nosocomial infections in patients requires that:

- Unnecessary transfusions are not given.
- Potential donors are adequately screened to minimize the risk of transmitting a serious bloodborne infection (e.g., syphilis, HBV, HCV and HIV).
- Donor blood is collected aseptically into a closed system to minimize contamination, and all steps in processing the blood are accomplished within this closed system.
- Prior to use, the blood or blood products are stored at the correct temperature and the expiration date has not expired prior to transfusion.
- All steps are taken to ensure that donor and patient blood are compatible in terms of ABO grouping and Rh and that unexpected

clinically significant antibodies in the donor's or patient's blood have been identified.

- Prior to transfusion, all information matching the blood with the intended recipient has been verified to prevent possible mistakes that could harm the patient.
- Aseptic technique is used to establish the peripheral IV line for giving the transfusion.
- During the transfusion, the patient's vital signs are monitored and s/he is checked regularly for any adverse reaction.
- If an adverse reaction is thought to have occurred, the transfusion is stopped immediately, and the patient treated for any complications (e.g., fainting, convulsions, breathing or heart problems) and her/his blood is checked for hemolysis.

Protecting Healthcare Workers

Health staff working in blood banks and transfusion services are at risk of exposure to pathogenic organisms in blood in a number of ways. The most common are:

Note: Wear gloves when collecting and transfusing blood and performing various tests on blood.

- Exposure to blood while collecting the donor specimen, during testing and when infusing the blood.
- Accidental injury with sharps (needles, scalpel blades and contaminated broken glassware), the leading cause of laboratory-acquired infections.
- Splashes and sprays of blood onto mucous membranes of the mouth, nasal cavity and conjunctivae of the eyes. (Wearing a clear plastic facemask or shield, or a surgical mask and goggles, can minimize these risks.)

Note: Sharps should be handled with care and disposed of immediately after use in puncture-resistant sharps containers located close to the work area.

In addition, decontaminate work surfaces with 0.5% chlorine solution daily or when contaminated, such as after blood spills, and place infectious waste materials in plastic bags or leakproof, covered waste containers.

MAKING BLOOD BANK AND TRANSFUSION SERVICES BETTER AND SAFER

In countries where resources are limited, blood bank and transfusion services frequently are not supervised and poorly monitored, screening of prospective donors is limited, and testing for infectious diseases, even for syphilis, may not be available. Under these circumstances, complications (transfusion reactions) and transmission of life-threatening infections to unsuspecting patients occur all too often. Without the commitment and full support of ministry of health officials, hospital administrators and infection prevention committees or working groups to implement basic blood bank and transfusion service policies and guidelines, improving the quality and safety of blood transfusions is unlikely.

As outlined above, many of the processes and procedures that can improve the quality of blood bank and transfusion services and make them safer for patients, health workers and their fellow staff are inexpensive and doable. Improving performance and compliance with recommended policies and guidelines can be significantly enhanced if:

- There is consistent support by hospital administrators to improve the quality of services (e.g., identified deficiencies are corrected, dangerous practices eliminated and staff are actively encouraged to seek inexpensive solutions).
- Supervisors regularly provide feedback and reward appropriate behavior (e.g., better screening of donors, use of aseptic techniques when collecting specimens, handwashing after removal of gloves).
- Role models, especially physicians and other senior staff and faculty, actively support recommended policies and guidelines (Lipscomb and Rosenstock 1997).

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