

Blood Administration and Transfusion Reactions

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Purpose and Objectives

The purpose of this course is to provide the learner with information about blood products, blood product administration, and risks of transfusion.

After successful completion of this course, you will be able to:

1. Identify the rationale for the selection of specific blood transfusion products including whole blood, packed red blood cells, and platelets.
2. Describe pre-administration nursing priorities to assure safe administration of blood products.
3. Identify potential pre-administration medications and rationale for use.
4. Identify six critical pieces of information that must be co-assessed by two licensed personnel prior to blood administration.
5. Describe the essential steps with the administration of blood products including tubing, filter, priming solution, and rate of administration.
6. Identify signs and symptoms of suspected acute and late transfusion reactions.
7. Describe immediate nursing action required for the patient with a suspected hemolytic transfusion reaction.

Introduction

As many as 30 million blood components are transfused each year in the United States (American Red Cross, 2015).

A variety of medical conditions result in the need for a patient to receive a blood and/or blood product transfusion.

Nursing care for these patients is centered on knowledge of the various blood products, thorough pre-assessment skills, and through the application of accurate infusion parameters. Awareness of the signs and symptoms of early and late transfusion reactions is also key.

This course reviews essential nursing considerations for all stages of blood administration including the pre-assessment, equipment needed, blood product administration information, and review of potential post-transfusion reactions.

Overview of Blood Transfusions

Blood transfusions, when used correctly, can improve health and save lives. The United States (U.S.) has one of the most comprehensive and safest blood supplies in the world.

Appropriate use of blood and blood products can be directly related to a well-organized blood management system, and the ongoing education and training of staff involved in the transfusion process. Unfortunately, blood transfusions have not always been safe and many countries outside of the United States currently lack proper testing.

The absence of adequate testing increases the possibility of transmitting infectious diseases such as HIV, hepatitis viruses, syphilis and Chagas disease (WHO, 2015).

Even in countries where blood is available, the risk of transfusion-transmissible infections (TTIs) occurs due to poor selection practices, the use of untested blood and poor blood donor recruitment (WHO, 2015).

Test yourself:

The absence of adequate testing increases the possibility of transmitting infectious diseases such as:

- A. HIV
- B. Hepatitis viruses
- C. Syphilis
- D. All of the above. Correct.

The History of Blood Transfusions

Blood transfusions were first recorded in 1492 when Pope Innocent VIII, in Rome, had a stroke and lapsed into a coma. The Pope's physician advised a blood transfusion as a therapeutic measure for the Pope's illness. Sadly and not surprisingly, the Pope did not benefit and died later that year ("The History of Blood Transfusion Medicine", 2005).

Up until 1901 when an Austrian physician by the name of Karl Landsteiner documented the first three human blood groups, experimentation with direct human to human and animal to human transfusions took place with disastrous results. Once blood grouping was in place, the early 1900's saw the development of sodium citrate and citrate-glucose, long-term anticoagulants that allowed preservation of blood ("The History of Blood Banking", 2013).

Blood could now be stored in containers for later transfusion which aided in eliminating vein-to-vein transfusion ("The History of Blood Transfusion Medicine", 2005).

The History of Blood Banking

The first United States federal license permitting the processing and manufacture of whole blood was issued in 1946. Blood banking was experiencing rapid growth due to the return of physicians from World War II who had experienced the effectiveness of transfusion therapy.

The American Association of Blood Banks (AABB) was formed in 1947, to support and encourage continued blood research and to develop standards of practice for blood banks.

In 1950 the plastic infusion bag for blood collection and storage replaced breakable glass bottles.

Throughout the 1960s and 1970's more precise standards were developed for blood administration.

In 1985 the U.S. began screening all donated blood for HIV ("The History of Blood Transfusion Medicine", 2005). In the years since, improved processes for testing and refining blood products has helped to ensure the safety of the blood supply.

Sources of Blood Products

There are three basic sources of blood products. These include autologous blood, donor specific and banked blood. Patients that experience a considerable blood loss during a surgical procedure may be a candidate for auto transfusion as well.

Autologous Blood

One of the safest and most effective ways to treat blood loss is to give patients their own blood through the process of preoperative donation. Replacement of lost blood with previously donated blood eliminates most transfusion-associated risks. This type of blood source is typically coordinated

in the setting of a pre-arranged, elective surgery, when the physician anticipates a need for a post-operative blood transfusion. To allow for the adequate time needed for testing and processing, it is important to remember that autologous blood must be donated at least 3 days prior to the surgical date. Limitations for autologous donations also include a low hemoglobin level (< 11 g/dL) or certain cardiac conditions.

Some patients may be the recipient of their own blood that has been collected during a surgical procedure. Certain criteria apply. This is known as auto transfusion.

Sources of Blood Products

Donor Specific Blood

This type of blood source is also called “donor directed” blood. The blood source is from an individual, designated by a patient or a patient’s family, who is interested in donating blood for the patient. The blood donor must meet both the eligibility criteria and have a compatible blood type. Donor specific blood must be donated at least three days prior to administration. The donated blood will be tested by the blood collection agency according to the guidelines determined by the American Association of Blood Banks, American Blood Centers, and the American Red Cross.

Bank Blood

Bank blood is a blood product that is donated by the general public. Prior to donating blood the donor must meet donor eligibility criteria. Donated blood is tested by the blood collection agency according to national guidelines from the American Association of Blood Banks, American Blood Centers, and the American Red Cross.

Selection of Whole Blood

The patient’s healthcare provider will evaluate which blood product is best for treatment of the underlying medical or surgical condition. It is important for healthcare professionals to be familiar with the many different types of blood products available for treatment.

Whole Blood

A whole blood transfusion replenishes both the volume and the oxygen-carrying capacity of the circulatory system. This type of transfusion treats decreased hemoglobin and hematocrit levels, but is typically used in the setting of hypovolemia such as hemorrhage. Whole blood contains cellular debris, requiring in-line filtration during administration. Transfusion of whole blood is not common, but may be ordered when a needed blood component is unavailable, such as in the setting of the Emergency Department when an acute trauma patient is hemorrhaging and there is not enough time to wait for the blood type and cross match to be performed. Whole blood typically contains approximately 500 mL of volume.

Inline filtration is required with whole blood transfusions.

Selection of Packed Red Blood Cells

To avoid potential circulatory overload with whole blood transfusions, packed red blood cells (PRBCs) are given when decreased hemoglobin and hematocrit levels accompany a normal blood volume. Transfusion of PRBCs (from which 80% of the plasma has been removed) restores the oxygen-carrying capacity of the blood with less volume. The normal hemoglobin level is between 12-18 g/dL. Elderly patient’s values are normally slightly decreased. If a patient’s hemoglobin level is < 7 g/dl and they are also symptomatic, a transfusion is generally indicated. It is generally NOT appropriate to

transfuse a patient with PRBCs when the hemoglobin is > 10 g/dL.

Each unit of blood should raise the patient's hematocrit by approximately 3%. One unit is approximately 250 mL of volume and is typically infused over 2-4 hours. Patients who are prone to congestive heart failure (CHF) or circulatory overload may require a slower rate of infusion, (not to exceed 4 hours) as well as administration of a diuretic per physician's orders. Like whole blood, this product also contains some cellular debris, thereby requiring an in-line filtration during administration.

Washed PRBC's and Leukocyte-poor PRBC's

Washed Packed Red Blood Cells

This type of blood product is used for patients previously sensitized to transfusions. The blood is rinsed with a special solution that removes white blood cells and plasma proteins, thus decreasing the chance of a transfusion reaction. This product typically contains approximately 250 mL of volume.

Leukocyte-poor Red Blood Cells

This product is similar to PRBCs combined with the removal of approximately 95-99% of the leukocytes. The removal of leukocytes helps to prevent a febrile reaction from leukocyte antibodies. This product typically contains approximately 200 mL of volume.

Platelets and Fresh Frozen Plasma

Platelets

The transfusion of platelets is given to treat a patient that has a decreased platelet count (thrombocytopenia) due to either a decreased platelet production or increased platelet destruction. Platelet transfusions are also given to treat acute leukemia and bone marrow aplasia. A typical platelet transfusion contains 35-50 mL per unit. Up to 10 units can be transfused at a time.

Test Yourself:

A typical platelet transfusion contains 250 mL per unit.

- A. True
- B. False – Correct

Fresh Frozen Plasma

Fresh frozen plasma (FFP) is a product in which plasma is separated from RBCs. This plasma is rich in coagulation factors V, VIII and IX and may be given to expand plasma volume, treat post-operative hemorrhage/shock or to correct an undetermined coagulation factor deficiency. FFP is indicated for urgent warfarin reversal and in liver disease with coagulopathy and bleeding. This product is kept frozen until needed and then thawed in the blood bank. FFP typically contains 200 to 250 mL of volume and can be infused over 30-45 minutes.

Less Common Blood Products

Factor VIII (Cryoprecipitate or Cryo)

Cryoprecipitate is a frozen blood product, prepared from plasma, and contains clotting factors. It is typically transfused to treat hemophilia A and to control bleeding associated with factor VIII and/or fibrinogen deficiency.

A normal fibrinogen level is between 200-400 mg/dL or 2.0-4.0 g/L. If the patient's fibrinogen level is <

100 mg/dl, a cryoprecipitate transfusion may be indicated. The amount given depends on the patients underlying disease and the “goal” fibrinogen level.

Cryoprecipitate must be kept frozen until ready to transfuse, when it can be defrosted.

Cytomegalovirus (CMV) Negative Blood

This type of blood product does not contain CMV antibodies. Leuco-reduced products, which are prepared by leukocyte reduction filters, are considered to be CMV safe products and are equivalent to CMV negative blood.

CMV negative blood may be used for premature infants, intrauterine transfusions, and CMV negative patients with an immunosuppressed system or at risk for other reasons.

Overview of Blood Products & Nursing Considerations

Blood Product	Actions	Administration & timing	Nursing Considerations
Whole Blood (RBC's, WBC's, Plasma & electrolytes.	Improves tissue oxygenation, expands volume & promotes coagulation.	Max hang time per unit: 4 hours from refrigerator removal. Recommended total infusion time in otherwise healthy adult: 1.5 to 2 hours.	Requires ABO and Rh crossmatching. Rarely used today, except for patients needing rapid, massive replacement of lost volume (loss of more than 25% of total blood volume).
Packed RBC's (PRBCs)	Increases the oxygen carrying capacity of blood in anemic patients; often used to replace blood lost during surgery.	Max hang time per unit: 4 hours from refrigerator removal. Can split into smaller bags.	Composed of 70 -80% hematocrit, so very viscous. Require ABO and Rh crossmatching.

(Bielefeldt, 2009)

Overview of Blood Products & Nursing Considerations

Blood Product	Actions	Administration & timing	Nursing Considerations
Platelets	Contain concentrate made from whole blood (random donor) or plasmapheresis (single donor); may also contain plasma and some RBCs and WBCs.	Max hang time per unit: 4 hours or by expiration time marked on the unit label (whichever occurs first). Note: Platelets do not tolerate refrigeration. Storage at room temperature is limited to 5-7 days because of the risk of bacterial growth and loss of platelet functionality (Josefsson et al., 2007).	Doesn't require ABO and Rh crossmatching in adults.

Fresh Frozen Plasma Contains normal components of blood plasma, including fibrinogen.	Aids coagulation in actively bleeding patients with clotting deficiencies.	Use as soon as possible after thawing. Maximum hang time for one unit; 6 hours.	Use blood component recipient set, and monitor coagulation studies. Needs ABO crossmatching.
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(Bielefeldt, 2009)

Blood Testing

Ensuring that the United States (U.S.) blood supply remains safe is the ultimate responsibility of the nation's more than 3,000 blood establishments, which collect and process 14 million units of donated whole blood each year (FDA, 2013).

Blood transfusions are protected by layers of overlapping safeguards. Some of these safeguards include accurate blood typing and crossmatch testing.

With blood typing, ABO and Rh antigens can be detected in the blood of prospective blood donors and potential blood recipients. The ABO system, Rh factors, and blood crossmatching are critical factors in blood transfusion (FDA, 2013).

ABO System

Human blood is grouped according to the presence or absence of these specific antigens. The two major antigens, A and B, form the basis of the ABO system.

It is important that the recipient not have antibodies to the donor's RBCs. If this were to occur, there could be a hypersensitivity reaction, which can vary from mild fever to anaphylaxis with severe intravascular hemolysis.

To prevent an **acute hemolytic transfusion reaction (AHTR)**, blood for transfusion must be of a compatible ABO blood type. Patients should receive blood that matches their blood type.

Type O (negative) whole blood or RBCs may be used for any patient in an emergent situation and is known as the "universal donor."

Persons with Type AB + (positive) can receive blood from any blood type and are considered the "universal recipient."

Compatible Red Blood Cell Types - DONOR				
RECIPIENT	Type O	Type A	Type B	Type AB
Type AB	X	X	X	X
Type B	X		X	
Type A	X	X		
Type O	X			

Test Yourself:

Your patient has O – (negative) blood. This means they are the universal recipient.

- A. True
- B. False - Correct

Rh Factor Testing

The presence or absence of the Rh antigen on the surface of the RBCs determines the classification of Rh-positive or Rh-negative. Rh factor is the next most important antigen associated with blood transfusion and ABO compatibility.

If the Rh factor is absent, the patient is considered Rh-negative. If present, the person is considered Rh-positive. All persons are either Rh positive or negative. Rh-negative patients may develop antibodies to Rh antigens if exposed to Rh-positive blood and should always receive Rh-negative blood. Rh-positive patients may receive either Rh-positive or Rh-negative blood.

The table indicates the most common ABO and Rh factor types in the general population.

Blood Types

Blood Type (ABO & Rh)	% of General Population
O, +	35%
O, - *	7 %
A, +	35%
A, -	7 %
B, +	8%
B, -	2 %
AB, + ~	4%
AB, -	2%

*Universal donor
~Universal recipient

Compatibility Testing

Blood Crossmatching

Although typing for major ABO and Rh antigens is no guarantee that a reaction will not occur, it does greatly reduce the possibility of such a reaction. Many potential minor antigens are not routinely detected during blood typing. If allowed to go unrecognized, these minor antigens also can initiate a blood transfusion reaction. Therefore, blood is not only typed, but is also crossmatched to identify mismatch of blood caused by minor antigens. Crossmatching consists of the mixing of the recipient's serum with the donor's RBCs in a saline solution followed by the addition of the Coomb's serum test.

Only blood products containing RBCs need to be crossmatched. Plasma products DO NOT need to be crossmatched, but should be ABO compatible because other cells (WBCs and platelets) have ABO antigens.

Additional Blood Testing

There are a few additional tests which donated blood must undergo. Blood is tested for Human T-Lymphotropic Virus, Types I and II, which can cause infections that can lead to leukemia or a variety of neurologic diseases. Donated blood is also tested for both active and previous infections with the bacteria that cause syphilis and West Nile Virus (CDC, 2013).

Premedication

To minimize or prevent transfusion reactions, pharmacological agents may be ordered prior to the commencement of a blood transfusion, such as acetaminophen (Tylenol) and diphenhydramine (Benadryl). These agents can minimize fever and histamine release.

If there is a high risk of fluid overload, a diuretic such as furosemide (Lasix) may also be ordered prior to the transfusion.

Febrile non hemolytic reactions seem to be linked to certain blood components, such as platelets and fresh frozen plasma, as opposed to packed red blood cells (Bielefeldt, 2009). These reactions are mediated by donor leucocytes in the plasma, causing sensitization to human leucocyte antigens.

Use of blood products that have been leucocyte reduced or irradiated have been linked to reduced complications stemming from an immunological response (Bielefeldt, 2009).

In organ transplant recipients, these products reduce the risk of graft rejection as well.

Safe Blood Administration

The following eight steps outline the appropriate procedure to safely administer blood.

Step One

Before initiating a blood or blood component transfusion:

- Match the **blood or blood component** to the order

Double check the patient has a physician order for the actual transfusion of the product. Unfortunately transfusion errors have occurred when the physician order reads to “type and cross 2 units of PRBCs” versus an order to “administer 2 units of PRBCs.” The first order is to only prepare the products (should the transfusion be needed at a future time), and not to actually administer the product. The second order is to actually administer the blood product. It is important for the nurse to differentiate between these two types of orders.

You should also evaluate the patient’s need for a blood product. Question whether the laboratory results and patient symptoms are consistent with the need for a blood product transfusion. If the rationale is unclear, call the prescribing physician to clarify.

Step Two

Assess that the patient has a blood bank identification armband and/or barcode. Blood must never be administered to a patient who has a “no blood” designation. Some hospitals have a “blood conservation” armband. These patients have elected to not use blood products except in a medical emergency. Typically the “No Blood” or “Blood Conservation” armbands will only be removed if a

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patient has changed an existing advance directive to indicate that blood products are acceptable. Follow your hospital's policy for all specific types of armbands and the process used to alter the armbands.

Step Three

Explain the procedure to the patient. Make sure there is a signed informed consent form (per hospital policy) before the therapy is initiated. The physician is required (via the Paul Gann Act) to discuss with patient (or legal representative), the benefits, risks, and possible alternatives to transfusion. The physician is also required to document this information in the medical record.

Step Four

Obtain the patient's blood pressure, heart rate, respiratory rate and temperature. Obtaining an accurate temperature is important since febrile reactions are the most common reaction to blood transfusions. An increased temperature may be one of the first signs of impending reaction.

Ideally, it is helpful if the transfusion begins when the patient is afebrile or has an only low-grade temperature of < 100-101 degrees Fahrenheit. Follow your facility's policies to guide you in regards to blood transfusions and increasing temperature or fever.

Make sure you know and adhere to the window of time during which the product must be transfused - starting from when the product arrives from the blood bank to when the infusion should be completed. Failing to adhere to these times increases the risk of complications like bacterial contamination (Bielefeldt, 2009).

Step Five

Determine per hospital policy and physician's order if the blood product is to be given via gravity flow or through an infusion pump. For gravity infusions, a 20-gauge or larger catheter is recommended. For transfusions administered via an infusion pump, a 22-gauge catheter may be adequate (check with infusion pump manufacturer's recommendations for specific catheter requirements and your facility policy).

Prime the transfusion tubing using aseptic technique. **Only 0.9% intravenous sodium chloride solution should be used to push the blood tubing or blood bag.** Dextrose solutions may lyse RBCs and decrease RBC survival. The calcium contained in the Lactated Ringers (LR) solution may cause clotting.

Do not administer any blood products if there is a patient related discrepancy.

Step Six

Obtain whole blood, packed RBCs, or the blood product from the blood bank and begin administering the product within 30 minutes of the transfusion start time. **If there is an unexpected delay with the initiation of the transfusion, return the blood to the blood bank approved refrigerator as soon as possible. Most hospitals have a policy that the blood product will be discarded and wasted if there is greater than a 30-minute delay in returning the blood.** Blood cannot be stored in the medication refrigerator on your unit. Blood can only be stored in refrigerators continuously monitored by the hospital's blood bank department.

Step Seven

Perform a visual check of the product. Assess the blood product for any abnormalities in color, RBC clumping, gas bubbles or extraneous material. Return outdated or abnormal blood to the blood bank.

Step Eight

Perform a bedside patient identification and blood product verification by two licensed individuals or a one-person verification process accompanied by automated identification technology, such as barcoding.

- When using a two-person verification process, one individual conducting the identification verification is the qualified transfusionist who will administer the blood or blood component to the patient.
- When using a two-person verification process, the second individual conducting the identification verification is qualified to participate in the process, as determined by the organization (The Joint Commission, 2015).

Step Eight (Continued)

Compare the name and number on the patient's wristband or barcode with those on the blood bag label. Verify the following information:

- Patients full name
- Medical record number or other designated number
- Blood bank armband number
- Unit number
- Blood component type
- ABO/RH type compatibility
- Expiration date

Note: Upon completion of bedside verification, both persons verifying the accuracy of the patient identification and blood product information will sign the transfusion record.

Blood Administration Tips

It is always a good idea to review your hospital's blood administration policy before administering blood products. The following recommendations are generic and typically found in the policies of most facilities.

- After the blood product has been co-assessed, put on gloves, a gown, and a face shield. Using a Y-type IV blood tubing set (with built-in filter), close all clamps. Insert the spike of one Y line into the bag of the 0.9% NS (Normal Saline) solution using aseptic technique. Next, open the port on the blood bag and insert the other Y spike of the line into the blood product. Both Y tubings should be clamped.
- Hang the saline and blood products on an IV pole. Open the clamp on the line of the saline solution and squeeze drip chamber until at least half full. Prime the tubing with the NS.

- Remember that the blood tubing cannot be piggybacked into an existing IV line. Do not add medications or IV fluids other than normal saline to blood transfusions. Blood and blood products may be administered through a needleless device.

Blood Administration Tips

- Record the patient's vital signs per facility policy. Stay alert for signs and symptoms of a reaction, such as fever, chills, flank pain, nausea, headache, urticaria, dyspnea, and bronchospasm.
- Optimal management of reactions begins with a standardized protocol for monitoring and documenting vital signs (Bielefeldt, 2009).
- After completing the transfusion, put on gloves and remove the blood tubing and bag. Dispose of the IV tubing and empty blood bag in the biohazardous containers or per your facility policy.

Most fatal reactions occur from human error. The most important step in preventing such error is to follow your facility's policies and procedures for administering blood products.

Blood Administration Filters

The standard blood administration set Y blood tubing has a built-in 170-260 micron filter designed to remove debris and clots. This tubing must be used for administration of all blood and blood components. The entire surface of the filter must be filled with the component to improve flow rates. Each standard blood administration set with built-in filter can be used for the transfusion of up to 2 units of PRBC or for a maximum of 6 hours of total hang time. It is felt that microbial growth may increase within the tubing when hanging for > 6 hours.

Leukocyte removal filters are used for leukocyte removal from the RBCs when pre-filtered products are not available. Filters are generally issued from the blood bank. Each filter can be used for only one unit of RBCs.

Microaggregate filters are a 40-micron filter. These filters are used in conjunction with auto-transfusions.

If a transfusion needs to be given slower than over a 4-hour period (for potential CHF or hypervolemia), the unit of RBCs should be separated into smaller units in the blood bank. This separation should be performed by blood bank personnel only.

When administering multiple units of blood under pressure, use a blood warmer to avoid hypothermia.

Transfusion Reactions

Blood transfusion reactions occur when the recipient's immune system launches a response against a component of the transfused product.

If the reaction occurs within the first few minutes of the transfusion, it is termed an acute reaction. A reaction that develops hours to days later is termed a delayed reaction. Late reactions may go undetected for days, weeks, or even months, and generally occur more than 48 hours after the transfusion.

If red blood cells are destroyed, the reaction is further classified as hemolytic; all other types of reactions are non-hemolytic (Bielefeldt, 2009).

Some reactions result from infectious, chemical, or physical forces or human error during blood product preparation or administration.

Types of Transfusion Reactions

Type of Reaction	Signs & Symptoms	Nursing Interventions
Acute Hemolytic Reaction	Classic triad of chills, flank pain & blood stained urine	Stop transfusion immediately. Hydrate with normal saline. Maintain airway, breathing & circulation.
Delayed Hemolytic Reaction	Mild fever, jaundice & decreased post transfusion hematocrit.	As above, plus obtain pre-transfusion bank specimens. If ordered, replace lost blood with additional transfusion.
Febrile non-hemolytic Reaction	Fever, chills, flushing, nausea most common type	Same management as for acute hemolytic reaction.
Anaphylactic Reaction	Lack of fever, urticaria, dyspnea, chest tightness & hypotension, decreased oxygen saturation.	Same as above, & administer steroids & epinephrine as ordered.
Bacterial Infection	Fever or hypothermia, chills or rigors, abdominal pain, nausea.	Same as above, plus broad spectrum antibiotics as ordered. Notify blood bank & lab. Draw cultures for testing.

Table adapted from Bielefeldt, (2009).

Adverse Transfusion Reactions & The NHSN

The chance of having a reaction to a blood transfusion is very small (CDC, 2013). The most common adverse reactions from blood transfusions are allergic and febrile reactions, which make up over half of all adverse reactions reported (CDC, 2013).

Rare but serious adverse reactions include infection caused by bacterial contamination of blood products and immune reactions due to problems in blood type matching between donor and recipient (CDC, 2013).

The National Healthcare Safety Network (NHSN) is a national internet-based surveillance system administered by the CDC, and includes a component for hospitals to monitor adverse reactions associated with blood transfusions. Check to see if your facility participates in this program.

These adverse reactions are not common following blood transfusions but are tracked so that CDC can better understand them and develop interventions to prevent them (CDC, 2013).

Risk of Infection

The safety level of the U.S. blood supply is the result of continuous refinements and improvements in donor screening and testing. It will always be of critical importance to protect the blood supply from

known pathogens and to detect the emergence of new or previously undetected infectious agents (CDC, 2013). All blood is tested for evidence of certain infectious disease pathogens, such as hepatitis B and C viruses and human immunodeficiency virus (HIV). The tests used to screen donated blood are listed below.

Risks Associated with Blood Transfusion: Hepatitis

Hepatitis is the most common transfusion-transmitted infection. The tests that detect both hepatitis B and C can produce false-negative results, and may allow some hepatitis cases to go undetected. These viruses have a long seronegative period when they cannot be detected by screening. Thus, donors may test negative for hepatitis, but in fact are infected with the virus. By the time the hepatitis is detected, the donor blood may already be in use.

Hepatitis C accounts for more than 90% of transfusion-transmitted hepatitis cases. Approximately 2% are attributed to hepatitis B. All blood components and most blood products, except albumin, can transmit hepatitis. High risk factors for hepatitis can be identified through pre-donation screening questions that make certain patients ineligible to donate, thereby helping decrease the chances of transmitting hepatitis. The risk of acquiring hepatitis C is approximately 1 in 103,000 transfusions.

Risks Associated with Blood Transfusion: HIV

The estimated risk of acquiring human immunodeficiency virus (HIV) from a blood product is approximately 1 in 493,000 transfusions. Although less than 20 HIV cases per year are transfusion-related, this virus remains one of the most feared transfusion-transmitted infections for patients. Identification of high-risk behaviors among potential donors, and the improved use of sensitive lab assays have decreased the risk of HIV infection from donor blood. When testing for the antibodies to HIV, the challenge is that these specific antibodies are not detectable until 6 to 12 weeks after exposure.

Risks Associated with Blood Transfusion: CMV

Many blood banks screen blood for cytomegalovirus (CMV). Blood with CMV is especially dangerous for an immunosuppressed or critically ill patient. An estimated 60% of blood donors carry the virus. Transfusion of infected blood can cause CMV infection in the recipient. All leukocyte-containing blood products, including whole blood and RBCs, transmit the virus.

In critically ill patients, CMV is a major cause of increased morbidity and mortality. Post transfusion infection with CMV can manifest within 2-4 weeks in immunocompetent patients, but more quickly in critically ill patients. Symptoms include fever lasting 2 to 3 weeks, varying degrees of hepatitis, splenomegaly, and atypical lymphocytosis resembling that of mononucleosis.

Management of Transfusion Reactions

As soon as a transfusion reaction is suspected, the transfusion should be immediately stopped. With new IV tubing, use NS at a rate to keep vein open for future IV access. Do not discard the blood or blood tubing as the blood bank will require these for testing.

Follow your facility guidelines which likely indicate to:

- Notify the physician.
- Monitor vital signs every 5-15 minutes or as indicated by the severity and type of reaction.
- Compare the labels on all blood containers with corresponding patient identification forms to verify

the transfusion was the correct blood or blood product.

- Notify the blood bank when a possible hemolytic or septic transfusion reaction is suspected. Collect blood and urine samples as ordered. Immediately send the samples, all transfusion containers (even if empty), and the blood tubing to the blood bank. The blood bank will re-type and cross the patient with the new blood specimen. The first voided urine specimen is analyzed for the presence of hemoglobin, which indicates a hemolytic reaction.

Your patient's life may depend on your ability to anticipate, detect and effectively manage a transfusion reaction (Bielefeldt, 2009).

Test Yourself

As soon as a transfusion reaction is suspected, the transfusion should be immediately stopped.

- A. True - Correct
- B. False

Management of Transfusion Reactions

- Closely monitor intake and output. Note evidence of oliguria or anuria because hemoglobin deposits in the renal tubules can cause renal damage.
- If prescribed, administer oxygen, epinephrine, or other drugs and apply hypothermia blanket to reduce fever.
- Make the patient as comfortable as possible and provide reassurance.
- Document the following:
 - Time of the transfusion reaction
 - Type and amount of infused blood or blood product
 - Clinical signs of the transfusion reaction in order of occurrence
 - Vital signs
 - Specimens sent to the lab
 - Treatments given and patient's response to treatment
 - Completing the transfusion reaction form and any quality variance forms (If required by your facility policy)

Conclusion

Administration of blood and blood products is a common nursing activity; however, it carries with it certain risks.

Knowledge about blood products and adherence to appropriate procedures for blood administration is critical. Recognition of reactions and rapid treatment is essential for the safe administration of blood products.

The nurse is the central healthcare provider who performs the pre-administration assessment, safely infuses the product, monitors for potential adverse outcomes, and supports the patient through the entire process.

Although accurate typing and testing of donor blood have made transfusions increasingly safer, healthcare professionals should be aware that there are still many early and late transfusion reaction risks associated with the transfusion process.

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