



Blood Administration and Transfusion Reactions

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Purpose

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

Objectives

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

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.

Nursing care for patients requiring blood component transfusion is centered on blood component knowledge, 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 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.

Blood Facts

Annually in the United States:

- Every two seconds someone needs blood
- A single car accident victim can require 100 blood transfusions
- Nearly 21 million blood components are transfused
 - The average transfusion is 3 units
 - 36,000 transfusions are required every DAY
 - 7,000 units of platelets are needed every DAY
 - 10,000 units of plasma are needed every DAY
- There are 6.8 million blood donors
 - 36% of the population is eligible to donate blood
 - Less than 10% of the eligible donate
- 13.6 million units of whole blood and red blood cells are collected

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).

- 1901, Austrian physician by the name of Karl Landsteiner documented the first three human blood groups
 - Early 1900's: Development of sodium citrate and citrate-glucose, long-term anticoagulants, that allowed preservation of blood.
 - 1950: The plastic infusion bag replaced glass storage bottles
 - 1960-1970: More precise standards were developed for blood administration
 - 1985: Screening all donated blood for HIV began
 - In the years since, improved processes for testing and refining blood products has helped to ensure the safety of the blood supply
- (The History of Blood Transfusion Medicine, 2005 & The History of Blood Banking, 2013)

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. Now known as AABB, this international organization defines the highest standards of medical, technical and administrative performance activities related to transfusion and cellular therapies. The AABB standards of practice serves as the guiding foundation for the Joint Commission (TJC) and Centers for Medicare and Medicaid Services (CMS) guidelines for the transfusion of blood components. Each hospital blood bank should have a copy of the most recent edition of the AABB standards and these standards should be used when developing and revising blood transfusion policies (AABB, 2012 & 2018).

Did You Know?

AABB standards are revised and published every April of the even numbered years. This year's revision is number 31 (AABB, 2012 & 2018).

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.
- Autotransfusion
 - May be used to define the use of autologous blood
 - Is the collection of blood from an actively bleeding site and the reinfusion of this blood to the same patient to maintain blood volume
- Donor Specific Blood
 - Also known as donor directed and predesignated blood donation
 - Blood source is donated from a friend or family member for a particular patient
 - Blood donation must occur at least 48 hours prior to transfusion
 - Has not been shown to be safer than bank blood
- Bank Blood
 - Bank blood is a blood product that is donated by the public
 - Prior to donating blood, the donor must meet donor eligibility criteria

All donated blood and blood products are tested according to national guidelines.

(Society for the Advancement of Blood Management (SABM), 2018)

Blood Testing

Ensuring that the U.S. blood supply remains safe is the ultimate responsibility of the nation's more than 3,000 blood establishments, which collect and process approximately 14 million units of donated whole blood each year (The American Red Cross, 2018).

Blood transfusions are protected by layers of overlapping safeguards. Some of these safeguards include accurate blood typing and crossmatch testing. The ABO system, Rh factors, and blood cross-matching are critical factors in blood transfusion safety (The U.S. Food and Drug Administration (FDA), 2018).

While the U.S. has practices in place to safeguard the public, in some countries where blood is available, the risk of transfusion-transmissible infections still occurs due to poor selection practices, the use of untested blood and poor blood donor recruitment (World Health Organization (WHO), 2018).

The absence of adequate testing increases the possibility of transmitting infectious diseases such as HIV, hepatitis viruses, syphilis and Chagas disease (WHO, 2018).

Test Your Knowledge

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

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

Rationale: The absence of adequate testing increases the possibility of transmitting infectious diseases such as HIV, hepatitis viruses, syphilis and Chagas disease (WHO, 2018).

Risk of Infection

Hepatitis

Hepatitis is the most common transfusion-transmitted infection. 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.

- Hepatitis B: 2%
- Hepatitis C: 90%
 - The risk of acquiring hepatitis C is approximately 1 in 103,000 transfusions
- All blood and blood products can transmit hepatitis except albumin
- Tests that detect both hepatitis B and C can produce false-negative results
 - Allowing some hepatitis cases to go undetected
 - These viruses have a long seronegative period when they are undetectable
 - Donors may test negative for hepatitis but are infected with the virus
 - By the time the hepatitis is detected, the donor blood may already be in use.

Human Immunodeficiency Virus (HIV)

Less than 20 HIV cases per year are transfusion-related; however, this virus remains one of the most feared transfusion-transmitted infections. Identification of high-risk behaviors among potential donors and the improved use of sensitive lab assays have decreased the risk of HIV infection.

- The estimated risk of acquiring HIV is 1 in 493,000 transfusions
- HIV specific antibodies are not detectable until 6 to 12 weeks after exposure

Cytomegalovirus (CMV)

All leukocyte-containing blood products transmit the virus; therefore, most regional blood banks leukocyte reduce blood products prior to sending the blood to hospital blood banks, thus reducing the risk of CMV transmission.

- 60% of donors have the virus
- CMV in critically ill patients is the major cause of increased morbidity and mortality

Test Your Knowledge

The most commonly transferred infection during a blood transfusion is:

- A. Cytomegalovirus
- B. HIV
- C. Hepatitis B
- D. Hepatitis C**

Rationale: Hepatitis is the most common transfusion-transmitted infection. 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.

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 - Donors may test negative for hepatitis but are infected with the virus
 - By the time the hepatitis is detected, the donor blood may already be in use

Blood Typing

Human blood is grouped according to the presence or absence of specific antigens (A & B). In addition, the blood is tested for Rh antigen, antibodies, and for compatibility.

To prevent an **acute hemolytic transfusion reaction (AHTR)**, blood for transfusion must be of a compatible ABO blood type.

Did You Know?

Type O- (negative) blood or packed red blood cells (RBC) are considered the **universal donor** and may be used for any patient in an emergent situation

Type AB + (positive) patients are considered the **universal recipient** and can receive blood from any blood type

(AABB, 2012 & 2018)

Test Your Knowledge

Which blood type indicates a universal donor?

- A. O neg
- B. O pos
- C. AB pos
- D. AB Neg

Rationale:

Type O (negative) blood or packed red blood cells (RBC) are considered the **universal donor** and may be used for any patient in an emergent situation

Type AB + (positive) patients are considered the **universal recipient** and can receive blood from any blood type

(AABB, 2012 & 2018)

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.

- Rh- (negative) – the antigen is NOT present
 - May develop antibodies to Rh antigen if given Rh + (positive) blood
 - Should always receive Rh – (negative) blood
- Rh+ (positive) – the antigen IS present If present, the person is considered Rh-positive.
 - 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

Recipient/Donor Compatibility

The table below indicates general guidelines for ABO/Rh compatibilities. Be sure to review your facility's blood bank policy and procedure to ensure safe transfusion practices.

Recipient/Donor ABO and Rh Compatibility Guidelines			
RECIPIENT Blood Type	DONOR PRBC	DONOR PLASMA	DONOR PLATELETS
A	A, O	A, AB	A, AB
B	B, O	B, AB	B, AB
AB	AB, A, B, O	AB only	AB, A, B*
O	O	O, A, B, AB	O, A, B, AB
Rh Positive	Rh positive Rh negative	Rh positive Rh negative	Rh positive Rh negative
Rh Negative	Rh positive* Rh negative	Rh positive Rh negative	Rh positive* Rh negative
Unknown	O negative	AB positive or negative	AB negative AB positive*

* Special consideration should be used when transfusing this blood type

Crossmatching

After typing for major ABO and Rh antigens, the blood is subjected to a Coomb's serum test to ascertain if there are any additional antigens in either the banked blood or the recipient's blood that might lead to a transfusion reaction.

Typing blood does not identify the many potential minor antigens present in blood. These antigens may occur naturally; however, many occur when the patient has received multiple blood transfusions. 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.

Did You Know?

Only blood products containing RBCs need to be cross matched. Plasma products DO NOT need to be cross matched but should be ABO compatible.

Additional blood testing includes:

- Human T-Lymphotropic Virus, Types I and II
- Hepatitis B & C
- HIV-1 & HIV 1/2
- Trypanosoma cruzi (t. cruzi and anti-T. cruzi assay)
- West Nile Virus

- Zika

As other diseases are identified, they may be added to this list.

(FDA, 2018a)

Blood and Blood Products

Healthcare professionals need to be familiar with the many different types of blood products available.

Blood can be modified into the following products:

- Whole blood
- Packed red blood cells (PRBC)
- Platelets
- Plasma
- Cryoprecipitate
- Granulocytes

The following table provides general guidelines and special considerations for each product.

BLOOD AND BLOOD PRODUCT GUIDELINES				
Product/Volume	Compatibility Requirements	Indications	Infusion Dose/Rate	Special Considerations
Whole Blood Volume based on the desired final hematocrit	Crossmatch required ABO & Rh Compatibility	Hemorrhage Exchange transfusion	Per physician order	ABO compatibility not necessary for infants under 4 months of age Blood filter required (150-230 micron)
Packed RBC 200-400 mLs	Crossmatch required every 72 hours ABO & Rh Compatibility	Anemia Blood loss Decrease in oxygen carrying capacity (need to increase Hgb/Hct)	10-15 mL/kg Rate: over 2 hours or as ordered	ABO compatibility not necessary for infants under 4 months of age Blood filter required (150-230 micron) May be infused via gravity or infusion pump
Platelets Single donor 30-40 mLs Plateletpheresis 200-400 mLs	Crossmatch not necessary ABO & Rh Compatibility	Low platelet count with bleeding Thrombocytopenia Acute leukemia Bone marrow aplasia	5-10 mL/kg Rate: as fast as tolerated	Blood filter required (150-230 micron) May be infused via gravity or infusion pump Store at room temperature
Plasma Fresh Frozen and thawed 200-500 mLs	Crossmatch and ABO & Rh Compatibility not necessary	Bleeding patients with low coagulation factors Anticoagulant reversal	10-30 mL/kg Rate: as indicated by clinical situation	Blood filter required (150-230 micron) May be infused via gravity or infusion pump Contains plasma proteins, fibrinogen, & factors V, VIII, & IX
Cryoprecipitate 10-25 mLs per single unit 3-10 units may	Crossmatch and ABO & Rh Compatibility not necessary	Low fibrinogen	1-2 units/10 kg Rate: as fast	Blood filter required (150-230 micron) May be infused via gravity or infusion pump

be pooled together			as tolerated	Contains fibrinogen & factor VII May be reconstituted by adding 10 mLs of 0.9 saline directly to bag and kneading gently
Granulocytes With Platelets: 200-400 mLs Without platelets: 100-200 mLs	Crossmatch not necessary ABO & Rh Compatibility		10 mL/kg/day Rate: slowly over 4 hours	Must be ordered 3-5 days in advance of transfusion Blood filter required (150-230 micron) Do not use PALL microaggregate filter May be infused via gravity or infusion pump

Test Your Knowledge

What blood or blood product needs to be crossmatched?

- A. RBC
- B. Plasma
- C. Platelets
- D. Cryoprecipitate

Rationale: **Only blood products containing RBCs need to be cross matched.** Plasma products DO NOT need to be cross matched but should be ABO compatible.

Additional Facts

- All blood and blood products contain some cellular debris, thereby requiring an in-line filtration during administration. See the section on filters for more information.
- All blood and blood product tubing should be primed with 0.9% saline
 - Dextrose solutions may lyse RBCs and decrease RBC survival
 - The calcium contained in the Lactate Ringers (LR) solution may cause clotting
- Medications and other solutions should not be added to the blood product
- Blood and blood products should be infused through a separate line
- A blood warmer is recommended for use with multiple blood transfusions
- Whole Blood:
 - O negative blood is used in emergent situations when it is not prudent to wait for a full type and crossmatch
- Packed Cells:
 - 80% of plasma has been removed
 - Transfusion with PRBC may help avoid potential circulatory overload
 - Transfusions are not appropriate when the hemoglobin is greater than 10g/dL unless the clinical condition indicates
 - Each unit of PRBC raises the hematocrit by approximately 3%
- Leukocyte reduced PRBC
 - In most cases, blood products are leukocyte reduced prior to leaving the regional blood bank, therefore a PALL filter or leukoreduction filter is no longer necessary
 - A physician order is no longer required for this type of blood (washed PRBCs)
 - Check with your facility's blood bank to determine if leukocyte reduced PRBCs are the normal issue from your regional blood bank

- Washed PRBC
 - A special solution removes white blood cells and plasma proteins
 - Used for patients previously sensitized to transfusions
 - A physician order is required for this type of blood
 - Cytomegalovirus (CMV) Negative Blood
 - Does not contain CMV antibodies
 - Leukocyte reduced products are considered CMV safe and equivalent to CMV negative blood
 - May be used for premature infants, intrauterine transfusions, and CMV negative patients with an immunosuppressed system or at-risk patients
- (AABB, 2012 & 2018)

Test Your Knowledge

The type of blood product that may not require a special order is:

- A. Washed platelets
- B. Washed PRBC
- C. Leucocyte reduced PRBC**
- D. Leucocyte reduced platelets

Rationale: Leukocyte reduced PRBC

- In most cases, blood products are leukocyte reduced prior to leaving the regional blood bank, therefore a PALL filter or leukoreduction filter is no longer necessary
- A physician order is no longer required for this type of blood (washed PRBCs)
- Check with your facility's blood bank to determine if leukocyte reduced PRBCs are the normal issue from your regional blood bank

Blood Administration Filters

Most standard blood administration tubing has a built-in 170-230 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 4 units of PRBC or for a maximum of 4 hours of total hang time (AABB, 2012 & 2018).

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.

Test Your Knowledge

Filters are generally issued from the blood bank. Each filter can be used for only one unit of RBCs is the definition of which type of filter?

- A. Microaggregate
- B. Leukocyte removal**
- C. PALL
- D. In-line

Rationale: 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.

Nursing Considerations

Blood Product	Administration & timing
Whole Blood (RBC's, WBC's, Plasma & electrolytes).	Must be hung within 30 minutes of removal from blood bank refrigerator Max hang time 4 hours from removal from blood bank refrigerator Must be stored in a blood bank refrigerator Recommended total infusion time in otherwise healthy adult: 1.5 to 2 hours
Packed RBC's (PRBCs)	Must be hung within 30 minutes of removal from blood bank refrigerator Max hang time 4 hours from removal from blood bank refrigerator Must be stored in a blood bank refrigerator Recommended total infusion time in otherwise healthy adult: 1.5 to 2 hours Can be split into smaller amounts (aliquots)
Platelets	Must be stored at room temperature Max hang time 4 hours
Fresh Frozen Plasma	Must be utilized within 24 after thawing Max hang time 4 hours from thawing Must be stored in a blood bank refrigerator Recommended total infusion time in otherwise healthy adult: 1.5 to 2 hours

(AABB, 2012 & 2018)

Consider the following prior to starting a transfusion:

- Premedication
 - If a patient reports prior reactions to a transfusion
 - If the blood bank reports antibodies
- Diuretics or infuse the blood or blood product at a slower rate (max: 4 hours)
 - If there is a risk of fluid overload
- Leucocyte reduced or irradiated blood
 - History of non-hemolytic reactions
 - These reactions are mediated by donor leucocytes in the plasma, causing sensitization to human leucocyte antigens
 - In organ transplant patients

(AABB, 2012 & 2018)

Test Your Knowledge

Which blood or blood product requires a filter?

- A. All products
- B. None, as they are filtered at the blood bank

C. Leukocyte reduced

D. Autologous

Rationale: Most standard blood administration tubing has a built-in 170-micron filter designed to remove debris and clots. This tubing must be used for administration of all blood and blood components.

Safe Blood Administration

The following steps indicate an example of how to safely administer blood and blood products.

Step One: Does the patient have a signed blood transfusion consent?

- Patients have the right to refuse blood and blood products
- Some facility blood banks will require a copy of the consent to be sent to the blood bank along with the blood component order
- Obtain informed consent if one is not in the medical record

When a patient is not able to sign a consent for blood products, and the patient's condition indicates an emergent need for a transfusion, consult your institution's policy on emergency transfusion consent.

- Most emergency consents include:
 - Two physicians' signature (one should be an independent physician- not involved in the patient's care)
 - Written informed consent from the patient or family should be obtained at the first available time

Some patients may refuse blood and blood components based on cultural and religious reasons. A refusal of consent for blood products should be in the medical record.

- Facilities need a court order to give blood to these patients
- Usually there is a liaison who can help healthcare workers understand these beliefs and when it is necessary to try for a court order

Step Two: Compare the blood or blood component request to the order

- Does the order read:
 - Type and cross: matching banked blood to the patient's sample
 - This blood is ready to be issued in the event of need
 - Transfuse/administer: Patient requires a transfusion of the matched blood
- These orders may not be interchanged. Both are needed to safely administer blood and blood products

In the event that a transfusion of blood or blood products is needed emergency and the type and cross cannot be done, consult your institution's policy on emergency universal donor blood transfusions.

Step Three: Start or ensure the patient has the appropriate size vascular access device and that it is patent, prior to obtaining the blood or blood product

Step Four: At the blood bank, using two unique patient identifiers, verify that the blood being issued is for the correct patient

- Some facilities allow blood to be delivered to the unit either by transporters or by the pneumatic tube system

- Know your facility's policy and procedure
- Each state and facility may have regulations or policies mandating who may pick up, transport, and verify blood products
 - Know the regulations of your state and facility policies

Step Five: Explain the procedure to the patient.

Step Six: At the patient bedside, with a second verifier, verify that the patient is the correct patient for the transfusion

- Know your state and facility policy regarding who can verify the blood product
 - The most common error made, is the use of unlicensed personnel at the bedside verification of patient and blood product
- Using the blood bank arm band, patient identification arm band, bar code, and the blood product identification, verify that the following are correct:
 - 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
- Both verifiers should sign the blood product identification slip
- The blood product identification slip should remain attached to the product until the transfusion is complete

Step Seven: Obtain supplies

- Blood tubing with an inline microaggregate filter (170 micron)
- Non-sterile gloves
- Normal saline
- Infusion pump with tubing (if applicable)
- Blood warmer and tubing (if applicable)

Step Eight: Obtain baseline vital signs including patient temperature

- 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

Step Nine: Start infusion and remain in room until next set of vital signs are taken

- The AABB suggests that the nurse remain in the room to observe for signs of immediate reaction to the transfusion

Step Ten: Obtain serial vital signs during and after transfusion

- The AABB suggests:
 - Vital signs are taken within 15 minutes after the start of the infusion and every hour there after until one hour after the transfusion is discontinued

Step Eleven: Discontinue the transfusion

- Following your facility's policy document:

- Transfusion amount
- Vital signs
- Evidence or no evidence of suspected transfusion reaction

(AABB, 2012 & 2018)

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.

Test Your Knowledge

The AABB suggests that vital signs are taken:

- Every 5 minutes x3, every 15 minutes x 4, every 30 minutes x2 and hourly there after until the infusion is complete
- Before the transfusion and every hour until the infusion is complete
- Within 15 minutes after the start of the infusion and every hour there after until one hour after the transfusion is discontinued**
- Every thirty minutes until the infusion is complete

Rationale: The AABB suggests: Vital signs are taken within 15 minutes after the start of the infusion and every hour there after until one hour after the transfusion is discontinued

Transfusion Reactions

Transfusion reactions occur rarely and the most common adverse reactions from blood transfusions are allergic and febrile reactions, which make up over half of all adverse reactions. The Centers for Disease Control and Prevention along with the National Healthcare Safety Network monitor the adverse events. To understand more about this process, visit: <https://www.cdc.gov/nhsn/acute-care-hospital/bio-hemo/>

Blood transfusion reactions occur when the recipient's immune system launches a response against a component of the transfused product and can be an acute, delayed, or late reaction.

These reactions are further classified as hemolytic or non-hemolytic.

- Acute: occurs within the first few minutes of the start of the transfusion
- Delayed: occurs hours to days after the transfusion
- Late: Undetected reactions occurring more than 48 hours after the transfusion
- Hemolytic: Red blood cell destruction occurs
- Non-hemolytic: all other reactions

(AABB, 2012 & 2018)

Signs and Symptoms

Type of Reaction	Cause	Signs & Symptoms
Circulatory Overload	Administration of excessive volume or at a rate faster than the circulatory system can accommodate	Distended neck veins, difficulty breathing, cough, severe headache, tachycardia
Febrile, nonhemolytic	Antibodies directed against donor leukocytes, HLA antigens and pre-formed cytokines in the donor plasma because of leukocyte breakdown.	Chills, fever, hemoglobinuria, vomiting, diarrhea, hypotension
Pyrogenic	Bacterial contamination of blood or	Chills, fever, hemoglobinuria,

	blood product	vomiting, diarrhea, hypotension
Allergic	Allergy to soluble product in donor plasma	Flushing, itching, hives, rash, wheezing
Anaphylactic	Infusion of IgA proteins or other compound into a recipient who has developed antibodies to this compound	Coughing, respiratory distress, hypotension, nausea, vomiting, diarrhea, loss of consciousness
Hemolytic	Triggered by an antigen/antibody reaction caused by the transfusion of incompatible blood components	Fever, chills, chest/back pain, hypotension, hemoglobinuria, generalized bleeding, decrease urinary output (less than 1cc/kg/hr), respiratory distress, pain at infusion sight
TRALI (Transfusion-Related Acute Lung Injury)	Passive transfer of donor white blood cell antibodies reacting with recipient's white cells.	Respiratory distress with pulmonary edema in the absence of fluid overload, fever, chills, and hypotension are often present
Delayed Transfusion Reaction (less than 24 hours post transfusion)	Alloimmunization: Immune response to foreign antigens on RBCs, WBCs or platelets.	Alloimmunization: Fever, decreasing hemoglobin, newly positive antibody screen and/or DAT, platelet refractoriness, delayed hemolytic reaction, hemolytic disease of the fetus or newborn
Delayed Transfusion Reaction (more than 24 hours post transfusion)	Hemolytic: Anamnestic immune response to red cell antigens	Hemolytic: fever, decreasing hemoglobin, newly positive antibody screen, mild jaundice
Graft vs. Host Disease	Donor lymphocytes engraft in recipient and mount attack on host tissue	Erthroderma, maculopapular rash, anorexia, nausea, vomiting, diarrhea, hepatitis, pancytopenia, fever
Post Transfusion Purpura	Patient's platelet antibodies (usually anti-HPA-1) destroy donor platelets	Thrombocytopenic purpura, bleeding, 8-10 days after transfusion
Iron Overload	Multiple transfusions with obligate iron overload in transfusion-dependent patient	Diabetes, cirrhosis, cardiomyopathy

(AABB, 2012 & 2018)

Test Your Knowledge

A reaction to a soluble product in the donor's plasma is a(n):

- Acute reaction
- Delayed reaction
- **Allergic reaction**
- Anaphylactic reaction

Rationale: Allergic: Allergy to soluble product in donor plasma

Anaphylactic: Infusion of IgA proteins or other compound into a recipient who has developed antibodies to this compound

Management of Transfusion Reactions

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Your facility should have a policy describing the process for dealing with a transfusion reaction. Common practices include:

- Stopping the infusion immediately
- Maintain airway, breathing & circulation
- Notify blood bank and physician
- Vital sign regimes such as: Monitor vital signs every 5-15 minutes or as indicated by the severity and type of reaction
- Note evidence of oliguria or anuria: hemoglobin deposits in the renal tubules can cause renal damage
- Be sure to keep the blood administration set intact and send to the lab unless otherwise specified in your facility's policy.

Test Your Knowledge

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

A. True

B. False

Rationale: Your facility should have a policy describing the process for dealing with a transfusion reaction. Common practices include:

- Stopping the infusion immediately
- Maintain airway, breathing & circulation
- Notify blood bank and physician
- Vital sign regimes such as: Monitor vital signs every 5-15 minutes or as indicated by the severity and type of reaction
- Be sure to keep the blood administration set intact and send to the lab unless otherwise specified in your facility's 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 performing 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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