How Do I Administer and Monitor Blood/Blood Products?

Competency for RNs & LPNs

Developed by Garden City Hospital Professional Nursing Development

Garden City Hospital is an approved provider of continuing nursing education by the Wisconsin Nurses Association, an accredited approver by the American Nurses Credentialing Center’s Commission on Accreditation.
How Do I Administer and Monitor Blood/Blood Products?

General Information Regarding the Program

Successful Completion: To receive 0.5 contact hours, for How Do I Administer and Monitor Blood/Blood Products?, participants must read the entire self-learning module, complete the post-test with a passing score of ≥80% and complete/submit an evaluation form.

Conflicts of Interest: The activity planners and presenters for How Do I Administer and Monitor Blood/Blood Products? reported no relevant financial relationships with commercial interests or conflicts of interest related to their presentations.

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Expiration: The expiration date for this educational activity is June 22, 2014. No contact hours will be awarded to participants who submit evaluation forms and post-tests after this date. Please contact Professional Nursing Development with questions.

Thank you
How Do I Administer and Monitor Blood/Blood Products?

**Purpose of Activity:** To identify safe blood/blood product administration and monitoring guidelines to reduce the risk of adverse reactions.

**Objectives of the Program:**
1. Identify what physical reactions would be assessed in the event of adverse reactions.
2. Distinguish the blood group compatibilities within the ABO system.
3. Differentiate the Rh factor compatibilities within the ABO system.

**Target Audience:** Registered Nurses and Licensed Practical Nurses.

**Date:** September 1, 2011

0.5 Contact Hours awarded if completion of entire educational activity, passing score of ≥80% on post-test, and completion/submission of evaluation form. Must be completed by June 22, 2014 to receive contact hours.

**Planning Committee/Presenters:**
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Blood and blood component transfusions have often been referred to as the “Gift of Life”. While the benefits of this gift to our patients should not be underestimated, neither should the risks associated with this type of therapy. To better understand the risks it is important to review the basics of blood and blood administration.

It is estimated that 8 million Americans donate blood each year providing approximately 15 million units of blood (Wilkinson and Leuven, 2009). Each unit of blood can then be separated into components of red blood cells, platelets, plasma and clotting factors. Thus a single unit of donated blood can benefit more than one individual.

### Blood Group Compatibility

In order to understand blood compatibility, it will be helpful to familiarize yourself with a couple of terms. **Antigens** are located on the surface of the RBC & they stimulate the production of antibodies. **Antibodies** are proteins in plasma which are produced in response to antigen exposure. If you are going to transfuse RBC to a patient, you must be concerned with the **antigens** that may be present on the donor RBC, in relation to the **antibodies** in the patient’s plasma. When plasma is to be transfused, you must be aware of the **antibodies** in the donor plasma which may react with **antigens** on the patient’s RBC.

Blood is classified into groups based on the presence or absence of certain antigens on the red blood cells and antibodies found in the plasma (Wilkinson and Leuven, 2009). The groups consist of A, B, AB and O and are genetically determined. Blood group A has A antigens on the surface of the red blood cell and B antibodies in the plasma. The opposite is true of Blood group B. Persons with AB blood group have both the A and B antigens on the red blood cell and no antibodies. Blood group O has no antigens and both A and B antibodies in the plasma (Nowlin, 2006, Wilkinson and Leuven, 2009).

Before administering blood/blood components, ask yourself the following three questions:

1. What antigen or antibody does the patient have?
2. What antigen or antibody is in the blood/blood component?
3. Is there an antigen or antibody in the blood/blood component that is new to the patient? (If there is, STOP! DO NOT administer the blood/blood component).

### The ABO System

Let’s discuss specific blood products. RBC are the most frequently transfused and they also have hundreds of known antigens on the RBC. Fortunately, we are concerned only with a few of them. These antigens are grouped into systems, with the ABO system being the most significant. That is, a mistake in the ABO system can cause the most harm to the patient.
The following are the **antigens** of the ABO system:

<table>
<thead>
<tr>
<th>Blood Group/Type</th>
<th>Antigen</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>AB</td>
<td>Both A and B</td>
</tr>
<tr>
<td>O</td>
<td>Neither A nor B</td>
</tr>
</tbody>
</table>

Using the chart above, let’s look at a couple of examples.

**Situation #1:**  
- **QUESTION:** If the patient is blood group/type A, then is blood group/type AB appropriate for transfusion of RBC?  
  - Ask yourself question #1: What antigen or antibody does the patient have?  
    - Answer #1: The patient has antigen A.  
  - Ask yourself question #2: What antigen or antibody is in the blood/blood component?  
    - Answer #2: The donor has both antigens A and B.  
  - Ask yourself question #3: Is there an antigen or antibody in the blood/blood component that is new to the patient?  
    - Answer #3: Yes, Antigen B would be a new antigen for the patient.  
- **ANSWER:** No, the blood group/type AB **must not** be transfused.

**Situation #2:**  
- **QUESTION:** If the patient is blood group/type B, is blood group/type O appropriate for transfusion of RBC?  
  - Ask yourself question #1: What antigen or antibody does the patient have?  
    - Answer #1: The patient has antigen B.  
  - Ask yourself question #2: What antigen or antibody is in the blood/blood component?  
    - Answer #2: The donor has neither antigen A nor antigen B.  
  - Ask yourself question #3: Is there an antigen or antibody in the blood/blood component that is new to the patient?  
    - Answer #3: No, since the donor does not have any antigens, you would not be giving the patient an antigen that he/she does not already have.  
- **ANSWER:** Yes, the blood group/type O may be transfused to this patient.

Blood group/type O is called the “universal donor” of red blood cells because this group/type contains neither antigen A nor antigen B. This allows any blood group/type to receive group/type O for a red blood cell transfusion.

Blood group/type AB is called the “universal recipient” of red blood cells because this group/type contains both A and B antigens. This means that any blood group/type can donate to group/type AB for a red blood cell transfusion.

Now, let’s discuss antibodies. When the blood component to be transfused is plasma, we are concerned with the antibodies. In the ABO system, one, both, or none of the two naturally occurring antibodies, anti-A and anti-B, are found in the serum. An example of this is, a patient with group A blood anti-B antibodies, rather than anti-A
antibodies, because the later would destroy the patient’s RBC. Antibodies are designated by placing the prefix “anti-“ in front of the antigen against which the antibody will react.

When preparing to transfuse plasma or a component containing plasma, you must determine the ABO antibodies it contains.

The following are the antibodies of the ABO system:

<table>
<thead>
<tr>
<th>Blood Group/Type</th>
<th>Antibodies</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Anti-B</td>
</tr>
<tr>
<td>B</td>
<td>Anti-A</td>
</tr>
<tr>
<td>AB</td>
<td>Neither Anti-A nor Anti-B</td>
</tr>
<tr>
<td>O</td>
<td>Both Anti-A and Anti-B</td>
</tr>
</tbody>
</table>

Using the chart above, let’s look at a couple of examples.

**Situation #1:**
- **QUESTION:** If the patient is blood group/type A, is blood group/type AB appropriate for transfusion of plasma?
  - **Ask yourself question #1:** What antigen or antibody does the patient have?
    - **Answer #1:** The patient has antibody anti-B.
  - **Ask yourself question #2:** What antigen or antibody is in the blood/blood component?
    - **Answer #2:** The donor has neither anti-A nor anti-B antibodies.
  - **Ask yourself question #3:** Is there an antigen or antibody in the blood/blood component that is new to the patient?
    - **Answer #3:** No, the patient already has anti-B antibodies & the AB plasma does not have any antibodies.
- **ANSWER:** Yes, the patient may receive blood group/type AB plasma.

**Situation #2:**
- **QUESTION:** If the patient is blood group/type B, is blood group/type O appropriate for transfusion of plasma?
  - **Ask yourself question #1:** What antigen or antibody does the patient have?
    - **Answer #1:** The patient has antibody anti-A.
  - **Ask yourself question #2:** What antigen or antibody is in the blood/blood component?
    - **Answer #2:** The donor has both anti-A and anti-B antibodies.
  - **Ask yourself question #3:** Is there an antigen or antibody in the blood/blood component that is new to the patient?
    - **Answer #3:** Yes, anti-B antibodies would be new to the patient. The anti-B in the donor plasma will react with the B antigen on the patient’s RBC and could result in an acute hemolytic transfusion reaction.
- **ANSWER:** No, the blood group/type O plasma must not be transfused to blood group/type B.

**The Rh System**

In addition to the ABO system, blood is also grouped based on the Rh antigen. The Rh system includes approximately 50 different antigens with RhD the most important (Nowlin, 2006). The presence of the D antigen, which occurs in approximately
85% of the population, indicates that the person is Rh positive (+). A patient is Rh negative (-) if he/she lacks the D antigen.

<table>
<thead>
<tr>
<th>Patient Rh Type</th>
<th>Donor Rh Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rh Positive (+)</td>
<td>Either Rh Positive (+) or Rh Negative (-)</td>
</tr>
<tr>
<td>Rh Negative (-)</td>
<td>Rh Negative (-)</td>
</tr>
</tbody>
</table>

There are 8 basic blood groups: A positive (+), A negative (-), B positive (+), B negative (-), AB positive (+), AB negative (-), O positive (+), and O negative (-). Transfusion of blood and most blood products requires that both the blood group and the Rh type/factor are compatible between the recipient and the donor. The following table depicts the blood groups and compatibility:

### Blood Component ABO and Rh Compatibility Chart

<table>
<thead>
<tr>
<th>ABO Blood Group/Type</th>
<th>Antigen on RBC</th>
<th>Antibody in Serum</th>
<th>Can Receive RBC from:</th>
<th>Can Donate RBC to:</th>
<th>Can Receive Plasma from:</th>
<th>Can Receive Whole Blood from:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>A</td>
<td>Anti-B</td>
<td>A+, A-, O+, or O-</td>
<td>A+ or AB+</td>
<td>A &amp; AB</td>
<td>A+ or A-</td>
</tr>
<tr>
<td>A-</td>
<td>A</td>
<td>Anti-B</td>
<td>A- or O-</td>
<td>A-, A+, AB-, or AB+</td>
<td>A &amp; AB</td>
<td>A-</td>
</tr>
<tr>
<td>B+</td>
<td>B</td>
<td>Anti-A</td>
<td>B+, B-, O+, or O-</td>
<td>B+ or AB+</td>
<td>B &amp; AB</td>
<td>B+ or B-</td>
</tr>
<tr>
<td>B-</td>
<td>B</td>
<td>Anti-A</td>
<td>B- or O-</td>
<td>B-, B+, AB-, AB+</td>
<td>B &amp; AB</td>
<td>B-</td>
</tr>
<tr>
<td>AB+ (universal recipient of RBC)</td>
<td>Both A and B</td>
<td>Neither Anti-A nor Anti-B</td>
<td>Everyone AB+, AB-, A+, A-, B+, B-, O+, or O-</td>
<td>AB+</td>
<td>AB</td>
<td>AB+ or AB-</td>
</tr>
<tr>
<td>AB- (universal donor of RBC)</td>
<td>Both A and B</td>
<td>Neither Anti-A nor Anti-B</td>
<td>AB-, A-, B-, or O-</td>
<td>AB- or AB+</td>
<td>AB</td>
<td>AB-</td>
</tr>
<tr>
<td>O+</td>
<td>Neither A nor B</td>
<td>Both Anti-A and Anti-B</td>
<td>O+ or O-</td>
<td>O+, A+, B+, or AB+</td>
<td>Everyone O, AB, A, or B</td>
<td>O+ or O-</td>
</tr>
<tr>
<td>O-</td>
<td>Neither A nor B</td>
<td>Both Anti-A and Anti-B</td>
<td>O-</td>
<td>Everyone O-, O+, A-, A+, B-, B+, AB-, or AB+</td>
<td>Everyone O, AB, A, or B</td>
<td>O-</td>
</tr>
</tbody>
</table>
Transfusions of blood and blood products occur when the patient has a significant blood loss resulting in a decrease in O2 carrying capacity or a deficiency in clotting factors (Wilkinson and Leuven, 2009). Each of the blood products has a specific indication for use. The following table depicts information regarding the blood products.

<table>
<thead>
<tr>
<th>Product</th>
<th>Use</th>
<th>Compatibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Blood</td>
<td>Replace volume and O2 carrying capacity following severe trauma or significant blood loss during surgery.</td>
<td>Requires type and crossmatch with ABO and Rh compatibility.</td>
</tr>
<tr>
<td>(Not available due to diminished coagulation factors as it ages). If whole blood is required the physician may order 1 unit of packed red blood cells and 1 unit of plasma.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packed Red Blood Cells (PRBC).</td>
<td>Replace O2 carrying capacity without volume following trauma, blood loss in surgery or anemia.</td>
<td>Requires type and crossmatch with ABO and Rh compatibility.</td>
</tr>
<tr>
<td>80% of the plasma is removed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leukocyte-poor PRBC</td>
<td>Immunosuppressed patients requiring PRBC.</td>
<td>Requires type and crossmatch with ABO and Rh compatibility</td>
</tr>
<tr>
<td>80% of the plasma is removed.</td>
<td>Patients who have had 2 or more non-hemolytic febrile reactions with PRBC,</td>
<td></td>
</tr>
<tr>
<td>99% of the leukocytes removed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Platelets Obtained from plasma</td>
<td>Treat bleeding disorders when the circulating platelet count is low or platelet function is abnormal.</td>
<td>Does not require type and crossmatch with ABO and Rh compatibility</td>
</tr>
<tr>
<td>Fresh Frozen Plasma</td>
<td>Treat bleeding disorders and coagulation deficiencies.</td>
<td>Does not requires type and crossmatch with ABO and Rh compatibility</td>
</tr>
<tr>
<td>Separated from Red blood cells.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consists of 90% water and constitutes 55% of blood volume.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Lippincott Nursing Procedures, 2009).

Albumin and Factor VIII and Cryoprecipitate are obtained from plasma and replace specific coagulation factors. It is important to note that Albumin and Factor VIII do not require ABO and Rh compatibility and are dispensed from pharmacy.

**Transfusion Reactions**

It is necessary to check compatibility of blood and blood components prior to administration in order to prevent a severe transfusion reaction. For example, if a person with type B blood receives a transfusion with type A blood, the donor’s plasma will have antibodies that will attack the recipient’s red cells causing hemolysis and the recipient’s plasma will have antibodies that will attack the donor cells also causing hemolysis. This type of hemolytic reaction places the recipient in immediate danger within minutes of receiving the wrong blood type and will trigger signs and symptoms of shock, intravascular coagulation, renal failure and often proves fatal (Nowlin, 2006). Therefore, checking blood and blood products at the bedside using two identifiers, and remaining
with the patient for the first 15 minutes of a transfusion with the infusion starting slowly at 20-30 gtt/min must be done each time blood or blood products are infused.

Rh incompatibility can also trigger a hemolytic reaction which occurs extravascularly and can lead to cardiopulmonary arrest (Nowlin, 2006). Rh+ individuals can receive both Rh+ and Rh- blood products while Rh- individuals can only receive Rh- blood and blood products.

Individuals do not routinely make Rh antibody. A person who is Rh-negative (lacks D antigen) may be stimulated to make anti-D by exposure to D antigen. This exposure may be related to a pregnancy with an Rh-positive fetus or a transfusion with a blood product that contains Rh-positive RBC.

Whole blood, RBC, and platelets contain enough blood cells to act as a stimulus for production of anti-D. Plasma components have been tested to assure that no anti-D is present. To prevent the production of anti-D, we avoid transfusing blood components containing Rh-positive RBC to recipients who are Rh-negative.

A transfusion reaction in the Rh-negative recipient doesn’t usually occur immediately after the initial exposure to Rh-positive blood. The antibodies develop slowly, over months, causing the Rh-negative recipient to become sensitized to the antigen. A second exposure results in a transfusion reaction and hemolysis. In hemolytic disease of the newborn (HDN), the mother’s antibody can cross the placenta and enter the blood stream of the fetus where it can destroy the Rh-positive fetal RBC and possibly cause fetal death.

To prevent a transfusion reaction caused by Rh incompatibility in the Rh-negative recipient, always avoid exposure to Rh-positive RBC. In the Rh-negative pregnant patient, Rh Immune Globulin is administered as antepartum prophylaxis at 26 - 28 weeks gestation and following delivery of an Rh-positive baby irrespective of the ABO groups of the mother and baby. It can also be used after any other suspected exposure to Rh positive fetal blood such as antepartum fetal-maternal hemorrhage from placenta previa, amniocentesis, chorionic villus sampling, percutaneous umbilical blood sampling, other obstetrical manipulative procedure, or any abdominal trauma, actual or threatened pregnancy loss at any stage of gestation, or ectopic pregnancy. It is also necessary to administer Rh Immune Globulin for each subsequent pregnancy.

There are a number of non-hemolytic reactions that can occur with the transfusion of blood and blood products. Some of these reactions can occur immediately or may take as long as 96 hours to develop. In the case of transfusion transmitted infections, signs and symptoms may not occur for weeks or months. Although the blood and donors are screened for Hepatitis B and C, HIV, syphilis, t-lymphotropic viruses and West Nile virus and this has greatly reduced the incidence of disease transmission; infection transmission through the blood product continues to remain a risk for patients receiving blood.

In addition, surface antigens found on WBC and lesser known antigens found on RBC can be responsible for most non-hemolytic reactions (Nowlin, 2006). Sensitivity usually develops after multiple transfusions. The patient may develop a fever causing their temperature to rise 1 degree above baseline. In most cases pre-medicating the patient with Tylenol and Benadryl (administered per physician order) will prevent an immune-mediated reaction. If the patient’s temperature continues to rise to 1.5 degrees above baseline, the transfusion should be stopped and the physician notified. This type of febrile reaction must be investigated quickly and thoroughly. The patient could be
developing a hemolytic reaction or the fever may be the result of bacterial contamination of the blood or blood product. To prevent bacterial contamination the blood should be started immediately when it arrives on the unit and the infusion for PRBCs must not exceed four hours. The normal suggested infusion time for PRBCs depending on the patient’s condition, is 2 hours. Platelets and plasma should be transfused in 30 minutes. It is important to note that the transfusion of blood and blood products are not held because of an existing temperature elevation.

Another type of immune-mediated reaction is TRALI (Nowlin, 2006). TRALI is transfusion-related acute lung injury. The onset is 1 to 6 hours of the transfusion with symptoms of acute respiratory distress, severe hypoxemia, fever and non-cardiogenic pulmonary edema (Mariani, 2003). Prompt recognition with appropriate treatment is required to decrease mortality of this syndrome.

In addition to allergic reaction and plasma protein incompatibility, patients can develop reactions from external factors in the blood such as elevated blood ammonia due to increase ammonia levels in stored donor blood; hemosiderosis from RBC destruction which may occur after multiple transfusions and hypocalcemia which occurs if citrate treated blood is infused too rapidly. Patients also need to be observed for circulatory overload and hypothermia from infusion of large amounts of cold blood or blood products. Again, close monitoring of your patient during and following a transfusion and strict adherence to the policy and procedure are a must to ensure that the patient receives all the benefits from this therapy and it remains the “gift of life” that it was intended to be.

A Transfusion reaction typically stems from a major antigen-antibody reaction and can result from a single or massive transfusion of blood or blood products. A transfusion reaction requires immediate recognition and prompt action to prevent further complications.

<table>
<thead>
<tr>
<th>REACTIONS &amp; CAUSES</th>
<th>SIGNS &amp; SYMPTOMS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Endogenous</strong> (antigen-antibody reaction)</td>
<td></td>
</tr>
<tr>
<td>Allergic: allergen in donor blood; donor blood hypersensitive to certain drugs.</td>
<td>Anaphylaxis (chills, facial swelling, laryngeal edema, pruritis, urticaria, wheezing), fever, nausea and vomiting.</td>
</tr>
<tr>
<td>Bacterial: organisms that can survive cold, such as Pseudomonas or Staphylococcus</td>
<td>Chills, fever, vomiting, abdominal cramping, diarrhea, shock, signs of renal failure.</td>
</tr>
<tr>
<td>Febrile: bacterial lipopolysaccharides; antileukocyte recipient antibodies directed against donor white blood cells.</td>
<td>Fever up to 104°F, chills, headache, facial flushing, palpitations, cough, chest tightness, increased pulse rate, flank pain.</td>
</tr>
<tr>
<td>Hemolytic: ABO or Rh incompatibility; intradonor incompatibility; improper crossmatching; improperly stored blood.</td>
<td>Chest pain, dyspnea, facial flushing, fever, chills, shaking, hypotension, flank pain, hemoglobinuria, oliguria, bloody oozing at</td>
</tr>
<tr>
<td>Condition</td>
<td>Symptoms</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>------------------------------------------------------------------</td>
</tr>
<tr>
<td>Plasma protein incompatibility:</td>
<td>Immunoglobulin-A (IgA) incompatibility.</td>
</tr>
<tr>
<td>Exogenous: caused by external factors in</td>
<td>Abnormal bleeding and oozing from a cut, a break in the skin surface, or the gums; abnormal bruising and petechiae.</td>
</tr>
<tr>
<td>administered blood.</td>
<td></td>
</tr>
<tr>
<td>Bleeding tendencies: low platelet count in</td>
<td>Abdominal pain, diarrhea, dyspnea, chills, fever, flushing, and hypotension.</td>
</tr>
<tr>
<td>stored blood, causing thrombocytopenia.</td>
<td></td>
</tr>
<tr>
<td>Circulatory overload: may result from infusing</td>
<td></td>
</tr>
<tr>
<td>whole blood too rapidly.</td>
<td></td>
</tr>
<tr>
<td>Elevated blood ammonia level: increased</td>
<td>Confusion, forgetfulness, lethargy.</td>
</tr>
<tr>
<td>ammonia level in stored donor blood.</td>
<td></td>
</tr>
<tr>
<td>Hemosiderosis: increased level of hemosiderin</td>
<td>Iron plasma level exceeding 200mg/dl.</td>
</tr>
<tr>
<td>(iron-containing pigment) from RBC destruction, especially after many transfusions.</td>
<td></td>
</tr>
<tr>
<td>Hypocalcemia: citrate toxicity occurs when</td>
<td>Arrhythmias, hypotension, muscle cramps, nausea and vomiting, seizures, tingling in fingers.</td>
</tr>
<tr>
<td>citrate-treated blood is infused rapidly.</td>
<td></td>
</tr>
<tr>
<td>Citrate binds with calcium, causing a calcium</td>
<td></td>
</tr>
<tr>
<td>deficiency, or normal citrate metabolism</td>
<td></td>
</tr>
<tr>
<td>becomes impeded by hepatic disease.</td>
<td></td>
</tr>
<tr>
<td>Hypothermia: rapid infusion of large amounts</td>
<td>Chills, shaking, hypotension; arrhythmias, esp. bradycardia, cardiac arrest. If core temp falls below 86°F.</td>
</tr>
<tr>
<td>of cold blood, which decreases body temperature.</td>
<td></td>
</tr>
</tbody>
</table>
Type and Crossmatch Blood Specimens:

1. The staff member (Phlebotomist, Technical Partner, or Registered Nurse) will obtain the computer accession label(s) generated with each specimen order that is entered into the computer order entry system.
2. Prepare the equipment for the draw.
3. Identification of the patient must be made by using two (2) patient identifiers.

   KEY POINTS:
   - Correctly identify the patient before drawing any specimen by utilizing the Patient Identification Policy.
   - Confirmation of the patient by using the two-identifier system by checking the patient identification band for correct name as well as date of birth or medical record number.
   - Match the medical record number on the hospital identification wristband to the appropriate patient accession label(s).
   - If the type and crossmatch specimen is drawn by a Technical Partner, the identification of the patient and correct labeling of the type and cross specimen must be verified by a Registered Nurse or Physician co-checker. The Registered Nurse or Physician co-checker places first initial, full last name, and title on the type and crossmatch specimen label next to the Technical Partner identification number.
4. Explain the procedure to the patient and/or family.
5. Once the patient is appropriately identified, complete the patient’s Typanex blood recipient band at the bedside with the following information:
   - Patient’s last name, first name
   - Patient's medical record number
   - Date and time of collection
   - Technical Partner identification number along with the Registered Nurse or Physician co-checker first initial, full last name, and title, or the first initial and full last name of the Registered Nurse, Physician, or Phlebotomist that obtained the specimen.

   KEY POINTS:
   - All trained Technical Partners are to use their assigned identification number when labeling Type and Crossmatch specimens.
   - The numbers and their signature are kept in the Blood Bank.
6. Assemble all supplies and put on gloves.
7. Obtain the blood specimen in the pink top tube.
8. Peel off the top layer of the Typanex label and place it lengthwise on the tube where the paper label is, with the patient’s name towards the top.
9. Place the Typanex band onto the patient’s wrist.
   - Make sure the clamp is shut tight.
   - Remove the end stripe of the band next to the clamp.
   - Peel off the backing paper of the end stripe and adhere it to the top of the specimen tube.
10. Ensure that the Registered Nurse or Physician who has identified the patient with the Technical Partner and has verified the blood sample, has signed both the
specimen label and the typanex band with his/her first initial, full last name, and title.

11. Take the correctly labeled specimen to the lab office. The accession label must be with the specimen when taken back to the lab office.

12. The Blood Bank has the right to discard any specimen that they feel is not obtained, identified, or labeled properly.

13. The Registered Nurse documents on the Clinical Management Record that the blood specimen for Type and Crossmatch was obtained and sent to lab.

**KEY POINT:** Because a complete crossmatch may take from 45 minutes to 2 hours, an incomplete (10 minute) crossmatch may be performed in an emergency such as severe blood loss due to trauma.

**Key Points to Follow for Blood and Blood Component Administration:**

- A written physician order is required for blood/blood component transfusion.
- The type & screen specimen is good for crossmatch for 31 days; unless the patient has had a transfusion in the preceding 3 months, has been pregnant in the preceding 3 months, has a clinically significant antibody, or is uncertain about a transfusion or pregnancy history, the type & screen must be collected within 3 days of the scheduled transfusion.
- The Registered Nurse will place the patient identification label on a piece of paper and must verify the written physician order for blood/blood component transfusion, the blood consent is signed, both the Typanex band and patient identification bracelet are on the patient, pre-transfusion vital signs are obtained, and the intravenous line is patent and infusing normal saline through the blood tubing **before** arranging the pick up of blood/blood components.
- A phone call is made by the Registered Nurse to Blood Bank specifying the type and number of units of blood/blood component requested for pick up **before** sending transporter to Blood Bank for blood/blood component pick up.
- All checking is done at the bedside by two licensed professionals (RN/Physician). The Registered Nurse hanging the blood/blood component must have another licensed Registered Nurse or Physician double check the blood/blood component bag, patient identification, and the Typanex wristband against the “Crossmatch Transfusion Tag” prior to starting the transfusion.
- All patient identification numbers must match exactly.
- Check the expiration date, donor type, blood type and unit number.
- If it is necessary to return the blood/blood component to Blood Bank, it must be returned within 30 minutes from the time it was released from the Blood Bank.
- Keep the blood and blood components away from extreme heat or cold.
- No medications are given through the blood tubing.
- Blood/blood components can only be hung for a total time of 4 hours from the time the blood/blood component is signed out/picked up from the Blood Bank.
- A Registered Nurse or Licensed Practical Nurse must accompany any patient leaving the nursing unit while blood or a blood component is transfusing.
Blood/Blood Component Transfusion
Using the Baxter Sigma Spectrum Intravenous Pump:

- Blood should be administered at Garden City Hospital through the Baxter Sigma Spectrum Intravenous Pump.
- For situations when the pump is not used for blood component transfusion, such as in the Operating Room, the Y-type blood tubing that does not fit the Baxter Sigma Spectrum Pump is available.

To Start the Transfusion:
1. Obtain Y-type blood/solution set/tubing with standard filter and Baxter Sigma Spectrum Intravenous Pump.
2. Ensure all clamps on Y-type tubing are clamped before spiking bags.
3. Insert/spike a sterile end of the Y-type tubing, maintaining aseptic technique, into the 250ml normal saline bag and manually prime the tubing by opening the appropriate clamps.
4. Load the primed Y-type blood/solution set/tubing into the Baxter Sigma Spectrum Intravenous Pump.

**KEY POINT:** Filter in the tubing is to be 6 inches above the pump.

**KEY POINT:** Normal saline and blood bags are to be 20 inches above the pump.

5. Insert/spike the other sterile end of the Y-type tubing into the blood bag, maintaining aseptic technique.
6. Program the Baxter Sigma Spectrum Intravenous Pump for the correct blood component.
   - Select “Blood”.
   - Select “Cryo”, “Fresh Frozen Plasma”, “Platelets”, or “PRBC’s”.
7. Program the blood as a primary bag with the appropriate rate and volume for administration. Infusion rate must be calculated based upon the length of time the blood/blood product is to be infused (i.e. 300ml bag to be infused over 2 hours: 150ml/hr).

**KEY POINT:** Blood/blood product volume in every bag varies. The volume in the bag is printed on the Crossmatch Transfusion Tag. The blood volume listed for PRBC’s is an estimate and reprogramming of the pump may be necessary to ensure that all blood is infused from the bag and that there is no waste.

8. Clamp off the Y-type tubing leading to the normal saline bag and open/unclamp the Y-type tubing leading to the blood/blood product bag.
9. Select Run to start administration of blood/blood product.
10. Start timing the blood transfusion at the time the blood enters the patient.
11. Unless the patient’s condition warrants otherwise, start the transfusion slowly. For the first 15 minutes the rate of the transfusion should be 20 – 30 drops/minute.
KEY POINT: Registered Nurse stays at the bedside for the first 15 minutes of the transfusion. Observe for adverse reactions.

12. Each unit of packed red blood cells must be transfused within 4 hours from being released from the Blood Bank.
   - Unless otherwise ordered, the unit should be transfused over a 2 hour period.
   - Transfusion of plasma and platelets should be transfused over a 30 minute period.

13. 30 minutes before the blood has completed, a call back alarm will sound.

14. The nurse will be required to turn off the call back alarm.

15. Upon completion of blood administration, clamp the Y-type tubing leading to the blood/blood product bag and unclamp the Y-type tubing leading to the normal saline bag.

KEY POINT: The blood administration rate will default to 10ml/hr once the programmed volume has been infused if the primary bag is not changed on the pump from the blood/blood product to normal saline.

16. Program the normal saline in the pump to infuse as a primary bag.

17. Select Run to start the normal saline infusion to flush the Y-type blood/solution set.

18. If the patient is to receive another unit of blood/blood component:
   - Clamp Y-type tubing leading to blood/blood component bag.
   - Open Y-type tubing leading to normal saline; infuse normal saline at keep vein open rate.
   - Obtain second unit of blood/blood component from the Blood Bank.
   - Proceed with hanging blood/blood component according to procedure.
   - The blood administration set (Y-type tubing) may be used for administration of only 2 units of the same type of blood component over a 4 hour time frame.

KEY POINT: Always take into account the condition of your patient to avoid fluid overload or other reactions. Patient should be checked at least every 30 minutes for signs of sepsis, IV patency, and tolerance of transfusion.

Clinical Actions for Suspected Transfusion Reaction:

1. Immediately STOP infusion of blood or blood component by clamping blood tubing.
   - **DO NOT DISCONNECT BLOOD TUBING** (in case it is not a hemolytic reaction) **unless told to do so by Blood Bank.**
   - When reactions are hemolytic due to incompatibility or bacterial contamination, blood bank will notify the nurse to disconnect the blood and intravenous tubing and send to the lab.
2. Notify physician to assess the patient for suspected transfusion reaction.
   - If the physician does not suspect a transfusion reaction, confirm order to continue the transfusion.

3. Check the patient’s ID band against the ID printed on the crossmatch tag, the hospital ID band, and the blood band’s typanex band.

4. Insert a new intravenous catheter (if necessary) and hang a new normal saline solution with new tubing if needed for supportive measures during an emergency.

5. Notify Blood Bank of possible transfusion reaction if physician suspects a transfusion reaction.
   - If physician suspects a transfusion reaction, lab orders will be written to confirm reaction.
   - The physician completes the top portion of the Blood Transfusion Suspected Reaction Investigation Report and signs it.

6. A Phlebotomist from Lab will come to the bedside to obtain specimens and will also provide nursing staff with blood cooler at this time.
   - The blood cooler will have a label indicating the time the blood/blood component unit was released from Blood Bank and the time the blood/blood component unit expires.

7. The Registered Nurse places the blood or blood component unit, with all blood tubing still attached to unit and patient, into the blood cooler provided by Blood Bank kept at the patient’s bedside.

8. Wait for Blood Bank to call with reaction report.

9. If no evidence of hemolytic transfusion reaction is found, the Registered Nurse will notify the physician.
   - The physician will then instruct on whether to proceed with the transfusion.

10. If the report indicates a hemolytic reaction is suspected or confirmed, the Registered Nurse will notify the physician and disconnect unit and all intravenous blood tubing and send them down to Blood Bank in a biohazard bag along with the transfusion record. A Quality Control Report (QCR) must be completed.
   - A Quality Control Report (QCR) must be completed.
   - A new intravenous line may be started or the previous intravenous line may be taken apart all the way down to the hub of the catheter and a new normal saline and new tubing will be hung.
   - If a Peripherally Inserted Central Catheter (PICC) line or Central Venous Catheter (CVC) line was used:
     - Withdraw 20 ml waste and then flush line/ports with 20 ml normal saline.
     - New intravenous tubing and solution can be hung after appropriate waste and flushing is done.

11. When reactions are non-hemolytic such as a febrile allergic reaction, infusion of blood components may continue up until the 4 hour time limit, after the patient is treated with appropriate medications and the symptoms have diminished.
KEY POINT: Remain aware that the blood/blood components can only be hung for a total time of 4 hours from the time the blood or blood component is signed out/picked up from the Blood Bank.

12. Monitor vital signs every 5 minutes for the first 15 minutes and then every 15 minutes until stable or as indicated by the severity and type of reaction and document on the Clinical Management Record.
   o The Registered Nurse is to stay with the patient.
13. Monitor intake and output and observe for oliguria or anuria.
   o Have Crash Cart available.
   o Place emergency equipment at the patient’s bedside and prepare for a potential Intensive Care Unit transfer.
15. Return cooler to Blood Bank as time permits.
References


