Transfusion Reactions: Monitoring – an Overview

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<th>Standard Met/Initials</th>
<th>Competency Areas</th>
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<td><strong>Prerequisite Skills</strong></td>
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<td>Understanding that transfusion reactions can be acute or delayed reactions, and signs and symptoms range in severity from uncomfortable to life-threatening</td>
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<td>Knowledge of the pathophysiology, signs and symptoms, and potential complications associated with the different types of acute transfusion reactions, including</td>
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<td>• acute hemolytic reaction (also called acute hemolysis)</td>
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<td>• febrile nonhemolytic reactions</td>
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<td>• allergic reaction, including life-threatening anaphylaxis</td>
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<td>• transfusion-related acute lung injury (TRALI)</td>
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<td>• transfusion-associated circulatory overload (TACO)</td>
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<td>• hypocalcemia</td>
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<td>• sepsis</td>
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<td>Knowledge of the pathophysiology, signs and symptoms, and potential complications associated with the different types of delayed transfusion reactions, including</td>
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<td>• delayed hemolytic reaction</td>
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<td>• graft-versus-host disease (GVHD)</td>
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<td>• post-transfusion purpura (PTP)</td>
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<td>• bloodborne illness (e.g., viral hepatitis, AIDS)</td>
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<td>Understanding of the importance of closely monitoring patients during blood transfusions for indications of potentially life-threatening transfusion reactions</td>
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<td>Knowledge of preventive strategies that significantly reduce the risk for transfusion reactions, including</td>
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<td>• obtaining a careful patient history of allergies and adverse reactions that occurred during previous blood transfusions</td>
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<td>• verifying proper labeling and accurately cross-checking of the blood or blood products to be transfused</td>
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<td>• following facility guidelines for patient identification</td>
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<td>Knowledge of and proper use of equipment, including demonstrated competency managing intravenous (I.V.) lines</td>
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<td><strong>Knowledge of facility/unit protocols for administration of blood transfusions and monitoring for and managing transfusion reactions</strong>&lt;br&gt;•Understanding that the first action to take if a transfusion reaction is suspected is to turn off the blood product and infuse normal saline at a keep vein open (KVO) rate</td>
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<td><strong>Preparation</strong>&lt;br&gt;Reviews the facility/unit-specific protocol for administering blood products and for patient monitoring during transfusion, if available</td>
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<td>Reviews the treating clinician’s order for transfusion, including the&lt;br&gt;•type of blood product ordered&lt;br&gt;•number of units to be transfused&lt;br&gt;•indication for the transfusion&lt;br&gt;•administration time and duration&lt;br&gt;•use of a blood warmer, if indicated&lt;br&gt;•premedication to be administered, if ordered</td>
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<td>Reviews manufacturer instructions for all equipment to be used and verifies that the equipment is in good working order</td>
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<td>Verifies completion of facility informed consent documents for transfusion</td>
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<td>Reviews the patient’s medical history/medical record for information about&lt;br&gt;•recent laboratory test results (e.g., coagulation profile, Hgb, Hct, calcium, and/or other laboratory data) to determine the purpose of the transfusion&lt;br&gt;•the patient’s blood type and Rh factor&lt;br&gt;–Arranges for the type and cross-match of the patient’s blood for the transfusion, if not already completed&lt;br&gt;•underlying conditions (e.g., heart failure) that may affect the patient's tolerance of the rate and volume of the transfusion and/or increase risk for a transfusion reaction&lt;br&gt;•allergies (e.g., to latex, medications, or other substances); uses alternative materials, as appropriate</td>
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<td>Contacts the blood bank to verify the availability of the blood product</td>
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<td>Establishes and/or assesses the patency of I.V. access via large-bore (e.g., 18-gauge) peripheral I.V. catheter or central line</td>
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Gathers supplies necessary to administer the transfusion and monitor the patient, which typically include the following:

- Nonsterile gloves; additional personal protective (PPE; e.g., gown, mask with eye shield) may be necessary depending on the facility/unit specific protocol
- Facility-approved pain assessment tool, analgesic medication if prescribed, and means for its administration
- I.V. infusion pump
- Blood infusion set, including 170–260 micron filter, if applicable
- Isotonic (0.9%) saline for infusion (250 mL volume)
- Premedication (e.g., diphenhydramine [Benadryl], acetaminophen), if ordered
- Blood product when delivered from the blood bank
- Blood warmer, if ordered
- Supplies necessary for patient monitoring such as:
  - Vital signs equipment (e.g., thermometer, stethoscope, BP machine)
  - Pulse oximetry unit and sensor
  - EKG machine
- Emergency resuscitation cart (crash cart) in a readily accessible location
- Written materials to support patient education

**Procedure**

Performs hand hygiene and dons PPE, as appropriate

Identifies the patient using 2 identifiers, according to facility protocol

Establishes privacy by closing the door to the patient’s room and/or drawing the curtain surrounding the patient’s bed

Introduces self to the patient and family members, if present; explains clinical role; assesses the coping ability of the patient and family and for knowledge deficits and anxiety regarding blood transfusion

- Determines if the patient/family requires special considerations regarding communication (e.g., due to illiteracy, language barriers, or deafness); makes arrangements to meet these needs if they are present
  - Uses professional certified medical interpreters, either in person or via phone, when language barriers exist
- Assesses the patient’s understanding of and previous experience with the blood transfusion; explains the procedure and its purpose; answers any questions and provides emotional support, as needed

Assesses the patient’s general health status, including vital signs and level of pain using a facility-approved pain assessment tool

- As appropriate, administers prescribed analgesics and allows sufficient time for a therapeutic level to be reached before proceeding

Obtains verbal consent for the procedure
Primes the I.V. infusion set and filter with normal saline and begins saline infusion at a low rate according to facility protocol; includes secondary filter, if ordered

Administers prescribed premedication (e.g., diphenhydramine) and allows sufficient time for the medication to reach therapeutic effect

Obtains the blood product from the blood bank; checks for normal appearance and color, the absence of bubbles, and the absence of indications of bacterial contamination
- Records the date and time the blood product was received from the blood bank and verifies that it was received within 30 minutes of the time dispensed from the blood bank
  - **Does not allow blood/blood components to stand at room temperature for longer than 30 minutes, and completes the transfusion within 4 hours or less**

Follows facility protocol for completing the required pretransfusion safety checks with another clinician, which typically includes the following:
- Confirms the patient’s medical record number on his/her medical record and on the unit of the blood or blood component to be infused
- Confirms that the donor blood type and Rh factor noted on the unit to be transfused are compatible with those of the patient
- Confirms that the blood bank identification number is identical to that on the transfusion bag
- Documents in the patient’s medical record the date and time the above information was confirmed. Signs this chart entry with the other clinician

Immediately prior to initiating the transfusion, measures vital signs, auscultates the lungs, checks for jugular venous distention, and assesses the condition of the patient’s skin so that any changes that occur during or after the transfusion can be identified. Notifies the treating clinician of abnormal findings, especially for oral temperature ≥ 101 °F (38.3 °C)

 Begins the transfusion at a very slow rate (e.g., 1–5 mL/min) and remains with the patient during the first 15 minutes

Identifies any of the following signs and symptoms as suggestive of a transfusion reaction:
- Hives and/or skin rash
- Fever with or without chills
- Rigor
- Flushing, patient report of having a feeling of warmth
- Hypotension
- Tachycardia
- Gastrointestinal manifestations (e.g., cramping and diarrhea)
- EKG abnormalities
- Hypoxia
- Chest discomfort
- Shortness of breath
- Wheezing, crackles, or stridor
If no transfusion reaction noted, increases the transfusion rate so that the transfusion is completed within 4 hours

If a transfusion reaction is suspected, rapidly performs the following interventions:
- Stops the transfusion and begins saline infusion at a KVO (keep vein open) rate (e.g., ~ 40 mL/hr) to maintain I.V. access. Does not infuse the blood remaining in the filter or the I.V. tubing as this may exacerbate the transfusion reaction.
- Reconfirms patient identity and compares the labels of all transfusion containers with blood bank records to verify that the correct transfusion was provided to the correct patient.
- Notifies the treating clinician immediately and initiates appropriate interventions according to facility protocol, which may include administration of oxygen or other medications. If necessary in the case of anaphylactic shock, notifies the rapid response team or other facility support team.
- Monitors the patient’s vital signs every 15 minutes or as indicated to adequately evaluate the patient’s response to the transfusion.

Determines the type of acute transfusion reaction the patient is experiencing, according to the patient’s signs and symptoms, as follows:
- Acute hemolytic transfusion reaction: Tachycardia, hypotension, low back/flank pain, pain at the infusion site, fever, chills, rigors, hematuria, and oliguria/anuria.
- Febrile nonhemolytic reaction: Headache, fever of 38°C/100.4°F (or an increase of 1°C/1.8°F from baseline), chills, rigors, and generalized discomfort.
- Allergic reaction: Generalized flushing, rash, hives, itching, angioedema, conjunctival edema, facial edema, hypotension, and/or asthmatic wheezing, and can progress to laryngeal edema and anaphylaxis.
- TRALI: Respiratory distress, crackles, hypoxemia (i.e., oxygen saturation < 90% on room air).
- TACO: Dyspnea, orthopnea, cyanosis, jugular venous distension, crackles, increased blood pressure, peripheral edema, S3 heart murmur, and precordial pain.
- Hypocalcemia: Hypotension, muscle cramps, arrhythmia, nausea, vomiting.
- Bacterial sepsis: Fever, hypothermia, hyperventilation, chills, shaking, warm skin, skin lesions, lethargy, confusion, coma, hyperglycemia, ileus, and muscle weakness.
| If an acute hemolytic transfusion reaction is suspected, performs the following, as ordered: |
| • Administers supplemental oxygen  
• Increases the I.V. infusion rate as needed to support blood pressure and kidney function  
• Draws, or assists with drawing, blood specimens to assess for hemolysis and hemolytic reaction  
• Gathers the remaining blood component and tubing, as well as any blood specimens drawn, and arranges transport to the blood bank for analysis  
• Continues to assess the patient frequently, according to facility protocol, and responds as appropriate  
• Notifies the rapid response team and assists with transfer to the ICU for hemodynamic monitoring and support, as needed |

| If a febrile nonhemolytic transfusion reaction is suspected, performs the following, as ordered: |
| • Administers an antipyretic agent (e.g., acetaminophen [Tylenol]) and monitors for response  
  – Does not administer aspirin to thrombocytopenic patients as this increases risk for bleeding  
• Resumes the transfusion at a slow rate (e.g., 1–5 mL/minute) once the fever begins to subside; increases the transfusion rate to finish the transfusion within 4 hours if there are no further signs or symptoms of transfusion reaction |

| If an allergic reaction is suspected, performs the following, as ordered: |
| • Administers an oral or I.V. antihistamine and monitors for response  
• Resumes the transfusion at a slow rate (e.g., 1–5 mL/minute) once the allergic reaction has subsided; increases the transfusion rate to finish the transfusion within 4 hours if there are no further signs or symptoms of transfusion reaction  
• Continues to monitor the patient for allergic reaction or anaphylaxis. If anaphylaxis develops,  
  – protects the patient’s airway  
  – calls for the emergency response team  
  – administers subcutaneous epinephrine, if ordered  
  – administers supplemental oxygen using a nasal cannula or face mask  
  – arranges transfer to the ICU |

| If TRALI is suspected, performs the following, as ordered: |
| • Administers supplemental oxygen using a nasal cannula or face mask  
• Continues to monitor the patient’s respiratory status and oxygen saturation  
• If the patient remains hypoxemic, arranges immediate transfer to the ICU for mechanical ventilation and additional supportive care |
If TACO is suspected, performs the following, as ordered:
• Places the patient in an upright position with the feet dependent
• Administers supplemental oxygen using a nasal cannula or face mask
• Administers diuretics and initiates strict monitoring of intake and output. Inserts an indwelling urinary catheter, as appropriate
• Initiates cardiac monitoring, if available, and continues monitoring the patient’s cardiovascular status
• Monitors the patient’s respiratory status, including oxygen saturation using pulse oximetry
• If the patient shows signs of worsening heart failure or respiratory failure, arranges immediate transfer to the ICU for further care

If the patient is suspected of being hypocalcemic, performs the following, as ordered:
• Obtains a blood specimen for electrolyte monitoring
• Administers I.V. calcium gluconate
• Continues with blood transfusion

If bacterial sepsis is suspected, performs the following, as ordered:
• Draws, or assists with drawing, blood cultures
• Administers broad spectrum antibiotics after blood cultures have been drawn
• Gathers the remaining blood component and tubing, as well as any blood specimens drawn, and arranges transport to the clinical laboratory/blood bank for analysis

Continues monitoring vital signs and performing patient assessments during the transfusion, according to facility/unit-specific protocol (e.g., every 30 minutes until the transfusion is complete)

Following the transfusion, reassesses vital signs, cardiopulmonary status, pain/discomfort level, and tolerance of the transfusion, according to facility/unit-specific protocol (e.g., at the conclusion of the transfusion and at 1 hour after transfusion)

Disposes of used materials in proper receptacles and performs hand hygiene

**Post-Procedural Responsibilities**

On successful completion of the blood transfusion, encourages return of patient to prior activity level, as appropriate

Reviews documentation, verifying that all required information has been recorded
Continues to monitor patient or transitions monitoring to oncoming staff for monitoring for delayed signs and symptoms of transfusion reaction. Performs the following if a transfusion reaction is suspected or confirmed:

- Does not discard the transfusion bag and infusion solution. Sends these materials to the blood bank as soon as possible so that the blood bank can test them for bacterial contamination and other possible causes of the transfusion reaction
- Collects the patient’s first post-transfusion urine sample for laboratory screening for the presence of Hgb, an indicator of a hemolytic reaction; monitors the patient’s intake and output to screen for decreased or absent urinary flow, as Hgb deposition in the renal tubules can damage the kidneys
  - Urine output should be > 1 mg/kg/hr
- Obtains a blood sample via venipuncture in a vein that is different from the one used for the transfusion, and transports the specimen to the laboratory (e.g., for blood culture, coagulation studies, chemistry tests, or other prescribed laboratory tests to determine the presence of infection or extent of the reaction [e.g., destruction of red blood cells])
- Initiates other interventions as indicated by the treating clinician’s orders or facility protocol

Follows facility protocol for reporting of serious transfusion reactions (e.g., reaction causing death, disability, or incapacitation)

Reinforces patient/family education about the purpose of the blood transfusion, strategies performed to reduce risk for transfusion reactions, the importance of reporting abnormal signs and symptoms, and treatment that becomes necessary to manage adverse events
Follows facility protocols for complete documentation of the blood transfusion and adverse events that occurred during the transfusion. Completes the blood transfusion record and forwards all necessary documentation to the blood bank. Updates the patient’s plan of care, as appropriate, and documents the following information in the patient’s medical record:

• Date and time the transfusion began and was completed
• Description of the procedure, including
  – all prescribed medications administered
  – type and gauge of the I.V. catheter used
  – flow rate of the transfusion
  – total volume infused during the transfusion (also updates the patient’s intake and output records)
  – if the transfusion unit was warmed and by what method
• Patient assessment findings, including
  – pretransfusion coagulation profile, Hgb, Hct, calcium, and other relevant laboratory data, as ordered
  – vital signs and other clinical assessment information before and after the transfusion
• Patient’s response to the procedure
• Any laboratory specimens obtained and sent for analysis
• Any unexpected patient events or outcomes, interventions performed, and whether or not the treating clinician was notified
• Patient/family member education, including topics presented, response to education, plan for follow-up education, barriers to communication, and techniques that promoted successful communication

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<tr>
<td>Evaluator's Signature</td>
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