



HEALTH HOLDING

HAFER ALBATIN HEALTH  
CLUSTER  
MATERNITY AND  
CHILDREN HOSPITAL

<b>Department:</b>	Laboratory and Blood Bank		
<b>Document:</b>	Multidisciplinary Policy and Procedure		
<b>Title:</b>	Adverse Reactions to Transfusion		
<b>Applies To:</b>	Blood Bank and Medical Staff (Physicians and Nurses) Involved in Transfusion Process		
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## 1. PURPOSE:

- 1.1 To provide advice and guidance on the clinical management of an adverse transfusion reaction to blood/ blood component.
- 1.2 To trace the causes and minimize the incidence of adverse transfusion reactions as the transfusion reactions (or the noninfectious complications of blood transfusion) are statistically the greatest risk of morbidity and mortality from transfusion.
- 1.3 To ensure that reporting of adverse transfusion reactions are forwarded to blood bank and reviewed by the Hospital Transfusion Committee.

## 2. DEFINITIONS:

- 2.1 Complications of blood transfusion include non-infectious complications (or adverse reactions) and possible blood-borne infections causing transfusion-transmitted diseases. Adverse events require interventions. Side effects of blood transfusion are usually related to the transfusion manoeuvre itself, requiring no special intervention, and spontaneously resolve with time.
- 2.2 Transfusion reaction: An adverse response to a transfusion. Transfusion reactions may be acute or delayed.
- 2.3 Acute transfusion reaction: Any recent symptoms or adverse signs during or within 24 hours of a blood transfusion which are reported after starting transfusion.
- 2.4 Delayed transfusion reaction: Any recent symptoms or adverse signs occurring after 24 hours of a blood transfusion.
- 2.5 Hemolytic transfusion reaction (HTR): A reaction from red blood cell destruction caused by patient's antibody(ies) directed to donor red blood cell antigen(s).
- 2.6 Graft-versus-host (GVH) disease: A disorder in which the grafted tissue attacks the host tissue.
- 2.7 Disseminated intravascular coagulation (DIC): Clinical condition of altered blood coagulation secondary to a variety of diseases.

## 3. POLICY:

- 3.1 Blood transfusion can be life-saving and provides great clinical benefit to many patients but it is not without risks. Acute transfusion reactions can be associated with significant morbidity and rarely with mortality.
- 3.2 Prompt recognition and management of adverse reactions are essential.
- 3.3 Transfusion reactions are reported and analyzed for preventive and corrective actions.
  - 3.3.1 Side effects, or complications are immediately reported to the medical staff and blood bank and the transfused unit is sent to the blood bank for further investigations.
  - 3.3.2 Severity and appropriate action should be assessed by the responsible medical personnel.
  - 3.3.3 All adverse transfusion reactions results are added to the patient's permanent record.
- 3.4 The process for the management of adverse transfusion events covers the following:
  - 3.4.1 Recognition and handling of adverse transfusion events.
  - 3.4.2 Reporting and monitoring of adverse transfusion events.
- 3.5 The process for management of suspected transfusion reactions includes many investigations essential for

avoiding further mistakes. The process covers the following:

- 3.5.1 Clerical check of the identification information and records.
- 3.5.2 Visual inspection of the blood product, pre and post transfusion samples.
- 3.5.3 Initial immune-hematological testing and conditions for performing additional testing (minor/major cross-match, urine analysis, biochemistry, microbial culture).
- 3.5.4 Conclusion and instructions for future transfusion.
- 3.6 Adverse transfusion reactions have to be registered in monthly report .
- 3.7 The transfusion reaction reports are reviewed by the lab and blood bank director and submitted to blood and blood products utilization committee.

#### 4. PROCEDURE:

##### 4.1 Recognition and evaluation of a suspected transfusion reaction:

- 4.1.1 It is important that physicians be aware of such risks when discussing the need for transfusion with a patient.
- 4.1.2 Furthermore, nurses and transfusionists administering components should be well aware of the signs and symptoms of a possible reaction and be prepared to take steps to mitigate the current episode as well as prevent future similar reactions when possible.
- 4.1.3 Signs and symptoms that may be indicators of a transfusion reaction include:
  - 4.1.3.1 Fever, generally defined as  $\geq 1$  °C rise in temperature above 37 °C. It is the most common sign of an acute hemolytic transfusion reaction (acute HTR or AHTR).
  - 4.1.3.2 Chills with or without rigors.
  - 4.1.3.3 Respiratory distress, including wheezing, coughing, and dyspnoea.
  - 4.1.3.4 Hyper- or hypotension.
  - 4.1.3.5 Abdominal, chest, flank, or back pain.
  - 4.1.3.6 Pain at the infusion site.
  - 4.1.3.7 Skin manifestations, including urticaria, rash, flushing, pruritus, and localized edema.
  - 4.1.3.8 Jaundice or hemoglobinuria.
  - 4.1.3.9 Nausea/vomiting.
  - 4.1.3.10 Abnormal bleeding.
  - 4.1.3.11 Oliguria/anuria.
- 4.1.4 Details of acute and delayed transfusion reaction will be discussed later.

##### 4.2 Clinical evaluation and management of transfusion reactions:

- 4.2.1 The nurse or transfusionist must treat the patient and administer supportive care at the direction of the physician as well as discontinue transfusion of the implicated component and contact the blood bank for direction in the investigation.
- 4.2.2 Most serious transfusion reactions, such as ABO incompatibility and anaphylaxis, occur within the first 15 minutes of transfusion. Therefore, a slow initial infusion rate with continuous monitoring of the patient during the early stages of a transfusion allows the reaction to be discovered in a timely manner.
- 4.2.3 The physician will evaluate the patient to determine what type of reaction has occurred.
- 4.2.4 When the nurse or transfusionist suspects an AHTR, immediate steps must be taken.
- 4.2.5 Patient-focused steps are as follows:
  - 4.2.5.1 Stop the transfusion immediately but keep the line open with saline.
  - 4.2.5.2 Document the clerical recheck between the patient and the component. The labels on the component, patient records, and patient identification must be examined to detect any identification errors.  
If a mistake is apparent, inform the blood bank immediately, as another patient may be involved in the same incident.
  - 4.2.5.3 Contact the treating physician immediately for instructions for patient care.
- 4.2.6 Component-focused steps are as follows:

- 4.2.6.1 Contact the blood bank for directions for investigations using a Blood transfusion reactions form (GDOH-LAB-BTR-325) to document all the information available for both the patient and the component. In addition, "Adverse reaction investigation form" is used to document the investigations done.
  - 4.2.6.2 Return any remaining component, associated intravenous (IV) set, and tubing.
  - 4.2.6.3 Determine appropriate samples (blood and urine) to be sent to the laboratory.
- 4.3 **Standard laboratory investigations of transfusion reactions:** When the laboratory receives notice of a possible transfusion reaction, several steps are performed by technologists:
- 4.3.1 Clerical check of the component bag, label, paperwork, and patient sample to identify the potential for an ABO incompatibility.
  - 4.3.2 Repeated ABO and Rh testing are performed on the unit of blood or available segment, pre-transfusion specimen, and post- transfusion sample to exclude any clerical errors or sample mix-ups.
  - 4.3.3 Visual check of pre- and post-transfusion sample (Comparison of the supernatant) to look for evidence of hemolysis (hemolysis may not be visible if <50 mg/dL of hemoglobin is present). Destruction of red cells and release of free hemoglobin result in a pink to red appearance of the supernatant. Detectable hemoglobinemia may result from hemolysis of only 2.5 to 5 mL of red cells.
  - 4.3.4 Pre- and post-transfusion sample direct antiglobulin test (DAT). In most cases where the pre-transfusion DAT is negative, a positive DAT after transfusion indicates the presence of remaining incompatible red cells. Sometimes, hemolysis is brisk; destroying all of the transfused red cells, and the post-transfusion DAT is negative.
  - 4.3.5 The crossmatch is repeated with both pre- and post-transfusion specimens using the indirect antiglobulin test (IAT) method.
  - 4.3.6 Examination of the returned components may yield important information concerning possible traumatic or mechanical causes of hemolysis. Both the blood bag and the administration tubing should be included in the examination. Hemolysis in both the component container and administration set could result from a process that affected the unit of blood, such as inappropriate warming of the unit. If the hemolysis was present only in the administration set, a faulty infusion pump, if used, could be the cause.
  - 4.3.7 Visual examination of the returned component is conducted in suspected cases of post-transfusion sepsis, paying particular attention to any color changes, especially brown or purple discoloration in a red cell component, and bubbles, especially frothiness in a platelet component. A Gram's stain should be performed on the returned component, and cultures should be performed on both the component and the patient's post- transfusion blood sample (as applicable).
  - 4.3.8 Using "Adverse reaction investigation form", findings are reported to blood bank supervisor or blood bank physician, who may request additional studies or tests.
  - 4.3.9 The patient may be evaluated by serial measurement of certain laboratory values such as haptoglobin, lactate dehydrogenase (LDH), and unconjugated bilirubin levels. An increase in bilirubin may begin as early as 1 hour after the reaction, peak at 4 to 6 hours, and disappear within 24 hours if liver function is normal.
  - 4.3.10 CBC, urine analysis, coagulation screen, Urea, creatinine, electrolytes.
  - 4.3.11 The tubes of samples vary according to the desired tests; for DAT, crossmatch, and blood group: violet tube and red tube, for chemistry: green tube, for CBC: violet tube, and for coagulation tests: blue tube.
  - 4.3.12 The results must be well interpreted and the cause should be concluded.
  - 4.3.13 Additional units of blood or blood components are not issued until reaction workup is complete with the conclusion and instructions for future transfusion. In an emergency situation, after consultation with senior blood bank staff, further blood components may be released.
  - 4.3.14 All adverse transfusion reactions results are added to the patient's permanent record and reported to, reviewed by and discussed with blood bank medical doctor, lab Director, patient's physician and blood utilization committee.
  - 4.3.15 Finally, The blood bank retains any patient records that are related to transfusion reactions.
- 4.4 **Categories and management of adverse transfusion reactions:**

- 4.4.1 Acute (<24 hours) transfusion reactions — immunologic:
  - 4.4.1.1 Hemolytic (Acute intravascular hemolytic reaction):
    - 4.4.1.1.1 Incidence: ABO/Rh mismatch; 1:40000. –AHTR; 1:76000 -Fatal HTRs: 1:1.8 million.
    - 4.4.1.1.2 Etiology:
      - 4.4.1.1.2.1 Red cell incompatibility (It occurs within minutes of start of transfusion).
    - 4.4.1.1.3 Presentation:
      - 4.4.1.1.3.1 Chills, fever, hemoglobinuria, hypotension, renal failure with oliguria, DIC (oozing from IV sites), back pain, pain along infusion vein, anxiety.
    - 4.4.1.1.4 Diagnostic Testing:
      - 4.4.1.1.4.1 Clerical check
      - 4.4.1.1.4.2 DAT
      - 4.4.1.1.4.3 Visual inspection (free HB)
      - 4.4.1.1.4.4 Repeat patient ABO, pre- and post-transfusion sample
      - 4.4.1.1.4.5 Further tests as indicated to define possible incompatibility
      - 4.4.1.1.4.6 Further tests as indicated to detect hemolysis (LDH, bilirubin, etc).
    - 4.4.1.1.5 Therapeutic/Prophylactic Approach:
      - 4.4.1.1.5.1 Keep urine output; >1 mL/kg/hr with fluids and IV diuretic (furosemide).
      - 4.4.1.1.5.2 Analgesics (may need morphine).
      - 4.4.1.1.5.3 Pressors for hypotension (low-dose dopamine).
      - 4.4.1.1.5.4 Hemostatic components (platelets, cryoprecipitate, FFP) for bleeding.
  - 4.4.1.2 Febrile, non-hemolytic:
    - 4.4.1.2.1 Incidence: 0.1%-1% with universal leukocyte reduction
    - 4.4.1.2.2 Etiology:
      - 4.4.1.2.2.1 Accumulated cytokines in unit.
      - 4.4.1.2.2.2 Antibody to donor white cells.
    - 4.4.1.2.3 Presentation:
      - 4.4.1.2.3.1 Fever, chills/rigors, headache, vomiting.
    - 4.4.1.2.4 Diagnostic Testing:
      - 4.4.1.2.4.1 Rule out hemolysis (DAT, inspect for hemoglobinemia, repeat patient ABO).
      - 4.4.1.2.4.2 Rule out bacterial contamination.
      - 4.4.1.2.4.3 White cell antibody screen (as applicable)
    - 4.4.1.2.5 Therapeutic/Prophylactic Approach:
      - 4.4.1.2.5.1 Leukocyte-reduced components.
      - 4.4.1.2.5.2 Antipyretic premedication (acetaminophen, no aspirin).
  - 4.4.1.3 Urticarial:
    - 4.4.1.3.1 Incidence: 1%-3%.
    - 4.4.1.3.2 Etiology:
      - 4.4.1.3.2.1 Antibody to donor plasma proteins.
    - 4.4.1.3.3 Presentation:
      - 4.4.1.3.3.1 Urticaria, pruritus, flushing
    - 4.4.1.3.4 Diagnostic Testing:
      - 4.4.1.3.4.1 Rule out hemolysis (DAT, inspect for hemoglobinemia, repeat patient ABO)
    - 4.4.1.3.5 Therapeutic/Prophylactic Approach:

- 4.4.1.3.5.1 Antihistamine, treatment or premedication (PO or IV).
- 4.4.1.3.5.2 May restart unit slowly after antihistamine if symptoms resolve.
- 4.4.1.4 Anaphylactic:
  - 4.4.1.4.1 Incidence: 1:20,000- 1:50,000.
  - 4.4.1.4.2 Etiology:
    - 4.4.1.4.2.1 Antibody to donor plasma proteins (includes IgA, haptoglobin, C4).
    - 4.4.1.4.2.2 Cytokines
  - 4.4.1.4.3 Presentation:
    - 4.4.1.4.3.1 Hypotension, urticaria, bronchospasm (respiratory distress, wheezing), local edema, anxiety
  - 4.4.1.4.4 Diagnostic Testing:
    - 4.4.1.4.4.1 Rule out hemolysis (DAT, inspect for hemoglobinemia, repeat patient ABO).
    - 4.4.1.4.4.2 Anti-IgA. -IgA, quantitative (as applicable).
  - 4.4.1.4.5 Therapeutic/Prophylactic Approach:
    - 4.4.1.4.5.1 Trendelenberg (feet up) position.
    - 4.4.1.4.5.2 Fluids
    - 4.4.1.4.2.3 Epinephrine (adult dose: 0.2-0.5 mL of 1:1000 solution SC or IM; in severe cases, 1:10,000 IV, initial rate 1 µg/min).
    - 4.4.1.4.2.4 Antihistamines, corticosteroids, beta-2 agonists.
    - 4.4.1.4.2.5 IgA-deficient components.
- 4.4.1.5 Transfusion- related acute lung injury (TRALI):
  - 4.4.1.5.1 Incidence: 1:1,200-1:190,000.
  - 4.4.1.5.2 Etiology:
    - 4.4.1.5.2.1 WBC or HLA antibodies in donor (occasionally in recipient).
    - 4.4.1.5.2.2 Other WBC-activating agents in components.
  - 4.4.1.5.3 Presentation:
    - 4.4.1.5.3.1 Hypoxemia, respiratory failure, hypotension, fever, bilateral pulmonary edema.
  - 4.4.1.5.4 Diagnostic Testing:
    - 4.4.1.5.4.1 Rule out hemolysis (DAT, inspect for hemoglobinemia, repeat patient ABO).
    - 4.4.1.5.4.2 Rule out cardiogenic pulmonary edema.
    - 4.4.1.5.4.3 WBC antibody screen (according to availability) in donor and recipient. If positive, antigen typing may be indicated.
    - 4.4.1.5.4.4 WBC crossmatch (according to availability)
    - 4.4.1.5.4.5 Chest x-ray
  - 4.4.1.5.5 Therapeutic/Prophylactic Approach:
    - 4.4.1.5.5.1 Supportive care until recovery.
    - 4.4.1.5.5.2 Defer implicated donors
- 4.4.2 Acute (<24 hours) transfusion reactions — non-immunologic:
  - 4.4.2.1 Transfusion- associated sepsis:
    - 4.4.2.1.1 Incidence: Varies by component
    - 4.4.2.1.2 Etiology:
      - 4.4.2.1.2.1 Bacterial contamination.
    - 4.4.2.1.3 Presentation:
      - 4.4.2.1.3.1 Fever, chills, hypotension
    - 4.4.2.1.4 Diagnostic Testing:
      - 4.4.2.1.4.1 Gram's stain.
      - 4.4.2.1.4.2 Component culture
      - 4.4.2.1.4.3 Patient culture
      - 4.4.2.1.4.4 Rule out hemolysis (DAT, inspect for hemoglobinemia, repeat



- 4.4.2.5.3.1 Sudden shortness of breath, acute cyanosis, pain, cough, hypotension, cardiac arrhythmia.
  - 4.4.2.5.4 Diagnostic Testing:
    - 4.4.2.5.4.1 X-ray for intravascular air:
  - 4.4.2.5.5 Therapeutic/Prophylactic Approach:
    - 4.4.2.5.5.1 Place patient on left side with legs elevated above chest and head.
- 4.4.2.6 Hypocalcemia (ionized calcium/citrate toxicity):
  - 4.4.2.6.1 Incidence: Dependent on clinical setting.
  - 4.4.2.6.2 Etiology:
    - 4.4.2.6.2.1 Rapid citrate infusion (massive transfusion of citrated blood, delayed metabolism of citrate, apheresis procedures).
  - 4.4.2.6.3 Presentation:
    - 4.4.2.6.3.1 Paresthesia, tetany, arrhythmia.
  - 4.4.2.6.4 Diagnostic Testing:
    - 4.4.2.6.4.1 Ionized calcium.
    - 4.4.2.6.4.2 Prolonged Q-T interval on electrocardiogram
  - 4.4.2.6.5 Therapeutic/Prophylactic Approach:
    - 4.4.2.6.5.1 PO calcium supplement for mild symptoms during therapeutic apheresis procedures.
    - 4.4.2.6.5.2 Slow calcium infusion while monitoring ionized calcium levels in severe cases.
- 4.4.2.7 Hypothermia:
  - 4.4.2.7.1 Incidence: Dependent on clinical setting.
  - 4.4.2.7.2 Etiology:
    - 4.4.2.7.2.1 Rapid infusion of cold blood.
  - 4.4.2.7.3 Presentation:
    - 4.4.2.7.3.1 Cardiac arrhythmia.
  - 4.4.2.7.4 Diagnostic Testing:
    - 4.4.2.7.4.1 Central body temperature.
  - 4.4.2.7.5 Therapeutic/Prophylactic Approach:
    - 4.4.2.7.5.1 Use blood warmer.
- 4.4.3 Delayed (>24 hours) transfusion reactions — immunologic:
  - 4.4.3.1 Alloimmunization, RBC antigens:
    - 4.4.3.1.1 Incidence: 1%
    - 4.4.3.1.2 Etiology:
      - 4.4.3.1.2.1 Immune response to foreign antigens on RBCs.
    - 4.4.3.1.3 Presentation:
      - 4.4.3.1.3.1 Positive antibody screening test.
    - 4.4.3.1.4 Diagnostic Testing:
      - 4.4.3.1.4.1 - Antibody screen & DAT
    - 4.4.3.1.5 Therapeutic/Prophylactic Approach:
      - 4.4.3.1.5.1 Avoid unnecessary transfusions.
      - 4.4.3.1.5.2 Identify antibody
      - 4.4.3.1.5.3 Transfuse compatible red cells as needed.
  - 4.4.3.2 Alloimmunization, HLA antigens
    - 4.4.3.2.1 Incidence: 10%
    - 4.4.3.2.2 Etiology:
      - 4.4.3.2.2.1 WBCs and platelets (HLA)
    - 4.4.3.2.3 Presentation:
      - 4.4.3.2.3.1 Platelet refractoriness
    - 4.4.3.2.4 Diagnostic Testing:

- 4.4.3.2.4.1 Platelet antibody screen (according to availability).
- 4.4.3.2.4.2 Lymphocytotoxicity test (according to availability).
- 4.4.3.2.5 Therapeutic/Prophylactic Approach:
  - 4.4.3.2.5.1 Avoid unnecessary transfusions.
  - 4.4.3.2.5.2 Give leukocyte- reduced blood.
- 4.4.3.3 Hemolytic:
  - 4.4.3.3.1 Incidence: 1:2500-11,000
  - 4.4.3.3.2 Etiology:
    - 4.4.3.3.2.1 Anamnestic immune response to red cell antigens
  - 4.4.3.3.3 Presentation:
    - 4.4.3.3.3.1 Fever, decreasing hemoglobin, new positive antibody screening test, mild jaundice.
  - 4.4.3.3.4 Diagnostic Testing:
    - 4.4.3.3.4.1 Antibody screen - DAT.
    - 4.4.3.3.4.2 Tests for hemolysis (visual inspection for hemoglobinemia, LDH, bilirubin, urinary hemosiderin as clinically indicated).
  - 4.4.3.3.5 Therapeutic/Prophylactic Approach:
    - 4.4.3.3.5.1 Identify antibody.
    - 4.4.3.3.5.2 Transfuse compatible red cells as needed.
- 4.4.3.4 Graft versus host disease (GVHD):
  - 4.4.3.4.1 Incidence: Rare.
  - 4.4.3.4.2 Etiology:
    - 4.4.3.4.2.1 Donor lymphocytes engraft in recipient and mount attack on host tissues.
  - 4.4.3.4.3 Presentation:
    - 4.4.3.4.3.1 Erythroderma, maculopapular rash, anorexia, nausea, vomiting, diarrhea, hepatitis, pancytopenia, fever.
  - 4.4.3.4.4 Diagnostic Testing:
    - 4.4.3.4.4.1 Skin biopsy (according to availability)
    - 4.4.3.4.4.2 HLA typing
    - 4.4.3.4.4.3 Molecular analysis for chimerism
  - 4.4.3.4.5 Therapeutic/Prophylactic Approach:
    - 4.4.3.4.5.1 Corticosteroids, cytotoxic agents.
    - 4.4.3.4.5.2 Irradiation of blood components for patients at risk (including related donors and HLA- selected components).
- 4.4.3.5 Post-transfusion purpura:
  - 4.4.3.5.1 Incidence: Rare.
  - 4.4.3.5.2 Etiology:
    - 4.4.3.5.2.1 Recipient platelet antibodies (apparent alloantibody, usually anti-HPA-1) destroy autologous platelets.
  - 4.4.3.5.3 Presentation:
    - 4.4.3.5.3.1 Thrombocytopenic purpura, bleeding, 8-10 days after transfusion
  - 4.4.3.5.4 Diagnostic Testing:
    - 4.4.3.5.4.1 Platelet antibody screen and identification (according to availability).
  - 4.4.3.5.5 Therapeutic/Prophylactic Approach:
    - 4.4.3.5.5.1 IVIG
    - 4.4.3.5.5.2 HPA-1-negative platelets
    - 4.4.3.5.5.3 Plasmapheresis
- 4.4.4 Delayed (>24 hours) transfusion reactions – non-immunologic:
  - 4.4.4.1 Iron overload:
    - 4.4.4.1.1 Incidence: Typically after >100 RBC units.
    - 4.4.4.1.2 Etiology:

- 4.4.4.1.2.1 Multiple transfusions with obligate iron load in transfusion-dependent patient.
- 4.4.4.1.3 Presentation:
  - 4.4.4.1.3.1 Diabetes, cirrhosis, cardiomyopathy.
- 4.4.4.1.4 Diagnostic Testing:
  - 4.4.4.1.4.1 Serum ferritin
  - 4.4.4.1.4.2 Liver enzymes
  - 4.4.4.1.4.3 Endocrine function tests
- 4.4.4.1.5 Therapeutic/Prophylactic Approach:
  - 4.4.4.1.5.1 Iron chelators
- 4.5 **Post-transfusion infection and transfusion-transmitted diseases:**
  - 4.5.1 Refer to "Investigation Of Suspected Cases Of Post-Transfusion Infection And Lookback " chapter (LB-MPP-246).
- 4.6 **Side effects of blood transfusion process:**
  - 4.6.1 They are usually related to the transfusion manoeuvre itself. They usually require no special intervention. Most side effects resolve spontaneously with the time.
  - 4.6.2 The patient may have some bruising or soreness for a few days at the site where the IV line was inserted but this should go away in a few days.
  - 4.6.3 If unexpected or unexplained bruising was noticed later after transfusion, the patient must seek medical advice preferably the ward or department where he had the blood transfusion.
- 4.7 **Complications of blood transfusion:**
  - 4.7.1 Complications of blood transfusion are rare to some extent but can be life-threatening.
  - 4.7.2 They vary widely regarding the onset, severity, and fatality.
  - 4.7.3 Transfusion-related acute lung injury (TRALI): could be considered the most common cause of major morbidity and death after transfusion.
  - 4.7.4 They include:
    - 4.7.4.1 Early complications:
      - 4.7.4.1.1 Circulatory overload (Hypervolemia).
      - 4.7.4.1.2 Air embolism
      - 4.7.4.1.3 Thrombophlebitis.
      - 4.7.4.1.4 Hyperkalaemia.
      - 4.7.4.1.5 Citrate toxicity and Hypocalcemia.
      - 4.7.4.1.6 Hypothermia.
      - 4.7.4.1.7 Coagulation abnormalities (after massive transfusion).
    - 4.7.4.2 Late complications:
      - 4.7.4.2.1 Transmission of infection: for example;
        - 4.7.4.2.1.1 Viral (hepatitis A, B, C, HIV, CMV)
        - 4.7.4.2.1.2 Bacterial (*Treponem pallidum*, *Salmonella*)
        - 4.7.4.2.1.3 Parasites (malaria, toxoplasma)
      - 4.7.4.2.2 Graft-vs-host disease
      - 4.7.4.2.3 Iron overload (after chronic transfusions)
      - 4.7.4.2.4 Immune sensitization (Rhesus D antigen)
- 4.8 **Notes & interpretation:**
  - 4.8.1 Acute or immediate transfusion reactions occur within 24 hours of the administration of a component and often during the transfusion itself.
  - 4.8.2 Rapid hemolysis of as little as 10 mL of incompatible blood can produce symptoms of an AHTR. The most common presenting symptom is fever with or without accompanying chills or rigors.
  - 4.8.3 The rate and magnitude of bilirubin rise are very variable. Rising bilirubin may be detectable as early as one-hour post transfusion reaction. Peak levels occur at 4-6 hours and disappear within 24hours if bilirubin excretion is normal.
  - 4.8.4 Red or dark urine may be the first sign of intravascular hemolysis, particularly in the anesthetized or

- unconscious patient, who may also present with oliguria, or, rarely, DIC. The severity of symptoms of this reaction is related to the amount of incompatible blood transfused.
- 4.8.5 Fever, particularly  $>38.5^{\circ}\text{C}$ , and shaking chills and hypotension, during or shortly after transfusion, are the most frequent presenting symptoms in transfusion-related sepsis.
  - 4.8.6 The key to diagnosing transfusion-related sepsis is culturing the same organism from both the patient and the remainder of the component.
  - 4.8.7 In massive transfusion, cooling of the core body temperature occurs if a blood warmer is not used.
  - 4.8.8 In Allergic (severe) or febrile non hemolytic reaction, avoid future reactions by using washed red blood cells or other specifically prepared components. Premedicate if indicated.
  - 4.8.9 Signs and symptoms suggestive of mild allergic reactions (eg, urticaria) need not be reported to the blood bank.
  - 4.8.10 Periodic in- service education is given to clinical personnel.
  - 4.8.11 Urgently notify the patient's physician (panic value measures) in any of following during investigation of a transfusion reaction:
    - 4.8.11.1 Positive Coombs test.
    - 4.8.11.2 Visible unexplained hemolysis in post-transfusion reaction patient sample.
    - 4.8.11.3 New incompatible crossmatch of transfused product.
    - 4.8.11.4 Presence of positive gram stain or culture of implicated blood component (if microbial testing was done).

## **5. MATERIALS AND EQUIPMENT:**

### **5.1 Forms and records:**

- 5.1.1 Blood transfusion reactions form (GDOH-LAB-BTR-325).
- 5.1.2 Adverse reaction investigation form and file.

## **6. RESPONSIBILITIES:**







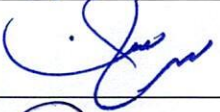


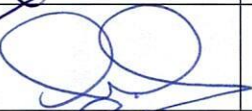
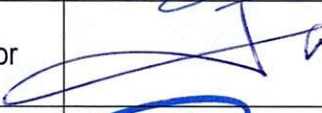
- 6.1 It is the responsibility of blood bank staff for the investigation and reporting of transfusion reaction or other incident related to transfusion.
- 6.2 It is the responsibility of the blood bank supervisor to prepare the monthly report of adverse transfusion reactions to be reviewed by blood bank physician and submitted to lab and blood bank director.
- 6.3 It is the responsibility of blood bank physician to represent the report in blood and blood products utilization committee meetings .
- 6.4 The treating physician has to administrate the transfusion process and manage possible transfusion reactions. He/she ensures adequate documentation of blood transfusion and adverse reactions in the medical records.
- 6.5 The departmental nurse has to follow the policy and procedure concerning the management of adverse transfusion reactions.
- 6.6 Blood utilization committee: refer to "Administration Of Blood Products" chapter.

## **7. APPENDICES:**

- 7.1 N/A

## **8. REFERENCES:**

- 8.1 The Unified Practical Procedure Manual For Blood Banks In The Arab Countries, 1434-2013.
- 8.2 The Standard Policy For Blood Banks In The Kingdom Of Saudi Arabia, 1st edition, 1435-2014.
- 8.3 National Standards For Clinical laboratories and Blood Banks, 1st edition, 2015.
- 8.4 AABB Technical manual, 18th edition, 2014.
- 8.5 AABB Standards for Blood Banks and Transfusion Services, 30th edition, 2016.
- 8.6 Mollison's Blood Transfusion in Clinical Medicine; 12th edition, 2014.

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