

TRANSFUSION SERVICE GUIDELINES
UNITED BLOOD SERVICES

Purpose

In order to provide the safest blood components for patients, Blood Systems (BSI) has established the following guidelines for pretransfusion testing and related services.

The Transfusion Service of United Blood Services (center location) is an FDA registered and AABB and CLIA certified laboratory that provides suitable blood components for transfusion. The laboratory performs compatibility testing and related serological testing procedures in accordance with the current version of the AABB Standards for Blood Banks and Transfusion Services.

CLIA Number:

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Hours of Operation

Normal hours of operation for the Transfusion Service are: .

Delivery service is available 7 days a week, 24 hours a day.

Turn Around Time (TAT)

- Requests for pretransfusion testing should be received at the Transfusion Service as soon as possible, but no later than 24 hours, after collection of the specimen.
 - Components issued by the Transfusion Service for transfusion are delivered to the Facility at the time requested, unless other arrangements are made by the Facility.
 - STAT services are only available upon mutual agreement, and as defined in Transfusion Service procedures.
 - Refer to Emergency Requirement for Blood on page 19-21 of this document.
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**Contact
Information**

Transfusion Service

- Supervisor:
- Manager:
- Laboratory Phone:
- Fax Number:
- Director of Technical Services:
- Medical Director:
- Hospital Services:
- Courier:

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Definitions

Transfusion Service: The laboratory at _____ that performs pretransfusion testing, prepares and provides compatible blood components for patient transfusion.

Blood Supplier: United Blood Services (UBS): the Blood Center that collects and delivers blood components to the Transfusion Service.

Transfusion Facility: The Transfusion Administration “Facility” is the entity and/or individuals responsible for the administration of blood components to the patient.

Must: the word is used in this document to indicate a mandatory statement.

Should: the word is used in this document to indicate a recommendation.

General Requirements

These Guidelines are based on the AABB Standards for Blood Banks and Transfusion Services. A Transfusion Facility should have policies and procedures related to blood transfusions that are in compliance with these Standards. They should also meet Federal and CLIA requirements.

- **Positive patient identification** is the most critical control point to ensure a safe transfusion.
 - A Facility wristband containing patient's name and unique Facility ID number must be placed on the patient prior to specimen collection and must remain on the patient until completion of the transfusion.
 - A Blood Bank wristband may also be used as a part of the identification process and placed on any patient receiving a transfusion.
 - Expiration date for use of this wristband is normally three (3) days from the date of specimen collection.
 - Patient specimens must be labeled at the bedside immediately after collection.
 - The patient's name, Facility ID number and Blood Bank wristband ID number, if used must be identical on the wristbands, specimen label, and TRANSFUSION REQUEST FORM. **Samples that do not meet this requirement are rejected.** The Transfusion Facility will be notified as soon as possible if this situation occurs.
 - Two individuals must confirm identification of donor unit and patient information at the time of component issue and at the time of transfusion.
 - The patient's name, Facility ID number and Blood Bank ID number, if used, must be identical on the wristbands attached to the patient and the DONOR UNIT TAG attached to the unit of blood.
 - The DONOR UNIT TAG must remain attached to the donor unit until completion of the transfusion.
 - A **physician order** and patient signed **Consent Form** must be present in the patient's chart prior to beginning the transfusion.
 - All records must be completed (or computer generated) in **indelible ink**, including the specimen label.
 - Any record relating to compatibility testing and transfusion processes, including administration must be maintained **a minimum of 10 years** from the last day of contact.
 - Should the Facility change management, access to the records must be maintained, in order to identify the appropriate information needed in retrospective recipient notification efforts, such as an HIV Lookback case.
 - UBS provides copies of the Circular of Information For The Use Of Human Blood And Blood Components (**Circular**).
 - The Circular should be distributed annually or when revised to physicians that practice at the Facility.
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Transfusion Facility Responsibilities

The Transfusion Facility is responsible for developing and maintaining policies, processes and validated SOPs that provide instructions for transfusion activities performed at the site.

- Obtaining informed consent and the associated form
 - Collection and recollection of samples
 - Providing patient information and medical history when requested by the Transfusion Service, to resolve serological problems prior to transfusion
 - Administration of blood products
 - Confirming identity of the documents attached to each blood unit and patient identity prior to transfusion
 - Medical supervision of the transfusion administration process
 - Equipment maintenance
 - Emergency release that aligns with emergency services provided by the Transfusion Service
 - Appropriate handling of blood components
 - Evaluating and approving deviations from SOP
 - Recognition and reporting of adverse reactions
 - Reporting adverse events, biological product deviations, and transfusion-related fatalities to the FDA/CBER
 - Reporting of post transfusion infectious diseases, including physician/patient notification and a 'Lookback' procedure
 - Management of Recall or Withdrawal notices
 - Component transport within the Facility
 - Component storage with provisions for isolation/quarantine of unsuitable components if units are removed from the Transfusion Service Transport Container
 - Provision of a quality system description, policy or procedure
 - Description of quality indicator data collection
 - Description of blood product utilization review and annual review process
 - Notification to BSI of major changes to procedures and policies
 - Staff training and competency assessment
-

**Request for
Transfusion**

Complete the UBS supplied TRANSFUSION REQUEST FORM.

- **Bolded** information is required for acceptance of patient specimen and REQUEST FORM.

Requested patient information

- **Recipient name (first and last)**
 - **Unique patient ID number (Facility wristband identification band)**
 - **Blood Bank ID number (Blood Bank wristband identification band), if used by the Transfusion Service**
 - Date of birth (can call Facility and obtain if missing)
 - Gender
 - **Requesting physician**
 - **Requesting Facility, contact name and phone number**
 - **Date of request**
 - Reasons for request: Diagnosis, Pre-Op
 - **Date and time components are needed**
 - **Phlebotomist's ID**
 - **Blood component(s) requested, including any special needs (e.g., irradiated)**
-

Type and Screen Procedure

The **Type and Screen Procedure** is performed to provide a current blood type and antibody screen for a patient when transfusion may not be required for a surgical procedure. If there are no unexpected antibodies identified, the specimen is stored in the Transfusion Service for future crossmatching if a unit is needed for transfusion.

- If transfusion becomes necessary, ABO/Rh compatible blood can be safely released after immediate spin (IS) or computer crossmatch tests provided the antibody screen is negative and there is no history of clinically significant antibodies.

IS and computer crossmatch tests are performed to confirm ABO compatibility of the red cell components.

Patient blood specimen is tested for:

- ABO Group
- Rh Type
- Antibody detection of unexpected antibodies

Antibody identification testing is performed for any positive antibody screen detected in initial testing.

- The Transfusion Service contacts the Transfusion Facility to determine the total number of components that may be required. These units should be crossmatched prior to an identified need.
-

Specimen Collection

Collect specimens after appropriate identification of the patient from wristband(s) attached to the patient.

- Blood Bank ID wristbands, if used, are supplied by the Transfusion Service for use by the Facility.

Step	Action
1	Place wristband identification bracelets on patient: <ul style="list-style-type: none">▪ Facility ID wristband▪ Blood Bank ID wristband, if used
2	<ul style="list-style-type: none">▪ Facility wristband must contain:<ul style="list-style-type: none">▪ Patient's name (first and last)▪ Unique patient Facility identification number▪ Blood Bank wristband, if used, must contain:<ul style="list-style-type: none">▪ Unique Blood Bank identification number▪ Date placed on the patient
3	Collect _____ mL EDTA anticoagulant tube(s). <ul style="list-style-type: none">▪ Fill tube(s) completely. <p>NOTE: If patient has a history of antibodies to red cell antigens, collect additional tubes.</p>
4	Specimen may be used for testing up to 3 days after collection. <ul style="list-style-type: none">▪ Day of collection is day zero▪ A new sample is required if additional testing is requested after the specimen has expired.

Specimen Labeling

Each sample tube **must** contain the following information:

- Patient name (first and last)
- Unique patient Facility ID number
- Blood Bank ID number, if used
- Date sample collected
- Initials of phlebotomist (if missing, may be obtained via phone call)

Specimen Transport

Specimens accompanied by the TRANSFUSION REQUEST FORM, must arrive at the Transfusion Service as soon as possible, but no later than 24 hours, after collection of the specimen if compatibility testing is to be performed.

Step	Action
1	Package and ship samples appropriately.
2	Place a biohazard label on the outside of the shipping container, if not already present.
3	Contact a courier service or UBS Hospital Service Representative (if service is available in your area) to deliver the container to the Transfusion Service.

**Specimen
and Request
Acceptability
Criteria**

The following conditions require a new specimen and REQUEST FORMS:

- Incomplete or illegible requests
- Any discrepancy between required information on the blood specimen labels and/or REQUEST FORMS
- Missing specimen label information
- Refer to Specimen Labeling on page 12 of this document.
- Returning the wristband identification bracelets with the specimen and REQUEST FORMS
- Specimen is grossly hemolyzed
- A discrepancy between current patient blood type and historical blood type, unless recipient has received allogeneic Hematopoietic or Progenitor cell transplant during the interim time period that causes the discrepancy
- Specimen is received beyond 24 hours of collection

In these situations, the original specimen will be destroyed, and the Facility contacted to provide a new sample and REQUEST FORM.

Evaluation of Requests

Each request for transfusion of blood components is reviewed against defined criteria.

- Orders requiring further review are referred to the Transfusion Service Medical Director or designee **prior** to completing the order and issuing blood.

Criteria prompting further investigation for non-acute care Facilities:

Criteria	Component
Number of components exceed maximum for infusion in a given period of time	Red Cells: > 3 within 24 hours
	Platelets: > 1 single donor platelet pheresis unit or whole blood derived platelet pool within 24 hours
	Any combination of components that results in an infusion volume > 1,000 mL in 24 hours.
Component is not a packed red cell, or platelet	Plasma
	Cryoprecipitated AHF or Pooled Cryoprecipitated AHF
	Granulocyte Concentrate
	Whole Blood
Albumin, IVIG	
Recipient is a pediatric patient, with a blood volume < 4L	All components
Special Components or Current Order of special components is inconsistent with historical records	Special transfusion needs <ul style="list-style-type: none"> ▪ Irradiated ▪ CMV negative ▪ Washed components ▪ Hgb S negative ▪ Volume reduce components ▪ Fresh red cell units ▪ Latex free

NOTE: Red cells are provided as leukocytes reduced.

Pretransfusion Testing

All requests require a comparison of current order with previous historical records.

For recipients with current or historical serological problems, a delay in the provision of blood products may occur.

- Transfusion Service staff contacts the Transfusion Facility and advises accordingly.
- Additional patient samples may be needed.

Required recipient testing depends on ordered component:

Component	Required Test
Red Blood Cells	<ul style="list-style-type: none">▪ ABO Group determination▪ Rh Type determination▪ Antibody detection▪ Antibody identification, if required▪ Crossmatch of each donor unit▪ Confirmation of donor red cell ABO/Rh Type
Autologous Red Blood Cells	<ul style="list-style-type: none">▪ ABO/Rh determination▪ Additional ID of donor unit/recipient is required (e.g., date of birth or unique patient identification number)▪ Confirmation of donor red cell ABO/Rh determination
Plasma Containing Components (plasma, platelets and cryoprecipitate [AHF])	<ul style="list-style-type: none">▪ ABO/Rh determination

**Compatible
Blood
Components for
Transfusion**

The following tables, defined by type of component, show the appropriate donor unit ABO Group and Rh type that will be compatible with the patient/recipient:

RED BLOOD CELLS: See Rh Requirement

Component Requested	Recipient's ABO Group	Component ABO Group
Whole Blood	O, A, B, AB	ABO Identical
Red Blood Cells	O	O
	A	A or O
	B	B or O
	AB	AB, A, B, or O

FROZEN PLASMA: No Rh Requirement

Recipient's ABO Group	Component ABO Group
O	O, A, B, or AB
A	A or AB
B	B or AB
AB	AB

PLATELETS: See Rh Requirement

Recipient's ABO Group	Component ABO Group*
O	O, A, B, or AB
A	A or AB
B	B or AB
AB	AB

***NOTES:**

- If ABO group compatible platelets are not available, any group can be given to a patient > 2 years of age.
- ABO compatible products should be provided for chronically transfused patients and patients < 2 years of age.

CRYOPRECIPITATE: No ABO/Rh specific criteria required for this component.

Rh (D type) REQUIREMENTS:

Recipient Rh Type	Red Cell Component Rh Type	Platelet Component Rh Type
D Positive	D Positive or Negative	D Positive or Negative
D Negative	D Negative	D Negative Preferred

NOTE: For female children or women of child bearing age Rh type compatible should be provided whenever possible. RhIG therapy should be considered for Rh Negative females receiving Rh Positive red cell and/or platelet products.

Critical Results (Panic Values)

Definition: **Critical results** (also known as alert or panic values), are laboratory results that indicate a possible life-threatening situation for the patient.

- The critical values listed below have been approved by BSI Medical Directors.

When a critical value has been obtained (and verified as critical), the Transfusion Service is responsible notifying the Transfusion Facility head nurse or requesting physician immediately.

- If the Transfusion Facility is closed Transfusion Service staff attempts to contact the physician or the person designated as being on-call for the physician.
- If this cannot be done, the Transfusion Service staff notifies the Medical Director.

Critical Results (Panic Values):

- A transfusion reaction investigation that suggests any evidence of immunohematologic incompatibility, clerical error, blood administration error or sample collection error
 - Incompatible crossmatch completed after emergency release of uncrossmatched red cells
 - Evidence of a delayed hemolytic transfusion reaction
 - Evidence of a transfusion error
 - ABO discrepancy of current type and screen specimen with previous record
 - Positive antibody screen causing a potential delay
 - Unavailable blood components
 - Unavailable compatible blood components
-

**Donor Unit
Tag**

- Each component provided by the Transfusion Service has the Donor Unit Tag attached to the donor unit bag.
 - At time of issue information on the donor unit label is compared to information on the attached Donor Unit Tag.
 - **The information must match.**
 - Immediately prior to transfusion, two individuals must confirm the information on the donor unit label, the Donor Unit Tag, the patient's **Facility ID wristband and the Blood Bank wristband, if used**, to ensure all information matches.
 - If the information does not match, the Facility must contact the Transfusion Service and return the unit for appropriate resolution of the problem.
 - The Donor Unit Tag **must** remain attached to the donor unit until completion of the transfusion.
 - Upon completion of transfusion, Transfusion Facility personnel must complete the Donor Unit Tag and place the top portion in the patient's chart.
 - Properly discard the empty blood product bag and tubing in a biohazard container.
 - Return the bottom portion to the Transfusion Service to provide documentation of unit disposition.
 - On the reverse of the Donor Unit Tag are instructions for what to do should the patient develop symptoms of an adverse reaction. Refer to Signs and Symptoms of Transfusion Reactions later in these Guidelines.
-

Emergency Requirement for Blood: Storage Option

For Facilities that maintain appropriate blood component storage equipment (Hospitals), the Transfusion Service can supply O Negative red cells labeled as Emergency Issue, Uncrossmatched.

- O Positive red cells may be supplied, depending on availability.
- Antibody positive O Negative units may be used for this purpose.
- Other components can also be supplied, as needed, with the exception of Whole Blood or Granulocyte Concentrates.

The RBC units are for emergency use, only, and must be handled according to the process below.

- A RELEASE OF UNCROSSMATCHED/INCOMPATIBLE BLOOD UNITS form must be completed for use of these units.

Process for using Emergency Issue, Uncrossmatched units:

Step	Action
1	Physician determines that emergency situation requires the use of uncrossmatched RBC units, (or other components).
2	Facility personnel complete the Emergency Transfusion Request Form and obtain physician signature. <ul style="list-style-type: none">▪ Patient's specimen should be collected and labeled appropriately prior to transfusion of blood components.
3	Fax the form to the Transfusion Service at FAX number: <ul style="list-style-type: none">▪ Make a copy for Facility documentation.
4	Send original form, _____ mL EDTA patient sample(s) which is properly labeled, and TRANSFUSION REQUEST FORM to the Transfusion Service as quickly as possible.
5	Transfuse red cells according to normal practice.
6	When compatibility testing is completed by the Transfusion Service, a Donor Unit Tag is sent to the Transfusion Facility. <ul style="list-style-type: none">▪ Place the completed copy of Donor Unit Tag with the copy of the RELEASE OF UNCROSSMATCHED/INCOMPATIBLE BLOOD UNITS in the patient's chart.

Emergency Requirement for Blood: Supplied by Transfusion Service Option

Facilities that do not maintain appropriate blood storage equipment on site and are required to have emergency access to red cells may make arrangements with the Transfusion Service to access Emergency Issue red cells (or other components) following the process below.

- A RELEASE OF UNCROSSMATCHED/INCOMPATIBLE BLOOD UNITS, must be submitted for each occurrence.
- **Transport distance** is a critical factor in determining appropriateness of this option.

Process for using Emergency Issue, Uncrossmatched units:

Step	Action
1	Physician determines that emergency situation requires the use of uncrossmatched units (or other components).
2	Facility personnel contact Transfusion Service by phone to describe emergency situation. Provide: <ul style="list-style-type: none"> ▪ Name of patient ▪ Date of birth ▪ Patient's identification numbers (Facility number and Blood Bank ID number, if used). ▪ Name of requester ▪ Date and time of request ▪ Physician's name ▪ Quantity of red cells (maximum of 3 units), or other components, required ▪ Facility name and phone number
3	Facility personnel complete the Emergency Transfusion Request Form and obtain physician signature. <ul style="list-style-type: none"> ▪ Patient's specimen should be collected and labeled appropriately prior to transfusion of blood components.
4	FAX the form to the Transfusion Service at (FAX number). <ul style="list-style-type: none"> ▪ Make a copy for Facility documentation.

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Emergency Requirement for Blood: Supplied by Transfusion Service Option
(continued)

Step	Action
5	Send original form, _____ mL EDTA patient sample(s) that is properly labeled, and TRANSFUSION REQUEST FORM to the Transfusion Service as quickly as possible.
6	Transfusion Service labels unit(s) as 'Emergency Issue, Uncrossmatched', with patient's name and unique number. <ul style="list-style-type: none"> ▪ Keeps two segments (for red cell components). ▪ Red cell units must be O Negative or O Positive based on patient age/physician request. <ul style="list-style-type: none"> ▪ Other blood components supplied are ABO/Rh Compatible whenever possible. ▪ Whole Blood and Granulocyte Concentrates are not available on an Emergency Basis. ▪ Documents donation identification number(s) on the Form.
7	Transfusion Service arranges for STAT transport of unit(s).
8	After checking patient identification, transfuse component(s) according to normal practice.
9	When compatibility testing is completed by the Transfusion Service, a Donor Unit Tag is sent to the Transfusion Facility. <ul style="list-style-type: none"> ▪ Place the completed copy of Donor Unit Tag with the copy of the RELEASE OF UNCROSSMATCHED/INCOMPATIBLE BLOOD UNITS in the patient's chart.

**Post
Emergency
Request
Audit**

- As soon as possible after the request for emergency transfusion, obtain the following information:
 - Diagnosis
 - Clinical indication for the emergency request
 - Supporting laboratory data
 - Information must be verified and signed by ordering physician and reviewed and signed by the Transfusion Service Medical Director.
 - A peer review of indication by a physician at facility should occur within 24 hours.
 - Copy of the review should be forwarded to the Transfusion Service
-

**Issue and
Transport of
Blood
Components**

Blood units are packed in a sealed, temperature-validated transport container according to SOP for the type of component being issued.

- Blood Component transport is arranged by Transfusion Service prior to designated transfusion time.
 - Only one patient's components are packed per transport container for Facilities that do not have appropriate blood storage equipment.
 - For all Facilities, components requiring different storage temperatures are packed in different transport containers.
-

**Blood
Component
Storage**

Store all blood components according to FDA and AABB requirements.

Component	Storage Temperature	Other Considerations
Red Blood Cells or Whole Blood	1 – 6C	
Plasma	≤ -18C when frozen	Frozen expiration date indicated on label
	1 – 6C after thawing	
Platelets	20 – 24C	Maintain continuous gentle agitation during prolonged storage (more than 6-8 hours)
Cryoprecipitated AHF or Pooled Cryoprecipitated AHF (Cryo)	≤ -18C when frozen	Frozen expiration date indicated on label
	20 – 24C after thawing	If units are pooled after thawing, expiration is 4 hours from pooling
Granulocyte Concentrate	20 – 24C	Requires crossmatch, and 48 hour notification prior to need.

NOTES:

- **Components must be transfused within the expiration date indicated on the Donor Unit Tag.**
 - **Frozen components must be stored appropriately by the Facility and an expiration time assigned when the unit is thawed.**
-

Storage Considerations

Facility may store red blood cell components in the Transfusion Service sealed transport container for not longer than 48 Hours.

- Other components must be transfused immediately.

If	Then
Facility does not have approved storage equipment	Transfusion(s) must be initiated within 4 hours of opening transport container.
	Components must be transfused within time frame approved for sample collection and blood component ordered, if container remains sealed.
Facility maintains approved blood storage equipment	Transfer blood components to storage unit immediately after opening transport container.
	Components must be transfused within time frame approved for sample collection and blood component ordered.
Facility does not have return privileges	Destroy unused blood components at the end of storage container expiration time. <ul style="list-style-type: none"> ▪ Destroy following appropriate regulation for disposal of biohazardous material using universal precautions.
Facility has return privileges	Transport container may be returned to Transfusion Service if container remains sealed.

For All Facilities:

If Transfusion is successfully completed, not completed or performed, and transport container is opened:

- Destroy blood component bags or blood components (place in biohazard waste container) unless adverse reaction to transfusion occurs.
- Return bottom portion of the Donor Unit Tag to the Transfusion Service, marked as Partially or Not Transfused.
- If adverse reaction to transfusion occurs, initiate Transfusion Reaction Work-up and return blood component, IV solutions, post-reaction samples and completed Transfusion Reaction Form to the Transfusion Service.

NOTES:

- **Blood storage equipment must be dedicated to blood components ONLY.**
- **NO food and/or chemicals or drugs may be stored in the equipment.**
- **Empty transport containers must be returned to the Transfusion Service.**

Adverse Reactions

Signs and Symptoms of Transfusion Reactions

The following tables list the definitions and symptoms associated with types of reactions. A transfusion reaction represents any unfavorable event that may have a relationship to transfusion and should be investigated.

IMMEDIATE TRANSFUSION REACTIONS

Type of Reaction	Definition	Symptoms
Transfusion associated sepsis	Bacterial contamination of transfused blood	<ul style="list-style-type: none"> ▪ Drop or rise in blood pressure of 30/mm Hg compared to pretransfusion values ▪ Shaking chills ▪ Hemoglobinuria ▪ DIC ▪ Oliguria/anuria ▪ Fever ▪ Heart rate 120/min, or rise of 40/min from pretransfusion values ▪ Neutropenia (post-transfusion)
Febrile non-hemolytic reactions	Temperature increase of >1C associated with transfusion and without any other explanation	<ul style="list-style-type: none"> ▪ Temperature increase of $\geq 1C$ or 2F ▪ Chills ▪ Rigors
Immune-mediated hemolysis	Transfused RBCs interact with pre-formed antibodies in recipient	<ul style="list-style-type: none"> ▪ Fever, (rise of $\geq 1C$ or 2F) ▪ Chills ▪ Pain in chest, lower back, abdomen, and/or at infusion site ▪ Hypotension (decrease by ≥ 20 mm Hg) ▪ Nausea ▪ Flushing ▪ Dyspnea ▪ Hemoglobinemia ▪ Hemoglobinuria ▪ Bilirubinemia/Bilirubinuria ▪ Oliguria/Anuria ▪ Acute pancreatitis ▪ Shock ▪ Generalized bleeding (DIC)

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Signs and Symptoms of Transfusion Reactions (continued)

IMMEDIATE TRANSFUSION REACTIONS

Type of Reaction	Definition	Symptoms
Non immune-mediated hemolysis	<p>Red cells undergo hemolysis due to:</p> <p>Temperature-related damage</p> <ul style="list-style-type: none"> ▪ Improper storage or shipping temperatures ▪ Malfunctioning or improper use of blood warmers (use of microwave ovens or hot waterbaths) ▪ Inadvertent freezing of red blood cells <p>Mechanical hemolysis</p> <ul style="list-style-type: none"> ▪ Roller pumps, pressure infusion pumps, pressure cuffs <p>Addition of drugs or hypotonic solutions to blood component or IV solutions</p>	May present with symptoms similar to immune-mediated hemolysis
Urticaria (Hives)	Mild allergic reaction to transfusion	<ul style="list-style-type: none"> ▪ Generalized or circumscribed rash, erythematous macular eruption ▪ Hives ▪ Itching ▪ Usually without fever
Anaphylactic reactions (occur after infusion of only a few mL of blood component)	Severe allergic reaction to transfusion in which there are systemic symptoms.	<ul style="list-style-type: none"> ▪ Hoarseness, stridor, wheezing, chest tightness, coughing, bronchospasm, respiratory distress ▪ Localized or disseminated urticarial reaction may be present ▪ Vascular instability, hypotension, cardiac arrhythmias, cardiac arrest ▪ Nausea, abdominal cramps, vomiting ▪ Diarrhea ▪ Shock

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Signs and Symptoms of Transfusion Reactions (continued)

IMMEDIATE TRANSFUSION REACTIONS

Type of Reaction	Definition	Symptoms
Air Embolism	Air allowed into infusion equipment or blood in open system infused under pressure causing air bubble	<ul style="list-style-type: none"> ▪ Cough ▪ Dyspnea ▪ Chest pain ▪ Shock
Transfusion-related acute lung injury (TRALI)	A new episode of acute lung injury (ALI) that occurs during or within 6 hours of a completed transfusion.	<ul style="list-style-type: none"> ▪ Acute respiratory insufficiency in the absence of evidence of circulatory overload. ▪ No left atrial hypertension ▪ Acute onset ▪ Hypoxemia (capillary oxygen saturation decreases to < 90% on room air) ▪ Bilateral infiltrates on frontal chest x-ray ▪ No other evidence of cardiac failure or reason for respiratory failure
Circulatory Overload	Acute pulmonary edema due to volume overload.	<ul style="list-style-type: none"> ▪ Dyspnea, orthopnea ▪ Severe headache ▪ Hypertension, tachycardia (usually concomitant) ▪ Congestive heart failure ▪ Acute pulmonary edema
Metabolic reactions		<ul style="list-style-type: none"> ▪ Citrate toxicity ▪ Hyperkalemia ▪ Hypocalcemia ▪ Hypothermia ▪ Respiratory alkalosis

DELAYED TRANSFUSION REACTIONS

Type of Reaction	Definition	Symptoms
Alloimmunization to red cell antigens Risk: 1-1.6% per donor unit	<ul style="list-style-type: none"> ▪ Primary development of antibodies to red cell antigens ▪ An anamnestic immune response of antibodies to red cell antigens that had fallen below the level of detection 	<ul style="list-style-type: none"> ▪ Fever ▪ Decreasing hemoglobin ▪ Mild jaundice ▪ Signs of hemolysis in about 20-35% of sensitized recipients ▪ Primary immune responses typically occur 14-30 days following transfusion ▪ Anamnestic immune response usually occurs 3-10 days following transfusion

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Signs and Symptoms of Transfusion Reactions (continued)

DELAYED TRANSFUSION REACTIONS

Type of Reaction	Definition	Symptoms
Alloimmunization to leukocyte antigens <ul style="list-style-type: none"> ▪ Occurs in patients receiving repeated non-leukoreduced platelet transfusions and women with ≥ 4 pregnancies 	Development of antibodies to leukocyte (HLA) antigens	Signs of febrile non-hemolytic transfusion reactions
Refractoriness to platelet transfusion	<ul style="list-style-type: none"> ▪ Rapid clearance of transfused platelets ▪ Non-immune causes related to the patients underlying condition are most common: Sepsis, drugs, DIC, etc ▪ Immune causes include HLA or platelet specific antigen sensitization, usually in patients that have received multiple transfusions or multiparous females 	Poor incremental increase in platelet count after an appropriate dose of platelets
Post-transfusion purpura (usually occurs > 1 week after transfusion)	<ul style="list-style-type: none"> ▪ Development of an antibodies to the HPA-1 platelet antigen ▪ Abrupt onset of severe thrombocytopenia an average of 9 day post transfusion (range 1-24 days) 	<ul style="list-style-type: none"> ▪ Abrupt onset of severe thrombocytopenia 1-24 days following transfusion ▪ Generalized purpura
Iron overload <ul style="list-style-type: none"> ▪ Occurs in chronically transfused patients (> 20 units per lifetime) 	Accumulation of iron in chronically transfused patients	<ul style="list-style-type: none"> ▪ Interference with heart, liver or endocrine gland function ▪ Hepatic failure ▪ Cardiac toxicity
Acute Transfusion-associated Graft-vs-Host disease	Immunologic complication caused by engraftment and proliferation of donor lymphocytes from a non-irradiated cellular blood component in a susceptible (immunocompromised) host.	<ul style="list-style-type: none"> ▪ Fever ▪ Erythroderma, often starting on palms, soles, earlobes, and face, ranging from edema to full blistering ▪ Enterocolitis ▪ Pancytopenia ▪ Mortality >90%

Process for Immediate Adverse Reactions

In the event of a suspected transfusion reaction, discontinue the transfusion and evaluate the patient status.

NOTE: Initiate transfusion reaction work-up prior to releasing patient from medical care. If symptoms suggest a hemolytic or anaphylactic transfusion reaction, administer appropriate treatment and keep the patient under observation until Transfusion Service reports results of the work-up. If patient symptoms are severe, consider transporting patient to an Emergency Center.

Step	Action	
1	Stop transfusion. <ul style="list-style-type: none"> ▪ Do not disconnect the blood component. <ul style="list-style-type: none"> ▪ Keep IV line open with slow infusion of saline. <ul style="list-style-type: none"> ▪ Treatment of hypotension and promotion of adequate renal blood flow are primary concerns. ▪ Avoid over-hydration. ▪ Ensure adequate renal perfusion by monitoring measurement of urine output to achieve a rate above 100 mL/hour in adults, or as appropriate. 	
2	Notify the patient's physician immediately.	
3	If	Then
	Physician requests a Transfusion Reaction Work-up	Discontinue the transfusion. <ul style="list-style-type: none"> ▪ Document in patient's chart. ▪ Notify Transfusion Service. Go to Step 4.
	Physician does not request a Transfusion Reaction Work-up but a transfusion reaction is suspected.	<ul style="list-style-type: none"> ▪ Continue with transfusion following physician's orders. ▪ Make note in patient's chart. Go to Step 4
4	Complete the TRANSFUSION REACTION WORKUP AND REPORT FORM.	
5	Draw one 5 mL EDTA and one 10 mL Red Top specimen carefully to avoid hemolysis. Label with: <ul style="list-style-type: none"> ▪ Patient's name ▪ Patient's unique ID numbers ▪ Date and time of draw ▪ Phlebotomist's initials 	

Continued on next page

Process for Immediate Adverse Reactions (continued)

Step	Action
6	If symptoms include hypotension and fever (for red cells or platelets), bacterial contamination is a possibility. <ul style="list-style-type: none">▪ Draw a blood culture sample immediately and send to your reference laboratory for culture.
7	Submit blood component bag and attached infusion line/IV solutions, post-reaction blood samples to Transfusion Service, along with the WORKUP FORM.
8	Transfusion Service notifies Facility and physician verbally, as soon as evidence of a hemolytic transfusion reaction is ruled out.
9	Upon completion of Workup, Transfusion Service notifies Facility and physician verbally, with follow-up written document of results.

NOTE: If additional components are required subsequent to the Transfusion Reaction Work-Up, send a new patient specimen and REQUEST FORM to the Transfusion Service.

**Process for
Other
Adverse
Reactions**

- Post transfusion, the recipient may develop symptoms related to other adverse reactions:
 - Delayed transfusion reaction
 - Transfusion transmitted diseases

 - If symptoms develop, notify Transfusion Service.
 - Complete a TRANSFUSION REACTION WORKUP AND REPORT FORM for symptoms relating to a delayed transfusion reaction.
 - Complete a REPORT OF TRANSFUSION ASSOCIATED INFECTION form for symptoms relating to a transfusion transmitted disease.

 - When completing the REPORT OF TRANSFUSION ASSOCIATED INFECTION form include any abnormal laboratory results identified post-transfusion, along with pre-transfusion results, if available:
 - Seroconversion seen with any of the following tests:
 - HBsAg
 - Anti-HBc
 - Anti-HBs (without Hepatitis vaccination)
 - Anti-HBe
 - Anti-HIV 1 / 2
 - Anti-HTLV I/II
 - Anti-HCV
 - CMV
 - T. cruzi
 - WNV

 - The forms and instructions for completing the forms are obtained from the Transfusion Service.
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**Transfusion
Associated
Infections**

The following diseases have been associated with blood transfusion:

- Hepatitis (usually HBV or HCV)
 - Human Immunodeficiency Virus (HIV)
 - Human T-Cell Lymphotropic Virus (HTLV)
 - Cytomegalovirus (CMV)
 - Epstein-Barr Virus (EBV)
 - Parvovirus B19
 - Colorado Tick Fever
 - Tick-Borne Encephalitis Virus
 - Creutzfeldt-Jakob Disease (CJD)
 - Bacterial Infections
 - Malaria
 - Babesia
 - Syphilis
 - Chagas' Disease (T. cruzi)
 - Toxoplasmosis
 - Lyme Disease
 - Parasitic Worms
 - West Nile Virus (WNV)
 - Dengue Fever
 - Chikungunya Fever
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**Donor
Related
Issues**

Occasionally a blood unit is investigated for issues related to the donor or positive test results from the donation or donor on subsequent donations.

- When this occurs, the Transfusion Service is notified via a Lookback, Recall or Withdrawal notice from the Blood Center.
 - If the unit was issued by Transfusion Service to the Transfusion Facility, the Transfusion Service will contact the Facility.
 - Follow instructions outlined in the contact letter.
 - Physician and patient notification and additional follow-up, if applicable, are the responsibility of the Facility.
 - If there are any questions, contact the Transfusion Service.
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Key Quality Indicators

- The Transfusion Service tracks quality indicators that relate to the provision of blood components for patient transfusion.
 - A periodic summary of results is sent to the Facility, along with any recommendations for improvement.
 - The Transfusion Service will provide continuing education and consultation when requested by the Facility.
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