

TRANSFUSION SERVICE GUIDELINES
INLAND NORTHWEST BLOOD CENTER

Purpose

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

The Transfusion Service of INBC is a 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: Regional Headquarters 50D0661599

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Hours of Operation

The Transfusion Service operates 24 hours a day, 7 days a week.

Specimen Pick-up and Product 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:
 - Supervisor:
 - Manager:
 - Laboratory Phone:
 - Fax Number:
 - Medical Director::
- Pam Beasley (509) 232-4505
 - Juanita Sanchez (509) 232-4506
 - Steve Allen (509) 232-4568
 - (509) 624-8591
 - (509) 232-4524
 - Dr. Ranlett (509) 232-4424 or
(509) 434-4434
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Definitions

Transfusion Service: The laboratory performs pretransfusion testing, and, prepares and provides compatible blood components for patient transfusion. Additionally, this laboratory performs more complex serological work-ups including, but not limited to, common clinically significant antibody identification, direct antihumanglobulin testing (DAT), Warm and Cold Autoantibody workups, Transfusion Reaction Workups, RhoGam workups, Fetal Screens, etc.

Blood Supplier: Inland Northwest Blood Center (INBC) is 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 (i.e. Typenex) may optionally be used as a part of the identification process and placed on any patient receiving a transfusion.
 - Patient specimens must be labeled 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 REQUEST FOR BLOOD OR SERVICES. **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 CROSSMATCH TICKET attached to the unit of blood.
 - The CROSSMATCH TICKET 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.
- INBC provides copies of the Circular of Information For The Use Of Human Blood And Blood Components (COI).
 - The COI will be distributed by the Laboratory Manager in the first quarter of each year to each facility to whom which we provide blood or blood products. If there is a change to the COI during the year, the Laboratory Manager will provide an up-date/errata sheet indicating the changes.

**Transfusion
Facility
Responsibilities**

The Transfusion Facility (hospital/clinic receiving the blood product) 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 at INBC, 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 at INBC
- Appropriate handling of blood components
 - Maintenance and Quality Control of their own storage equipment
 - Validation of their own storage equipment including blood transport/OR storage boxes
 - Relabeling of products modified within their facility (i.e. thawed plasma products, pooled products)
- 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 INBC of major changes to procedures and policies
- Staff training and competency assessment
- Appropriate documentation of receipt, storage and transfusion of blood products
- Proper shipment/packaging of returns

**Request for
Transfusion
or Testing**

Hospital/Laboratory/ Ordering facility will complete the INBC supplied REQUEST FOR BLOOD OR SERVICES FORM.

- **Bolded** information is required for the acceptance of the patient's 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), by the Transfusing Facility)
 - Date of birth (can call Facility and obtain if missing)
 - Gender
 - Requesting physician
 - Requesting Facility ID
 - 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)
 - Other testing wanted
 - History of recent pregnancy or transfusion if a 7-day ("pre-op") sample is wanted
 - Specimen draw/collection date
-

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 computer crossmatch testing provided the antibody screen is negative and there is no history of clinically significant antibodies.

Computer crossmatch tests are performed to confirm ABO compatibility of the red cell components. The patient's blood specimens are 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. If the Transfusion Facility at INBC is unable to contact the requesting physician, two (2) units will be processed
-

**Specimen
Collection**

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

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">▪ The patient's full name▪ Unique Hospital/Blood Bank identification number▪ The date it was placed on the patient (same date the specimen was drawn)
3	Collect at least one 6 – 7 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 <p>NOTE: Exceptions are made for 7 day tubes; documentation of no recent transfusion or pregnancy is required</p>

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
- Initials of phlebotomist (if missing, may be obtained via phone call)
- Accompanying documentation/requisition must identify the phlebotomist and date

NOTE: The sample collection date needs to be noted on the sample or requisition.

***If “spacer digits” such as Z000 or D00 are added to the sample because they have printed on the requisition, INBC may use the actual MRN (the last 6-7 digits of the MRN) on our Crossmatch Ticket/Reference Report.**

Specimen Transport

Specimens accompanied by the Request for Blood or Services, 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 specimens appropriately.
2	Contact INBC for specimen pick-up (if this is part of your agreement with INBC)
3	Transport specimens to INBC

Specimen and Request Acceptability Criteria

The following conditions require a new specimen and Request for Blood or Services:

- Incomplete or illegible requests
- Any discrepancy between required information on the blood specimen labels and/or REQUEST FORMS
- Missing specimen label information (refer to page 12 above)
- Returning the wristband identification bracelets with the specimen and Request for Blood or Services
- Specimen is grossly hemolyzed, diluted with IV fluid, or is quantity not sufficient (QNS)
- 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

In these situations, the original specimen will be kept at INBC, and the requesting Facility will be contacted to provide a new sample and Request for Blood or Services.

The INBC Technologist performing the serological testing has the right to refuse any specimen

In emergent situations, unacceptable specimens can be used with an emergency request/release form signed by the requesting physician.

**Requests for
Antibody
Identification
or
Consultation**

Antibody identifications are performed on all specimens presenting with unexpected serological problems (i.e. positive antibody screens, ABO discrepancies, etc.). Occasionally a facility may want to submit a specimen for antibody identification and/or consultation; requests for antibody identification or consultation should be submitted on INBC Form TS 648.3, see below. As much information as possible is needed to assist in the serological work-up.

Inland Northwest Blood Center
210 W Cataldo Ave, Spokane, WA 99201

REQUEST FOR ANTIBODY IDENTIFICATION or CONSULTATION

Patient Information	
Hospital requesting:	Contact name:
Patient name:	Contact phone:
Patient ID:	Contact fax:
Patient DOB:	
Current lab values: Hgb/Hct _____	Other pertinent lab values:
Diagnosis:	
Medications:	
Transfusion history:	
Obstetric history:	Currently pregnant? Weeks?
Rh Immune Globulin given / date:	
Problem encountered:	
ABO discrepancy _____	
Positive antibody screen _____	
Positive DAT _____	
Other (describe):	

Services requested (Please indicate urgency / TAT needed below)
RBC antibody identification
Workup for positive DAT
Prenatal antibody ID and titer
Products needed?: _____
Irradiated? ____ CMV neg? ____ Other ____
Needed by: +

Sample required: Antibody ID and crossmatch: 2-3 full purple tops (i.e. 10 mls) DAT workup: 3-4 full purple tops (15-20 mls)
Contact INBC Lab at 509-624-8591 to arrange transport / notify lab of sample drawn A preliminary report of antibody ID studies and preliminary billing will be faxed to the fax number you have indicated above. A final written report and optionally a pathologist's letter of interpretation will follow.

INBC Form
TS 648.3
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01/09

Evaluation of Requests

There must be an order from a licensed care provider for components to be administered:

- The order should include the patient's name and other identifiers (i.e. date of birth, hospital number, etc.);
- The component requested (i.e. RBCs, FFP, Platelets, etc.);
- Any special processing required of the component (irradiation, split, volume reduced, etc.); and,
- The number of units or volume requested.

Each request for transfusion of blood components is reviewed against defined criteria. Unusual requests (special components, larger number of units/volume normally provided, etc.) will require consultation with the Transfusion Service Medical Director or designee prior to completing the order and/or issuing blood components.

NOTE: Platelets and 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 (can be a computer crossmatch if indicated)▪ Confirmation of donor red cell ABO/Rh Type
Autologous Red Blood Cells	<ul style="list-style-type: none">▪ ABO Group determination▪ Rh Type determination▪ Antibody detection▪ 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
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, except HPC recipient patients (see below).
- ABO identical products should be provided for HPC recipients until they engraft, chronically transfused patients, and, patients < 2 years of age. If not available, volume reduced products should be provided.

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

Definition: **Critical results** are laboratory results that indicate a possible life-threatening situation for the patient.

- The critical values listed below have been approved by the INBC Medical Director.

When a critical value has been obtained (and verified as critical), the Transfusion Service is responsible notifying the Transfusion Facility or the requesting physician and notify them of the particular situation.

- If the Transfusion Facility is closed, the Transfusion Service staff will attempt 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:

- A transfusion reaction investigation that suggests any evidence of immunohematologic incompatibility, blood administration error, or sample collection error
- Evidence of a transfusion error
- Suspected cases of TRALI

Results requiring notification to the Transfusion Facility:

- Evidence of a delayed hemolytic transfusion reaction
 - ABO discrepancy of current type and screen specimen with previous record (unresolved discrepancy)
 - Positive antibody screen causing a potential delay
 - Unavailable blood components
 - Unavailable compatible blood components
-

Crossmatch Ticket

- Except for stock components, each component/unit provided by the Transfusion Service has the Compatibility/Crossmatch Ticket attached to the component/unit bag (products given as a group [i.e. Cryo AHF, etc.], will be printed on a packing list rather than a Compatibility/Crossmatch Ticket).
 - At time of issue information on the donor unit label is compared to information on the attached Crossmatch Ticket.
 - **The information must match.**
 - Immediately prior to transfusion, two individuals must confirm the information on the donor unit label, the Crossmatch Ticket, 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 Crossmatch Ticket **must** remain attached to the donor unit until completion of the transfusion.
 - Upon completion of transfusion, Transfusion Facility personnel must complete the Crossmatch Ticket 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.
-

Emergency Requirement for Red Blood Cells

For Facilities that maintain appropriate blood component storage equipment (Hospitals), the Transfusion Service can supply O Rh Positive and Negative red cells for Emergency Issue. Other components (i.e. Fresh Frozen Plasma/Plasma Frozen within 24 hours, Cryoprecipitate AHF, platelets, etc.) can be supplied as needed with the exception of whole blood or granulocyte concentrates.

The RBC units are for emergency use, should 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 an Emergency Request for Blood or Services 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 and sent to the Transfusion Service Laboratory STAT.
3	Send original form, 6 – 7 mL EDTA patient sample(s) which is properly labeled, and Request for Blood or Services to the Transfusion Service as quickly as possible.
4	Transfuse red cells according to normal practice.
5	When compatibility testing is completed by the Transfusion Service, a Crossmatch Ticket with any additional blood components requested will be sent to the Transfusion Facility. <ul style="list-style-type: none">▪ Place the completed copy of Crossmatch Ticket with the copy of the RELEASE OF UNCROSSMATCHED/INCOMPATIBLE BLOOD UNITS in the patient's chart.
6	After the transfusion is complete, send the component/unit bag and a copy of the emergency release form to INBC.

**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.
 - 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	1 – 6C	
Plasma	≤ -18C when frozen	Frozen expiration date indicated on label
	1 – 6C after thawing	Expiration date is 24 hours after thawing for FFP/FP24, and 5 days after thawing for Thawed Plasma
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, otherwise if not pooled, 6 hours post thaw
Hematopoietic Stem Cells (Autologous)	≤ -135°C (liquid nitrogen vapor phase)	Transported by Laboratory Service staff to facility in special transport container.

NOTES:

- **Components must be transfused within the expiration date indicated on the component's label.**
- **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 (insulated box/INBC calibrated container, **NOT THE TRANSPORT BAG**) for no longer than 24 Hours.

- Other components must be transfused As Soon As Possible (ASAP).

If	Then
Facilities that do not have approved storage equipment	Transfusion(s) must be initiated within 4 hours of removal from the transport container.
	Components must be transfused within time frame approved for sample collection and blood component ordered, if container remains sealed.
Facilities that utilize 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.
Facilities that have return privileges	Transport container may be returned to Transfusion Service Laboratory if container remains sealed and is received within the specified time requirement for the particular container. Components will be inspected upon receipt, if they are not acceptable, no credit will be issued to the facility.

For All Facilities:

If transport container was opened and the component wasted:

- Destroy the blood component bags or blood component(s) (place in biohazard waste container).
- Return the bottom portion of the Crossmatch Ticket to INBC, marked as "Partially or Not Transfused."

NOTES:

- **Blood storage equipment must be dedicated to blood components ONLY.**
- **Empty transport containers must be returned to the Transfusion Service.**

**Hospital Blood
Component
Storage Audit**

Facilities which have blood component return privileges are required to store and handle blood components in a manner which will preserve the safety, potency, purity, identity and quality of each component. Inland Northwest Blood Center will conduct audits of facilities to assist facilities meet this requirement.

Guidelines:

As a general rule, audits will be annual, however, facilities may choose to request biennial audits (once every two years) if:

- They have two consecutive years of satisfactory inspections; and,
- Current AABB accreditation and/or FDA licensure (FDA registration does not qualify as FDA licensure).

A copy of the audit tool/checklist will be provided each facility at least two weeks before the audit; however, the facility may request an audit tool/checklist from the Laboratory Services Manager at any time.

If significant discrepancies are discovered during the audit that impact the safety, potency, purity, identity and/or quality of blood components, these discrepancies will be immediately identified to the facility's management and INBC Quality Assurance Department. A follow-up audit can/will be performed within 30 days to ensure the discrepancies are corrected.

Failure to correct discrepancies or reoccurring significant discrepancies can/will result in the loss of return privileges by the facility.

INBC will provide all contracted facilities with technical assistance upon request.

Adverse Reactions

Signs and Symptoms of Transfusion Reactions

- Adverse reactions to blood transfusions may occur during or following a blood transfusion. If an adverse reaction or suspected reaction to transfusion occurs, initiate a Transfusion Reaction Report Form and return the blood component, IV solutions, post-reaction samples and completed Transfusion Reaction Form to the Transfusion Service. Possible signs and symptoms of an adverse reaction include any one or combinations of the following:

Possible Signs and Symptoms of an Adverse Reaction to Transfusion

<ul style="list-style-type: none">▪ Temperature rise > 2°F (1°C)▪ Shaking chills (rigors)▪ Hives (urticaria)▪ Tachycardia▪ Chest, flank and/or back pain▪ Shortness of breath▪ Itching (pruritus)▪ Facial flushing	<ul style="list-style-type: none">▪ Hypertension or hypotension▪ Anxiety, restlessness▪ Skin rash▪ Wheezing▪ Pink or red urine (hemoglobinuria)▪ Abnormal bleeding▪ Nausea, vomiting
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Signs and Symptoms of Transfusion Reactions *(continued)*

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	Red cells undergo hemolysis due to: Temperature-related damage <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 Mechanical hemolysis <ul style="list-style-type: none"> ▪ Roller pumps, pressure infusion pumps, pressure cuffs Addition of drugs or hypotonic solutions to blood component or IV solutions	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

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DELAYED TRANSFUSION REACTIONS

Type of Reaction	Definition	Symptoms
<p>Alloimmunization to red cell antigens</p> <p>Risk: 1-1.6% per donor unit</p>	<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
<p>Alloimmunization to leukocyte antigens</p> <ul style="list-style-type: none"> ▪ Occurs in patients receiving repeated non-leukoreduced platelet transfusions and women with > 4 pregnancies 	<p>Development of antibodies to leukocyte (HLA) antigens</p>	<p>Signs of febrile non-hemolytic transfusion reactions</p>
<p>Refractoriness to platelet transfusion</p>	<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 	<p>Poor incremental increase in platelet count after an appropriate dose of platelets</p>

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Signs and Symptoms of Transfusion Reactions (continued)

DELAYED TRANSFUSION REACTIONS

Type of Reaction	Definition	Symptoms
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 Report Form.	
5	Draw one 6-7 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 	

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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 Transfusion Reaction Report 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, notify INBC.

**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 Laboratory.
 - Complete a Transfusion Reaction Report Form for any symptoms relating to a delayed transfusion reaction.

 - If a transfused patient develops a suspected transfusion related infection/disease, notify the Transfusion Service Laboratory of 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
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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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