

# **TRANSFUSION SERVICE GUIDELINES**

**September 7, 2014**

**Inland Northwest Blood Center**

**210 W. Cataldo Avenue**

**Spokane, WA 99201**

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**Overview**

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

The Transfusion Service of Inland Northwest Blood Center (INBC) 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: Regional Headquarters 50D0661599

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**Hours of Operation**

Normal hours of operation for the Transfusion Service are: 24 hours a day, 7 days a week.

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

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**Turn Around Time (TAT)**

- Orders 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 ordered, 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 pages 20-22 of this document.
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**Contact Information**

Transfusion Service

- Supervisor: Tina N. or Tamera G. (509) 232-4444
- Manager: Michelle Palk (509) 232-4505
- Laboratory Phone: (509) 232-4444
- Fax Number: (509) 232-4487
- Director of Technical Services: Steve Allen (509) 232-4568
- Medical Director: Paul Eastvold, MD (509) 434-4434
- Hospital Services: Juanita Sanchez (509) 232-4506
- Courier: (800) 304-0181 or (509) 624-8591

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## Definitions

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

**Blood Supplier:** 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:** This word is used in this document to indicate a mandatory statement.

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

**Acute Care Facility:** Facilities providing services requiring regular STAT need for blood components, and transfusion of full range of blood components (e.g., RBCs, plasma, platelets, cryoprecipitated, AHF).

Example: Long Term Acute Care Facility

**Non-Acute Care Facility:** Facilities ordering components, primarily RBCs, for routine transfusions or pre-scheduled surgical procedures. Require an occasional STAT need for blood.

Examples: Rehab Centers, Outpatient transfusion Centers, Surgical Centers.

**Turn Around Times:** Defined from receipt of specimens/order in the Transfusion Service until units are available for issue.

- Routine: 8 hours
  - ASAP: 4 hours
  - STAT: 2 hours
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## 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 Barcoded Blood Bank or Hospital armband must be placed on any patient receiving a transfusion.
  - Patient specimens must be labeled at the bedside immediately after collection.
    - Specimens normally expire three (3) days after collection.
  - All identifying information (patient's name, Facility Patient ID number, date of collection, and the Barcoded Blood Bank or Hospital armband number) must be identical on the armbands, specimen label, and TRANSFUSION SERVICES ORDER, TS 003. **Orders 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.
    - All identifying information (the patient's name, Facility Patient ID number and the Barcoded Blood Bank or Hospital armband number must be identical on the armbands attached to the patient and the COMPATIBILITY/TRANSFUSION RECORD attached to the unit of blood.
    - The COMPATIBILITY/TRANSFUSION RECORD 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.
  - The Transfusion Service 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 procedures that provide instructions for transfusion activities performed at the site. These should include:

- 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 Transfusion Service of major changes to procedures
  - Staff training and competency assessment
  - Requests for a 14 day pre-operative sample use, including patient-confirmed transfusion/pregnancy history
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**Order for  
Transfusion**

Complete the Transfusion Service supplied TRANSFUSION SERVICES ORDER, TS 003 or approved Transfusion Facility equivalent for acceptance of patient specimen.

The information below is required.

- Recipient name (first and last)
- Barcoded Blood Bank or Hospital Armband number – entered on the TS 003 after armband is placed on the patient
- Unique patient ID number (Facility Patient Identification Number, if used)
- Gender
- Ordering physician
- Ordering Facility, contact name, and phone number
- Sample Collection Date
- Phlebotomist ID
- Date and time components are needed
- Date of birth
- Testing ordered
- Blood component(s) ordered, including any special needs (e.g., irradiated)
- Pretransfusion criteria when a component is ordered

If possible, Transfusing Facility should include:

- Prior transfusion
  - Pregnancy history
  - Diagnosis
  - Medication history
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## **“Type and Screen” Protocol**

The **“Type and Screen” Protocol** is performed to obtain a current blood type and antibody screen result for a patient when transfusion may not be needed for a surgical procedure.

Patient’s blood specimen is tested for:

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

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 crossmatch or computer crossmatch is performed to confirm ABO compatibility of the red cell components.

A patient with a positive antibody screen or a history of clinically significant antibodies is NOT ELIGIBLE for the “Type and Screen” Protocol.

- Antibody identification testing is performed for any positive antibody screen detected in initial testing.
  - The Transfusion Service will contact the Transfusion Facility to determine the total number of components that may be needed.
    - These units should be crossmatched prior to an identified need.
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**Pre-  
Operative  
Sample  
Collection**

**NOTE:** For Hospital Patients Only.

- Blood samples may be collected from a patient within 14 days of scheduled surgery where transfusion might be a possibility, if there is no history of pregnancy or transfusion within the last 3 months.
  - Documentation of transfusion and pregnancy history is obtained on a Compatibility Sample Questionnaire, TS 007, Transfusion Services Order, TS 003, or approved Transfusion Facility document, if the 14 day sample retention option is requested.
  - The documentation of patient history is sent with the patient samples and the TRANSFUSION SERVICES ORDER, TS 003 to the Transfusion Service.
  - If the patient is drawn pre-operatively, and returns home, the patient must keep the armband on and return with the armband still attached and legible.
  - If the armband is removed, the identification chain is broken and requires a new armband be placed on the patient.
    - A new specimen and TS 003, or Transfusion Facility equivalent must be submitted.
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## Specimen Collection

Collect specimens after appropriate identification of the patient from armbands attached to the patient.

- Blood Bank armbands are supplied by the Transfusion Service for use by the Facility, if requested.

Step	Action
1	Place armband identification bracelets on patient. <ul style="list-style-type: none"><li>▪ Barcoded Hospital armband or</li><li>▪ Barcoded Blood Bank armband</li></ul>
2	Armband must contain: <ul style="list-style-type: none"><li>▪ Patient's name (first and last)</li><li>▪ Unique patient identification number<ul style="list-style-type: none"><li>▪ Transfusing Facility Armband number or</li><li>▪ Blood Bank number</li></ul></li><li>▪ Phlebotomist's ID</li><li>▪ Collection Date</li><li>▪ Hospital or Blood Bank armband number must be placed or written on the TRANSFUSION SERVICES ORDER, TS 003.</li></ul>
3	Personnel trained in phlebotomy must collect the blood samples. <ul style="list-style-type: none"><li>▪ Phlebotomist identification must be documented on TRANSFUSION SERVICES ORDER, TS 003.</li></ul>
4	Collect a minimum of one 7 mL EDTA anticoagulant tube. <ul style="list-style-type: none"><li>▪ Fill tube(s) completely.</li></ul> <p><b>NOTE:</b> If patient has a history of antibodies to red cell antigens, collect additional tubes.</p>
5	Specimen may be used for testing up to 3 days after collection. <ul style="list-style-type: none"><li>▪ Day of collection is day zero</li><li>▪ A new sample is required if additional testing is ordered after the specimen has expired.</li></ul>

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## Specimen Labeling

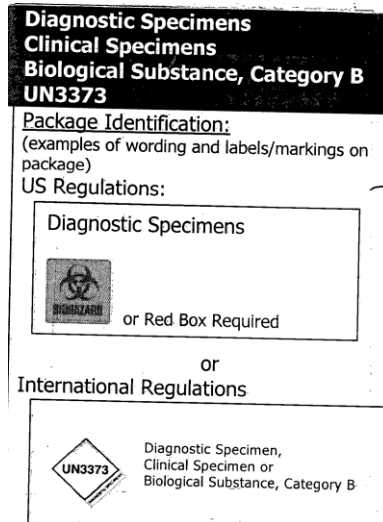
Each sample tube **must** contain the following information.

- Patient name (first and last)
  - Unique patient ID number
    - Blood Bank Armband number or
    - Transfusion Facility ID number
  - Date sample collected
-

**Specimen Transport**

Specimens accompanied by the TRANSFUSION SERVICES ORDER, TS 003, 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. <ul style="list-style-type: none"> <li>▪ Include the TRANSFUSION SERVICES ORDER, TS 003 inside the container, but separated from the specimen(s) should it break during transport.</li> </ul>
2	Place a label on the outside of the shipping container, if not already present. <ul style="list-style-type: none"> <li>▪ Label should indicate Diagnostic Specimens or Biological Substance, Category B.</li> <li>▪ An example of appropriate labels is shown below.</li> </ul>
3	Contact a courier/transport service or Transfusion Services Representative (if service is available in your area), to deliver the container.



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**Specimen  
and Order  
Acceptability  
Criteria**

The following conditions require a new specimen and TRANSFUSION SERVICES ORDER, TS 003.

- Incomplete or illegible orders
- Any discrepancy between information on the blood specimen labels and/or TRANSFUSION SERVICES ORDER, TS 003
- Missing specimen label information
  - Refer to Specimen Labeling on page 11
- Returning the armband identification bracelets with the specimen and TRANSFUSION SERVICES ORDER, TS 003
- 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 TRANSFUSION SERVICES ORDER, TS 003.

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**Evaluation of Orders**

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

- If the TRANSFUSION SERVICES ORDER, TS 003 is completed with respect to the Pretransfusion Criteria listed on the bottom of the form for any given component ordered, sufficient documentation is present for compliance with regulatory agencies.
- Orders requiring further review are referred to the Transfusion Service Medical Director or designee **prior** to completing the order and issuing blood.

For Non-Acute Care Facilities, criteria prompting further investigation and Transfusion Service Medical Director consultation are indicated in the table below:

Criteria	Component Requested
Number of components exceed maximum for infusion in a given period of time	Release any combination of more than 4 blood components per 24 hour period. <ul style="list-style-type: none"> <li>▪ Release of more than 2 platelet apheresis products in a 24 hour period requires TS Medical Director notification.</li> </ul>
Component is not a packed red cell or platelet  Any quantity ordered	<ul style="list-style-type: none"> <li>▪ Release of plasma or cryoprecipitate products with normal or near normal PT or aPTT, with an INR &lt; 1.5</li> <li>▪ Request of only 1 unit of plasma</li> <li>▪ Granulocyte concentrates</li> <li>▪ Whole blood</li> </ul>
Recipient is a pediatric patient (≤ 18 years of age)	All components
Special Components or Current Order of special components is inconsistent with historical records	Special transfusion needs <ul style="list-style-type: none"> <li>▪ CMV negative</li> <li>▪ Hgb S negative</li> <li>▪ Washed components</li> <li>▪ Volume reduced components</li> <li>▪ Fresh red cell units</li> <li>▪ IgA deficient products</li> </ul>

**NOTE:** Red cells are provided as leukocytes reduced.

**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.

<b>RED BLOOD CELLS: See Rh Requirement</b>		
<b>Component Ordered</b>	<b>Recipient's ABO Group</b>	<b>Component ABO Group</b>
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

<b>FROZEN PLASMA: No Rh Requirement</b>	
<b>Recipient's ABO Group</b>	<b>Component ABO Group</b>
O	O, A, B, or AB
A	A or AB
B	B or AB
AB	AB

<b>PLATELETS: See Rh Requirement</b>	
<b>Recipient's ABO Group</b>	<b>Component ABO Group*</b>
O	O, A, B, or AB
A	A or AB
B	B or AB
AB	AB

**NOTE:**

- 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.

<b>CRYOPRECIPITATE: No ABO/Rh specific criteria required for this component.</b>
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## Compatible Blood Components for Transfusion (continued)

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 < 56 years old Rh type compatible should be provided whenever possible.

- RhIG therapy should be considered for Rh Negative women < 56 years old receiving Rh Positive red cell and/or platelet products.
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## **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.

When a critical value has been obtained (and verified as critical), the Transfusion Service is responsible for notifying the Transfusion Facility head nurse or ordering 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 (TS) staff notifies the TS Medical Director.

### **Critical Results (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, not accounted for by known history
  - Positive antibody screen with newly identified antibody
  - OB patient with new clinically significant antibody identified during pregnancy
  - Antibody titer in OB patient with clinically significant antibody or an increase in titer of more than 2 dilutions from a previously collected specimen
  - Positive DAT on cord blood, when the mother's ABO/Rh is compatible with the infant's ABO/Rh
  - Feto-maternal hemorrhage in excess of 30 mL whole blood
  - Delay of availability of blood components
  - Unavailable compatible blood components
  - Provision of blood components utilizing massive transfusion protocol
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**Pretransfusion Testing**

All orders 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 will contact the Transfusion Facility and advise accordingly.
- Additional patient samples may be needed.

Required recipient testing depends on ordered component.

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

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## Compatibility/ Transfusion Record

- Each component provided by the Transfusion Service has the COMPATIBILITY/TRANSFUSION RECORD attached to the donor unit bag.
    - At time of issue information on the donor unit label is compared to information on the attached COMPATIBILITY/TRANSFUSION RECORD.
    - **The information must match.**
  - Immediately prior to transfusion, two individuals must compare the information on the donor unit label, the COMPATIBILITY/TRANSFUSION RECORD and the patient's **Barcoded Hospital or Blood Bank armband**, 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 COMPATIBILITY/TRANSFUSION RECORD **must** remain attached to the donor unit until completion of the transfusion.
  - Upon completion of transfusion, Transfusion Facility personnel must complete the COMPATIBILITY/TRANSFUSION RECORD and place in patient's chart.
    - Properly discard the empty blood product bag and tubing in a biohazard container.
    - Fax the completed COMPATIBILITY/TRANSFUSION RECORD to the Transfusion Service to provide documentation of unit disposition.
  - On the COMPATIBILITY/TRANSFUSION RECORD are instructions for what to do should the patient develop symptoms of an adverse reaction. Refer to Signs and Symptoms of Transfusion Reactions starting on page 25 of this document.
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**Emergency Requirement for Blood: Storage Option**

For facilities that maintain appropriate blood component storage equipment (hospitals), the Transfusion Service can supply long-dated, Group O red cells labeled as Emergency Issue, Uncrossmatched.

- 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.

- These units must be rotated periodically if the facility has return privileges.
- The Transfusion Service keeps segments on any RBC unit stored as Emergency Issue, in order to facilitate subsequent compatibility studies, when necessary.
  - An ISSUE OF INCOMPATIBLE OR UNCROSSMATCHED BLOOD UNITS, TS 010 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 ISSUE OF INCOMPATIBLE OR UNCROSSMATCHED BLOOD UNITS, TS 010 and obtain physician signature. <ul style="list-style-type: none"> <li>▪ Patient's specimen should be collected and labeled appropriately prior to transfusion of blood components.</li> </ul>
3	Fax the form to the Transfusion Service fax number: (509) 232-4487 <ul style="list-style-type: none"> <li>▪ Make a copy for facility documentation.</li> </ul>
4	Send original ISSUE OF INCOMPATIBLE OR UNCROSSMATCHED BLOOD UNITS, TS 010, one properly labeled 7 mL EDTA patient sample, and TRANSFUSION SERVICES ORDER, TS 003 to the Transfusion Service as quickly as possible.
5	Transfuse red cells according to normal practice. The Transfusion Facility may send the empty bag to TS if applicable.
6	When compatibility testing is completed by the Transfusion Service, a COMPATIBILITY/TRANSFUSION RECORD is sent to the Transfusion Facility. <ul style="list-style-type: none"> <li>▪ Place the completed copy of COMPATIBILITY/TRANSFUSION RECORD with the copy of the ISSUE OF INCOMPATIBLE OR UNCROSSMATCHED BLOOD UNITS, TS 010 in the patient's chart.</li> </ul>

**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.

- An ISSUE OF INCOMPATIBLE OR UNCROSSMATCHED BLOOD UNITS, TS 010 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"> <li>▪ Name of patient</li> <li>▪ Date of birth</li> <li>▪ Patient's identification numbers (Facility Patient ID number or Blood Bank Armband number).</li> <li>▪ Name of person placing the order</li> <li>▪ Date and time of order</li> <li>▪ Physician's name</li> <li>▪ Quantity of red cells (maximum of 3 units), or other components, required</li> <li>▪ Facility name and phone number</li> </ul>
3	Facility personnel complete the ISSUE OF INCOMPATIBLE OR UNCROSSMATCHED BLOOD UNITS, TS 010 and obtain physician signature. <ul style="list-style-type: none"> <li>▪ Patient's specimen should be collected and labeled appropriately prior to transfusion of blood components.</li> </ul>
4	Fax the form to the Transfusion Service fax number: (509) 232-4487 <ul style="list-style-type: none"> <li>▪ Make a copy for Facility documentation.</li> </ul>
5	Send original ISSUE OF INCOMPATIBLE OR UNCROSSMATCHED BLOOD UNITS, TS 010, one properly labeled 7 mL EDTA patient sample, and TRANSFUSION SERVICES ORDER, TS 003, to the Transfusion Service as quickly as possible.

*Continued on next page*

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

Step	Action
6	Transfusion Service labels unit(s) as 'Emergency Issue, Uncrossmatched', with patient's name and unique numbers. <ul style="list-style-type: none"> <li>▪ TS keeps two segments (for red cell components), if applicable.</li> <li>▪ Red cell units must be O Negative or O Positive based on patient age/physician order.                             <ul style="list-style-type: none"> <li>▪ Other blood components will be supplied as ABO/Rh Compatible whenever possible.</li> <li>▪ Whole Blood and Granulocyte Concentrates are not available on an Emergency Basis.</li> </ul> </li> <li>▪ TS documents Donation Identification Number(s) on ISSUE OF INCOMPATIBLE OR UNCROSSMATCHED BLOOD UNITS, TS 010.</li> </ul>
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 COMPATIBILITY/TRANSFUSION RECORD is sent to the Transfusion Facility. <ul style="list-style-type: none"> <li>▪ Place the completed copy of COMPATIBILITY/TRANSFUSION RECORD with the copy of the ISSUE OF INCOMPATIBLE OR UNCROSSMATCHED BLOOD UNITS, TS 010 in the patient's chart.</li> </ul>

**Post  
Emergency  
Order Audit**

- A peer review of indication at the Facility is recommended.
- Diagnosis
  - Clinical indication for the emergency order
  - Supporting laboratory data, if available

**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 the 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 or Whole Blood	1 – 6C	
Plasma	≤ -18C when frozen	
	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	
	20 – 24C after thawing	
Granulocyte Concentrate	20 – 24C	Requires crossmatch, and 48 hour notification prior to need.

### NOTE:

- Components must be transfused within the expiration date indicated on the COMPATIBILITY/TRANSFUSION RECORD.
  - Refer to the Storage Considerations block on the next page.
- 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 of components <b>must</b> 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"> <li>▪ Destroy following appropriate regulation for disposal of biohazardous material using universal precautions.</li> </ul>
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.
- Fax copy of COMPATIBILITY/TRANSFUSION RECORD to the Transfusion Service marked appropriately, for utilization tracking purposes.
- If adverse reaction to transfusion occurs, initiate Transfusion Reaction Work up and return blood component, IV solutions, post reaction samples and completed REPORT OF TRANSFUSION REACTION, TS 009 to Transfusion Service.

**NOTE:**

- Blood storage equipment must be dedicated to blood components ONLY.
- NO food and/or chemicals or drugs may be stored in the equipment.
- The Transfusion Facility shall not return blood components to the Transfusion Service for credit unless appropriate blood storage equipment (approved by the Transfusion Service) is maintained.
  - If the Transfusion Service, in its sole discretion, agrees to accept a return, the blood components shall be returned to the TS in the original transport container within twenty-four (24) hours of packing. In no event will the Transfusion Service accept a return where it appears the transport container seal has been broken or where the blood and/or components or container have been damaged in any manner.



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

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## Signs and Symptoms of Transfusion Reactions (continued)

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"> <li>▪ Improper storage or shipping temperatures</li> <li>▪ Malfunctioning or improper use of blood warmers (use of microwave ovens or hot waterbaths)</li> <li>▪ Inadvertent freezing of red blood cells</li> </ul> <p>Mechanical hemolysis</p> <ul style="list-style-type: none"> <li>▪ Roller pumps, pressure infusion pumps, pressure cuffs</li> </ul> <p>Addition of drugs or hypotonic solutions to blood component or IV solutions</p>	<p>May present with symptoms similar to immune-mediated hemolysis</p>
Urticaria (Hives)	Mild allergic reaction to transfusion	<ul style="list-style-type: none"> <li>▪ Generalized or circumscribed rash, erythematous macular eruption</li> <li>▪ Hives</li> <li>▪ Itching</li> <li>▪ Usually without fever</li> </ul>
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"> <li>▪ Hoarseness, Stridor, wheezing, chest tightness, coughing, bronchospasm, respiratory distress</li> <li>▪ Localized or disseminated urticarial reaction may be present</li> <li>▪ Vascular instability, hypotension, cardiac arrhythmias, cardiac arrest</li> <li>▪ Nausea, abdominal cramps, vomiting</li> <li>▪ Diarrhea</li> <li>▪ Shock</li> </ul>

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## Signs and Symptoms of Transfusion Reactions (continued)

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"> <li>▪ Cough</li> <li>▪ Dyspnea</li> <li>▪ Chest pain</li> <li>▪ Shock</li> </ul>
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"> <li>▪ Acute respiratory insufficiency in the absence of evidence of circulatory overload.</li> <li>▪ No left atrial hypertension</li> <li>▪ Acute onset</li> <li>▪ Hypoxemia (capillary oxygen saturation decreases to &lt; 90% on room air)</li> <li>▪ Bilateral infiltrates on frontal chest x-ray</li> <li>▪ No other evidence of cardiac failure or reason for respiratory failure</li> </ul>
Transfusion Associated Circulatory Overload (TACO)	Acute pulmonary edema due to volume overload.	<ul style="list-style-type: none"> <li>▪ Dyspnea, orthopnea</li> <li>▪ Severe headache</li> <li>▪ Hypertension, tachycardia (usually concomitant)</li> <li>▪ Congestive heart failure</li> <li>▪ Acute pulmonary edema</li> </ul>
Metabolic reactions	Metabolic derangements resulting from large-volume transfusions.	<ul style="list-style-type: none"> <li>▪ Citrate toxicity</li> <li>▪ Hyperkalemia</li> <li>▪ Hypocalcemia</li> <li>▪ Hypothermia</li> <li>▪ Respiratory alkalosis</li> </ul>
Hypothermia	Depressed body temperature resulting from rapid infusion of large volumes of cold blood components.	<ul style="list-style-type: none"> <li>▪ Hypothermia</li> <li>▪ Cardiac arrhythmia or arrest</li> <li>▪ Exacerbation of underlying coagulopathy</li> </ul>

## 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"> <li>▪ Primary development of antibodies to red cell antigens</li> <li>▪ An anamnestic immune response of antibodies to red cell antigens that had fallen below the level of detection</li> </ul>	<ul style="list-style-type: none"> <li>▪ Fever</li> <li>▪ Decreasing hemoglobin</li> <li>▪ Mild jaundice</li> <li>▪ Signs of hemolysis in about 20 – 35% of sensitized recipients</li> <li>▪ Primary immune responses typically occur 14 – 30 days following transfusion</li> <li>▪ Anamnestic immune response usually occurs 3 – 10 days following transfusion</li> </ul>

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## Signs and Symptoms of Transfusion Reactions (continued)

Type of Reaction	Definition	Symptoms
Alloimmunization to leukocyte antigens <ul style="list-style-type: none"> <li>▪ Occurs in patients receiving repeated non-leukoreduced platelet transfusions and women with <math>\geq 4</math> pregnancies</li> </ul>	Development of antibodies to leukocyte (HLA) antigens	Signs of febrile non-hemolytic transfusion reactions
Refractoriness to platelet transfusion	<ul style="list-style-type: none"> <li>▪ Rapid clearance of transfused platelets</li> <li>▪ Non-immune causes related to the patients underlying condition are most common: Sepsis, drugs, DIC, etc</li> <li>▪ Immune causes include HLA or platelet specific antigen sensitization</li> </ul>	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"> <li>▪ Development of an antibodies to the HPA-1 platelet antigen</li> <li>▪ Abrupt onset of severe thrombocytopenia an average of 9 day post transfusion (range 1 – 24 days)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Precipitous fall in platelet count</li> <li>▪ Generalized purpura</li> </ul>
Iron overload <ul style="list-style-type: none"> <li>▪ Occurs in chronically transfused patients (&gt; 20 units per lifetime)</li> </ul>	Accumulation of iron and no physiologic means of excretion	<ul style="list-style-type: none"> <li>▪ Interference with heart, liver or endocrine gland function</li> <li>▪ Hepatic failure</li> <li>▪ Cardiac toxicity</li> </ul>
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"> <li>▪ Fever</li> <li>▪ Erythroderma, often starting on palms, soles, earlobes, and face, ranging from edema to full blistering</li> <li>▪ Enterocolitis</li> <li>▪ Pancytopenia</li> <li>▪ Mortality &gt; 90%</li> </ul>

**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"> <li>▪ <b>Do not disconnect the blood component.</b> <ul style="list-style-type: none"> <li>▪ Keep IV line open with slow infusion of saline.               <ul style="list-style-type: none"> <li>▪ Treatment of hypotension and promotion of adequate renal blood flow are primary concerns.</li> </ul> </li> <li>▪ Avoid over-hydration.</li> <li>▪ Ensure adequate renal perfusion by monitoring measurement of urine output to achieve a rate above 100 mL/hour in adults, or as appropriate.</li> </ul> </li> </ul>	
2	Notify the patient's physician immediately.	
3	<b>If</b>	<b>Then</b>
	Physician orders a Transfusion Reaction Work up	Discontinue the transfusion. <ul style="list-style-type: none"> <li>▪ Document in patient's chart.</li> <li>▪ Notify Transfusion Service.</li> <li>▪ Go to Step 4.</li> </ul>
	Physician does not order a Transfusion Reaction Work-up but a transfusion reaction is suspected.	<ul style="list-style-type: none"> <li>▪ Continue with transfusion following physician's orders.</li> <li>▪ Make note in patient's chart.</li> <li>▪ Go to Step 4</li> </ul>
4	Complete the REPORT OF TRANSFUSION REACTION, TS 009 or approved Transfusion Facility equivalent.	
5	Draw one 7 mL EDTA and one 7 mL Red Top specimen carefully to avoid hemolysis. Label with: <ul style="list-style-type: none"> <li>▪ Patient's name</li> <li>▪ Patient's unique ID numbers, including the Barcoded Blood Bank or Hospital ID number</li> <li>▪ Date and time of draw</li> <li>▪ Phlebotomist's initials</li> </ul>	
6	If symptoms include hypotension and fever (for red cells or platelets), bacterial contamination is a possibility. <ul style="list-style-type: none"> <li>▪ Draw a blood culture sample immediately and send to your microbiology reference laboratory for culture.</li> </ul>	

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## Process for Immediate Adverse Reactions (continued)

Step	Action
7	Submit blood component bag and attached infusion line/IV solutions, post reaction blood samples to Transfusion Service, along with the REPORT OF TRANSFUSION REACTION, TS 009 or approved Transfusion Facility equivalent.
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 TRANSFUSION SERVICES ORDER, TS 003 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 REPORT OF TRANSFUSION REACTION, TS 009 or approved Transfusion Facility equivalent for symptoms relating to a delayed transfusion reaction.
  - Complete a REPORT OF TRANSFUSION ASSOCIATED INFECTION, BS 314 or equivalent for symptoms relating to a transfusion transmitted disease.
- When completing the REPORT OF TRANSFUSION ASSOCIATED INFECTION, BS 314 or equivalent, 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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**Transfusion Administration**

The following table presents general transfusion information by blood component from the reference cited below. Facility SOPs may list other information.

Criteria	Red Blood Cells	Platelets/Plasma	Granulocytes	Cryoprecipitate
Venous Access	23 gauge or larger (18 gauge is preferred).	23 gauge or larger	20 gauge or larger	23 gauge or larger
Routine in-line filter	Particulate filter 170 – 260 microns			
Leukocyte reduction filter	May be used <b>NOTE:</b> Do not use on pre-storage leukocytes reduced components		Do not use	
Microaggregate filter	May be used	Do not use		
Product volume	~ 300 mL	150 – 270 mL	200 – 300 mL	~ 100 mL
Maximum time for transfusion	4 hours			As rapidly as tolerated
Avg. time for routine transfusion	1 – 2 hours	30 min – 1 hour	2 – 4 hours	
Slow rate	2 mL per minute		1 mL per minute	
Avg. rate	2 – 5 mL/minute	4 – 10 mL/minute or as tolerated	Do not give rapidly	

**NOTE:**

- Normal Saline is the dilution fluid of choice. Other solutions may be approved by the Transfusion Facility (ABO compatible plasma, 5% albumin and plasma protein fraction).
- Do NOT add Calcium or Dextrose-containing solutions or drugs to a component.
- Use of infusion pumps or blood warmers may require special tubing.
- Transfusion tubing should be used as defined by the vendor in their manufacturer’s instructions.

**Technical Questions**

If Transfusion Facility staff raises questions concerning the technical process of transfusion of a component that cannot be answered in the Transfusion Service, refer the person to their procedure manual, the Transfusion Facility Medical Director, or to the physician attending the patient.

**Reference**

Transfusion Therapy: Clinical Principles and Practice, 2<sup>nd</sup> Edition, Paul D. Mintz, MD, editor, AABB Press, 2005, pp 597-608.