**Blood Ordering v 4: Place Orders**

**Approval & Citation**

**Explanation of Evidence Ratings**

**Summary of Version Changes**

**Transfusion Reaction**

**Blood Product Attributes**

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**Inclusion Criteria**
- Blood ordered

**Exclusion Criteria**
- Outpatient preadmission for surgery (see next phase)

**Update Transfusion Profile**
- If **Additional Blood Product Attributes** needed based on diagnosis, complete Blood Component Transfusion Profile Form
  - May launch from Blood Bank Summary
  - Once charted, attributes will automatically be added to orders and Blood Bank Summary

**Will be Transfused**

**Order Transfusion (Set-Up IF NEEDED)**
- Review **Additional Blood Product Attributes**, update if needed
- Attributes will be added from transfusion profile
- Determine dose and rate of transfusion, see Job Aid: Blood Products (for SCH only)
- If needed, CIS prompts provider to order samples:
  - ABO/RhD and Antibody Screen (Type & Screen)
  - ABO/RhD (confirmatory), only needed for very first transfusion at Seattle Children’s
- If history of transfusion reaction or patient consistently febrile due to underlying disease or treatment, order premedications (consider postponing transfusion if patient’s temperature is increasing)

**Draw Sample(s)**
- If 2 ABO/RhD samples required, draw separately
- Use Blood Testing for Transfusion (PE1712) (for SCH only) for education

**Prepare and Deliver Product**
- Blood Bank receives order to prepare product
  - CIS blood bank summary shows “Available Product” when ready
  - Receiving staff requests blood product(s) using CIS blood bank summary release button (for SCH only) or calls Blood Bank if emergent
  - Blood Bank sends product
  - Receiving staff verifies that components are for the correct patient using CIS blood bank summary receive button
  - See P&P: Blood Component Ordering and Administration (for SCH only) for handling instructions

**Transfusion Needed?**
- Yes
  - Possibly (OR, procedure, etc.)

**Blood sample(s) required?**
- Yes
  - Draw Sample(s)

**May be Transfused**

**Order Set-Up ONLY**
- Review **Additional Blood Product Attributes**, update if needed
- Attributes will be added from transfusion profile
- If needed, CIS prompts provider to order samples:
  - ABO/RhD and Antibody Screen (Type & Screen)
  - ABO/RhD (confirmatory), only needed for very first transfusion at Seattle Children’s

**Blood sample(s) required?**
- Yes
  - Draw Sample(s)

**When Blood Product Needed, Order Transfusion**
- Order Transfuse Blood Products Plan
  - Exception: in operative services, anesthesiologist transfuses product as needed during procedure
  - Determine dose and rate of transfusion, see Job Aid: Blood Products, (for SCH only)
  - If history of transfusion reaction or patient consistently febrile due to underlying disease or treatment, order premedications (consider postponing transfusion if patient’s temperature is increasing)

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For questions concerning this pathway, contact: bloodordering@seattlechildrens.org
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Last Updated: June 2016
Next Expected Revision: February 2020
Inclusion Criteria
- Blood ordered preoperatively in outpatient setting

Exclusion Criteria
- Inpatient, OR

Review Blood Bank Summary

Confirm Transfusion Profile
- Update if needed

Has a transfusion profile been entered?

Yes

Order
- Consider ordering additional RBCs for surgery (crossmatch turn-around time is 1-4 hours)

No

Order Samples and Products
- Use Set-Up Blood Products Subphase EKM
  - Order ABO/RhD and Antibody Screen (Type & Screen)
  - Collect sample within 3 days of surgery
  - Order ABO/RhD (confirmatory) if required. Exception: Ortho Service orders in OR, not preoperatively.
  - If needed, order Red Blood Cells (Set-Up ONLY)
    - Priority: OR/Procedure
    - Enter surgery date/time

Confirm Transfusion Profile

Does patient have RBC antibodies?

Yes

Order Samples and Products
- Use Pre-admission Red Blood Cell Plan Subphase EKM
  - Preadmission Type & Screen is prechecked
  - Collect sample within 30 days of surgery
  - Order ABO/RhD (confirmatory) if required. Exception: Ortho Service orders in OR, not preoperatively.
  - If needed, order Red Blood Cells (Set-Up ONLY)
    - Priority: Preadmission
    - Enter surgery date/time

No

Patient pregnant or transfused in past 3 months?

Yes

Order Samples and Products
- Use Set-Up Blood Products Subphase EKM
  - Order ABO/RhD and Antibody Screen (Type & Screen)
  - Collect sample within 3 days of surgery
  - Order ABO/RhD (confirmatory) if required. Exception: Ortho Service orders in OR, not preoperatively.
  - If needed, order Red Blood Cells (Set-Up ONLY)
    - Priority: OR/Procedure
    - Enter surgery date/time

No

During procedure, use Place Order phase

Phase Change

Transfusion Reaction

Blood Product Attributes

Summary of Version Changes
- Last Updated: June 2016
- Next Expected Revision: February 2020
Blood Ordering v 4: Transfusion Reaction, Increase in Temperature

**Inclusion Criteria**
- Blood transfusion in process or completed

**Exclusion Criteria**
- None

**Immediate Actions:**
- STOP TRANSFUSION IMMEDIATELY (do not discard)
- Keep IV line open
- Stay with and assess patient
- Ask for help if needed

- Repeat patient/component ID check
- Call provider to assess patient
- Document vital signs every 5-10 minutes and actions taken

**Symptoms**
- <1°C above baseline and no other new symptoms

**Possible febrile non-hemolytic**
Cytokines in the blood product causing fever

**Possible hemolytic transfusion reaction**
Hemolysis from transfusion of ABO incompatible RBCs, fever may be initial symptom, see Transfusion Reaction: Other → Hemolytic transfusion reaction

**Bacteremia**
Bacterial contamination from handling blood product or bacteremia in donor (more common in platelets)

**Intervention**
- Continue transfusion if stable and no other symptoms

- Give acetaminophen
- Consider blood cultures (patient), empiric antibiotics if neutropenic
- Do NOT restart transfusion
- Strongly consider culturing blood product if >2°C increase in temperature or if high clinical suspicion of sepsis
- Complete "Report of Suspected Transfusion Reaction" (pink PSBC form), send product + NEW sample to Blood Bank

**Report**
- Order Transfusion Reaction Workup PSBC Orderset in CIS
- Report fatalities, unanticipated reactions, serious complications, or suspected disease transmission possibly related to transfusion of blood or blood components to the Blood Bank physician on-call at (206) 987-5151 as soon as possible
- Blood Bank physician reviews all reported reactions
- Puget Sound Blood Center Regulatory Affairs staff notifies FDA when required.

For questions regarding transfusion diagnosis or management, call the Blood Bank at 7-5151 for the Blood Bank physician on call, available 24/7.
Blood Ordering v 4: Transfusion Reaction, Allergic Reaction

Inclusion Criteria
- Blood transfusion in process or completed

Exclusion Criteria
- None

Immediate Actions:
- STOP TRANSFUSION IMMEDIATELY (do not discard)
- Repeat patient/component ID check
- Keep IV line open
- Call provider to assess patient
- Stay with and assess patient
- Document vital signs every 5-10 minutes and actions taken
- Ask for help if needed
- DISCONTINUE TRANSFUSION

Urticaria (Hives only)
Patient has allergic sensitivity (pre-formed IgE causing mast cell histamine release) to antigen in blood product/donor.

Symptoms
Mild hives, rash, or itching on skin ONLY

Intervention
- Antihistamines
- If symptoms resolve, may slowly resume transfusion
- If symptoms do not improve, or worsen or recur, then DISCONTINUE TRANSFUSION
- When transfusion completed/discontinued, complete "Report of Suspected Transfusion Reaction" (pink PSBC form), neither sample or product required to be sent to Blood Bank

Possible allergic reaction
Patient has allergic sensitivity (pre-formed IgE causing mast cell histamine release) to antigen in blood product/donor. Severity ranges from mild (skin only) to anaphylaxis.

Symptoms
Hives, rash, or itching with any other new symptoms

Intervention
- Antihistamines
- DO NOT restart transfusion
- Complete "Report of Suspected Transfusion Reaction" (pink PSBC form), send product + sample to Blood Bank

Possible anaphylaxis
(may occur with only a few mLs of blood)
Allergic sensitivity as above; possible etiology is antigen-antibody complexes involving antibodies to IgA.

Symptoms
Cough, respiratory distress, absence of fever, shock, hypotension, nausea, emesis, abdominal cramps

Intervention
- Treat symptoms as indicated (epinephrine, antihistamines, steroids, oxygen/respiratory support)
- DO NOT restart transfusion
- Order washed blood products for future transfusions
- Complete "Report of Suspected Transfusion Reaction" (pink PSBC form), send product + new sample to Blood Bank

Report
- Order Order Transfusion Reaction Workup PSBC Orderset in CIS
- Report fatalities, unanticipated reactions, serious complications, or suspected disease transmission possibly related to transfusion of blood or blood components to the Blood Bank physician on-call at (206) 987-5151 as soon as possible
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For questions regarding transfusion diagnosis or management, call the Blood Bank at 7-5151 for the Blood Bank physician on call, available 24/7.
Summary of Version Changes

Immediate Actions:

- STOP TRANSFUSION IMMEDIATELY (do not discard)
- Keep IV line open
- Stay with and assess patient
- Ask for help if needed

- Repeat patient/component ID check
- Call provider to assess patient
- Document vital signs every 5-10 minutes and actions taken

Reaction Cause

Hemolytic transfusion reaction
Can be due to transfusion of ABO incompatible blood resulting in hemolysis of red cells (mistransfusion), mechanical, or due to alloantibodies.

Fluid overload
Infusion too rapid, or too much volume to a cardiovascularly decompensated patient

Transfusion Related Acute Lung Injury (TRALI)
Donor WBC antibodies react with recipient WBCs, resulting in WBC activation and agglutination in lungs (like acute respiratory distress syndrome), causing damage

Symptoms

Fever, chills, rigors, hypotension, hemoglobinemia, hemoglobinuria, lumbar pain, shock, dyspnea, diaphoresis, anxiety (impending sense of doom) chest pain, restlessness, disseminated intravascular coagulation (DIC)

Coughing, dyspnea, cyanosis, pulmonary edema, elevated systolic blood pressure, increased central venous pressure, headache

Within 6 hours post-transfusion

Intervention

- Rapid hydration; blood pressure, renal, and respiratory support
- Do NOT restart transfusion

- Administer oxygen and diuretics
- Fowler’s position
- Do NOT restart transfusion

- Administer oxygen
- Call RRT or CODE as necessary
- Do NOT restart transfusion

Report

- Complete “Report of Suspected Transfusion Reaction” (pink PSBC form), send product and new sample to Blood Bank
- Order Transfusion Reaction Workup PSBC Orderset in CIS
- Report fatalities, unanticipated reactions, serious complications, or suspected disease transmission possibly related to transfusion of blood or blood components to the Blood Bank physician on-call at (206) 987-5151 as soon as possible
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### Indications for Blood Product Attributes

For all infants LESS THAN 4 months, Irradiated and Hemoglobin S negative products are automatically provided. Attributes may be subject to review and approval by transfusion medicine service.

<table>
<thead>
<tr>
<th>Patient Type</th>
<th>Select Additional Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oncology or severe Immunodeficiency</td>
<td>Irradiated</td>
</tr>
<tr>
<td>Cardiac surgery</td>
<td>If LESS THAN 2 years: Irradiated</td>
</tr>
<tr>
<td>Volume Sensitive or History of repeated transfusion reaction (Check Blood Bank Summary)</td>
<td>Volume reduced</td>
</tr>
<tr>
<td>Hemoglobinopathy</td>
<td>Rh/K antigen-selected</td>
</tr>
<tr>
<td></td>
<td>If sickle cell disease: Hemoglobin S negative</td>
</tr>
<tr>
<td>History of SEVERE Transfusion Reaction (e.g. anaphylaxis)</td>
<td>Washed (requires Blood Bank Medical Director approval)</td>
</tr>
<tr>
<td>Transplant patient</td>
<td>Select TRANSPLANT tab to provide additional instructions to the blood bank.</td>
</tr>
</tbody>
</table>

### Description of Available Blood Product Attributes

<table>
<thead>
<tr>
<th>Applicable Blood Products</th>
<th>Leukoreduced Filtered to decrease number of WBC's (leukocytes), but does not remove all of them</th>
<th>Irradiated Gamma irradiation or x-ray prevents WBC's from replicating, but does not remove them</th>
<th>CMV(^1) Negative Donated products that test CMV negative</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Blood Cells</td>
<td>Automatically in all products</td>
<td>Available</td>
<td>Ø Use</td>
<td>Decreases HLA allo-immunization(^2), which can result in transfusion reactions or platelet refractorinuses(^4). Decreases rate of febrile transfusion reactions. Makes product CMV-safe.</td>
</tr>
<tr>
<td>Platelets</td>
<td>Automatically in all products</td>
<td>Available</td>
<td>Ø</td>
<td>Reduce risk of TA-GVHD(^5)</td>
</tr>
<tr>
<td>Plasma (FFP)</td>
<td>Ø</td>
<td>Ø</td>
<td>n/a</td>
<td>Decreases risk of acquiring CMV disease</td>
</tr>
<tr>
<td>Cryoprecipitate (Cryo)</td>
<td>Ø</td>
<td>Ø</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Granulocytes (Neutrophils)</td>
<td>Ø</td>
<td>Automatically in all products</td>
<td>Available(^3)</td>
<td></td>
</tr>
</tbody>
</table>

Ø = Attribute unavailable for product; n/a = not applicable

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\(^1\) Virus of Herpes family; can be latent (remaining in the body for life) & never develop into active disease. Data suggests latent form can become active in recipient.

\(^2\) Granulocyte products are provided CMV negative and cannot be leukoreduced. All granulocyte transfusions must be irradiated.

\(^3\) Recipient develops HLA antibodies to antigens on donor platelets and/or WBC’s.

\(^4\) Lack of therapeutic response to platelet transfusion

\(^5\) Transfusion Associated Graft vs. Host Disease (TA-GVHD) occurs when recipient tissues are attacked by lymphocytes in the donor blood. TA-GVHD is a highest risk for immunocompromised patients and is over 90% fatal. Because irradiation increases potassium concentration in storage over time and shortens expiration date, it is only recommended for patients at risk for developing TA-GVHD.
Definitions

Serious complications:
- Hemolytic transfusion reaction
- Bacterial contamination
- Transfusion-related acute lung injury
- Transfusion-associated graft versus host disease
- Post-transfusion purpura

Suspected disease transmission (transfusion-transmitted infection) may include:
- Bacterial contamination
- Hepatitis A, B, or C
- Chagas Disease
- HTLV-1 and HTLV-2
- Syphilis
- West Nile Virus
- Human Immunodeficiency Virus (HIV)
Blood Ordering Approval & Citation

Approved by the CSW Blood Ordering for July 29, 2015

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Surgeon-in-Chief
Bob Sawin, MD

Retrieval Website: http://www.seattlechildrens.org/pdf/blood-ordering-pathway.pdf

Example:
This pathway was developed through local consensus based on published evidence and expert opinion as part of Clinical Standard Work at Seattle Children’s. Pathway teams include representatives from Medical, Subspecialty, and/or Surgical Services, Nursing, Pharmacy, Clinical Effectiveness, and other services as appropriate.

When possible, we used the GRADE method of rating evidence quality. Evidence is first assessed as to whether it is from randomized trial or cohort studies. The rating is then adjusted in the following manner (from: Guyatt G et al. J Clin Epidemiol. 2011;4:383-94.):

Quality ratings are *downgraded* if studies:
- Have serious limitations
- Have inconsistent results
- If evidence does not directly address clinical questions
- If estimates are imprecise OR
- If it is felt that there is substantial publication bias

Quality ratings are *upgraded* if it is felt that:
- The effect size is large
- If studies are designed in a way that confounding would likely underreport the magnitude of the effect OR
- If a dose-response gradient is evident

Guideline – Recommendation is from a published guideline that used methodology deemed acceptable by the team.

Expert Opinion – Our expert opinion is based on available evidence that does not meet GRADE criteria (for example, case-control studies).

**Quality of Evidence:**
- ⭐⭐⭐⭐⭐ High quality
- ⭐⭐⭐⭐ Moderate quality
- ⭐⭐⭐⭐ Low quality
- ⭐⭐⭐⭐⭐ Very low quality

Guideline
Expert Opinion
Summary of Version Changes

- **Version 1 (2/11/2015):** Go live
- **Version 2 (5/27/2015):** Fixed box errors in Preadmit phase
- **Version 3 (7/29/2015):** Implemented electronic process to request and verify receipt of blood products
Medical Disclaimer

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