

Transfusions in the CDU

By: Elizabeth Lee, MD

Inclusion Criteria

- Patient is hemodynamically stable
- Source of hemorrhage is identified and treated
- Appropriate consults obtained in ED (JATS/Gyn/Surgery/GI/Heme)
- Probability of discharge > 80%

Exclusion Criteria

- Hemodynamically unstable/abnormal vital signs prior to transfusion
- Unknown source of bleeding
- Patient requiring more than 1 blood product
- Informed consent unable to be obtained by ED physician
- Patient with sickle cell disease requiring transfusion (unless cleared by hematology)

Hospital Admission

- Unstable patient
- Transfusion reaction*
- Patient requires repeat transfusion
- Patient with inappropriate rise in hemoglobin with active bleeding

*What to watch out for:

Transfusion Reactions

Potentially life-threatening

- TRALI
- TACO
- Acute hemolytic transfusion reactions
- Transfusion-associated sepsis
- Anaphylactic transfusion reactions
- Post-transfusion purpura

Non-life-threatening

- Urticarial (allergic) transfusion reactions
- Febrile nonhemolytic transfusion reactions
- Primary hypotensive reactions

TRALI and TACO

- Management
 - Stop transfusion
 - Order stat portable CXR, BNP
 - Call RRT if patient is unstable
 - **Admit to inpatient**

Helpful features in distinguishing TRALI and TACO

Feature	TRALI	TACO
Body temperature	Fever may be present	Unchanged
Blood pressure	Hypotension may be present	Hypertension may be present
Respiratory symptoms	Acute dyspnea	Acute dyspnea
Neck veins	Unchanged	May be distended
Auscultation	Rales	Rales and S3 may be present
Chest radiograph	Diffuse bilateral infiltrates	Diffuse bilateral infiltrates
Ejection fraction	Normal	Decreased
PAOP	Most often 18 mmHg or less	Greater than 18 mmHg
Pulmonary edema fluid	Exudate	Transudate
Fluid balance	Neutral or negative	Positive
Response to diuretics	Inconsistent	Significant improvement
White cell count	Transient leukopenia may be present	Unchanged
BNP	<250 pg/mL	>1200 pg/mL

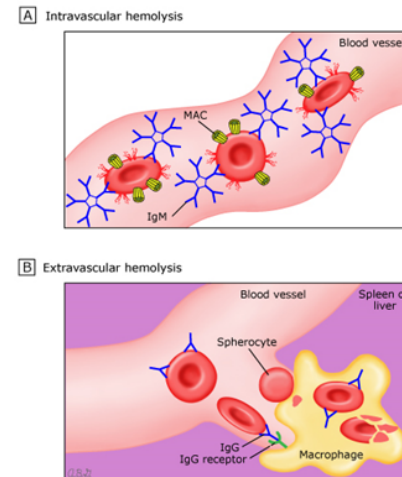
TRALI: transfusion-related acute lung injury; TACO: transfusion-associated circulatory overload; PAOP: pulmonary artery occlusion pressure; BNP: brain natriuretic peptide.

Modified with permission from: Skeate RC, Eastlund T. Distinguishing between transfusion related acute lung injury and transfusion associated circulatory overload. Curr Opin Hematol 2007; 14:682. Copyright © 2007 Lippincott Williams & Wilkins.

Hemolytic Transfusion Reactions

- Acute- during or within 24 hours after transfusion
 - Rapid intravascular hemolysis
 - Sx: "fever, flank pain, red urine"
 - Fever, chills, chest/back pain, red/pink serum or urine
 - **Admit to inpatient**
- Delayed- days to weeks after transfusion

Differences between mechanisms of intravascular and extravascular immune hemolysis



A: Intravascular hemolysis occurs when complement is fixed and red blood cells lyse in the circulation, releasing free hemoglobin. Lysis occurs because the membrane attack complex (MAC) creates holes in the red blood cell membrane. Typically IgM is responsible for fixing complement (as shown) although other mechanisms may be involved.

B: Extravascular hemolysis occurs when reticuloendothelial macrophages (mostly in the liver and spleen) phagocytose antibody (or complement component C3)-coated red blood cells. This can occur in stages, with production of spherocytes and microspherocytes that are trapped in splenic sinusoids, or all at once. Refer to UpToDate topics on immune hemolysis and hemolytic transfusion reactions for details.

Anaphylactic Transfusion Reaction

- Rare, rapid onset (shortly after starting transfusion), can be preceded by urticarial symptoms
- Diagnosis
 - Shock, hypotension, angioedema, respiratory distress, and/or wheezing
- Management
 - Stop transfusion
 - Give Epinephrine 0.3ml of 1:1000 solution IM
 - Call RRT
 - Airway maintenance and oxygenation
 - Resuscitate hypotension with IVF bolus
 - Prepare for IV epi drip if needed
 - Vasopressors (eg dopamine) if needed
 - **Admit to appropriate service**

Post-transfusion Purpura

- Extremely rare, can occur within hours of transfusion up to 10 days
- Diagnosis
 - Severe thrombocytopenia (plt < 20,000) with purpura, petechia
- Management
 - Consult hematology/JATS for possible IVIG, steroids, exchange transfusion
 - **Admit to inpatient service**

Urticarial Transfusion Reactions

- Common, hives can appear during/at the end/shortly after transfusion
- Diagnosis
 - Rash without progression to more severe symptoms
- Management
 - Stop transfusion
 - Administer diphenhydramine
 - Resume transfusion if rash resolves without dyspnea, hypotension, or anaphylaxis
 - Monitor in CDU if rash persists and no concern for anaphylaxis
 - **Admit for symptom progression**

Febrile Nonhemolytic Transfusion Reaction

- Most common, children > adults, all types of blood products, products that have not been leukoreduced (removal of donor leukocytes)
- Management
 - Stop transfusion
 - Administer antipyretic for fever
 - Evaluate for other causes of fever
 - Admit to r/o infection if considered high likelihood of infection or for management of severe symptoms (rigors, chills, persistent fever)

Primary Hypotensive Reaction

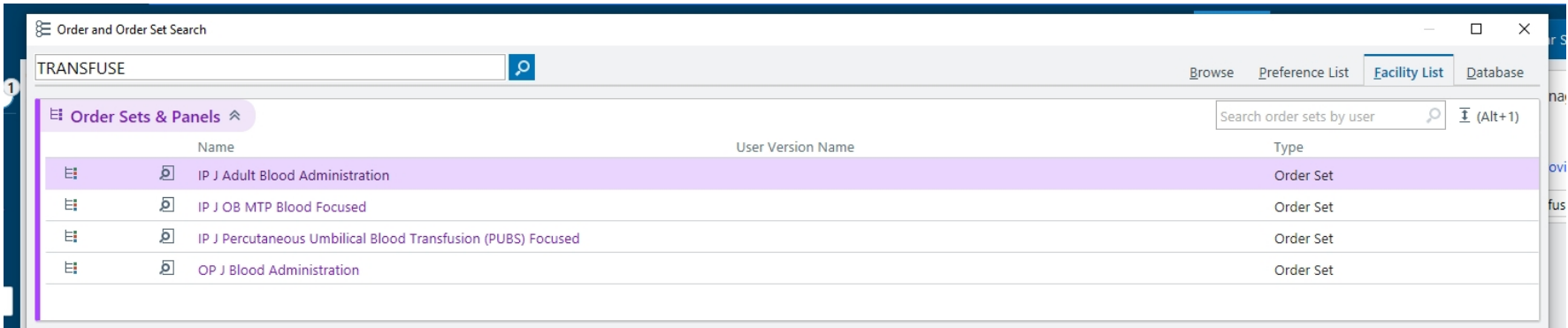
- Rare
- Diagnosis
 - Drop in systolic blood pressure by 30mmHg or more within minutes of onset of transfusion returning to baseline once transfusion is stopped, not associated with other causes
- Management
 - Avoid ACE inhibitors prior to planned transfusion
 - Stop transfusion
 - **Admit if patient has symptomatic anemia requiring management**

If a reaction occurs:

- Stop transfusion
- Assess patient and call RRT if patient is unstable
- Confirm correct product was transfused and order labs if appropriate
- Admit if patient requires treatment for symptomatic anemia

Ordering a Transfusion

- Under Order Sets you will see **IP J Adult Blood Administration** if you search for "transfuse"



The screenshot shows a software interface titled "Order and Order Set Search". At the top, there is a search bar containing the text "TRANSFUSE". To the right of the search bar are buttons for "Browse", "Preference List", "Facility List", and "Database". Below the search bar, there is a section titled "Order Sets & Panels" with a search input field labeled "Search order sets by user" and a magnifying glass icon. Below this, a table displays the search results. The table has three columns: "Name", "User Version Name", and "Type". The first row is highlighted in purple and contains the text "IP J Adult Blood Administration" under "Name", an empty field under "User Version Name", and "Order Set" under "Type". The other three rows are not highlighted and contain: "IP J OB MTP Blood Focused", "IP J Percutaneous Umbilical Blood Transfusion (PUBS) Focused", and "OP J Blood Administration", all with "Order Set" as their type.

Name	User Version Name	Type
IP J Adult Blood Administration		Order Set
IP J OB MTP Blood Focused		Order Set
IP J Percutaneous Umbilical Blood Transfusion (PUBS) Focused		Order Set
OP J Blood Administration		Order Set

• Leave these checked under Nursing section

▼ Nursing

▼ Transfusion Interventions

- Suspected Transfusion Reaction
- Nursing Blood Protocol

Transfusion Reaction Management

Routine, Once, First occurrence today at 2319

For Suspected Transfusion Reaction: 1) Stop transfusion. Keep IV line open with normal saline. 2) Complete transfusion reaction form. 3) Notify blood bank of reaction. 4) Draw blood for STAT hemoglobin, haptoglobin, LDH, indirect bilirubin and send to blood bank with blood products and collect clean urine specimen 5) Contact ordering physician.

Vital Signs: Ongoing

Ongoing, starting today at 2319, Until Specified, Record pre-transfusion vital signs; notify physician of significant changes or if the temperature is > 100°F. Observe patient every 15 minutes after initiation of transfusion for the first 30 minutes and then at least every hour until transfusion is completed.

▼ Labs

▼ Blood Bank Tests

Type and Screen Indications

Red Blood Cells

- within 3 days
- SDA/PAT specimens can extend up to 28 days prior to date of surgery (if no transfusion or pregnancy within 3 months)

Platelets

- on file in blood bank

Plasma

- within that admission

Cryoprecipitate

- on file in blood bank

Granulocytes

- within 3 days

Type and Screen

Blood - Once, First occurrence today at 2319

Blood

- Order post-transfusion labs here

▼ Pre-Transfusion Labs

- Hemoglobin and Hematocrit
Once, Prior to transfusion.
- CBC
Once, Prior to transfusion.
- Protime-INR
Once, Prior to transfusion.
- PTT
Once, Prior to transfusion.
- Fibrinogen
Once, Prior to transfusion.

▼ Post-Transfusion Labs

- Hemoglobin and Hematocrit
Once, After transfusion completed.
- CBC
Once, After transfusion completed.
- Fibrinogen
Once, After transfusion completed.
- Protime-INR
Once, After transfusion completed.
- PTT
Once, After transfusion completed.

- Order blood products here

▼ Transfusion Orders

▼ Blood Products - Adult

- Adult Blood Administration - Red Blood Cells
- Adult Blood Administration - Platelets
- Adult Blood Administration - Frozen Plasma
- Adult Blood Administration - Cryoprecipitate
- Adult Blood Administration - Granulocytes

- Must order BOTH "Prepare" AND "Transfuse"


▼ Transfusion Orders

▼ Blood Products - Adult


Adult Blood Administration - Red Blood Cells

Step 1: enter info in 'Prepare' order and click Accept (*one way send info*)
Step 2: 'Transfuse' order receives info* from 'Prepare' order
*** Exception of Priority (Routine/Stat) must be made manually updated**

Prepare Red Blood Cells , 1 Units

 Routine
Prepare 1 Units

Transfuse Red Blood Cells, 1 Units

 Routine
Transfuse 1 Units

Adult Blood Administration - Platelets

Adult Blood Administration - Fresh Plasma

Prepare Products

- Change priority to STAT
- Infusion location Inpatient/ED

Step 1: enter info in 'Prepare' order and click Accept (one way send info)
 Step 2: 'Transfuse' order receives info* from 'Prepare' order
 * Exception of Priority (Routine/Stat) must be made manually updated

Transfuse Products

- Change to STAT
- Transfusion time for floor may vary

Step 1: enter info in 'Prepare' order and click Accept (one way send info)
 Step 2: 'Transfuse' order receives info* from 'Prepare' order
 * Exception of Priority (Routine/Stat) must be made manually updated

Call attending or admin on call with questions

References

- <https://www.uptodate.com/contents/approach-to-the-patient-with-a-suspected-acute-transfusion-reaction>
- <https://www.uptodate.com/contents/immunologic-transfusion-reactions>

Further reading

- <https://www.uptodate.com/contents/indications-and-hemoglobin-thresholds-for-red-blood-cell-transfusion-in-the-adult>
- <https://www.uptodate.com/contents/massive-blood-transfusion>
- <https://www.uptodate.com/contents/the-approach-to-the-patient-who-declines-blood-transfusion>
- <https://www.uptodate.com/contents/transfusion-related-acute-lung-injury-trali>
- <https://www.uptodate.com/contents/transfusion-associated-circulatory-overload-taco>