Banner Health

Title: **Whole Blood Transfusion**	
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Next Review Date: 09/05/2027	**Author**: Laura Stephens, MD, Andrew Tang, MD, Bellal Joseph, MD, Paul Dabrowski, MD, Patrick Bosarge, MD, Ricardo Hernandez, Greg Coons, MD, System Blood Bank
Approved by: Banner Health Trauma System Steering Council, BDMC Medical Executive Committee, BDMC Trauma Committee, BTMC Medical Executive Committee, BTMC Trauma Committee, B—UMCP Medical Executive Committee, B—UMCP Trauma Committee, B—UMCT Trauma Operations Committee, B—UMCT Transfusion Committee Chairs, System Blood Bank Staff, PolicyTech Administrators, 09/05/2024	
Discrete Operating Unit/Facility: **Hospitals** Banner Desert Medical Center Banner North Colorado Medical Center Banner Thunderbird Medical Center Banner--University Medical Center Phoenix Banner--University Medical Center Tucson Wyoming Medical Center	

I. Purpose and Population:

A. **Purpose**: To standardize the management of resuscitation with whole blood

B. **Scope**: The use of whole blood will be limited to the following patients:

1. All adult male patients
2. All adult female patients of any age (see **Section IV and Appendix** for guidance)
3. Pediatric trauma patients ≥ 2 years old (see **Section IV and Appendix** for guidance)
4. Other patients, at the discretion of the Laboratory Pathologist/Transfusion Medicine physician

II. Definitions:

A. Low-titer group O whole blood (also known as universal whole blood or WB):

1. Approximately 500 mL unit of whole blood
2. May be group O-negative or group O-positive
3. Contains red blood cells (RBC), plasma, and platelets in an anticoagulant-preservative
4. Contains low titers of anti-A and anti-B isoagglutinins in the plasma
5. Donated from aspirin-free donors selected by transfusion-related acute lung injury (TRALI) risk mitigation techniques
6. Pre-storage leukoreduced via a platelet-sparing filter
7. Stored at 1-6°C for up to 21 days

B. Low titer is defined as anti-A and anti-B titers of less than 200, in accordance with labeling by the blood suppliers, the American Red Cross and Vitalant.

NOTE: WB units are not irradiated, cannot be returned to the blood supplier, and cannot be separated into individual components.

III. Background:

A. Hemorrhagic shock is the most common cause of preventable death in civilian and combat trauma.

B. Early intervention with blood products in patients with traumatic bleeding saves lives.

C. Component therapy that approximates WB (i.e., RBCs, plasma, and platelets in a 1:1:1 ratio) has been associated with improved survival in the management of hemorrhagic traumatic shock. According to the Banner Health Massive Transfusion Protocol (MTP) policy, MTP shipments of components are site-specific but in an approximate 1:1:1 ratio.

D. The use of WB in early resuscitation has several advantages over individual component therapy: WB delivers plasma, platelets, fibrinogen, and RBCs in the correct ratio, in one bag, at one time, with minimal processing and with simplified administration. Compared to individual components, WB also contains less physiologically inert fluid that does not contribute to hemostasis or oxygen delivery.

E. According to current regulatory standards, WB administered to a recipient must either be ABO-identical to the recipient or low-titer group O WB. Selecting low-titer group O WB for patients whose blood type is unknown or has not been confirmed mitigates the risk of hemolysis from isoagglutinins (e.g., anti-A antibodies hemolyzing RBCs in a group A patient).

F. Only 7% of the blood donor population has O-negative (or O, RhD-negative) blood. The availability of O-negative and/or O-positive WB is dependent on the blood supplier.

G. Selection of RhD-positive or RhD-negative WB should consider female patients of childbearing age. RhD-negative women of childbearing potential (defined by Banner Health as < 50 years of age) are at risk of developing anti-RhD antibodies if transfused with O-positive (or O, RhD-positive) WB. Anti-D antibodies are clinically significant and can cause severe hemolytic disease of the fetus and newborn in future pregnancies with an RhD-positive conceptus.

H. Published statistical analysis predicts the risk of anti-D alloimmunization and fetal death from exposing a massively bleeding RhD-negative female trauma patient to RhD-positive blood is less than 0.5%.

I. Therefore, given that RhD-negative WB may not always be available, massively bleeding female patients of childbearing age who are RhD-negative or RhD-unknown should not be denied potentially life-saving RhD-positive treatment out of fear of anti-D alloimmunization. The decision to transfuse will be at the discretion of the attending trauma physician.

J. Data on the use of WB in pediatric civilian trauma patients are limited, but current data suggest that WB transfusion of up to 20 mL/kg is safe in children with severe injuries. This limit may change based on institutional and national experience and the WB policy may be revised, as needed.

IV. Policy:

A. Low-titer group O whole blood (WB) is activated for trauma patients who are in hemorrhagic shock and meet criteria for emergency blood release and initiation of a massive transfusion protocol (MTP).

1. The MTP may be activated in conjunction with the transfusion of WB; adult or pediatric weight-based MTPs may be activated, according to site-specific policies.

2. Adult patients may receive as many WB units as there are available in the inventory (i.e., there is no limit to the number of WB units a single patient may receive in a trauma setting).

3. Pediatric patients may receive up to 20 mL/kg of WB.

4. WB units will be stored in the remote blood refrigerator for immediate availability. If a remote refrigerator is unavailable or not operational, WB units will be stored in the Blood Bank.

5. The Blood Bank will procure WB as a standing order from the applicable blood supplier. Demand will be monitored to adjust the delivery volume and schedule, as needed.

B. The selection of RhD-positive or RhD-negative units will be guided by the site-specific policy (see APPENDIX).

C. The decision to transfuse WB with respect to patient sex, patient age, patient Rh status, and WB Rh status is at the discretion of the attending trauma physician.

D. The Laboratory Pathologist/Transfusion Medicine physician should be notified if RhD-positive WB is transfused to a female < 50 years of age with a confirmed RhD-negative blood type.

E. If WB units have not been replenished in time for another suitable trauma patient, standard blood products will be issued for the resuscitation.

F. Nursing staff shall transfuse WB per standard Banner Health blood administration protocols:

1. Verify the information on the transfusion record, attached tie tag, and blood product label match.
2. Sign the transfusion record after verification and return it to the Blood Bank.
3. Administer the unit using blood administration tubing and through a dedicated line with 0.9% normal saline.
4. Employ the use of blood warming devices for rapid, large-volume transfusions.
5. Monitor temperature, blood pressure, pulse, and respirations immediately prior to the initiation of transfusion and 15 minutes after the transfusion is initiated.
6. Complete the transfusion record documentation per Banner Health protocols.

G. Low-titer group O whole blood may also be transfused to other patients, at the discretion of the Laboratory Pathologist/Transfusion Medicine physician.

V. Procedural Details and Documentation:

A. Transfusion initiation

1. The Blood Bank shall be notified as soon as possible if a trauma patient requires WB resuscitation, following policy: Removal of Uncrossmatched Blood from a Remote Refrigerator (#1212).

   NOTE: If the local facility does not utilize a remote refrigerator, the local policy will be followed with Blood Bank delivering agreed upon units of blood in an approved cooler to the designated ED area with communication to the designated team member.

2. A type and cross blood sample must be submitted to the Blood Bank as soon as possible.

3. The transfusing physician must sign the Emergency Transfusion Request Form (ETRF), since they are uncrossmatched. The signed form(s) must be returned to the Blood Bank either during or following the completion of the transfusion(s).

4. WB units removed from the remote blood refrigerator that are not transfused should never be returned to the fridge—they should immediately be returned to the Blood Bank. WB units delivered in approved coolers that are not transfused should be returned to the Blood Bank.

B. Patient monitoring

1. Any patient transfused with WB should be monitored for signs and symptoms of a transfusion reaction per standard Banner Health protocol.

2. If a transfusion reaction is reported during the WB transfusion, the Blood Bank will switch to offering component therapy (e.g., RBCs, plasma, and platelets).

3. Monitoring of laboratory tests will be done at the discretion of the attending physician, resident, fellow, or licensed independent practitioner.

   a. Measurement of haptoglobin, total bilirubin, lactate dehydrogenase (LDH), and direct antiglobulin testing may be useful to evaluate for a hemolytic transfusion reaction.
   b. Thromboelastographic testing is recommended to help guide subsequent component therapy.

C. Consultation

1. Please contact the Blood Bank at any time for assistance or product requests. A Laboratory Pathologist/Transfusion Medicine physician is available during the daytime, and an on-call Laboratory Pathologist is available after hours and on weekends.

VI. References:

A. AABB Technical Manual, current edition.
B. AABB Standards for Blood Banks and Transfusion Services, current edition.
C. *Annals of Surgery*. 2013;258(4): 527–533.
D. *JAMA.* 2015;313(5):471-482.

E. JAMA Pediatr. 2018;172(5):491-492.
F. *J Trauma Acute Care Surg.* 2016;81(1):21-26
G. *J Trauma Acute Care Surg.* 2017;84 Suppl 1:S14-7.
H. Shock. 2014;41 Suppl.1:62-69.
I. *Transfusion*. 2016;56 Suppl 2:S190-202.
J. *Transfusion*. 2018;58:622–628.
K. *Transfusion*. 2019;59;3794–3799.

VII. Other Related Policies/Procedures:

A. Massive Transfusion Protocol
B. Blood and Blood Component Administration, Adult
C. Neonatal and Pediatric Blood Component Administration
D. Removal of Uncrossmatched Blood from a Remote Refrigerator
E. Transfusion Reaction

VIII. Keywords and Keyword Phrases:

A. Whole blood (WB)
B. Low titer group O whole blood (LTOWB)
C. Massive Transfusion Protocol (MTP)
D. Hemorrhage
E. Transfusion
F. Blood
G. Trauma

IX. Appendix:

A. Appendix A: Site-specific guidelines for product selection.

Appendix A

Site-specific guidelines for product selection.

B—UMCT:

1. The selection of RhD-positive or RhD-negative units should consider the patient's sex, age, and RhD-status, as shown in the table below.

2. The decision to transfuse WB units of any Rh type is ultimately at the discretion of the attending physician and may depend on product availability. The decision to activate a concurrent massive transfusion protocol is also at the discretion of the attending physician.

    a. For instance, a trauma surgeon may elect to transfuse O-positive WB to a hemorrhaging RhD-unknown female patient < 50 years of age if O-negative WB units are exhausted or unavailable.

Patients who should receive O-negative WB (when available)	**Patients who may receive O-negative and/or O-positive WB (when available)**
Females < 50 years with an unknown blood type	All males
Females < 50 years with confirmed RhD-negative blood type	Females ≥ 50 years
	Females < 50 years with confirmed hysterectomy
	Females < 50 years with confirmed RhD-positive blood type

B—UMCP, BDMC, BTMC, and NCMC:

1. The blood supplier, Vitalant, is presently only providing low-titer group O-Positive WB. Only O-Positive WB is stocked in the remote blood refrigerator or supplied in approved coolers.

2. The decision to transfuse O-Positive WB with respect to a patient's age, sex, and Rh status is at the discretion of the attending trauma physician. The decision to activate a Massive Transfusion Protocol (MTP) in conjunction with transfusion of WB, is at the discretion of the attending trauma physician.

3. Notify the Laboratory Pathologist and blood bank when O-Positive WB is transfused to a female < 50 years of age with confirmed RhD-negative blood type.