CBRAC Recommendations for Prehospital Whole Blood Transfusion in Pediatric Females of Future Childbearing Potential

Purpose: To provide guidance on the use of Low Titer Group O+ Whole Blood in the resuscitation of female children (females of future childbearing potential) from trauma or medical causes prior to admission to a treating facility.

LTOWB is indicated for the treatment of hemorrhagic shock from traumatic or medical causes and should not be delayed in reproductive-aged females, including pregnant patients

Definitions and Abbreviations:

- Female of future childbearing potential (FFCP): female child <12 years
- Low Titer O+ Whole Blood: LTOWB
- Rhesus Factor: Rh
- Rh immunoglobulin: RhIG

Practice Guideline:

- For pediatric FFCP with clinical parameters indicative of hemorrhagic shock from trauma or medical causes (i.e. gastrointestinal bleeding, bleeding related to inherited coagulopathy) who are unresponsive to prehospital resuscitative measures in the form of administration of LTOWB prior to hospital arrival is indicated.

- Use of LTOWB is indicated for use in pediatric FFCP and has been shown in small studies to decrease overall transfusion requirements, lead to faster resolution of shock, and decrease mortality in children.

- Despite risk of Rh mismatch, the potential life-saving benefit of LTOWB outweighs theoretical risks to future childbearing.

Special Considerations:

- Use of LTOWB may result in Rh mismatch where an Rh negative pediatric FFCP receives LTOWB.

- Risk of alloimmunization following Rh-mismatched transfusion in pediatric FFCP ranges from 0 to approximately 20% and is lower for younger children.

- When clinically feasible, informed consent should be obtained from a parent or legal guardian prior to the administration of LTOWB to a pediatric patient. In emergent, life-threatening situations, when immediate transfusion is required and consent cannot reasonably be obtained, treatment should proceed under the principle of implied consent.

- All Rh-negative pediatric FFCP and their parents or guardians MUST be counselled about risks for Rh alloimmunization and risk to future pregnancies following transfusion of LTOWB. Clinical staff should document these discussions and ensure appropriate post-transfusion follow-up with pediatric hematology or a women's health provider.

Documentation requirements:

- When administering LTOWB to a pediatric FFCP, prehospital teams must notify the receiving facility of this life-saving treatment.

- When a Rh mismatch of a Rh negative pediatric FFCP is identified, a notification of the facility's Transfusion Medicine Specialist/Pathologist, pediatric hematologist, or women's health provider is required by hospital pathologist. Follow-up antibody testing at 4-14 weeks is required to be established at time of discharge with either treating facility or usual health provider. Additional management strategies that may be considered are provided in Best Practices.

- Rh-negative pediatric FFCP who receive Rh-positive emergency-release blood will undergo routine, hospital-based quality review to ensure RhIG evaluation and follow-up were completed

- If an EMS patient meeting the criteria of this document receives blood product but subsequently refuses transport to a hospital, patient should receive the information below (Important Information Regarding Rh-Positive Blood Transfusion and Pregnancy) from the EMS agency

Best Practices for Pediatric FFCP:

1. Example letter for pediatric female patient of future childbearing potential and her parents(s) or guardian(s) following Rh mismatch during resuscitation:

[Date]
[Patient and Parent/Guardian Name(s)]
[Patient Address]

Subject: Important Information Regarding Rh-Positive Blood Transfusion and Future Pregnancy

Dear [Patient Name] and her parent/guardian(s),

Your daughter recently received an emergency transfusion of whole blood or red blood cells (RBCs) to help save her life.

What is Rh(D)?
Rh(D) is a protein found on the surface of red blood cells. If your daughter's blood has this protein, she is considered Rh(D) positive. If her blood does not have the protein, she is Rh(D) negative. The "+" or "–" sign you might see after the blood type indicates whether she is Rh(D) positive or negative.

Why is this Important for You to Know?
Your daughter has a Rh(D) negative blood type, but the blood she received was Rh(D) positive. This means there is a small chance her body could produce antibodies against Rh(D), called anti-D antibodies. This process is known as alloimmunization. While these antibodies won't affect her health, it could pose a risk during future pregnancies. If she has anti-D antibodies, this could cause hemolytic disease of the fetus and newborn (HDFN), which may lead to low blood counts (anemia) in the baby during pregnancy. With early and proper prenatal care, HDFN can be managed and treated successfully.

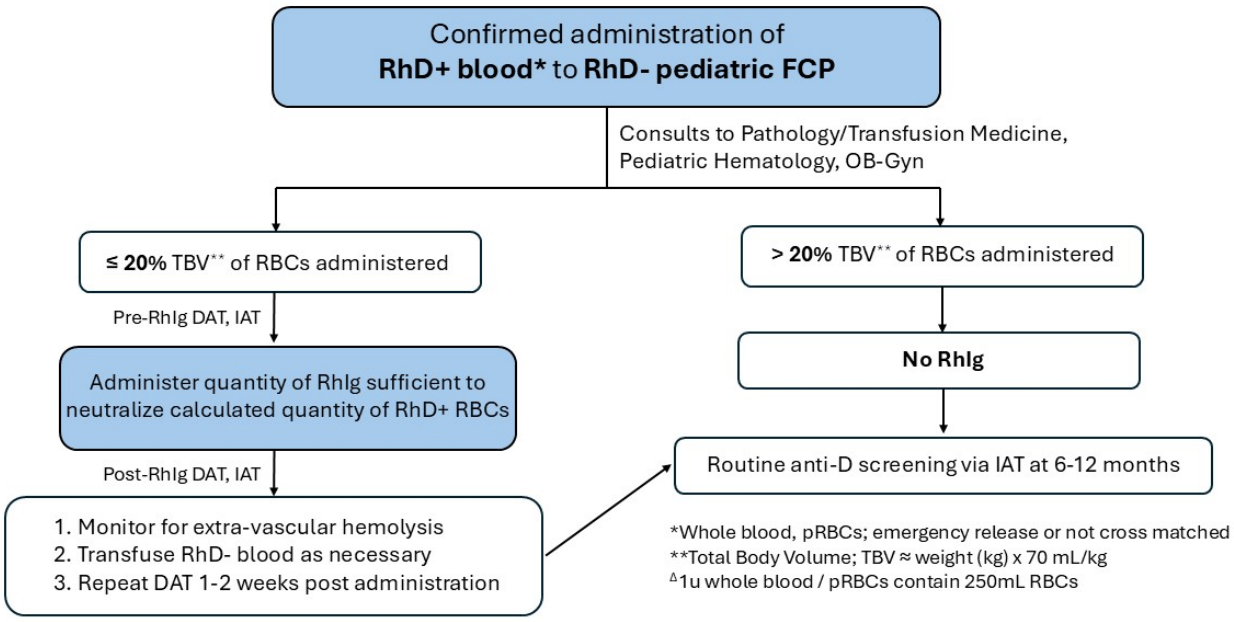
What Should You Do Next?
The first step to understand her risk is to check an antibody screen at least 4-14 weeks after the transfusion she received in the hospital. If this test is abnormal, she will be referred to the Pediatric Hematology or Maternal-Fetal Medicine clinic for counseling to understand her risks in future pregnancies.

In the meantime, we recommend learning about what to expect in pregnancies affected by anti-D antibodies. You can find helpful resources and information at The Allo Hope Foundation website: www.allohopefoundation.org.

For any immediate questions, please contact your healthcare provider (insert contact information).

Important Steps to Take: Complete antibody testing at least 4-14 weeks after exposure, either at [treating facility] or with her usual health care provider or pediatrician.

2. **Example treatment algorithm for Rh mismatch in reproductive-aged females and** pediatric **FFCPs for use of RhIG. Specific treatment recommendations can be found in references.**



Note: some organizations may use differing threshold of total blood volume transfused in Rh mismatch, including observation only.

References:

1. Alkateb R, Mazzolini K, Prajapati VP, Harrison C, Ireland KE, Jenkins D, Daniels J, Greebon L. How I do it: An institutional protocol for the management of RhD negative women who receive RhD positive blood. Transfusion. 2025 May:65 Suppl 1:S320-S327.
2. Anand, Tanya MD; Obaid, Omar MD; Nelson, Adam MD; Chehab, Mohamad MD; Ditillo, Michael, DO; Hammad, Ahmad MD; Douglas, Molly MD; Bible, Leticia MD; Joseph, Bellal, MD. Whole blood hemostatic resuscitation in pediatric trauma: A nationwide propensity-matched analysis. Journal of Trauma and Acute Care Surgery 91(4):p 573-578. October 2021
3. Easwaran, Lavanya; Eason, Caitlin R.; Cooper, Emily H.; Schauer, Steven G.; Diaz-Mirón, Jose L.; Acker, Shannon N. Whole Blood Resuscitation in Pediatric Trauma: A National Analysis of Use and Associated Outcomes. Journal of Pediatric Surgery. Published ahead of print, September 2025
4. Gaines, Barbara A. MD; Yazer, Mark H. MD; Triulzi, Darrell J. MD; Sperry, Jason L. MD, MPH; Neal, Matthew D. MD; Billiar, Timothy R. MD; Leeper, Christine M. MD, MS. Low Titer Group O Whole Blood in Injured Children Requiring Massive Transfusion. Annals of Surgery 277(4):p e919-924. April 2023
5. Khalil, Elissa A. MD; Morgan, Katrina M. MD; Gaines, Barbara A. MD; Spinella, Philip C. MD; Leeper, Christine M. MD. Use of whole blood in pediatric trauma: a narrative review. Trauma Surgery and Acute Care Open 9(Suppl 1):e001127. January 2024
6. Leeper, Christine M. MD; Yazer, Mark H. MD; Morgan, Katrina M. MD; Triulzi, Darrell J.; Gaines, Barbara A. MD. Adverse events after low titer group O whole blood versus component product transfusion in pediatric trauma patients: A propensity-matched cohort study. Transfusion 61(9):p 2621-2628. May 2021
7. Leeper, Christine M. MD, MS; Yazer, Mark H. MD; Triulzi, Darrell J. MD; Neal, Matthew D. MD; Gaines, Barbara A. MD. Whole Blood is Superior to Component Transfusion for Injured Children. Annals of Surgery 272(4):p 590-594. October 2020
8. Yazer, Mark H. MD; Panko, Gleb MD.; Holcomb, John B. MD; Kaplan, Alesia MD; Leeper, Christine MD; Seheult, Jansen N. MD; Triulzi, Darrell J. MD; Spinella, Philip C. MD. Not as “D”eadly as once thought – the risk of D-alloimmunization and hemolytic disease of the fetus and newborn following RhD-positive transfusion in trauma. Hematology 28(1):p 1-7. December 2023