



National Advisory Committee  
on Blood and Blood Products

Comité consultatif national sur  
le sang et les produits sanguins

## **Utilization and Inventory Management of Group O RhD Negative Red Blood Cells**



## **UTILIZATION AND INVENTORY MANAGEMENT OF GROUP O RHD NEGATIVE RED BLOOD CELLS**

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## LIST OF ABBREVIATIONS AND DEFINITIONS

<b>Individuals of childbearing potential</b>	People with the anatomy and physiology to bear children (regardless of gender) who are 45 years of age and younger.
<b>Individuals with no childbearing potential</b>	Individuals who are unable to conceive a child due to advanced age (over 45) or because they do not have the anatomy/physiology to bear children.
<b>Neonate</b>	An infant less than 120 days old.
<b>RBC</b>	Red blood cell



### SUMMARY OF REVISIONS

<b>February 2022</b>	Included definitions: Neonate, Individuals of childbearing potential, Individuals with no childbearing potential
	Gender neutral language adopted
	Added as likely unacceptable indication: RhD positive individuals awaiting ABO confirmation results
	Best practices recommendations updated to include: redistribution of O RhD negative RBCs and consider using O RhD positive RBCs for pre-hospital transfusion.
	Recommendations for hospital transfusion services updated to include: develop a policy for RBC transfusion of patients undergoing HSCT and consider using group O RhD positive RBCs in pre-hospital settings such as air and/or ground ambulance.

### KEY TAKE AWAY POINTS

<b>O-Negative red blood cells (RBC) are a <u>scarce resource</u></b>	Use appropriately to ensure they are available for those patients for whom there is no alternative.
	Use appropriately to reduce impact on health of O RhD negative donors.
	Optimal utilization of O RhD negative red cells ensures equitable use and access to a valuable and finite resource.

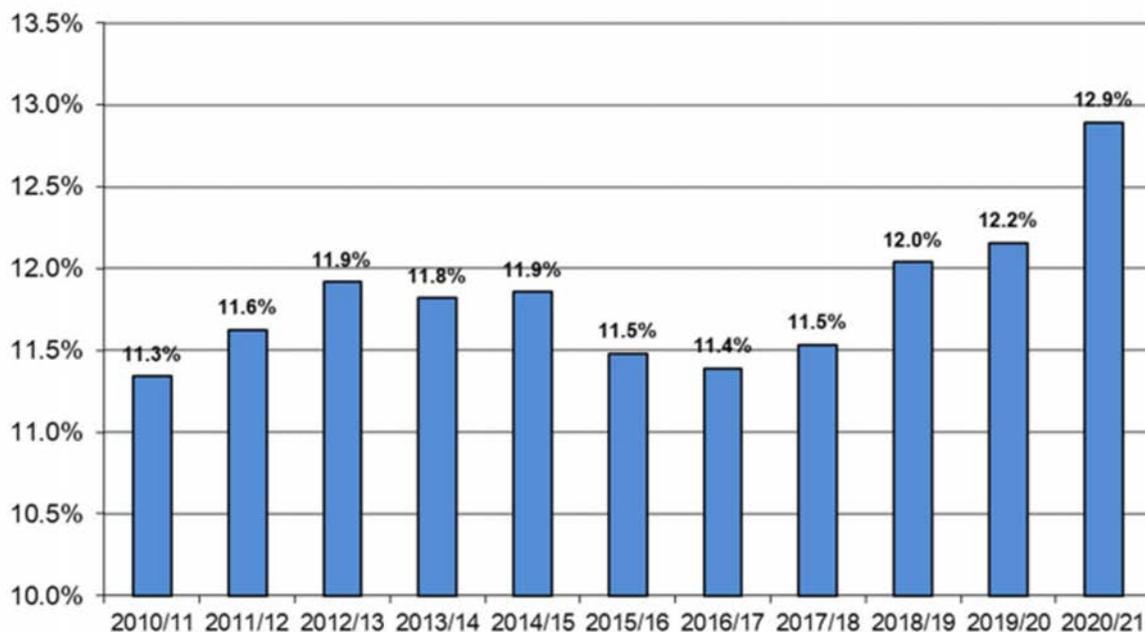


## PURPOSE

The purpose of this statement is to provide recommendations or examples of best practices for the use of Group O RhD negative red blood cell (RBC) units in order to ensure their availability for those patients for whom there is no alternative.

## BACKGROUND

While the total number of RBCs issued by the Canadian Blood Services has decreased over the past 10 years, the demand for O RhD negative RBCs continues to increase in Canada.



**Figure 1: Canadian Blood Services issues of O RhD negative RBCs (expressed as a percentage of total RBC issues) 2010-2021.** Source: Canadian Blood Services

While only 6 to 7% of the general population in most areas in Canada are O RhD negative, O RhD negative RBC issues have increased to over 12% of all RBCs. Canadian Blood Services has made continuous efforts to recruit and retain O RhD negative donors including encouraging frequent donations from O RhD negative donors, which may place these donors at greater risk of iron deficiency than less frequent donors of other blood groups. Further, as the donor population ages, supporting this level of O RhD negative RBC collections will likely become even more challenging. It is therefore imperative to ensure that O RhD negative RBC use follows clinical guidelines to protect and conserve a vulnerable donor population and to ensure adequacy of supply for recipients for whom there is no alternative.



## WHO SHOULD RECEIVE O RhD NEGATIVE RED BLOOD CELLS?

Group O RhD negative individuals<sup>1</sup> of child-bearing potential should receive only RhD negative components to prevent the development of alloantibodies directed at the RhD antigen which could result in hemolytic disease of the fetus and/or newborn in the case of a future RhD positive pregnancy. Group O individuals alloimmunized against RhD antigen must receive RhD negative RBCs to avoid a hemolytic transfusion reaction.

Other group O RhD negative individuals should receive O RhD negative RBCs but consideration should be given to the use of O RhD positive RBCs when large volumes are needed as described in the chart.

**Table 1: Recommendations for appropriate use of O-negative RBCs**

<b>Mandatory indications: O RhD negative RBCs should always be used for these indications</b>
<ul style="list-style-type: none"><li>• O RhD negative individuals of child-bearing potential (45 years of age and younger)</li><li>• O individuals with allogeneic anti-D</li><li>• Emergency use for individuals of child-bearing potential (45 years of age and younger) when Rh type is unknown, indeterminate, discrepant or compatible units are not available</li><li>• Intrauterine transfusions unless it is not feasible to find appropriate units because of antibodies present (for example, patients with anti-c)</li></ul>
<b>Highly recommended indications. When possible, O RhD negative RBCs should likely be used for these indications</b>
<ul style="list-style-type: none"><li>• O RhD negative individuals (any age) who are expected to receive chronic RBC transfusions (for example, individuals with hemoglobinopathies or with chronic transfusion requirement)</li></ul>
<b>Generally acceptable indications. The use of O RhD negative RBCs may be considered acceptable for these indications</b>
<ul style="list-style-type: none"><li>• O RhD negative individuals with no child-bearing potential requiring non-massive transfusion<sup>1</sup></li><li>• Non-O RhD negative infants where group specific units are not available</li><li>• Non-O RhD negative individuals requiring phenotypically matched or antigen negative units when group specific units are unavailable</li></ul>
<b>Likely unacceptable indications. The use of O RhD negative RBCs is likely unacceptable for these indications.</b>
<ul style="list-style-type: none"><li>• Any O RhD negative individuals without allo anti-D and no childbearing potential requiring a large volume transfusion (defined as greater than 4-6 units)<sup>2</sup></li><li>• Non-O RhD negative individuals to avoid expiry, when an ABO/Rh identical unit is available in the local inventory.</li><li>• RhD positive individuals awaiting ABO confirmation results</li></ul>

<sup>1</sup>Includes individuals who have discrepant or indeterminate RhD typing results, while awaiting genotyping to confirm RhD type.

<sup>2</sup>For O RhD negative individuals with no child-bearing potential, who do not have anti-D AND are under-going large volume transfusion (greater than 4 to 6 units), hospitals are strongly encouraged to have a policy on switching to O RhD positive RBCs after 4 to 6 units have been transfused.



## BEST PRACTICES

- Change to group-specific units immediately once the patient's ABO group is determined.
- Establish policies which detail the acceptable and unacceptable indications for utilization of O RhD negative RBCs. Examples of such indications are listed in Table 1. In general, use O RhD positive RBCs in emergency situations for individuals of non-childbearing potential and any other patient groups who meet hospital indications.
- Use group-specific phenotypically matched or antigen negative red cells when available instead of using O RhD negative RBCs.
- Collect and monitor usage data to confirm the appropriate use of O RhD negative RBCs. Ensure that the emergency use of O RhD negative RBCs is reviewed by the Hospital Transfusion Services and/or Transfusion Committee. This review may identify cases where the switch to group-specific RBCs could have been made earlier, where determination of patient blood group took longer than acceptable or was not performed, or patients for whom O RhD negative RBCs were not indicated.
- Review hospital outdate rates of O RhD negative RBCs and the transfusion of older O RhD negative RBCs to non-O RhD negative individuals to avoid the unit outdating. High outdate rates or rates of transfusion to avoid outdating suggest that greater than necessary inventory of O RhD negative RBCs may be held.
- Review hospital inventory levels of O RhD negative RBCs compared to the total number RBCs. Although this varies by institution, and depends on the patient population served and distance from the blood centre, in general, the percentage of O RhD negative RBCs should not exceed 10% of the total RBC inventory.
- Establish protocols for redistribution of O RhD negative RBCs to avoid expiry.
- Review hospital redistribution rates of O RhD negative RBCs. High redistribution rates suggest that greater than necessary inventory of O RhD negative RBCs may be held.
- Consider using O RhD positive RBCs for pre-hospital transfusion. Studies have shown that most patients receiving pre-hospital transfusion are not individuals of childbearing potential. Hence, many pre-hospital transfusion programs use either O RhD-positive RBCs or carry a mix of O RhD-positive and negative RBCs. The benefit of providing pre-hospital transfusion likely outweighs the risk of alloimmunization.



## WHAT CAN HOSPITAL TRANSFUSION SERVICES DO?

### Develop and implement a policy for emergency release of RBCs.

- Immediately determine ABO/Rh on patients who are bleeding or have severe anemia upon presentation.
- Transfuse all bleeding individuals of non-childbearing potential with group O RhD positive RBCs until their blood group is determined, unless have historical allogeneic anti-D.
- Determine the optimal child-bearing age restriction for individuals served by your hospital and transfuse individuals above that age with group O RhD positive RBCs until their blood group can be determined, unless known to have anti-D.
- Have a policy and procedure to switch patients to their own blood group as soon as determined.
- Have a policy and procedure for switching known O RhD negative hemorrhaging patients to O RhD positive RBCs unless known to have anti-D. Define patients who can be switched, number of units at which point the patient will be switched, and whether medical director approval is required each time.
- Develop a policy for RBC transfusion of patients undergoing HSCT.

### Develop and implement policies for optimal inventory management.

- Small rural hospitals should consider stocking a mix of O RhD positive and O RhD negative RBCs
- Consider using group O RhD positive RBCs in pre-hospital settings such as air and/or ground ambulance.
- Reevaluate optimal inventory levels on a regular basis, or after hospital organizational or clinical program changes, especially those that will reduce red cell demand. Promptly notify your local Canadian Blood Services of any adjustments.
- Transfuse oldest units first unless there are other clinical considerations.
- Always request group specific units for patients with RBC antibodies. Only use RhD negative substitutions if group specific is not available for the scheduled transfusion date. Notify your local Canadian Blood Services immediately for any antigen negative blood requests, especially those that will be potentially difficult to fill or for those patients who will require ongoing transfusions.
- Reduce crossmatched RBC inventory by using strategies such as just in time (crossmatch on demand), electronic crossmatch, and implementing a maximum surgical blood order schedule (MSBOS). Review and, if appropriate, cancel RBC inventory tagged for specific patients 24 hours after surgery or immediately after imminent need has passed, while making allowances for patients with RBC antibodies.
- Share inventory between affiliated hospital sites to ensure appropriate use and preventing outdating.



- Track O RhD negative RBC transfusions to O RhD positive patients as a quality indicator.
- Monitor soon to outdate O RhD negative RBC units and redistribute to larger nearby hospitals where they are less likely to expire.
- Track and review redistribution data and data about transfusions of O RhD negative RBC to non-O RhD negative patients to avoid expiry and adjust ordering practices from Canadian Blood Services if frequency is excessive.



## REFERENCES

National Blood Transfusion Committee. The appropriate use of group O D negative red cells. <https://www.transfusionsguidelines.org/document-library/documents/nbtc-appropriate-use-of-group-o-d-negative-red-cells-final-pdf#:~:text=The%20guidance%20for%20the%20Appropriate%20use%20of%20group,K%20negative%20%28K-%29%20red%20cells%20based%20on%20need>. Accessed 2021-07-20

O Rh negative red blood cells utilization and inventory management best practices. Canadian Blood Services, Professional Education website. <https://professionaleducation.blood.ca/en/transfusion/bonnes-pratiques/bonnes-pratiques-utilisation-des-produits-sanguins/o-rh-negative-red> . Accessed 2021-07-20

AABB Association Bulletin #19-02. Recommendations on the Use of Group O Red Blood Cells <https://www.aabb.org/docs/default-source/default-document-library/resources/association-bulletins/ab19-02.pdf> Accessed 2021-07-20.

Bhella S, Gerard L, Lin Y, Rizoli S, Callum J. Obstetric and trauma database review at a single institution finds the optimal maternal age restriction for the transfusion of O- blood to women involved in trauma to be 45 years. *Transfusion* 2012; 52:2488-9

Callum JL, Waters JH, Shaz BH, Sloan SR, Murphy MF. AABB Choosing Wisely: The AABB recommendations for the Choosing Wisely campaign of the American Board of Internal Medicine. *Transfusion* 2014; 54: 2344-52.

Choosing Wisely Canada and the Canadian Society for Transfusion Medicine (CSTM). Ten Things Physicians and Patients Should Question. <http://www.transfusion.ca/Education/Choosing-Wisely> Accessed 2021-07-20.

Selleng K, Jenichen G, Denker K et al. Emergency transfusion of patients with unknown blood type with blood group O Rhesus D positive red blood cell concentrates: A prospective, single-centre observational study. *Lancet Haematol* 2017; 4: e218-224.