



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



GROUP O RHD NEGATIVE UTILIZATION AND INVENTORY MANAGEMENT STATEMENT

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ABBREVIATIONS

RBC

Red Blood Cell

DEFINITIONS

Individuals of childbearing potential – People with the anatomy and physiology to bear children (regardless of gender), where individuals who are 45 years of age and younger have a higher statistical probability to conceive a child compared to those over 45 based on Canadian Institute for Health Information data.

Individuals of non-childbearing potential – Individuals who have a low statistical probability to conceive a child due to advanced age (over 45, based on Canadian Institute for Health Information data) or because they do not have the anatomy/physiology to bear children.

Neonate – An infant less than 120 days old.

KEY POINTS

O RhD negative RBCs are a <u>scarce resource</u>	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 RBCs ensures equitable use and access to a valuable and finite resource.



SUMMARY OF REVISIONS

September 2025

General	Updated Canadian Blood Services issues of O RhD negative red blood cells data. Clarified definitions of childbearing potential Merged Sections 4.0 and 5.0 (Best Practices; and What Can Hospital Transfusion Services Do?). Removed CBS abbreviation
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General	Gender neutral language adopted.
Definitions	Neonate, Individuals of childbearing potential, Individuals with no childbearing potential added.
Recommendations	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 hematopoietic stem cell transplantation and consider using group O RhD positive RBCs in pre-hospital settings such as air and/or ground ambulance.



1.0 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.

2.0 BACKGROUND

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

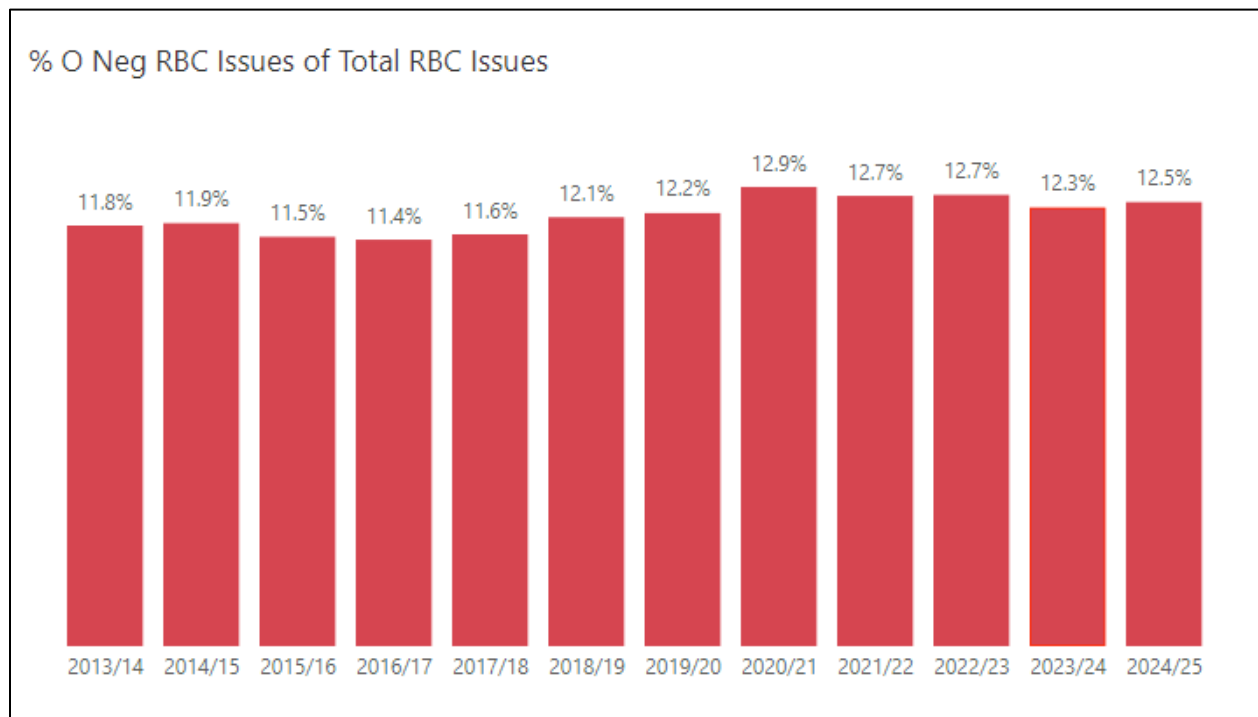


Figure 1: Canadian Blood Services issues of O RhD negative RBCs (expressed as a percentage of total RBC issues) 2013-2025. Source: Canadian Blood Services

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, retain, and encourage frequent donations from O RhD negative donors, while acknowledging that frequent donations increase the risk of iron deficiency. 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.



3.0 WHO SHOULD RECEIVE O RHD NEGATIVE RED BLOOD CELLS?

Group O RhD negative individuals¹ 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. Individuals alloimmunized against RhD antigen must receive RhD negative RBCs, unless extenuating circumstances exist, 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 significant use and/or anticipated use of O RhD positive RBCs.

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

Mandatory indications where O RhD negative RBCs should always be used
• RhD negative individuals of child-bearing potential (45 years of age and younger); • Group O individuals with allogeneic anti-D; and, • 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.
Indications where, when possible, O RhD negative RBCs are highly recommended be used
• O RhD negative individuals (any age) who are expected to receive chronic RBC transfusions (for example, individuals with hemoglobinopathies or with chronic transfusion requirement); and, • Intrauterine transfusions unless it is not feasible to find appropriate units because of antibodies present (for example, patients with anti-c).
Indications where the use of O RhD negative RBCs is generally considered acceptable
• RhD negative individuals with no child-bearing potential requiring non-massive transfusion;* • Non-O RhD negative infants where group specific units are not available; and, • Non-O RhD negative individuals requiring phenotypically matched or antigen negative units when group specific units are unavailable.
Indications where the use of O RhD negative RBCs is likely unacceptable
• 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);** • Non-O RhD negative individuals to avoid expiry, when an ABO/Rh identical unit is available in the local inventory; and, • RhD positive individuals awaiting ABO confirmation results.

*Includes individuals who have discrepant or indeterminate RhD typing results, while awaiting genotyping to confirm RhD type.

**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.



4.0 BEST PRACTICES AND RECOMMENDED ACTIONS FOR HOSPITAL TRANSFUSION SERVICES

4.1 Hospital Policies to Mitigate Unnecessary or Inappropriate Use of O RhD Negative RBCs

- Change to group-specific units immediately once the patient's ABO group is confirmed.
 - Hospitals should confirm the ABO/Rh type of patients who are bleeding or have severe anemia upon presentation; and implement policies/procedures to switch to group-specific RBCs as soon as possible.
 - Use group-specific phenotypically matched or antigen negative RBCs when available instead of using O RhD negative RBCs.
- Establish policies for the acceptable and unacceptable indications for utilization of O RhD negative RBCs. Examples of such indications are listed in [Table 1](#).
 - Transfuse all bleeding individuals of non-childbearing potential with group O RhD positive RBCs until their blood group is confirmed, unless there is history of alloimmune anti-D.
 - Have a policy and procedure for switching known O RhD negative hemorrhaging patients to O RhD positive RBCs, unless known to have anti-D. This includes defining 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 patients in whom blood grouping may be discrepant or indeterminate including patients undergoing hematopoietic stem cell transplantation, ideally to minimize O RhD negative RBC transfusion.

4.2 Hospital Inventory Management

- Community/rural hospitals and pre-hospital transfusion programs should consider including and/or exclusively using O RhD positive RBCs for emergency transfusion.
 - The benefit of providing emergency transfusion likely outweighs the risk of alloimmunization.
 - 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.
- Always request group specific units for patients with specific requirements (notably for patients with RBC alloantibodies). Group O RhD negative substitutions should only be used if group specific units are not available.
 - This may be facilitated through early communication with your local Canadian Blood Services distribution site for any antigen negative blood requests, notably for difficult and/or frequent requests.
- 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.



4.3 Hospital Inventory Monitoring for Quality Improvement

- Collect, monitor, and review 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; and benchmarked against comparative centres where data exist.
 - Review transfusion of older O RhD negative RBCs to non-O RhD negative individuals to avoid the unit outdating as well as the overall outdate rates of O RhD negative RBCs. High rates of transfusion to avoid outdating are highly indicative of overstocking O RhD negative RBCs.
 - 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 inventory levels of O RhD negative RBCs compared to the total number RBCs.
 - Hospitals and regions should prioritize review after hospital organizational or clinical program changes, especially for those that will reduce RBC demand. Regular review is also recommended. Promptly notify your local Canadian Blood Services distribution centre of any adjustments.
 - Jurisdictional Inventory and/or Shipment Indices as discussed in [*The National Plan for Management of Shortages of Labile Blood Components*](#) should be adhered to, although inventory varies by institution, dependent on the patient population served and distance from the blood centre.
- Consider protocols for redistribution and/or shared inventory of O RhD negative RBCs to avoid expiry.
 - Participating in a redistribution program to larger nearby hospitals may mitigate outdating, although high redistribution rates are highly indicative of overstocking.



REFERENCES

1. National Blood Transfusion Committee. The appropriate use of group O D negative red cells. National Blood Transfusion Committee. 2024 Sep [cited 2025 Sep 12]. Available from: <https://www.nationalbloodtransfusion.co.uk/sites/default/files/documents/2025-03/2-NBTC-Appropriate-Use-of-Group-O-D-Negative-Red-Cells-version-2-2024%29.pdf>
2. Canadian Blood Services. O Rh negative red blood cells utilization and inventory management best practices. Canadian Blood Services. 2025 [cited 2025 Sep 12] Available from: <https://professionaleducation.blood.ca/en/transfusion/bonnes-pratiques/bonnes-pratiques-dutilisation-des-produits-sanguins/o-rh-negative-red>
3. Association for the Advancement of Blood & Biotherapies. AABB Association Bulletin #19-02: Recommendations on the Use of Group O Red Blood Cells. Association for the Advancement of Blood & Biotherapies. 2019 Jun 26 [updated 2025 Apr; cited 2025 Sep 12]. Available from: <https://www.aabb.org/docs/default-source/default-document-library/resources/association-bulletins/ab19-02.pdf> Accessed 2021-07-20.
4. 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 Nov;52(11):2488-9. doi:10.1111/j.1537-2995.2012.03847.x
5. Callum JL, Waters JH, Shaz BH, Sloan SR, Murphy MF. The AABB recommendations for the Choosing Wisely campaign of the American Board of Internal Medicine. Transfusion. 2014 Sep;54(9):2344-52. doi:10.1111/trf.12802
6. Canadian Society for Transfusion Medicine. CSTM Choosing Wisely List. Canadian Society for Transfusion Medicine. 2025 [cited 2025 Sep 12]. Available from: <https://www.transfusion.ca/Education/Choosing-Wisely/CSTM-Choosing-Wisely-List>
7. Selleng K, Jenichen G, Denker K, Selleng S, Mülleijans B, Greinacher A. 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 May;4(5):e218-24. doi:10.1016/S2352-3026(17)30051-0

APPENDIX A: PREVIOUS AUTHORS

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