

**NATIONAL ADVISORY COMMITTEE (NAC) ON BLOOD AND BLOOD PRODUCTS
POSITION PAPER: UTILIZATION AND INVENTORY MANAGEMENT OF GROUP O RH(D)-
NEGATIVE RED CELLS**

PURPOSE

The purpose of this statement is to provide recommendations or examples of best practices for the use of Group O Rh(D)-negative (O-negative) red cells in order to ensure their availability for those patients for whom there is no alternative.

BACKGROUND

While the total number of red cells issued by Canadian Blood Services has decreased over the past 10 years, the demand for O-negative red cells continues to increase in Canada (although decreases were seen in the most recent fiscal year).

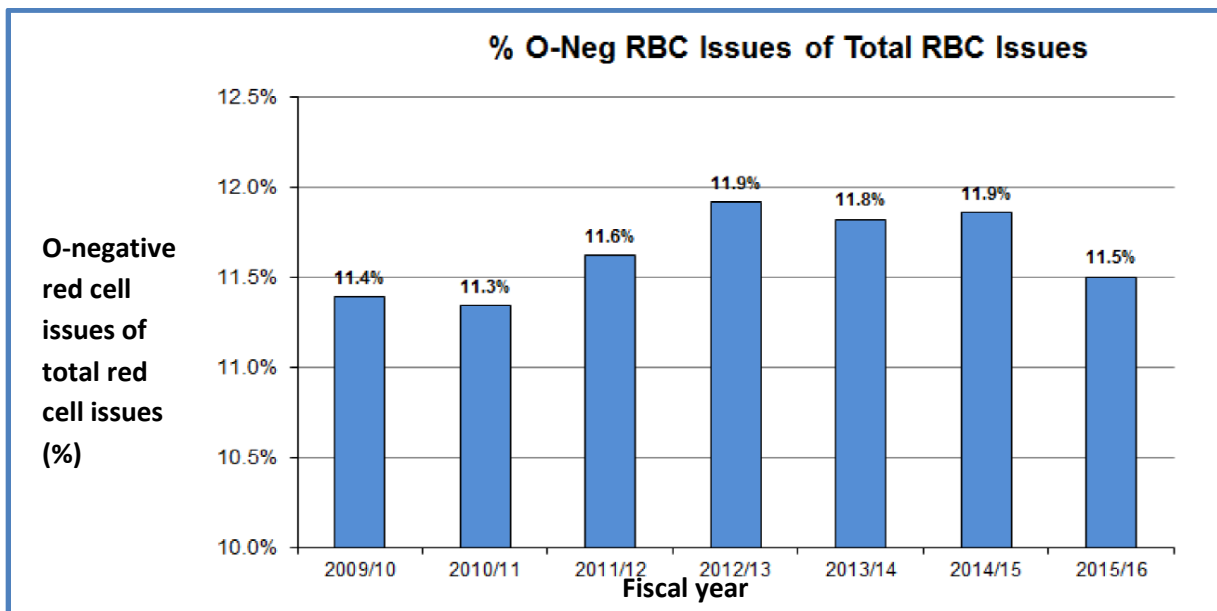


Figure 1: Canadian Blood Services issues of O-negative red cells (expressed as a percentage of total red cell issues) 2009-2016. Source: Canadian Blood Services

While only 6 to 7% of the general population in most areas in Canada are O-negative, O-negative red cell issues have increased to approximately 12% of all red cells. O-negative collections are not always adequate to meet O-negative red cell demand. In an attempt to solve this problem, Canadian Blood Services has made a concerted effort to recruit and retain O-negative donors, as well as encouraging more frequent donations from these dedicated donors. However, it should be recognized that O-negative red cell units are finite resource and that, as the donor population ages, maintaining this level of O-negative red cell collections will likely become impossible.

O-negative red cells need to be used appropriately to ensure they are available for those patients for whom there is no alternative.

WHO SHOULD RECEIVE O-NEGATIVE RED CELLS?

Type O-negative women of child-bearing potential must receive only Rh-negative components to prevent the development of alloantibodies directed at the Rh(D) antigen which could result in hemolytic disease of the fetus and/or newborn in the case of a future Rh-positive pregnancy. Individuals who are Rh-negative and have already formed anti-D must receive Rh-negative blood to avoid a hemolytic transfusion reaction.

Mandatory indications: O-negative red cells should always be used for these indications
<ul style="list-style-type: none">• O-negative females of child-bearing potential (≤ 45 years of age)• O-negative males and females with anti-D• Emergency use for females of child-bearing potential (≤ 45 years of age) when blood group is unknown• Intrauterine transfusions (intravascular and/or intraperitoneal transfusions)
Highly recommended indications. When possible, O-negative red cells should likely be used for these indications
<ul style="list-style-type: none">• O-negative individuals (any age) who are expected to receive chronic transfusions (for example, individuals with hemoglobinopathies or with chronic transfusion requirement)
Generally acceptable indications. The use of O-negative red cells may be considered acceptable for these indications
<ul style="list-style-type: none">• O-negative males requiring non-massive transfusion*• O-negative females (older than child-bearing potential, >45 years of age) requiring non-massive transfusion*• Non-O-negative infants less than 1 year of age where group specific units are not available• Non-O-negative patients requiring phenotypically matched or antigen negative units when group specific units are unavailable
Likely unacceptable indications. The use of O-negative red cells is likely unacceptable for these indications. (Likely indications for O-positive red cells)
<ul style="list-style-type: none">• Any O-negative male without anti-D requiring a large volume transfusion ($> 4-6$ units)*• Any O-negative female (older than child bearing potential, >45 years) without anti-D requiring a large volume transfusion ($> 4-6$ units)*• Non-O-negative patient because unit is approaching expiry

**For O-negative patients who are males or females older than 45 years and do not have anti-D AND are undergoing large volume transfusion (greater than 4-6 units), hospitals are strongly encouraged to have a policy on switching to O- positive red cells after 4-6 units have been transfused*

Table 1: Suggestions for appropriate use of O-negative red cells

BEST PRACTICES

- Establish policies which detail the acceptable and unacceptable indications for utilization of O-negative red cells. Examples of such indications are listed in Table 1. In general, use O-positive red cells in emergency situations for males, females of non-childbearing potential and any other patient groups who meet hospital indications.
- Change to type-specific units immediately when the patient's ABO type is determined.
- Use type-specific phenotypically matched or antigen negative red cells when available instead of using O-negative red cells. Consider performing in-house phenotyping for common antigens.
- Collect and monitor usage data to confirm the appropriate use of O-negative red cell units. Ensure that the emergency use of O-negative red cells is reviewed by the Hospital Transfusion Services and/or Transfusion Committee. This review may identify cases where the switch to group-specific red cells could have been made earlier, where determination of patient blood group took longer than acceptable or was not performed, or patients for whom Rh-negative red cells were not indicated.
- Review hospital outdate rates of O-negative red cells and the transfusion of older O-negative red cells to non-O-negative individuals to avoid the unit outdating. High outdate rates or rates of transfusion to avoid outdating suggest that greater than necessary stocks of O-negative red cells may be held.
- Review hospital stock levels of O-negative red cells compared to all group red cells. Although this varies by institution depending on such factors as patient population seen and distance from blood centre, in general, the percentage of total red cell stock that is O-negative should not be greater than approximately 10%.

Benefits of optimal utilization of red cells

Ensures equitable use and access to a valuable and finite resource.

Ensures that O-negative red cells will be available for patients who really need it.

WHAT CAN HOSPITAL TRANSFUSION SERVICES DO?

1. Develop and implement a policy for emergency release of red cells.

- a. Immediately collect a blood sample for ABO/Rh from all bleeding patients upon admission to the Emergency Department.
- b. Transfuse male trauma or hemorrhaging patients regardless of age with group O-positive red cells until their blood group can be determined or unless have historical anti-D.

- c. Determine the optimal maternal age restriction for women served by your hospital and transfuse female trauma or hemorrhaging patients above the optimal child bearing age with group O-positive red cells until their blood group can be determined or unless known to have anti-D.
- d. Have a policy to switch patients to their own blood group once determined.
- e. Have a policy for switching known O-negative hemorrhaging patients to O-positive red cells unless known to have anti-D. Define number of units at which point the patient will be switched, and if medical director consultation is required each time.

2. Develop and implement policies for optimal inventory management.

- a. Small rural hospitals should consider stocking a mix of O-positive and O-negative red cells
- b. Reevaluate optimal inventory levels on a regular basis, or after hospital organizational/clinical program changes, especially those that will reduce red cell demand. Promptly notify your local Canadian Blood Services of any adjustments.
- c. Transfuse oldest units first unless there are other clinical considerations.
- d. Always request group specific units for patients with red blood cell antibodies. Only use Rh-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.
- e. Reduce crossmatched red cell 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 red cell inventory tagged for specific patients 24 hours after surgery or immediately after imminent need has passed, while making allowances for patients with red cell antibodies.
- f. Share inventory between affiliated hospital sites to ensure appropriate use and preventing outdating.
- g. Track O-negative red cell transfusions to O-positive patients as a quality indicator.
- h. Monitor soon to outdate O-negative red cell units and, only as a last resort, transfuse to non-O-negative patients to avoid wastage or redistribute to larger nearby hospitals where they are less likely to expire.
- i. Track and review redistribution data and data about transfusions of O-negative red cells to non-O-negative patients to avoid expiry, and adjust ordering practices from Canadian Blood Services if frequency is excessive.

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