Group O Rh Negative Red Blood Cells: Tips for Optimizing Utilization

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Demand versus Supply

In the United States, only 6-7% of the general population is Group O Rh Negative (O Rh Negative). However, the demand for O Rh Negative Red Blood Cells (RBCs) at hospitals across the country is nearly double this at 11% or more.[1] Considering the low incidence of O Rh Negative donors compared to other blood types, these individuals donate up to 5 times more blood to meet inventory demands. Despite the increased donation frequency, there are many occasions when O Rh Negative RBCs are in short supply.

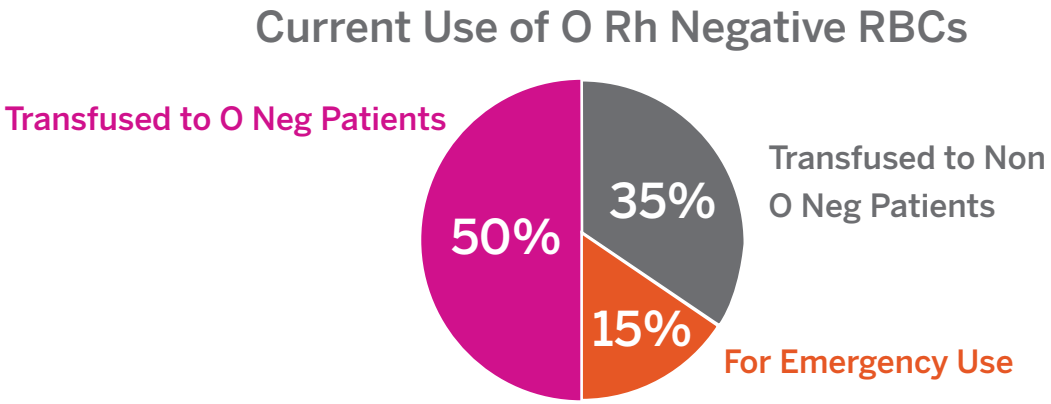
To meet demand, O Rh Negative donors donate 5x more blood

Besides being the universal red cell product, several factors have led to the increased demand in O Rh Negative RBC usage. Development of Massive Transfusion Protocols (MTPs) at nearly every healthcare institution requires that, at minimum, 4-8 units of "O" RBCs be "in reserve" for use at any given moment when the patient's blood type is unknown. Not surprisingly, O Rh Negative RBCs are often the units "in reserve." With recent evidence that pre-hospital transfusion for trauma patients improves outcomes, many emergency medical services carry O Rh Negative RBCs on every rescue flight. In addition, free standing emergency care services and growth of outpatient treatment centers that perform surgical procedures traditionally done in hospitals has forced the need for O Rh Negative RBCs on-site for "just in case" emergent bleeding situations.

Indications for transfusion of O Rh Negative RBCs need to be appropriate to improve utilization of this finite resource. Likewise, better inventory management practices are essential to assure equal access for all hospitals, availability for those patients who have no alternative, and respect for the welfare of these donors.

Current State: Where are O Rh Negative RBCs Used?

A recent survey of 104 hospital transfusion services in the upper Midwest (served by Versiti) found that about 50% of O Rh Negative RBCs were transfused to O Rh Negative patients and 15% were used for Emergency Release or MTPs. Surprisingly, 35% of O Rh Negative RBCs were given to non-O Rh Negative patients for routine transfusions.



Survey responders were asked to supply reasons when transfusing O Rh Negative RBC to non-O Rh Negative patients. An alarming 65% of the time the reason was to avoid expiration of the unit. Other reasons included provision of antigen-negative RBCs for patients with antibodies (20%) and type-specific RBC not available in the hospital inventory (10%). Similar usage patterns with O Rh Negative RBCs has been reported in other regions of the US and in Canada and Europe.[2]

So, how can hospital transfusion services optimize inventory management and ensure O Rh Negative RBCs are available for those who truly need it?

Tips for Appropriate Usage of O Rh Negative RBCs

1 Observe and Know Thy Inventory

Collect and monitor storage and usage data to re-evaluate your hospital RBC inventory. Adopt best practices to minimize regularly giving O Rh Negative RBCs to non-O Rh Negative patients.

- **Raise staff awareness** of RBC inventory levels at all sites, including remote storage locations, to positively affect outdate rates.[3,4] Daily posting of units nearing outdate or date to return to blood supplier alerts staff and helps prioritize usage and minimize waste.
- **Account for segregated "reserve" units** in the daily inventory, such as emergency-release sets and antigen-negative units. Stockpiling of these units decreases their availability for routine transfusions and leads to higher outdate rates.
- **Review usage patterns** including wastage/outdate rates, delivery patterns, and trigger levels for ordering.
- **Regularly re-assess RBC inventory levels** and adjust for better stewardship.[5] Monitor inventory on a monthly, quarterly or semi-annual basis. Seasonal variances, change in type of medical or surgical services offered at the hospital, and even changes in surgeons can affect RBC utilization and thus inventory needed.
- **Monitor data on the use of O Rh Negative RBCs** at the institutional level. Establish a process to regularly review and track the use of O Rh Negative RBCs in emergency events and investigate any incidents where its use is considered inappropriate. Collect data on the number of O Rh Negative RBCs transfused to non-O Rh Negative recipients to prevent wastage due to unit expiration.

2 Note and Limit Number of Units On Hold

Minimizing blood products crossmatched to be "On Hold" for patients can avoid excessive ordering of blood and help decrease wastage.

- **Practice "On Demand" crossmatching.** With widespread availability of electronic crossmatching, there should not be the need to crossmatch and place units "on hold". Best practice is to crossmatch

the RBC unit at time of issue.

- **Release any "on hold" and/or returned units after the imminent need has passed** or within 24 hours. Releasing "on hold" units allows for more effective "first in, first out" inventory management.
- **Consider implementing a Maximum Surgical Blood Order Schedule** (MSBOS) to help avoid unnecessary RBC requests for elective surgical patients while minimizing RBC units "on hold". (See ***Maximum Surgical Blood Order Schedule: Improved Inventory Management*** tool.)

3 Establish Policies and Procedures for Use of O Rh Negative Red Cells

Improve upon or establish policies for acceptable and unacceptable indications for O Rh Negative RBCs. Align them with AABB Choosing Wisely Campaign Recommendation 5 which states *"Don't transfuse O negative blood except to O negative patients and in emergencies for women of childbearing potential with unknown blood group."*[6]

- **Implement policies for use of O Rh Positive RBCs** for "Emergency-Release" or Massive Transfusion Protocols (MTP) in certain patient populations when blood type is *unknown*. Develop policies for MTPs as well as a threshold for when to switch from O Rh Negative RBCs (e.g. 2 units) to O Rh Positive when there is continued request for "Emergency-Release" RBCs.

  O Rh Positive RBCs can be safely given to adult males (e.g. ≥18 years of age) and females of non-childbearing potential (e.g. ≥50 years of age) when the blood type is unknown. Based on the prevalence of Rh in the population, 85% of patients with unknown blood type presenting to the Emergency Department are predicted to be Rh Positive. Furthermore, only about 1 in 5 Rh Negative patients who receive O Rh Positive RBCs for urgent or emergency transfusion may develop anti-D. In the unlikely event an anti-D develops, it is typically not detectable until 2 or more weeks after the transfusion.[7,8]

Of those Rh- patients who present to ED and receive emergent O+ RBCs, about 1 in 5 may develop anti-D.

- **Determine a "trigger" (number of units; e.g. 6 units) for switching a *known* O Rh Negative** adult male or female of non-childbearing potential to O Rh Positive RBC units when there is on-going hemorrhage and continued need for RBCs. Exception is those patients who have known or historical anti-D.
- **Avoid the use of O Rh Negative RBCs when the current blood type of the patient is known** (blood type other than O Rh Negative). Some hospital policies (and physicians!) associate "Emergency-Release" RBC to "O Rh Negative RBC"; that is, O Rh Negative RBC units are issued for every "Emergency-Release" RBC order. This is not good practice or the best use of such a limited resource.
- **Track sample collection and receipt time as well as turn-around time for type-specific, crossmatched RBCs in emergency situations.** Work closely with your Emergency Department to establish a process for early blood sample collection for trauma or massively bleeding patients.

Hospitals that are able to provide group specific blood in less than 15 minutes use up to 50% less emergency-release O Rh Negative RBCs.[5]

- **Consider implementing exceptions for the 2nd Rh type for "Emergency-Release" blood requests or MTP activations.** Two separate blood types prior to issuing type-specific RBCs is a key requirement for safe transfusion practice. However, the specifics related to an institution's policy may impact the amount of O Rh Negative RBCs issued during a massive hemorrhage event when the blood type is unknown. If your institution requires ABO *and* Rh typing for the 2 separate blood types, consider implementing exceptions to use the Rh type from the 1st sample for RBC selection while you wait for the 2nd sample to confirm the ABO typing. With this approach, O Rh Negative RBCs could be conserved nearly 80% of the time.
- **Return O Negative RBCs to the blood supplier with plenty of time** to be used wisely. If your blood supplier allows return of RBC units for credit, consider ample time for this exchange. Adding 3 to 4 days to the required "return date" allows sufficient time for transport and appropriate use at other healthcare facilities. Restocking O Rh Negative units more frequently might be more work initially but it could reduce the number of such units your hospital receives and the number given to non-O Rh Negative patients.
- **Avoid stocking exclusively O Rh Negative for RBCs with special modifications** such as "irradiated" and/or "CMV negative". If a patient requires irradiated RBCs and time allows, request ABO, Rh type-specific units. Otherwise, consider a mix of irradiated RBCs of different blood types for stock purposes – target blood types of frequent transfusion recipients. Implement a "Leukocyte-reduced only policy" for CMV negative requests (except for neonates and intrauterine transfusions) to eliminate the need for specific stock of "CMV negative" RBCs.
- **Consider inventory policies for antigen-negative stocked units to mirror strategies for O Rh Negative RBCs**. Unless the patient is O Rh Negative, request ABO, Rh type-specific RBC units for these patients' transfusion needs.

When monitoring your inventory daily, it is important to arrange your supply by expiration date. Utilize a "first in, first out" process to minimize wastage. Several recent studies on "age of blood" showed that giving older RBC units are safe and had no negative impact on clinical outcomes.[9]

- **Rotate emergency-release packs of O Rh Negative RBCS often.** Minimize product wastage by switching out once per week.
- **Avoid selecting units with the same expiration dates for emergency-release packs** when possible.
- If your facility has a **low utilization** of emergency-release packs, **consider not preparing emergency-release RBC ahead of time** or keep the tagged units always visible to staff on the "O Neg" shelf.

- If your facility has a **high utilization** of emergency-release packs, **avoid using the "freshest" units when possible.** Due to the high turnover of units, setting up packs with older units better adheres to the "first in, first out" principle.

5 Set Appropriate Inventory Levels

Good stewardship of the blood supply involves minimizing outdate rates of your blood product inventory while avoiding excessively high return rates. High outdate rates and high usage of O Rh Negative RBCs suggest overstocking of these products. The rate of O Rh Negative RBC transfused to non-O Rh Negative patients to avoid expiration directly correlates with the hospital's O Rh Negative RBC stock level.

- **Establish minimum and maximum levels for RBCs** by blood type to better gain control of inventory. Set your stock RBC inventory based on average daily use. (See ***Transfusion Service Inventory Calculators*** tool to help determine your appropriate RBC stock level by blood type.)
- **Work with your blood supplier** to determine the most appropriate inventory levels and ordering threshold. Factors such as distance from supplier and inventory replenishment schedules can affect your stock.
- **Monitor your inventory levels daily and follow best practices** as outlined under "Observe and Know Thy Inventory".

Summary

O Rh Negative RBCs are in high demand, but limited supply. Hospitals and blood suppliers alike need to be good stewards of the blood supply. Adopting best practices for inventory management, particularly focusing on O Rh Negative RBCs, and implementing policies for issuing RBCs in emergency situations can improve appropriate utilization of this finite resource. Collaboration between transfusion services and blood suppliers is essential for equal availability of O Rh Negative RBCs for all patients at all institutions while respecting the donors who give this precious gift.

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