University of Washington Medical Center 1959 NE Pacific Street. Seattle, WA 98195 Transfusion Services Laboratory Policies and Procedures Manual	Original Effective Date: 10-28-2020 Revision Effective Date:	Number: PC-0091.01
TITLE: **Ordering and Processing Red Blood Cells and Granulocytes at Northwest Campus**		

PURPOSE
To outline the process for ordering and processing red blood cell (RBC) and granulocyte components

LOCATION
Northwest Lab Transfusion Support Service (TSS)

PRINCIPLE & CLINICAL SIGNIFICANCE
Principle
Red blood cells are indicated to improve the oxygen carrying capacity and to replace the red blood cell mass during bleeding. Most common threshold for transfusion includes a hemoglobin 7 g/dL/ hematocrit 21%, but there are certain clinical situations such as hematological malignancies, active bleeding and acute coronary ischemia, that might benefit with higher hemoglobin thresholds.

Granulocyte transfusions are indicated for neutropenic patients or patients with neutrophil dysfunction with severe refractory infections. The therapeutic benefit of granulocyte transfusions has been extensively evaluated with conflicting results.

Clinical Significance
Red blood cell components are crossmatched with the recipient plasma prior to issue to determine compatibility between donor and recipient. Incompatible blood products can result in decrease product survival, alloimmunization, hemolysis and recipient death.

Granulocyte components typically contain more than 2 mL of red blood cells and need to be crossmatched with recipient plasma prior to issue to determine ABO compatibility between donor and recipient.

POLICIES

RED BLOOD CELL COMPONENT REQUIREMENTS:
- **GENERAL REQUIREMENTS:** All RBC components stocked at NW should meet the following requirements:
    - Leukoreduced (considered CMV safe)
    - Irradiated (to prevent graft-vs-host disease)
        - This includes autologous red cell components
- **SPECIAL REQUIREMENTS**
    - **Sickle Cell and Major Thalassemia Patients and Red Cell Exchanges:**
        - RBC compatibility and pretransfusion test requirements are the same as ADULT patients with the following additions:
            - Hemoglobin S negative
            - Phenotypically matched for Rh (C, E, c, e) and K antigens

- **SCCA Bone Marrow Transplant Patients**:
  - Group AB BMT patients should be provided group O Rh compatible RBCs
  - Post-BMT recipients require RBCs that are compatible with both the recipient and donor ABO/Rh
  - RBC selection is based ABO type of donor and recipient and specified in SQ comments.
- **Neonatal/Infants <4 months old and Intrauterine Transfusions (IUT):**
  - RBCs with the following requirements will be routinely provided
    - Group O, Rh negative
    - Leukoreduced
    - Freshly irradiated
    - < 7 days old
    - Hemoglobin S negative
  - Neonates/Infants with a negative antibody screen will routinely be provided group O Rh negative uncrossmatched RBCs
  - Neonates/Infants with passively acquired maternal RBC alloantibodies directed against the patient's own antigen should be provided O Rh compatible AHG crossmatch compatible RBCs, negative for the corresponding RBC antigen
    - A current, in-date specimen of maternal serum may be utilized to perform AHG crossmatching in lieu of collecting additional specimens from the neonate/infant
- **Autologous and Directed Red Blood Cell Components**
  - Route any requests for autologous blood collections to Montlake TSL who will contact the TSL Medical Director on Call
  - Autologous and directed components should be issued before allogeneic components.
  - Autologous and directed components are segregated from allogenic inventory. When stored in the HaemoBank, components are stored in individual locked trays assigned by the software. The tray is unlocked only if the correct recipient ID is entered at the kiosk.
  - Autologous and directed units will be assigned to the intended recipient in the LIS by Montlake TSL and may not be issued to any other patient

GRANULOCYTES:

- **GENERAL REQUIREMENTS**
  - Irradiated
  - ABO/Rh crossmatch compatible
- Granulocyte orders must be approved in advance by the TSL Medical Director on-call

Granulocytes expire within 24 hours of collection and additional processing due to patient requirements may shorten the expiration further. Coordination with the clinical team, is essential to ensure this rare resource is transfused prior to expiration

PRETRANSFUSION TEST REQUIREMENTS:

- Two consecutive concordant ABO/Rh results from testing performed by Montlake TSL
  - One from a current, in-date crossmatch eligible Type and Screen order (TSCR, TSCREX, and TXM) with no pending tests.
    - TSCR (Type and Screen) valid for 3 days from collection. Day 0 is day of collection and specimen expires at midnight of day 3.

- TSCREX (Type and Screen Extended) may be collected up to 30days in advance of a surgical procedure but must be tested within 3 days of collection. Specimen is eligible to extend beyond 3 days if there is no history of pregnancy and transfusion in the last 90days. Patients with clinically significant antibodies and/or a current positive antibody screens do not qualify for TSCREX and must have a current TSCR specimen collected within 3 days of the surgical procedure
- TXM (Type and Crossmatch) valid for 3 days from collection. Day 0 is day of collection and specimen expires at midnight of day 3. Placed by Montlake TSL staff when converting a BBHOLD specimen to a type and screen to fill a red blood cell order

- Second ABO/Rh from an independent collection
  - ABRH (ABO/Rh)
  - ABRH2 (Confirmatory ABO/Rh)
  - TSCR, TSCREX, TXM, PREN

Timely communication must occur with clinical staff to prevent delay when specimens must be drawn in order to fill red blood cell component orders

ABO/Rh COMPATIBILITY BETWEEN RECIPIENT AND DONOR

- **All patients are provided ABO/Rh compatible red blood cell components and granulocytes according to the Table 1**

TABLE 1: ABO/Rh Compatibility for Adults & Neonate/Infants < 4 mo. Old

RECIPIENT ABO/Rh		RBC ABO/Rh							
		O NEG	O POS	A NEG	A POS	B NEG	B POS	AB NEG	AB POS
ADULT Recipient	O NEG	✓							
	O POS	✓	✓						
	A NEG	✓		✓					
	A POS	✓	✓	✓	✓				
	B NEG	✓				✓			
	B POS	✓	✓			✓	✓		
	AB NEG	✓		✓		✓		✓	
	AB POS	✓	✓	✓	✓	✓	✓	✓	✓
	NTD NEG	✓							
	NTD POS	✓	✓						
	NTD	✓							

RECIPIENT ABO/Rh		RBC ABO/Rh							
		O NEG	O POS	A NEG	A POS	B NEG	B POS	AB NEG	AB POS
NEONATE <4 months old	ALL	✓							

- **Routine & STAT Orders: Pretransfusion testing including crossmatching can be completed**
    - **Adults** patients will routinely be provided crossmatched compatible RBC components
        - Red blood cell components are crossmatched with a current in-date specimen prior to allocation and issue
    - **Neonates and infants <4 months old** will routinely be provided uncrossmatched group O negative red blood cells except when they or the mother have positive antibody screen.

- **Emergency Orders including Massive Transfusion Protocol (MTP) & OB Bleeds: Pretransfusion testing is not complete and/or there is not time to crossmatch RBCs**

    - Group O universal donor RBC components are provided in bleeding emergencies such as MTP and OB bleeds when time does not allow completion of pretransfusion testing (crossmatching) – refer to SOP ***Massive Transfusion Protocol and Emergency Release of Blood Components at Northwest Campus***

      TABLE 2: Selection of UNIVERSAL DONOR Red Blood Cell Components for Bleeding Emergencies

Patient Age and Gender	RBC ABO/Rh
• Females < 50 years old • Males <15 years old • Unknown •	O NEGATIVE
• Females ≥ 50 years old • Males ≥ 15 years old	O POSITIVE

    - Both O positive and O negative RBC are available in the HaemoBank for issue as uncrossmatched in emergencies

ELIGIBILITY FOR HAEMOBANK REMOTE ALLOCATION

- Patients must meet specific requirement for RBC orders to be filled remotely from general stock stored in the HaemoBank
- Orders for patients not eligible for remote allocation will be filled from Montlake stock shipped to NW TSS and may be stored into the HaemoBank until requested for issue.

While these components can be stored in the HaemoBank, these patients are not considered to be remote allocation eligible

- Table 3 lists requirements for a patient to qualify for HaemoBank remote allocation and conditions that disqualify a patient for remote allocation. All conditions listed for eligibility must be met. If any condition in the ineligibility column exists, the patient is ineligible

TABLE 3: Recipient Eligibility Requirements for HaemoBank Remote Allocation

Recipient Requirements	
ELIGIBLE	**INELIGIBLE**

• Two consecutive concordant ABO/Rh results from testing performed by Montlake TSL
  ○ One from an in-date eligible battery (TSCR, TSCREX, TXM)
  ○ Second ABO/Rh from an independent collection with testing performed
• Current antibody screen is negative
• Patient with a history of passive transfer anti-D (i.e. Rhogam) whose current antibody screen is negative
	• Incompatible crossmatch
	• Red cell exchange
	• NTD ABO/Rh in SQ
	• Clinically significant antibodies or antigen matched for which appropriate red cell components are not available in the HaemoBank - refer to Table 4
	• Special Washed
	• Autologous if patient history does not allow remote allocation

ANTIBODIES:

- Most patients with a positive antibody screen or history of antibodies are ineligible for HaemoBank remote allocation.
  - **Exception:** Patient with a history of passive transfer anti-D (i.e. Rhogam) whose current antibody is negative
- Provision of crossmatch incompatible RBCs due to the patient's clinical status is approved by the TSL MD on-call prior to shipment to NW TSS.
- **Table 4** lists the most commonly identified antibodies and the requirements for providing RBC components. Other antibodies or causes of unexpected positive antibody screens not found listed might be encountered.

TABLE 4: Antibodies and RBC Requirements (list is not all inclusive)

Clinical Significance	Antibody	RBC Requirements	
Clinically significant	anti-D	Rh negative	Antiglobulin (AHG) crossmatch compatible
	anti-C	C negative	
	anti-c	c negative	
	anti-E	E (also c negative if patient is c negative)	
	anti-e	e negative	
	anti-K	K negative	

Clinical Significance	Antibody	RBC Requirements	
	anti-Fya	Fya negative	Antiglobulin (AHG) crossmatch compatible
	anti- Fyb	Fyb negative	
	anti-Jka	Jka negative	
	anti-Jkb	Jkb negative	
	anti-S	S negative	
	anti-s	s negative	
Antibody of unknown specificity	ABUS	AGH crossmatched compatible	
Antibodies to low incidence antigens	Anti-Kpa Anti-Wra Anti-Jsa Anti- Lua	Antigen negative for the corresponding antibody and/or AHG crossmatch compatible **NOTE:** It is not always possible to provide antigen negative RBC components	
Warm autoantibodies or HTLA (ABWARM)	ABWARM	Phenotypically matched for clinically significant antigens when AHG crossmatch is incompatible	
Warm autoantibodies due to daratumumab or other CD38 drug treatment	DARA	• K negative if patient's phenotype is K negative • AHG crossmatch may be incompatible • Electronic Crossmatch Eligible when the current Antibody Screen is negative	
Passive transfer anti D	PTAD	Rh Negative **NOTE:** AHG crossmatch compatible if antibody screen is positive	

STORAGE REQUIREMENTS

Component	Storage Requirements
Red Cells	1-6^{0}C
Granulocytes	20-24^{0}C no agitation

SPECIMEN REQUIREMENTS

NA

REAGENTS/SUPPLIES/EQUIPMENT

Reagents	Supplies	Equipment
NA	NA	• BB LIS • HaemoBank 80

QUALITY CONTROL
NA

INSTRUCTIONS

Order Receipt and Allocation of Red Cells

<table>
<tr><th>STEP</th><th>ACTION</th></tr>
<tr><td>1</td><td>Receive red cell order requisition
<table>
<tr><th>If order is placed</th><th>Then</th><th>Then</th></tr>
<tr><td>In Soarian</td><td>Requisition will print at NW TSS and Montlake TSL</td><td rowspan="2">Montlake TSL will place the order in the LIS</td></tr>
<tr><td>On manual requisition</td><td>NW TSS faxes a copy of requisition to Montlake TSL</td></tr>
</table></td></tr>
<tr><td>2</td><td>Log into SQ using Lab Location: NW</td></tr>
<tr><td>3</td><td>Click on Sunquest, Blood Bank Inquiry (BBI )</td></tr>
<tr><td>4</td><td>Select Lookup by ‘PatientID’ and enter the patient medical record number (MRN)</td></tr>
<tr><td>5</td><td>Review the patient historical record for the following:
Attributes, special requirements or restrictions- refer to Special Requirements page 1
Positive antibody screen and/or a history of antibodies- refer to Table 4
Comments such as additional RBC phenotype requirements in addition to standard requirements
<table>
<tr><th>If</th><th>Then</th></tr>
<tr><td>No discrepancies between the order and patient historical record
OR
Special processes or requirements</td><td>Go to the next step</td></tr>
<tr><td>Any discrepancies between order and patient historical requirements are found</td><td>Contact Montlake TSL for resolution of discrepancy
Go to next step when discrepancy is resolved</td></tr>
<tr><td>Special requirements or processes are required other than irradiation or leukoreduction</td><td>Contact Montlake for availability of red cell matching order and TAT
<table>
<tr><th>If</th><th>Then</th></tr>
<tr><td>No delay in availability</td><td>Go to next step</td></tr>
<tr><td>Delay in availability</td><td>Call and inform the ordering provider of the expected TAT</td></tr>
</table></td></tr>
</table></td></tr>
</table>

<table>
<tr><th>STEP</th><th>ACTION</th></tr>
<tr><td>6</td><td>Verify pretransfusion testing is complete and performed by Montlake TSL:
<table>
<tr><th>If patient has</th><th>Then</th></tr>
<tr><td>In-date Type and Screen AND Confirmatory ABO/Rh</td><td>• Go to SQ ‘Blood Bank Inquiry’ see if RBCs s are allocated to the patient - refer to Appendix 1
<table>
<tr><th>If RBCs are</th><th>Then</th></tr>
<tr><td>Allocated</td><td>Go to step 8</td></tr>
<tr><td>Not allocated</td><td>Go to next step</td></tr>
</table></td></tr>
<tr><td>No type and screen and/or type confirmation performed by Montlake TSL</td><td>Notify the clinical team to request test order
<table>
<tr><th>If priority is</th><th>Then</th></tr>
<tr><td>Routine</td><td>Go to next step when appropriate test is complete</td></tr>
<tr><td>STAT</td><td>Communicate testing TAT and product availability to ordering provider to determine if order needs to be changed to emergency.</td></tr>
<tr><td>Emergency/MTP/
OB Bleed</td><td>• Follow SOP Massive Transfusion Protocol & Emergency Release of Blood Components at Northwest Campus
• Go to next step</td></tr>
</table></td></tr>
</table></td></tr>
<tr><td>7</td><td>Montlake TSL will allocate the appropriate red cell for the order - refer to Table 3 for HaemoBank remote allocation eligibility
<table>
<tr><th>If patient is</th><th>Then</th></tr>
<tr><td>ELIGIBLE for HaemoBank remote allocation</td><td>• Montlake TSL will log into SQ: NWBB to allocate an RBC from HaemoBank inventory
• RBC will display as
○ ALLOCATED in SQ and
○ ASSIGNED in BloodTrack
Refer to Appendix 1:SQ & BloodTrack Terminology
• Go to next step</td></tr>
<tr><td>INELIGIBLE for HaemoBank remote allocation</td><td>• Montlake TSL:
○ Allocate the RBC from Montlake stock
○ Attach the Transfusion Record
○ Put it INTRANSIT to NWBB in SQ and ship it to NW Laboratory
• NW TSS will
○ Receive the RBC in SQ
○ Load the RBC into the HaemoBank following SOP Receiving Blood Components from Montlake TSL
• RBC will arrive the NW lab allocated to the patient in SQ</td></tr>
</table></td></tr>
</table>

STEP	ACTION
	• Follow SOP ***Receiving Blood Components from Montlake TSL*** to receive in NW inventory and place it the appropriate storage
8	• Notify clinical team of product availability at NW • Follow SOP ***Issuing Blood Components at Northwest Campus*** when clinical team request the RBC for transfusion

CALCULATIONS/INTERPRETATIONS/RESULTS REPORTING/NORMAL VALUES/CRITICAL VALUES

INTERPRETATIONS NA

RESULTS REPORTING NA

CALIBRATION:
NA

PROCEDURE NOTES/LIMITATIONS

- Any deviation from this procedure should be approved by the TSL Medical Director and documented the deviation on a QI form (include the name of the MD who approved the deviation)

REFERENCES:

- Technical Manual. Bethesda, MD; AABB, current edition.
- Standards for Blood Banks and Transfusion Services. Bethesda, MD; AABB, current edition

RELATED DOCUMENTS:

SOP *Transfusion Service Specimen and Test Order Receipt at Northwest Campus*
SOP *Issuing Blood Components at Northwest Campus*
SOP *Massive Transfusion Protocol and Emergency Release of Blood Components at Northwest Campus*
SOP *Receiving Blood Components from Montlake TSL*

UWMC SOP Approval:

CLIA Medical Director	Mark H. Wener, MD	Date	10/20/20
Transfusion Service Operation Manager	Nina Sen	Date	10/20/20
Transfusion Service Compliance Analyst	Christine Clark	Date	10-20-2020
Transfusion Service Medical Director	Monica B. Pagano, MD	Date	10-20-2020

UWMC Biennial Review:

	Date	
	Date	

APPENDIX:

APPENDIX 1: SQ and BloodTrack Terminology

LIS Sunquest Status	**Bloodtrack Status**	**Product Status**
Available	Available	RBC stocked in the HaemoBank and available to be allocated and assigned to a patient remotely allocated for an order
Allocated (AL)	Assigned	RBC available in the HaemoBank is electronically crossmatched and remotely allocated to patient When removed from the HaemoBank the Transfusion Record and Unit Compatibility Label will print from the kiosk and attached at the time of issue
Allocated (AL)	Available with Patient information	RBC crossmatched from Montlake stock, Transfusion Record and Unit Compatibility Label attached prior to shipping to NW lab **OR** RBC was issued, returned and available for reissue to the same patient