HEALTH HOLDING

HAFER ALBATIN HEALTH CLUSTER
MATERNITY AND CHILDREN HOSPITAL

Department:	Laboratory and Blood Bank		
Document:	Multidisciplinary Policy and Procedure		
Title:	Selection of Blood/Blood Product for Transfusion		
Applies To:	All Blood Bank Staff and Treating Physicians		
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1. PURPOSE:

1.1 To ensure selection of proper blood components units to increase patient's safety and reduce possible transfusion reactions or complications.

2. DEFINITIONS:

2.1 **Massive transfusion** is arbitrarily defined either as the administration of 8 to 10 RBC units to an adult patient in less than 24 hours, or as the acute administration of ≥4 RBC units in 1 hour.

2.1.1 Exchange transfusion of an infant is also considered a massive transfusion.

3. POLICY:

3.1 Selection of blood/blood components for transfusion is an organised process that ensures proper unit selection.

3.2 **For red blood cells component selection:**

3.2.1 The selected red blood cells component is ABO group-specific or ABO group-compatible with the recipient's plasma.

3.2.2 Only Rh-D negative red blood cell components are transfused to Rh-D negative patients.

3.2.3 Rh-negative patients can receive Rh-positive red cells only in extreme emergency with the unavailability of matched D negative compatible RBCs units and by the approval of treating physician. Those patients should be serologically monitored.

3.2.4 If the patient has current or previous history of clinically significant antibodies in the serum, the selected red cells must lack the corresponding antigen(s).

3.3 **For the selection of plasma components for transfusion:**

3.3.1 The selected plasma component is ABO group-specific or ABO group-compatible with the recipient's RBC.

3.3.2 Under certain conditions, ABO-incompatible plasma can be released.

3.3.3 Antibody screening is done for all donor's units. So, no clinically significant antibodies are present in the donor's plasma.

3.3.4 If the plasma components are visually contaminated with red blood cells (more than 2 ml of RBC), RBC selection criteria apply.

3.4 **There are special requirements for the selection of blood/blood components for patients under certain conditions like:**

3.4.1 The use of leukocyte-reduced cellular blood components.

3.4.2 Transfusion of known hemoglobin-S patients.

3.4.3 Massive transfusions. (Refer to "Massive blood transfusion" chapter (LB-MPP-245).

3.4.4 The use of irradiated-cellular blood components. No irradiated cellular blood components are available in MCH blood bank.

4. PROCEDURE:

4.1 Donor Red Cell Unit selection:

4.1.1 Selection of components of ABO group and Rh type that are suitable and compatible with the transfusion recipient and with any unexpected allogeneic antibodies.

4.1.2 Only Rh-D negative red blood cell components are transfused to Rh-D negative patients.

4.1.3 If the patient has current or previous history of clinically significant antibodies in the serum, the selected red cells must lack the corresponding antigen(s).

4.1.4 Choose blood bag from stock refrigerator (screened bags).

4.1.5 Standard of care is "first in, first out" and the oldest available ABO & Rh compatible RBCs unit is selected (for stock management and if fresh RBCs units are not indicated).

4.1.5.1 The fresher blood is recommended for infants, thalassemic patients and some patients with electrolytes disturbances.

4.1.6 Acceptable blood group for transfusion is as follows:

Patient blood group	First choice	Acceptable alternative	Acceptable in extreme emergency with approval of treating Doctor
O+ve	O+ve	O-ve	------
O-ve	O-ve	--------	O+ve
A+ve	A+ve	A-ve, O+ve, O-ve	------
A-ve	A-ve	O-ve	A +ve, O+ve
B+ve	B+ve	B-ve, O+ve, O- ve	-------
B-ve	B-ve	O-ve	B+ve, O+ve
AB+ve	AB+ve	AB-ve, A+ve, A-ve, B+ve, B-ve, O+ve, O-ve.	------
AB-ve	AB-ve	A-ve, B-ve, O-ve	AB+ve, A+ve, B+ve, O+ve

4.1.6.1 Patients with ±, trace or weak reactions with anti (D) is considered as D negative and must receive D negative cellular blood components.

4.1.6.2 Negative patients can receive Rh-positive red cells only in extreme emergency with the unavailability of matched D negative compatible RBCs units and by the approval of treating physician.

4.1.6.3 Rh-negative patients transfused by Rh-positive red cells will be serologically monitored by:

4.1.6.3.1 Performing DAT using polyspecific AHG on patient red cell specimen.

4.1.6.3.2 Comments will be recorded into the patient's history about his response to Rh-positive cells.

4.1.6.4 For inventory considerations, an ABO-compatible rather than an ABO-identical unit should be transfused.

4.1.6.5 Check for the unit number, blood group, expiry date, and signs of deterioration of unit. Inspect for abnormal color or other abnormal appearance.

4.1.7 Selecting Blood for Transfusion if an antibody has been identified:

4.1.7.1 If the patient has current or previous history of clinically significant antibodies in the patient serum, the selected red cells must lack the corresponding antigen(s). Full cross match must be performed.

4.1.7.2 It is important to determine the antibody's clinical significance.

4.1.7.3 Antibodies that react at 37° C, by IAT, or both, are potentially clinically significant.

4.1.7.4 Antibodies that react at room temperature and below are usually not clinically significant.

4.2 Fresh Frozen Plasma selection:

4.2.1 FFP does not need to be cross-matched but should be ABO compatible (to avoid potential haemolysis caused by donor anti-A or anti-B).

4.2.2 Plasma components of any RhD type can be given regardless to the RhD type of the recipient.

4.2.3 No anti-D prophylaxis is required if Rh D-negative patients receive Rh D-positive FFP.

4.2.4 Acceptable blood group for transfusion is as follows:

4.2.4.1

Patient's BLOOD GROUP	CAN RECEIVE
O	O,A,B or AB
A	A or AB
B	B or AB
AB	AB

4.2.4.2 For infants and neonates, plasma should be ABO compatible with the patient.

4.2.4.3 FFP which is not ABO group-compatible with the patient should only be used if it contains no high-titer anti-A and anti-B and only suitable for emergency use in adults;

4.2.4.3.1 It is preferable to use group A FFP for group B patients and vice versa.

4.2.4.3.2 Group O FFP only should be transfused to group O recipients.

4.2.5 For cryoprecipitate: the same guidelines for plasma selection apply.

4.3 **Platelets Concentrate Selection:**

4.3.1 When possible, the platelet component should be ABO group-specific and should not contain clinically significant unexpected red cell antibodies.

4.3.2 If it is necessary to provide platelets other than the patient's own blood group, the patient's age, diagnosis, therapy, component availability as well as any special circumstances should be considered.

4.3.3 As possible, Transfusion of ABO-incompatible plasma should be avoided in pediatric patients and especially in infants because of their small blood and plasma volumes.

4.3.4 Different choices of platelet component's blood group:

Patient's BLOOD GROUP	First choice	ALTERNATIVE (if RBC's are visually unapparent)	In emergency (with unavailability of ABO matched platelets)
O	O	A, B, AB	--------
A	A	AB	B, O
B	B	AB	A, O
AB	AB	----	A, B, O

4.3.5 If the plasma components are visually contaminated with red blood cells (more than 2 ml of RBC), RBC selection criteria apply.

4.3.6 Rh typing with platelet transfusion:

Patient's Rh type	Can receive
D negative	D negative
D positive	D negative or positive

4.3.7 If necessary and in case of unavailability of D negative platelets, RhD positive platelets may be transfused to an RhD negative recipient.

4.3.8 Prophylactic RhD immunoglobulin may be indicated when RhD positive platelets are transfused to an RhD negative recipient, particularly in female children or women of childbearing age.

4.3.9 Given the 3- week half-life of IgG and the minimal red cell content of most platelet units, a single dose of RhIG would be expected to provide prophylaxis for multiple transfusions over a 2- to 4- week period (certainly for the period during which anti-D was detectable serologically).

4.3.10 In emergency situations and platelet concentrate units are unavailable, platelet units may be released after few hours of their expiry time. The attending doctor must accept the units in these emergency cases.

4.4 **Selection of Compatible Blood and Components in Special Circumstances:**

4.4.1 Blood administered in urgent situations:

4.4.1.1 General guidelines:

4.4.1.1.1 When blood is urgently needed, the patient's physician must weigh the risk of transfusing uncross matched or partially cross matched blood against the risk of delaying transfusion until compatibility testing is complete.

4.4.1.1.2 In extreme emergency, Blood (or component) may be issued to patients before completion of compatibility testing or infectious disease testing.

4.4.1.1.3 The request must contain a signed statement from the requesting physician indicating that the clinical situation was sufficiently urgent to require release of blood before completion of compatibility testing or infectious disease testing. It is preferable to get consent of the patient or next of kin, when applicable.

4.4.1.1.4 Requests for emergency transfusion have priority over all other work for blood

bank staff and this request should have a unique identity. Multiple emergencies are handled on a first-received and first-processed basis.

4.4.1.1.5 Request may be modified, depending on the availability of blood or components with coordination between the requesting physician and blood bank staff. This process considers age and sex factors.

4.4.1.1.6 Blood bank will not release any components for transfusion until a blood transfusion request is received indicating patient identification (incompletely filled request may be accepted in such event). The telephone number to be called when the blood is ready should be included on the requisition request.

4.4.1.1.7 If RBC is taken uncrossmatched, the technician will continue the crossmatch and will inform the doctor if there is any incompatibility, as soon as possible.

4.4.1.1.8 Recipients whose ABO; Rh (D) group has been determined by the blood bank will receive only ABO; Rh (D) group-specific or compatible blood components.

4.4.1.1.9 If incompletely tested blood/blood components are released, blood bank technician/ specialist indicates on the attached label and blood transfusion form that compatibility testing and/or infectious disease testing was not completed at the time of issue.

4.4.1.1.10 Testing of the blood/blood components must be completed and reported promptly to the attending physician.

4.4.1.1.11 The release of incompletely tested blood/blood components is approved only for one transfusion event (except in life saving conditions).

4.4.1.1.12 If there is any question about the patient's true Rh type, it may be prudent to administer D-negative blood, especially if the patient is female in the childbearing period.

4.4.1.1.13 The use of RhIG prophylaxis may be considered when D-positive cellular components are transfused to D-negative patients.

4.4.1.1.14 Full documentation of the release process is essential.

4.4.1.2 Procedure for issuing group O, uncross matched RBC:

4.4.1.2.1 Group O Rh negative RBC can be issued within 4 minutes from the time the request form is received in blood bank.

4.4.1.2.2 Group O RBC (same Rh as patient) can be issued within 6 minutes from the time the request form is received in blood bank.

4.4.1.2.3 Uncrossmatched RBC can only be issued in an emergency, lifesaving event. The technician will only release uncrossmatched RBC from the blood bank after he or she has received a request from a physician, who has agreed to take responsibility for any ensuing complication.

4.4.1.2.4 The nurse should attend the blood bank with a request form. The form should be completed as far as possible but incompletely filled request may be accepted in such event. A doctor who should clearly state that the patient requires group O uncrossmatched RBC should sign the form and write his phone extension number.

4.4.1.2.5 The form must be accompanied by EDTA blood sample from the patient. In exceptional circumstances, O negative RBC may be issued without this sample, but only after an assurance that a blood sample from the patient will be brought to the blood bank as soon as practicable and before transfusion is commenced.

4.4.1.2.6 Once the patient's blood group is established, all further issues should be group compatible.

4.4.1.2.7 A cross match should be done in retrospect.

4.4.1.3 Procedure for issuing ABO and Rh D group specific, uncross matched blood:

4.4.1.3.1 This can be issued within 10 minutes after a labelled patient sample along with a request form are received in the blood bank.

4.4.1.3.2 The blood is released on the basis of ABO and Rh D type (i.e. before the antibody screen and other pre-transfusion tests are completed).

4.4.1.3.3 This is appropriate for massive blood loss where delay due to complete compatibility testing would significantly endanger the patient life.

4.4.1.3.4 This requires the physician to sign on the blood transfusion request form and also write in the request form that uncross matched group specific blood is required.

4.4.1.4 Procedure for issuing ABO and Rh D group specific, partially cross matched blood: immediate spin (saline phase):

4.4.1.4.1 This can be issued within 15 minutes after a labelled patient sample along with a request form are received in the blood bank.

4.4.1.4.2 Saline immediate spin cross match will check the ABO compatibility of donor and recipient in order to detect clerical or technical error in ABO grouping.

4.4.1.4.3 This requires the physician to sign on the blood transfusion request form and also write in the request form that partially cross matched (immediate spin/ saline phase) group specific blood is required.

4.4.1.5 Note:

4.4.1.5.1 In extreme emergency and the blood group of the patient is not known, it is better for the physician to send a requests to the blood bank: one orders for one unit uncross matched O RBC and the second orders for ABO and Rh D group specific, uncross matched blood or partially cross matched RBC.

4.4.1.5.2 Due to the limited stock of Rh (D) negative RBCs units, Rh (D) positive units may be released (in extreme emergency and with the approval of the treating doctor) to:

4.4.1.5.2.1 Male patients;

4.4.1.5.2.2 Female patients older than childbearing age;

4.4.1.5.2.3 Female patients in life saving conditions.

4.4.1.6 Summary:

4.4.1.6.1 Issue of complete crossmatched RBC takes about 60 minutes (STAT request) from the time the patient sample was received in Blood Bank until the RBC is ready for transfusion.

4.4.1.6.2 Issue of partially crossmatched (immediate spin- saline phase) blood takes about 15 minutes.

4.4.1.6.3 Issue of ABO and Rh D group specific, uncrossmatched blood takes about 10 minutes.

4.4.1.6.4 Issue of group O (Rh as patient), uncrossmatched blood takes about 6 minutes.

4.4.1.6.5 Issue of group O Rh negative, uncrossmatched blood takes about 4 minutes.

4.4.2 Blood administration after non group-specific transfusion:

4.4.2.1 Release group O RBC units for transfusion during emergencies.

4.4.2.2 Once a specimen is received, the patient's ABO and Rh can be quickly determined and group-specific RBCs can begin to be released.

4.4.2.3 Group O "additive solution (AS)" RBC units contain minimal residual plasma, which minimizes concerns regarding passive transfusion of anti-A and anti-B. In this case, switching to ABO-identical RBC components can be done safely, although an occasional patient may exhibit a transient positive DAT.

4.4.2.4 In some cases, when large volumes of red cells are transfused, or when small children or infants receive transfusions, passively acquired ABO antibodies may be detected in the patient's serum/ plasma. If that should occur, transfusion with red cells that lack the corresponding ABO antigen should be continued.

4.4.2.5 If there is any question about the patient's true Rh type, it may be prudent to administer D-negative blood, especially if the patient is female in the childbearing period.

4.4.2.6 The use of RhIG prophylaxis may be considered when D-positive components are transfused to D-negative patients.

4.4.3 Special considerations for neonates:

4.4.3.1 Guidelines:

4.4.3.1.1 Blood bank technicians/ specialists and the treating doctor must be aware that patients less than 4 months of age have small blood volumes and immature organ function, which necessitate special approaches to component therapy.

4.4.3.1.2 Blood bank is capable of providing smaller, appropriately sized blood components to meet their needs.

4.4.3.1.3 When administered slowly, small-volume transfusions typically do not require a blood warmer. However, inline blood warmers are required for all RBC exchange transfusions.

4.4.3.1.4 The exchange transfusion for new-borns is performed with the freshest blood conveniently available (less than 5 to 7 days old up to 14 days, as per availability and stock management considerations).

4.4.3.1.5 The medical need for fresh RBC units for small-volume transfusions has been suggested as unnecessary.

4.4.3.1.6 Antibody screen for unexpected red cell antibodies is performed using either plasma or serum from the infant (or mother).

4.4.3.1.6.1 Maternal sample for Ab identification should be used if Ab screen of a neonate is positive.

4.4.3.1.7 Repeat ABO grouping and Rh typing may be omitted for the remainder of the neonate's hospital admission or until the neonate reaches the age of 4 months, whichever is sooner.

4.4.3.1.8 If Rh (D) grouping for the neonate is performed using a method which gives a positive reaction with D variant, Rh (D) typing must be repeated using method which could not detect D variant for pre-transfusion testing and communication is required with the treating doctor in case of discrepancy.

4.4.3.1.9 If the mother group is AB and her baby is O or the mother group is O and her baby is AB, ABO grouping must be repeated from other samples.

4.4.3.1.10 If the initial screen for red cell antibodies is negative, repeat Ab screen testing may be omitted for the remainder of the neonate's hospital admission or until the neonate reaches the age of 4 months, whichever is sooner.

4.4.3.1.11 During any one hospitalization, cross match compatibility testing may be omitted as long as all of the following criteria are met: the antibody screen is negative; transfused red cells are group O, and transfused cells are either D negative or the same D type as the patient. Cross matches are no longer required up to 4 months of age because of the immature immunologic status of these infants.

4.4.3.1.12 If a non-Group-O neonate is to receive non-Group-O red blood cells that are not compatible with the maternal ABO group, the neonate's serum or plasma should be tested for anti-A or anti-B. If anti-A or anti-B is detected, red blood cells lacking the corresponding ABO antigen should be transfused.

4.4.3.1.13 If the initial antibody screen demonstrates clinically significant unexpected red cell antibodies, units must be prepared for transfusion that do not contain the corresponding antigen and are compatible by antiglobulin cross match until the antibody is no longer demonstrable in the neonate's serum or plasma.

4.4.3.1.14 A recipient can receive multiple small-volume transfusions from a single unit until it reaches its expiration date.

4.4.3.1.15 Small-volume transfusions (5 to 15 mL/kg) containing AS are safe for this patient population.

4.4.3.1.16 For infants with renal or hepatic insufficiency, the treating doctor has to order removing of the AS from the unit before transfusions.

4.4.3.1.17 When using AS-RBC units in an exchange transfusion, blood bank removes the additive-containing plasma in order to reduce the volume of AS being transfused.

4.4.3.1.18 If it becomes necessary to administer ABO- incompatible platelets to an infant, plasma may be removed by volume reduction or washing.

4.4.3.2 Group of donor red cells & FFP for exchange transfusion:

4.4.3.2.1 ABO group:

Infant group		Mother group O	Mother group A	Mother group B	Mother group AB
O	Choice of RBC	O	O	O	O
O	Choice of FFP	O,A,B,AB	O,A,B,AB	O,A,B,AB	O,A,B,AB
A	Choice of RBC	O	A, O	O	A,O
A	Choice of FFP	A , AB	A , AB	A , AB	A , AB
B	Choice of RBC	O	O	B, O	B, O
B	Choice of FFP	B, AB	B, AB	B, AB	B, AB
AB	Choice of RBC	O	A, O	B, O	O,A,B,AB
AB	Choice of FFP	AB	AB	AB	AB

*Choice of donor cells is listed in order of preference.

4.4.3.2.2 RhD grouping:

Infant group	Mother group	Donor red cells
D negative	D negative or positive	D negative
D positive	D negative	D negative
D positive	D positive	D positive

4.4.3.3 Whole blood preparation for exchange transfusion (Adjusting the hematocrit)

4.4.3.3.1 Sterile connect the tubing of the transfer bag to the tubing of the RBC bag.

4.4.3.3.2 Spin RBC bag for 5 minutes at 4000 rpm.

4.4.3.3.3 Transfer all plasma and AS from RBC to the transfer bag; mix well the original bag. Heat seal the bag's tube, strip the tube at least four times mixing the content of the tube with the original bag allowing RBCs to pass to the tube. Heat seal the tube, then cut the seal and check Hct of a segment of RBC bag tubing. The product should yield a HCT of approximately 90 %.

4.4.3.3.4 Weigh the bag.

4.4.3.3.5 Select FFP unit and thaw in a 37ºC water bath.

4.4.3.3.6 Determine the volume of FFP to be added to the RBC to give a Hct of 45-60 % using the formula below.

4.4.3.3.7 Connect the RBC bag into the plasma bag using the sterile connecting device.

4.4.3.3.8 Place the RBC bag on a scale.

4.4.3.3.9 Hang the plasma bag above the RBCs bag.

4.4.3.3.10 Open the welding and run the calculated volume of FFP into the RBCs bag.

4.4.3.3.11 Mix the contents in the blood bag.

4.4.3.3.12 Express any air and squeeze a volume of whole blood into the tubing.

4.4.3.3.13 Heat seal the tubing close to the plasma bag. Strip and seal the tube as before, then cut the seal.

4.4.3.3.14 Check Hct of a segment from blood bag tubing. The HCT of the mixture should be 45-60%.

4.4.3.3.15 A tag is used to indicate the unit number for the FFP and its ABO/Rh.

4.4.3.3.16 Record the information on blood transfusion request and register.

4.4.3.3.17 Calculations: FFP to be added (g)= (Original Hct of RBC/ Desired Hct) – 1 X Weight of RBC (g)

4.4.3.3.18 Notes:

4.4.3.3.18.1 The reconstituted WB can be stored at 1 to 6 °C for 24 hours with the expiration time that corresponds to expiration time of thawed plasma used for reconstitution.

4.4.3.3.18.2 Often, red cells less than 5 to 7 days old are used to avoid high levels of potassium and to maximize red cell survival.

4.4.3.3.19 Guidelines when requesting for exchange transfusion:

4.4.3.3.19.1 Request for exchange transfusion should be written as follows:

4.4.3.3.19.1 STAT- Prepare without mix.

4.4.3.3.19.2 The attending physician must follow up with the blood bank after about 1 hour.

4.4.3.3.19.3 When the blood is ready, the attending physician sends urgent sample for serum bilirubin.

4.4.3.3.19.4 If serum bilirubin is above or at the level of exchange, the attending physician orders the blood bank to mix (mixing takes about 30-45 min.).

4.4.3.4 Clinically significant antibodies of maternal origin:

4.4.3.4.1 Group 1: Anti - D, - c, - E, - e, - C, - K, - k, - Fy^a
These antibodies are commonly associated with clinical HDN. Those most often associated with moderate to severe HDN are anti-D, anti-c and anti-K.

4.4.3.4.2 Group 2: Anti, - C^w, - Fy^b, - Jk^a, - Jk^b, - S, - s, -M.
These antibodies may cause a positive DAT but therapy, if necessary, is likely to be limited to phototherapy.

4.4.3.4.3 Group 3: Anti-P1, - N, - H, - Le^a, - Le^b, -Lu^a, - Lu^b.
These antibodies are not documented to cause clinical HDN.

4.4.4 Leukocyte-depleted blood components: see "red cells preparation and storage" chapter (LB-IPP-235).

4.4.4.1 Principle and Indications: Reduction of leukocytes in transfused blood components reduce the risk of:

4.4.4.1.1 Febrile non-haemolytic transfusion reaction.

4.4.4.1.2 CMV transmission.

4.4.4.1.3 HLA allo-immunization.

4.4.4.1.4 Platelet refractoriness.

4.4.4.1.5 Immune-modulation, cancer recurrence and bacterial infections in some surgical procedures.

4.4.4.1.6 Prion disease (CJD).

4.4.4.1.7 Yersinia enterocolitica contamination of RBC's.

4.4.5 Irradiated cellular blood products: Not applicable in MCH blood bank.

4.4.5.1 Irradiation of blood and cellular components is recommended for the prevention of graft versus host disease caused by lymphocytes present in most blood products specially to the immunocompromised patients.

4.4.5.2 These patients include:

4.4.5.2.1 Bone marrow (BM) transplant recipients (blood products not BM).

4.4.5.2.2 BM donors receiving blood transfusion prior to and during harvest of marrow.

4.4.5.2.3 Intrauterine transfusion.

4.4.5.2.4 Post intrauterine transfusion during neonatal period.

4.4.5.2.5 Patients receiving directed donation from family members.

4.4.5.2.6 Patients with severe combined immune deficiency syndrome.

4.4.5.2.7 Aplastic anemia, acute leukemias and Hodgkin's disease.

4.4.6 Massive blood transfusion (see "massive blood transfusion" chapter (LB-MPP-245):

4.4.6.1 Massive Transfusion Protocol (MTP):

4.4.6.1.1 MCH implement massive transfusion protocol to guide transfusion in emergency situations.

4.4.6.1.2 Used in critically bleeding patients anticipated to require greater than 4 U of packed red blood cells within 1 h.

4.4.6.1.3 Ensure all hospital staff, including physicians, nurses, laboratory personnel and others are aware of the protocol related to dealing with maternal hemorrhage.

4.4.6.1.4 Incorporate this protocol into the hospital's mandatory annual educational programs and ensure all new staff is oriented to its content.

4.4.6.2 Role of the Massive Transfusion Protocol:

4.4.6.2.1 It improves the outcomes of the massively bleeding patient through:

4.4.6.2.1.1 Facilitation of communication.

4.4.6.2.1.2 Ensuring frequent laboratory monitoring.

4.4.6.2.1.3 Reducing delay in ordering and administering of the blood

components.

4.4.6.2.1.4 Delivering a reasonable ratio of plasma and platelets to red blood cells (RBCs: FFP: Platelet).

4.4.6.2.2 It should include the following elements:

4.4.6.2.2.1 Who can initiate the protocol?

4.4.6.2.2.2 When will the protocol be initiated?

4.4.6.2.2.3 What blood products should be released?

4.4.6.2.2.4 How are laboratories to be monitored?

4.4.6.2.2.5 Deactivating the Massive Transfusion Protocol.

4.4.6.3 Blood bank steps:

4.4.6.3.1 Upon activation of MTP, blood bank personnel will prepare the MT pack according to the order received.

4.4.6.3.2 1:1:1 ratio of PRBC: FFP: platelets will be prepared as applicable.

4.4.6.3.3 The products will be picked up by the ordering department as requested.

4.4.6.3.4 As soon as the first MT pack has been dispensed, blood bank readies a second MT pack. This process will be continued until the MT is discontinued.

4.4.7 Indications of fresh blood (rbcs) transfusion: (Commonly 5- 7 days; may extend to 14 days after donation):

4.4.7.1 Premature infants.

4.4.7.2 Exchange transfusion.

4.4.7.3 Complicated patients with sickle cell disease.

4.4.7.4 Cardiac patients.

4.4.7.5 Any patient with chronic transfusion needs e.g. B thalassemia.

4.4.7.6 Note: The medical need for fresh RBC units for small-volume transfusions to new-born has not been established and has even been suggested as unnecessary.

4.4.8 Transfusion of chronic recipients (like sickle cell disease and B thalassemia): In addition to the common compatibility criteria, the following RBCs units should be selected:

4.4.8.1 Phenotypically matched RBCs (especially for Rh system and K) to prevent alloimmunization.

4.4.8.2 Sickle (Hb solubility test) negative units (as per availability).

4.4.8.3 Pre-storage leukoreduced units (as per availability).

4.4.8.4 Fresh units (≤ 7 days) as much as possible.

4.4.8.5 Irradiated units for patients who are candidates for stem cell transplantation (but this is not available in MCH blood bank).

4.4.8.6 RBCs transfusion to thalassemia patients must be fresh but in case of rare phenotype or in the presence of multiple alloantibodies, old blood may be used.

4.4.8.7 Phenotypically non matched RBCs bags may be released in:

4.4.8.7.1 Some cases with multiple antibodies or rare phenotype with non-availability of full phenotypically matched RBCs bags.

4.4.8.7.2 In emergency cases with no time for searching for phenotypically matched units.

4.4.9 Transfusion when no units are "compatible":

4.4.9.1 Purpose:

4.4.9.1.1 To have a uniform Clinical Policy for the transfusion of least compatible RBCs whenever indicated.

4.4.9.2 Causes for non-availability of compatible RBCs units:

4.4.9.2.1 The presence of autoantibodies that typically react with all red cells. Exclusion of the presence of alloantibodies is required.

4.4.9.2.2 The presence of alloantibodies to high-prevalence RBCs' antigens.

4.4.9.2.3 The presence of alloantibodies against multiple RBCs' antigens.

4.4.9.3 Policy and Procedures:

4.4.9.3.1 If the need is sufficiently urgent, ABO-compatible but crossmatch-incompatible red cells may be given.

4.4.9.3.2 Depending on the alloantibody's specificity, incompatible transfusion does not

always result in immediate hemolysis, and the incompatible cells may remain in the patient's circulation long enough to provide therapeutic benefit.

4.4.9.3.3 Blood bank technician has to release the least incompatible unit after receiving written request from the treating doctor (Release the least incompatible units if no compatible units are available).

4.4.9.3.4 Family members are potential source of rare blood donors. Siblings are often the best source of serologically compatible blood.

4.4.9.3.5 In most cases, blood from the patient's parents, children, and half of the patient's siblings will express only one rare gene. If transfusion is essential and if there is no alternative to transfusing incompatible blood, these heterozygous (single-dose) donors would be preferable to random donors.

4.4.9.3.6 For infants with haemolytic disease of foetus and new-born (HDFN) resulting from multiple antibodies or an antibody to a high-prevalence antigen, the mother (if ABO compatible) is often the logical donor.

4.4.9.3.7 Because excluding alloantibodies may be difficult, a conservative transfusion strategy is usually recommended in managing patients with autoimmune haemolytic anaemia.

4.4.9.3.8 For some patients with multiple antibodies, it may be necessary to determine whether any of the antibodies is less likely to cause red cell destruction and, in a critical situation, to give blood that is incompatible for that particular antigen.

4.4.9.3.9 The serologically incompatible (or least incompatible) RBC units could be transfused with or without immunosuppression.

4.4.9.3.10 Strategies for ameliorating the immunological response are:

4.4.9.3.10.1 0.4g/kg IV immunoglobulin (IVIG) together with 100 mg hydrocortisone IV are infused 6–8 hours prior to a planned 'incompatible' transfusion.

4.4.9.3.10.2 The previous treatment has to be repeated 24 hours later.

4.4.9.3.10.3 In emergencies, the pre-transfusion dose should be given as soon as possible before the transfusion.

4.4.9.3.11 The transfusion should be given at the slowest rate consistent with the clinical condition.

4.4.9.3.12 An "in-vivo cross match" could be performed by cautiously transfusing 25 to 50 ml of the incompatible cells and watching the patient's clinical response. If no adverse symptoms or hemolysis are observed, the remainder of the unit can be transfused slowly with careful clinical monitoring.

4.4.9.3.13 Advice on this policy may only be given after discussing the situation between the treating physician, medical physician and blood bank doctor if available to evaluate the urgency of blood needed.

4.4.9.4 Notes:

4.4.9.4.1 It is important to note that antibodies that show strong reactivity by IAT may be more active in vivo.

4.4.9.4.2 Some of the antibodies are extremely rare and little or nothing is known about their clinical significance. Absence of evidence of clinical significance does not mean that a transfusion of 'incompatible' blood will be uneventful.

4.4.9.4.3 In these cases, even ABO compatible blood should be transfused with extra caution.

4.5 **Urgently notify the patient's physician in the following conditions** (see "Panic Values" policy)**:**

4.5.1 When a patient is in urgent need of blood, but all selected donor units are incompatible.

4.5.2 Any abnormal delay in providing blood for transfusion or surgery (blood shortages).

4.5.3 Blood that has been issued uncrossmatched only to be found incompatible upon completing testing.

4.5.4 Transfusion requests against established policy.

4.5.5 Clerical or serological error that could cause acute haemolysis in patient, i.e. Group A red cells transfused to Group O patient.

4.5.6 Look back notice for viral diseases transmitted by blood transfusions.

4.6 **Released nonconforming blood and blood components:**

4.6.1 Blood and blood components, that are determined after release not to conform to specified requirements must be evaluated to determine the effect of the non-conformance on the quality of the product.

4.6.2 Corrective action taken:

4.6.2.1 Immediately call the ward / treating doctor or the requesting hospital about the case and the non-conformance.

4.6.2.2 Try for retrieval of the unit.

4.6.2.3 If the transfusion was started, transfusion must be stopped and the bag must be returned to the blood bank.

4.6.2.4 OVR shall be written. Maintain records of the nature of non-conformance. Inform infection control department if the patient received TTD positive units /or query.

5. MATERIALS AND EQUIPMENT:

5.1 **Forms and Records:**

5.1.1 Blood & Blood Products Request & Release Form & hematos system of blood bank

5.1.2 Release of untested blood in emergency form

6. RESPONSIBILITIES:

6.1 Blood Bank technicians/ specialists to follow the detailed policy and procedures and to ask help of the supervisor of blood bank technicians and blood bank doctor in time of need.

6.2 The treating physician may be involved in certain situation of blood products selection (previously mentioned).

7. APPENDICES:

7.1 N/A

8. REFERENCES:

8.1 The Unified Practical Procedure Manual For Blood Banks In The Arab Countries, 1434-2013.

8.2 The Standard Policy For Blood Banks In The Kingdom Of Saudi Arabia, 1st edition, 1435-2014.

8.3 National Standards For Clinical laboratories and Blood Banks, 1st edition, 2015.

8.4 AABB Technical manual, 18th edition, 2014.

8.5 AABB Standards for Blood Banks and Transfusion Services, 30th edition, 2016.

8.6 Mollison's Blood Transfusion in Clinical Medicine; 12th edition, 2014.

8.7 Guidelines for the use of fresh-frozen plasma, cryoprecipitate and cryosupernatant. British Committee for Standards in Haematology, Blood Transfusion Task Force. The British Society for Haematology, 2004; 126: 11–28.

8.8 Good Manufacturing Practice for Blood Establishments, Version 2.0, May 2019, Saudi FDA

9. APPROVALS:

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