HEALTH HOLDING

HAFER ALBATIN HEALTH CLUSTER MATERNITY AND CHILDREN HOSPITAL

Department:	Laboratory and Blood Bank		
Document:	Multidisciplinary Policy and Procedure		
Title:	Massive Blood Transfusion		
Applies To:	Blood Bank and Medical Staff (Physicians and Nurses) Involved in Transfusion Process		
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1. PURPOSE:

1.1 The aim of this policy is to give best advice regarding the massive blood components transfusion in the case of major obstetric hemorrhage. The policy has been produced for hospital transfusion teams and committees. It is hoped that it can be used as a template for production of hospital guideline(s) and flow charts for the transfusion management of major obstetric hemorrhage .

2. DEFINITIONS:

2.1 **Massive bleeding:** Loss of 50% of circulating blood volume in 3 hours or Loss of whole blood volume within 24 hours.

2.2 **Massive transfusion (MT):**

2.2.1 In an adult, the replacement of a patient's total blood volume (8-10 units of RBCs) in less than 24 hours period, or as the acute administration of ≥ 4 RBCs units per hour, or as Replacement of 50% of the total blood volume (which is estimated as 5000 ml or 70ml/kg in a 70 kg adult) in 3 hours .

2.2.2 In children, transfusion of >40 ml/kg (blood volume in children over 1 month old is approximately 80 ml/kg).

3. POLICY:

3.1 Nursing staff and physicians in the Delivery, Postpartum, Operation and Recovery areas must be trained in accurately assessing the degree of maternal hemorrhage.

3.2 Fluid resuscitation and transfusion should be based on the estimation of current blood loss and the expectation of continued bleeding, regardless of apparent maternal hemodynamic stability.

3.3 All hospital staff, including physicians, nurses, laboratory personnel and others must be aware of and implement MCH massive transfusion protocol.

3.4 **Massive Transfusion Protocol (MTP):**

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

3.4.2 Used in acute life threatening bleeding with collapse or shock that is requiring volume expanders or critically bleeding patients anticipated to require greater than 4 units of packed red blood cells within 1 hour.

3.4.3 Ensure that all hospital staff, including physicians, nurses, laboratory personnel and others are aware of the protocol related to dealing with patient's hemorrhage.

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

4. PROCEDURE:

4.1 **Indications Of Massive Transfusion:** Massive bleeding as in:

4.1.1 Severe trauma.

4.1.2 Ruptured aortic aneurysm.

4.1.3 Surgery complications.
4.1.4 Obstetrics complications.

4.2 **Management Of Obstetric Hemorrhage:**

4.2.1 Estimation of Blood Loss:

4.2.1.1 Clinically, exact measurement of blood loss is often difficult, but it could be estimated by:

4.2.1.1.1 Visual: Underestimates by ½ to 1/3.

4.2.1.1.2 Effect of Acute Blood Loss on Hematocrit

4.2.1.1.2.1 Hemoglobin will appear normal.

4.2.1.1.2.2 Loss of 1000 ml may require more than 72 hours for complete compensation.

4.2.1.1.2.3 HCT is affected by the degree of intravenous hydration.

4.2.1.1.2.4 So, determinations of hemoglobin or hematocrit concentrations may not reflect the current hematologic status.

4.2.1.1.3 Signs and symptoms of hypovolemia:

4.2.1.1.3.1 Also of limited utility as they can be late findings in a young and healthy person.

4.2.1.2 Nursing staff and physicians in the operation, Recovery, Delivery, and Postpartum areas must be trained in accurately assessing the degree of maternal hemorrhage.

4.2.1.3 When problems are identified, the nurse assigned must notify the physician immediately.

4.2.2 Maintenance of tissue perfusion and oxygenation by restoration of blood volume and hemoglobin (Hb):

4.2.2.1 Restoration of blood volume through:

4.2.2.1.1 Crystalloid solutions.

4.2.2.1.2 Colloids such as hydroxyethyl starch (HES), dextran solutions, or albumin.

4.2.2.1.3 Use fluid resuscitation must be based on the estimation of current blood loss and the expectation of continued bleeding, regardless of apparent patient's hemodynamic stability.

4.2.2.2 Red Blood Cell (RBC) units needed: The treating physician should be aware of:

4.2.2.2.1 The amount already lost.

4.2.2.2.2 The amount that will be lost before bringing the situation under control.

4.2.2.2.3 An assumption of the patient's ability to tolerate this level of anemia, separate from the hypovolemia.

4.2.3 Arrest of bleeding including early surgical intervention.

4.2.4 Judicious use of blood component therapy to correct coagulopathy.

4.2.4.1 Fresh Frozen Plasma:

4.2.4.1.1 As this coagulopathy occurs very rapidly, FFP transfusion is required early and in greater volume than generally recommended.

4.2.4.1.2 The only way to immediately issue plasma with RBCs is to keep some thawed plasma.

4.2.4.1.3 The test results reflect not the current status of the patient, but when they were 30 or more minutes ago.

4.2.4.2 Platelets:

4.2.4.2.1 Aim to keep the platelet count >50,000 /ul (except in the presence of multiple trauma, head/spinal injury or microvascular bleeding where the aim is a platelet count >100,000 /ul)

4.2.4.2.2 Administration of ABO incompatible platelets is accepted when transfusion is necessary.

4.2.4.2.3 One approach is to limit the amount of plasma being transfused by centrifuging the unit and expressing off the majority of the plasma shortly before transfusion (Volume-Reduced Platelets) (as applicable).

4.2.5 Causes Of Coagulopathy:

4.2.5.1 Dilutional coagulopathy.

4.2.5.2 Consumption coagulopathy.

4.2.5.3 Hypothermia:
- 4.2.5.3.1 It leads to the decline in both platelet and coagulation enzyme activities.
- 4.2.5.3.2 These effects are often underestimated as nearly all laboratories re-warm blood samples to 37°C before testing for clotting assays.
- 4.2.5.3.3 Rewarming strategies initiated in the emergency department and operating room are aggressively continued in the intensive care unit. Strategies include passive and active external rewarming and active core rewarming (if available). Blood warmer should be used.
- 4.2.5.3.4 Warmers are rarely needed during routine transfusion situations but have to be used in massive transfusion.

4.2.5.4 Acidosis:
- 4.2.5.4.1 Resulting from decreased perfusion and production of anerobic metabolism leading to the accumulation of lactic acid. It is common among trauma victims.
- 4.2.5.4.2 Even a slight decrease in pH compromises the function of both coagulation enzymes and platelets, particularly in the presence of hypothermia.
- 4.2.5.4.3 Acidosis causes RBC swelling which increases viscosity.
- 4.2.5.4.4 Acidosis massively increases risk of coagulopathy, impairs factor VIIa/tissue factor complex.

4.2.5.5 Hyperfibrinolysis

4.2.5.6 Anemia-induced coagulopathy:
- 4.2.5.6.1 In addition to their role in oxygen delivery, red blood cells (RBC) provide important mechanical function in the coagulation process.
- 4.2.5.6.2 Anemia causes prolongation of the bleeding time, which can be corrected with a RBCs transfusion.

4.2.5.7 Hypocalcemia:
- 4.2.5.7.1 Has been noted with rapid transfusions.
- 4.2.5.7.2 This is usually transient and dependent on the amount and rate of citrate infused.
- 4.2.5.7.3 Calcium replacement is based on the patient's ionized serum calcium level.
- 4.2.5.7.4 If the corrected serum calcium is less than 2.1 mmol/l, or if the ionized calcium is less than 1.15 mmol/L, THEN SLOWLY ADMINSTER:
  - 4.2.5.7.4.1 Calcium chloride 1 gram IV via a central line, over 3-5 minutes. OR
  - 4.2.5.7.4.2 Calcium gluconate 2 grams IV via a peripheral line, over 3-5 minutes each.

4.3 Massive Transfusion Protocol (MTP):

4.3.1 Aim: Reduction of morbidity and mortality associated with major obstetric hemorrhage can be achieved through:
- 4.3.1.1 A rapid and coordinated multidisciplinary clinical response which
  - 4.3.1.1.1 Facilitates/ protocolizes communication.
  - 4.3.1.1.2 Ensures frequent laboratory monitoring.
  - 4.3.1.1.3 Reduces delay in ordering and administering blood components.
  - 4.3.1.1.4 Delivers a reasonable ratio of plasma and platelets to red blood cells (RBCs: FFP: Platelet), as applicable.
- 4.3.1.2 Implementation of an MTP that should be reviewed annually.

4.3.2 MTP Elements: MTP should include the following elements:
- 4.3.2.1 How the protocol is initiated:
  - 4.3.2.1.1 MTP can be activated by an attending physician in any hospital location, most often from:
    - 4.3.2.1.1.1 Emergency Department (ED): Activated by the ER resident.
    - 4.3.2.1.1.2 Operation Theatre (OT): Activated by the anesthesiologist.
    - 4.3.2.1.1.3 Critical or Intensive Care Unit (ICU): Activated by the attending physician.
    - 4.3.2.1.1.4 Labor & Delivery room: Activated by the attending obstetrician.
  - 4.3.2.1.2 Communication:

4.3.2.1.2.1 The MTP is activated by phone call to the Blood Bank.

4.3.2.1.2.2 Blood Bank staff will call and/ or urgently page the on call staff (s) to inform him/them of MTP activation, as applicable.

4.3.2.1.3 Blood product ordering:

4.3.2.1.3.1 The doctor who activates the protocol must send a MT order on Blood & Blood Products Request & Release Form (GDOH-LAB-BBPR-319) with a patient sample to the blood bank to arrange for massive transfusion pack

4.3.2.2 When will the protocol be initiated?

4.3.2.2.1 MTP is activated when it appears likely that the patient will require massive transfusion.

4.3.2.3 What blood products should be released?

4.3.2.3.1 It is helpful to depot blood products near the trauma operating room.

4.3.2.3.2 The most challenging demand for the blood bank is supplying FFP in a timely manner.

4.3.2.3.3 A trained transportation person should be responsible for issue and delivery of the blood components and laboratory samples.

4.3.2.3.4 Transfuse blood components and do not wait for lab results.

4.3.2.3.5 When one evaluates the clinical needs, attention should be given not only to the time required to issue blood from inventory but also to the time required for the blood to actually reach the patient.

4.3.2.3.6 MCH favours 1:1:1 ratio transfusion of PRBC: FFP: platelets for patients with massive transfusion, as applicable.

4.3.2.3.7 If more blood is needed, a second/third MTP cycle should be ordered by PHONE Call to blood bank.

4.3.2.3.8 Nursing staff/ departmental technician will be responsible for maintaining accurate records of what blood products have been administered and how much.

4.3.2.4 Hemostatic monitoring during massive blood transfusion:

4.3.2.4.1 CBC- every 1h.

4.3.2.4.2 INR- every 1h.

4.3.2.4.3 Fibrinogen – every 1h (as applicable).

4.3.2.4.4 Na, Cl, K, Ca, glucose, creatinine – every 2 hrs.

4.3.2.4.5 Arterial blood gases- at least hourly.

4.3.2.4.6 Temperature every hour or continuous temperature monitoring.

4.3.2.5 Deactivating the Massive Transfusion Protocol:

4.3.2.5.1 It is crucial that the attending physician informs the Blood Bank when the MTP is over or when the patient is transferred.

4.3.2.5.2 Promptly return the unused blood components to the hospital blood bank.

4.3.2.5.3 Significant wastage will result from late communication of this information.

4.4 **Physician Steps:**

4.4.1 The physician caring for the patient evaluates the need for MT using an accepted method of determining injury severity and probability of massive hemorrhage.

4.4.2 The physician must call blood bank.

4.4.3 MT order on Blood & Blood Products Request & Release Form (GDOH-LAB-BBPR-319) with a patient sample to the blood bank to arrange for massive transfusion pack. The physician may transfuse uncrossmatched RBCs (Refer to "The Emergency Release Of Incompletely Tested Blood And Blood Components" chapter (LB-MPP-238)).

4.4.4 A specimen for crossmatch should be sent to blood bank.

4.4.5 Other lab tests should be ordered and sent STAT: Hb, Hct, platelet count, INR, APTT, and fibrinogen.

4.4.6 Transfusion of plasma (FFP) and platelets should be started together with red cell units (RBCs) as soon as it is determined that transfusion of greater than 50% of the age/size appropriate patient blood volume is likely to be necessary.

4.4.7 Appropriate cardiovascular, electrolyte and coagulation parameters should be monitored closely throughout and following massive transfusion, understanding that more blood components may be available than are necessary or appropriate to administer.

4.4.8 All blood components should be given via a rapid infuser/fluid warmer or other blood-warming device to prevent hypothermia.

4.4.9 Subsequent requests (i.e. 2nd and 3rd MTP cycles) for MT components should be made by calling 1203 and be accompanied by MT order on Blood & Blood Products Request & Release Form (GDOH-LAB-BBPR-319). In case of contact difficulty, a nurse/departmental technician comes to blood bank to inform blood bank staff.

4.4.10 Once it is determined that the MTP can be discontinued, the physician must call blood bank.

4.4.11 All unused blood components must be returned to blood bank within 4 hours.

4.5 **Blood Bank Steps:**

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

4.5.2 Preferably, 1:1:1 ratio of PRBC: FFP: platelets will be prepared (as applicable).

4.5.3 The blood products will be picked up by the ordering department. The type and number of blood products are released according to the physician's order.

4.5.4 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.

4.6 **Auditing:**

4.6.1 Each activation of the MTP will be reviewed by the supervisor of Blood bank technicians and chiefs of obstetrics and anesthesia departments to be discussed in blood transfusion committee

4.6.2 Crucial Parameters to Monitor:

4.6.2.1 Attending physician.

4.6.2.2 Blood products received in a timely fashion.

4.6.2.3 Unused products stored appropriately.

4.6.2.4 RBC: Plasma: Platelet ratios are being followed (as applicable).

4.6.2.5 Wasted units.

4.6.2.6 Timely deactivation of protocol

4.7 **Notes:**

4.7.1 If patient's antibody screen is negative, group check on ABO compatible red cells for all subsequent crossmatches, with in date specimen.

4.7.2 After 24 hours from massive transfusion, a new type and screen must be requested.

4.7.3 If patient has clinically significant alloantibodies, full cross match is required with ABO compatible and antigen negative units.

5. MATERIALS AND EQUIPMENT:

5.1 **Forms and Records:**

5.1.1 Blood & Blood Products Request & Release Form (GDOH-LAB-BBPR-319).

6. RESPONSIBILITIES:

6.1 Obstetricians, anesthesiologists, Lab and blood banks staff, intensivists, midwives and nurses have to follow the policy and procedure.

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 Modern Blood Banking & Transfusion Practices, 6th edition, 2012.
8.8 Massive transfusion protocol, Ministry of Health, Saudi Arabia, 2016.

9. APPROVALS:

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KINGDOM OF SAUDI ARABIA

وزارة الصحة
Ministry of Health

Hospital: _____ مستشفى:

Region: _____ المنطقة/المحافظة:

Dept./Unit: _____ القسم/الوحدة:

MRN: _____ رقم الملف الطبي:

Name: _____ الاسم:

Nationality: _____ الجنسية:

Age: _____ ☐ سنة Years ☐ شهر Months ☐ يوم Days العمر:

Date of Birth: ____/____/14____ H ____/____/20____ تاريخ الميلاد:

Gender: ☐ Male ☐ Female الجنس:

BLOOD & BLOOD PRODUCTS REQUEST & RELEASE FORM

Note: One form must be submitted for each unit ordered. Blood release copy remains on chart until blood is needed. Blood bank copy must be returned to blood bank on completion of transfusion or return of blood.
RETURN BLOOD TO CENTRAL BLOOD BANK WITH 30 MINUTES FROM RELEASE OF BLOOD FROM BLOOD BANK IF NOT TRANFUSED.

Requisition for: ☐ Packed Red Cells ☐ Whole Blood ☐ Fresh Frozen Plasma ☐ Cryoprecipitate ☐ Platelet Concentrate

Special Instructions: ☐ Irradiated ☐ Leukocyte poor (Filtered) ☐ Volume _____ml

Requesting Physician's name: _____ Stamp&Signature: _____ Date:____/____/ ____

RELEASE BLOOD PRODUCTS

Unit No _____ Product _____ Blood Group _____ Expiry Date:____/____/ ____

Blood unit issued by: Name _____ Sign _____ Date:____/____/ ____ Time _____

Blood unit received by: from blood bank: Name: _____ Signature: _____

Blood unit received in the ward by: Name: _____ Signature: _____ Time: _____

TRANSFUSION RECORD

(This part must be completed when transfusion is started)

Pre transfusion

Patient's temp. _____ BP _____ Pulse _____

Date of transfusion _____ Time _____

I have verified ID, Blood Group and Rh of the recipient and donor on bag label and blood issue and compatibility testing forms. I have further verified that the recipient is same person named on all documents.

Remarks: _____

_____
Name and signature of person starting transfusion

_____
Name and signature of 2nd verifying person

(This part must be completed if blood is returned to BB)

Reason for return _____

Date ____/____/ ____ Time _____

Returned by: Name and signature _____

Received in blood bank :Date ____/____/ ____ Time ___

By Name and Sign _____

(I verify temperature and integrity of bag is acceptable)
If unacceptable for reuse, fill incident report form.

(This part must be completed when transfusion is stopped)

Post transfusion

Ending time: _____ Amount given _____

Patient's temp. _____ BP _____ Pulse _____

_____
Name and signature of person completing transfusion

Transfusion Reaction: ☐ None

☐ Yes (Specify)_____

If transfusion reaction is suspected then immediately:

1. Discontinue transfusion.
2. Treat shock, if present.
3. Notify attending physician.
4. Notify blood bank at once and send to blood bank/ lab.
   a. Unused blood, transfusion set with tubing attached (remove needle)
   b. Recipient venous blood sample 5ml EDTA tube.
   c. Completed transfusion reaction form.
   d. Next voided urine to central lab.

Other difficulties: (Equip, clots etc) ☐ None

☐ Yes (Specify)_____