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Work Instruction

Title: **TS-Massive Transfusion**		**WI Number** SFOWI-0110 **Revision:** 14
Department: Immunohematology **Area:** 2425 Geary Blvd SFO Hospital Lab	***Document is in the Final Approval Process. 2 - approvals are required***	
Type of Document: Work Instruction		**Review Period -** 340 **Days**

PURPOSE

To provide a policy and procedure for managing a Massive Transfusion Protocol (MTP). MTP is implemented to provide appropriate blood component therapy and to help avoid the dilutional coagulopathy and thrombocytopenia associated with massive transfusion of blood.

A. The three most common definitions of Massive Transfusion are:
   1. transfusion of more than 100% of the patient's total blood volume (TBV) within 24 hours, this approximates 10 units of whole blood for an average adult patient (70kg)
   2. transfusion of more than 4 units of whole blood in 1 hour for an average adult patient with anticipation of continued need for blood product support
   3. replacement of more than 50% of the TBV by blood products within 3 hours.

B. Once this occurs, the pre-transfusion specimen will not represent the patient's current serological status, and immediate spin and IAT crossmatches can be omitted.

C. A patient is a candidate for the massive transfusion protocol when they have lost 50 % of blood volume within 3 hours, rate of loss of 150 ml per minute or in adult, loss of 3-4 units blood in 1-2 hours.

D. It is the responsibility of the attending physician or designee to initiate and discontinue MTP.

E. Ongoing communication with the Blood Bank regarding the patient's status and clinical condition is essential to meet the patient's transfusion needs and to avoid blood wastage.

REAGENTS

A. Type and screen reagents
B. Phenotyping sera

EQUIPMENT

A. Automated analyzer
B. 12 X 75 mm test tubes
C. Centrifuges
D. Cell Washer
E. 37°C heat block

F. Optical Viewer
G. Validated blood coolers
H. Temperature indicators
I. Ice Packs

SPECIMEN
See Blood Bank Specimen and Requisition SOP.

CONTROL
A. Daily Analyzer QC
B. Daily Reagent QC
C. Daily Equipment QC
D. Supervisory review of LIS records and MTP Worksheet

PROCEDURE
A. Massive blood loss is defined as loss of 50 % of blood volume in 3 hours (150 ml per minute) or in adult, lost of 3-4 units in 1-2 hours. It is considered massive transfusion when the patient has received an amount of blood that exceeded their blood volume. The blood volume estimate is based on the age of the patient as follows:

Age of Patient	Red Blood Cells Issued
Less than 1 year	2 units
1-5 years	4 units
6-11 years	6 units
12-15 years	8 units
16 plus years	10 units

Note: Estimated blood volume: 70 ml/Kg or about 5000 ml (10 units of whole blood) in a 70 Kg adult. Adult blood volume is 7 % of body weight whereas 8-9% in a child.

B. When informed by the patient's physician or MTP coordinator (usually a physician or nurse) to **activate the Massive Transfusion Protocol**, perform the following:

1. Initiate an **MTP worksheet** by documenting the following information:
   a. Patient's name, MRN, age and location.
   b. Physician' name who activated the MTP.
   c. MTP contact's name and phone number.

2. Designate a **CLS to be the BB MTP coordinator**, who will perform the following:
   a. Primary contact with the MTP patient care team.
   b. Document activity on the MTP worksheet.

3. When patient's **blood type is unknown**, follow the 'Urgent requirements for Blood and Components' SOP to dispense MTP Set 1.
   a. 4 O Neg RBC, uncrossmatched.
   b. 4 AB plasma, thawed.
   c. 1 platelet pheresis, any blood type (dispense as soon as available).
   NOTE: Give Rh Neg platelets if available to Rh Neg female 50 years old and younger.

4. When MTP is initiated,
   a. **Check platelet inventory** and order adequate platelets STAT to stay ahead.
   b. Begin thawing 4 FFP if 4 units of thawed plasma are not available.
   c. Begin assembling MTP Set 1. Refer to the table below.

L&D Patients

Set 1, 2 and all Even# Sets	Set 3 and subsequent Odd# Sets
4 RBC	4 RBC
4 thawed plasma	4 thawed plasma
1 platelet pheresis	2 Cryo Pool-5 (10 units)

All Other Patients

Set 1	Set 2	Set 3
4 RBC	4 RBC	4 RBC
4 thawed plasma	4 thawed plasma	4 thawed plasma
1 platelet pheresis	1 platelet pheresis***** **(substitute with 10 cryo in even# sets if requested by MD)**	1 platelet pheresis

***** Alternate use of 10 units Cryoprecipitate instead of platelet pheresis in even # sets must be verbally communicated to the Blood Bank by the patient's MTP Coordinator. Otherwise, dispense 1 platelet pheresis.

   d. Attach a temperature indicator to the back of RBC units if dispensing to Surgery or in a cooler.
   e. **Computer Crossmatch Dispense of PRBC can be performed if patient qualifies** and if time does not permit crossmatch prior to dispense.
   f. Notify nursing unit as blood products become available. Dispense all available blood products in the current set.
   g. Continue assembling subsequent sets until the MTP is ended by the physician.
   h. Serological crossmatch can be omitted after 10 units of PRBCs have been dispensed. However, it will expedite the computer dispense if PRBCs are crossmatched.

C. If time permits, select blood products based on patient's antibody history and ABORh performed on the current sample. Attempt to obtain a DBCK specimen if needed. **A second ABORh is needed before type specific blood can be dispensed**. **Otherwise, set up group O Rh compatible RBCs. See section D for more information on Rh Neg patients and special requirements.**

1. **RBC Selection**
   Follow the table below for patients who have **a current and a second ABORh**. (N/A - not applicable).

Patient ABORh	1st Choice	2nd Choice	3rd Choice	4th Choice
O Pos	O Pos	O Neg	N/A	N/A
O Neg	O Neg	O Pos	N/A	N/A
A Pos	A Pos	A Neg/O Pos	O Neg	N/A
A Neg	A Neg	O Neg	A Pos	O Pos
B Pos	B Pos	B Neg/O Pos	O Neg	N/A
B Neg	B Neg	O Neg	B Pos	O Pos

AB Pos	AB Pos	AB Neg/A Pos	B Pos	O+,A-,B-,or O-
AB Neg	AB Neg	A Neg	B Neg/O Neg	AB+,A+,B+/O+

2. Patient has **negative antibody screen**.
   a. Set up ABORh compatible RBC.

3. Patient has **clinically significant antibody** in the current specimen or in the history.
   a. Set up ABORh compatible and antigen negative RBC if possible/available. **NOTE:** Antigen negative RBC may not be available for those antigens which are of high frequency, i.e. anti-e. Inform the attending physician and the pathologist immediately if antigen negative RBCs are unavailable.

   b. If the patient is **actively bleeding**, consider **switching to antigen untested units**.
      i) Speak to the physician to confirm that patient's bleeding is still active and cannot be controlled immediately.
      ii) Inform the attending physician and the pathologist about switching to antigen untested units.
      iii) Inform the attending physician to notify the Transfusion Service immediately if the bleeding is under control and to switch back to antigen negative RBC.
      iv) Document the approval in the Communication Log and Blood Bank Comments in LIS.

4. Patient has **clinically insignificant antibody** in the current specimen or in the history.
   a. Set up ABORh compatible RBC.

D. Select products based on **Rh type and special requirements** with certain exceptions specified below:

1. Patient is **Rh Negative**:
   a. Patient is **a female 50 years old or younger, or a male infant 1 year old or younger.**
      i) Set up ABO compatible Rh negative RBC.
      ii) It is preferable to switch to group compatible Rh negative RBC before switching to Rh positive RBC.
      iii) Avoid switching to Rh positive unless absolutely necessary.
      iv) If the continuation of transfusion is expected to deplete the available supply of Rh negative blood, evaluate switching to Rh positive blood product.
      v) When switching from Rh Negative blood to Rh Positive blood becomes necessary, notify the attending physician immediately and the pathologist.
      vi) Document the approval in the Communication Log and in the Blood Bank Comments in LIS that 'Rh Positive blood dispensed to Rh Negative patient'.

   b. Patient is **a female over 50 years old or a male over one year old**.
      i) Notify the physician and the pathologist to get approval for

releasing Rh Positive RBC to Rh Negative patient.

ii) Document the approval in the Communication Log and Blood Bank Comments in LIS.

iii) Set up ABO compatible Rh positive RBC.

iv) Switch to Rh positive blood should be made early to conserve blood for other recipients.

2. Patient requires **Irradiated** blood products.
   a. There is no substitution for irradiated blood products.
      i) Notify the physician and the pathologist that the available irradiated RBC inventory is inadequate to sustain the ongoing MTP.
      ii) Document the decision of the Medical Director/pathologist in the Communication Log and Blood Bank Comments in LIS.
      iii) Set up prestorage leukocytes reduced RBC or platelet.
      iv) Order irradiated products, as directed by the Medical Director/pathologist.

3. Patient requires **CMV Negative** blood products.
   a. Set up prestorage leukocytes reduced RBC or platelets.
   b. Notify the physician and the pathologist that prestorage leukocytes removed by filtration RBC can be considered CMV safe.
   c. Document the approval in the Communication Log and Blood Bank Comments in LIS.

4. Patient requires **HgbS Negative** (SIC-) blood products.
   a. Notify the physician and the pathologist that the available SIC- RBC inventory is inadequate to sustain the ongoing MTP.
   b. Majority of the donor units are HgS negative eventhough the units were not tested.
   c. Document the decision of the Medical Director/pathologist in the Communication Log and Blood Bank comments in LIS.

E. Order in LIS (this may be the initial order based on an Emergency Release signed form or placed in HeathConnect directly by the physician).
   1. If crossmatch has not been ordered, add Crossmatch Flex to current accession and add Order Comment 'Massive Tx'.

F. Dispensing blood products

Massive Transfusion Protocol is usually initiated in an emergency. The TAT is 10 minutes. However, thawed plasma products may not be immediately available. As such, the blood products are dispensed as they become available.

1. **Computer Crossmatch Dispense of PRBC can be performed if patient qualifies**. It may be necessary to override the special requirements (CMV-, IRR, SIC-) warnings.
2. Use **Dispense** to issue units or to emergency release uncrossmatched/unassigned units. It may be necessary to override the antigen negative and/or special requirements warnings. **NOTE: MTP is exempted from Prepare Order.**
3. **Any** of the following with complete patient's identification (emergency identification e.g. Doe, John/Jane is acceptable) can be used as blood products pick-up form:
   a. Last, First name and MR# of the patient on the Blood Bank Product

Pickup form.
b. Last, First name and MR# on a piece of paper.
c. Last, First name and MR# on the 'Emergency Release of Donor Blood' form.
d. Last, First name and MR# on the HealthConnect form.

4. Dispense all blood products that are ready in the current set.
5. Technologist performs a **visual inspection** of the blood products.
6. If time does not permit crosscheck with courier, CLS must ensure that all identifying information and paperwork are accurate and complete before dispense.
7. Dispense units in blood cooler if needed.
   a. Do not place platelets and cryoprecipitate in the cooler.
   b. Label the cooler with the appropriate expiration time.
8. Issue to 'SFO-HPS' when issuing to Surgery. Enter 'SFO Cooler' when issuing in a cooler.
9. Call nursing unit 20 minutes prior to the expiration time of the cooler to inquire if the blood products have been transfused, otherwise the icepack needs to be changed.

G. After the bleeding episode
1. The MTP coordinator or the patient's physician will notify Blood Bank to end the MTP. Record the name of the physician who ended the MTP and the time on the MTP worksheet.
2. Release unused plasma products to inventory.
3. Return to routine compatibility testing after the MTP.
4. Leave paperwork for Supervisor or designee to review.
5. Refer to Platelet Transfusion SOP for RhIg recommendation if Rh Pos Platelets were transfused to Rh Neg female of child bearing age (50 years and younger).

PROCEDURE NOTES

A. If Hemorrhagic Shock is life threatening, blood for transfusion must be issued immediately regardless of risk
B. When time does not permit crossmatch, units will be issued uncrossmatched (refer to Urgent Requirements for Blood and Components SOP).
C. The physician may order plasma, cryoprecipitate or platelets to supplement clotting factors.
D. The pre-event platelet count and fibrinogen will decrease by approximately 63 % with each blood volume replaced without the infusion of platelets or plasma
E. The results of platelet counts, PT, aPTT, and INR can guide the need for blood components transfusion.
F. In general, 1 platelet pheresis may be administered for every 10 units of RBCs transfused.
G. Refer to Blood Bank Specimen and Requisition SOP for additional specimen and requisition requirements.
H. Obstetric hemorrhage risk assessment:

Stage 0	Stage 1	Stage 2	Stage 3
Every Woman in labor	**EBL >500 vag and >1000 C/S or VS changes**	**QBL 1000 to 1500 and Symptomatic**	**1500 and above Severe Shock**
Focus on Risk Assessment-Order	**Get help-Charge RN,**	**Evaluate Causes-Tone, Tissue, Trauma,**	**Massive Transfusion**

blood	**Anesthesia**	**Thrombin**	**Protocol**
Active management of 3rd stage labor	**Pharmacologic intervention**	**Get to OR & intervene –uterine tamponde, inspect, curette, IR**	**Laparotomy-B-lynch, O'Leary, Hysterectomy, IR**
Fundal massage and Oxytocin or Cytotec	**Uterine Massage and clear the clots**	**Resuscitate and type and cross 2 units**	**Rapid infuser, Cell Saver, Warmer**
Estimate Blood Loss	**Quantify Blood Loss**	**Quantify Blood Loss**	**GIVE MTP, continue QBL**

REFERENCE

A. AABB, Standards for Blood Banks and Transfusion Services, current edition, Bethesda, MD.

B. Treatment and Prevention of Postpartum Hemorrhage, John Vallee MD. March 16, 2011.

Associated Documents:

External Documents

Associated Documents:

SFOWI-0060 -- TS-Work Priority for Technologists
SFOWI-0078 -- TS- Platelet Transfusion
SFOWI-0079 -- TS-Blood Bank Specimen and Requisition
SFOWI-0113 -- TS-Urgent requirements for Blood and Components
SFOFCD-0204 -- TF0030 MTP Worksheet
SFOWI-0054 -- TS-Double Check

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Documents Generated:

Document Revision History:

Revision: 14	**Date Created:** 09/22/2005 **Date of Last Revision:** 05/01/2018	**Last Approval Date:** 10/05/2016

Document Author: Cara H Lim/CA/KAIPERM	**Document Manager:** Richard Chui/CA/KAIPERM

Reason for Change:

Revision:	Sec/Para Changed	Change Made:	Date
1	N/A	Initial Issue of Document	
1	Approver	New Lab Director	1/12/07
2	Procedure	Add PTC patient comment for approval of Rhpos RBC for Rh neg patients and RILIS order and result massive transfusion.	5/6/07
3	Approver	New Lab Director	7/1/07
4	Procedure	Delete monitor coagulation during massive transfusion	7/18/07
5	Procedure	Add massive transfusion protocol (MTP)	3/8/09
6	Procedure	Changed RILIS to RILIS MILLENNIUM functions. Reformatted numbering and paragraphs. Substituted blood pack set# with Set#. Changed Patient Comments to Blood Bank Comments. Changed PLT PHR to platelet pheresis. Changed 'Emergency Release SOP' to 'Urgent requirements	6/1/11

		for Blood and Components SOP.'	
	C.	Added 'A second ABORh is needed before type specific blood can be dispensed. Otherwise, set up group O Rh compatible RBCs.'	
	C.1.	Added N/A for 3rd and 4th choices.	
	C.2.	Added 'available. NOTE: Antigen negative RBC may not be available for those antigens which are of high frequency, i.e. anti-e. Inform the attending physician and the pathologist immediately if antigen negative RBCs are unavailable.'	
	E.2.	Added 'if patient qualifies. It may be necessary to override the special requirements (CMV-, IRR, SIC-) warnings.'	
	E.3.	If the patient does not qualify for EXM, use Dispense to emergency release the units. It may be necessary to override the antigen negative and/or special requirements warnings.	
	E.4.	Added HgbS negative section.	
7	Procedure B.4.d. Procedure B.4.e. Procedure B.4.f. Procedure B.4.g. Procedure F. Procedure Notes H. Associated Documents	Added instructions to attach temperature indicators. Added instructions for EXM. Added instructions for notification. Added instructions for continuation of MTP. Added section for Dispense instructions. Added reference to SFOWI-0079 for sample expiration. Added two QSI docs, SFOWI-0089 and SFOWI-0113.	3/2/12
8	Procedure Notes I.	Added obstetric hemorrhage risk assessment.	6/14/12
9	Approver	New Lab Director.	5/16/13
10	Approver Procedure B.4.h. Procedure G. Procedure Notes C. Procedure Notes. Procedure F.9.	New BB Medical Director. New. Added to omit serological XM after 10 units of PRBCs. New section. Added end of MTP. Moved to G.3. Renumbered. New. Added to check cooler 20 min prior to expiration.	8/5/13
11	Procedure D.1.a. & b.	Clarified male and female patients' ages for switching from Rh neg to Rh pos RBC products.	8/21/14
12	Reagents B. Procedure A. Procedure B.3.c. Procedure B.4.c. Procedure G.5. Procedure Notes G.	Added phenotyping sera. Revised. Deleted instructions to notify physician when the amount transfused has exceeded patient's blood volume. Added definition for massive blood loss. Added NOTE to give Rh Neg platelets if available to Rh Neg female <=50 years old. Added MTP Set table for L&D patients. 10 units of cryoprecipitate replace 1 unit platelet pheresis starting with the 3rd set and all subsequent odd# sets. Added reference to SFOWI-0078 for RhIg recommendation if Rh Pos platelets were given to Rh Neg female <=50 years old. Revised. Deleted specimen expiration time and added reference to SFOWI-0079.	8/21/15
13	Approver	New CLIA Director.	9/28/16
14	Procedure B. Procedure B.4.Table All Other Patients. Set 2. Equipment and Procedure F.7.b. Procedure F. Procedure F.2. Procedure G.1. Purpose	Added that the MTP Coordinator is usually a physician or nurse. Changed from 10 cryoprecipitate* to 1 platelet pheresis*. Deleted specific coolers and expiration times. Specified 10 minutes TAT for MTP to align with SFOWI-0060 Work Priority for Technologists. Added NOTE that MTP is exempted from Prepare Order for BPAM, implementation scheduled 3/20/18. Besides the physician, the MTP Coordinator can call to end MTP. Updated MTP definitions.	1/18/17 3/13/18 3/14/18

Notification List:

Approvals:

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Document History Section