KK WOMEN'S AND CHILDREN'S HOSPITAL

Policy and Procedure Manual

Title/Description:	**Clinical Transfusion Protocol**		
Department:	CMB	**Effective Date:**	01/07/2005
Procedure No:	65010-1260	**Revision No.:**	20
Revision Date:	02/06/2021	**Approved by:**	Chairman, Hospital Transfusion Committee
Applies to:	All Healthcare Staff		Chairman, Medical Board

Amendments:		
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1.0 PURPOSE

1.1 The purpose of this Police and Procedure (P&P) is to:

1.1.1 Define the roles and responsibilities and provide guidelines for laboratory, nursing and medical staff in the collection of blood samples related to blood transfusion and storage, handling, usage and administration of blood and/or blood components.

1.1.2 Ensure that these processes meet the patient's treatment needs in a safe and timely manner.

1.1.3 Ensure patients requiring blood and/or blood components transfusions are taken care of appropriately to prevent and manage transfusions-related reactions and complications.

2.0 POLICY

2.1 General Indications For The Use of Blood and/or Blood Components

2.1.1 Blood and/or blood components should be administered only when there is a clear indication and alternatives to transfusion considered whenever possible.

2.1.2 The HSA-MOH Clinical Practice Guidelines For Clinical Blood Transfusion (2011) and individual departmental guidelines can be used as references to guide clinical transfusion therapy.

2.2 All healthcare workers handling blood and/or blood components must adhere to the standard precautions.

(Refer to P&P 61260-1000 'Standard Precautions and Transmission-Based Precautions').

2.3 Correct patient identification using 2 patient identifiers must be ascertained when taking blood samples for Group and Cross-match (GXM) and when transfusion blood and/or blood component to a patient. This is to ensure errors of misidentification do not occur.

Errors in patient identification or mislabelling of GXM sample can result in an incompatible blood being transfused, this can cause potential fatal consequences to the patient.

2.4 Consent for Transfusion of Blood and Blood Products:

2.4.1 An informed consent should be obtained prior to an elective transfusion of blood and/or blood component using the 'Consent for Transfusion of Blood and Blood

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Products' Form (65010-Consent Form-0006).

Please ensure that a valid GXM is available or would be made available together with the consent.

Consent will be valid for the entire duration of an inpatient admission, on a per admission basis.

2.4.2 A separate 'Consent for Transfusion of Blood and Blood Products' Form (65010-Consent Form-0006) should be obtained for patients undergoing elective surgical procedures who have a GXM performed, as they will have a higher probability of receiving a perioperative transfusion.

2.4.3 Consent for transfusion of blood and/or blood components, taken during patient's outpatient visit in SOCs for an elective surgical procedure, will **ONLY** be valid during the admission for that particular named procedure.

If the patient is admitted before the planned procedure for an alternative reason, and requires transfusion, a separate transfusion consent has to be taken.

2.4.4 For patients requiring regular outpatient transfusion, the consent taken shall be valid for a period of 1 year.

2.4.5 Consent shall be obtained from such persons identified in P&P 65010-1050 'Consent for Medical Treatment'.

2.4.6 In cases of unexpected, emergency transfusions, this is considered lifesaving and the 'Consent for Transfusion of Blood and Blood Products' Form (65010-Consent Form-0006) need not have been taken prior to the transfusion.

The consent can be taken retrospectively.

2.5 The person giving consent shall be informed of the benefits, risks and potential complications associated with the transfusion of blood and/or blood components as well as other alternatives that are available, E.g. autologous transfusion, erythropoietin.

The person giving consent needs to be informed of the risks set out in the consent form but is not exhaustive; and the doctor taking the consent will need to highlight to the person giving consent any other such risks which are relevant to each individual patient.

2.6 Autologous Blood Transfusion (ABT) refers to the procedure of transfusion blood that have been donated by the intended recipient, i.e. when a recipient serves as his/her own donor.

For ABT cases, the referring surgeon / physician / anaesthesiologist shall obtain from the

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person giving the consent, a written consent in the form set out in **ANNEX 4** before referring to patient to the Bloodbank@HSA.

(Refer to **ANNEX 4** for 'Request for Autologous Blood Donation Form' and 'Autologous Blood Donation Patient Information and Consent').

2.7 Doctors will occasionally encounter patients who refuse transfusion of blood and/or blood components even in emergency of life threatening situations. In such cases, the principles in the P&P 65010-1050 'Consent for Medical Treatment' shall apply. The 'Refusal of Blood Transfusion' form (65010-Consent Form-00026) has to be signed by the patient and relevant physicians involved.

2.8 Doctors who are responsible for ordering GXM or other transfusion-related investigations and blood and/or blood components for transfusion must be familiar with the following blood banking and transfusion practices:

2.8.1 The indications for transfusion of blood and/or blood components in an elective procedure and in an emergency situation.

2.8.2 The availability and viability of the various types of blood components, E.g. Red cells, Platelets and frozen plasma.

2.8.3 The procedures for ordering Type and Screen (T&S), routine or urgent GXM and emergency blood requests.

2.8.4 The possible difficulties and delays in obtaining blood for patients with rare blood groups, red cell alloantibodies or when national supply is low.

2.8.5 The clinical signs and symptoms of transfusion reactions and procedure to be followed in the event of any suspected transfusion reactions.

2.8.6 If a doctor is not available, the unit of blood or blood component can be checked by 2 RNs who are trained and certified competent to check the blood and/or blood components.

2.9 Transfusion of blood and/or blood components, including Anti-D immunoglobulin, must be based on blood grouping done in KKH Blood Bank.

This is due to the possibility of inherent errors in workflow and variability of different laboratory standards.

(Refer to Hospital Guidelines 'Identification and Management of Rhesus Negative Patients in Pregnancy').

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3.0 ABBREVIATIONS

3.1 BSG – Blood Services Group

3.2 CICU – Children's Intensive Care Unit

3.3 CPOE – Computerized Physician Order Entry

3.4 ECMO – Extra-Corporeal Membrane Oxygenation

3.5 GXM – Group and Cross-Match

3.6 HD – High Dependency

3.7 HSA – Health Sciences Authority

3.8 MOH – Ministry of Health

3.9 SOC – Specialist Outpatient Clinic

3.10 WICU – Women's Intensive Care Unit

4.0 PROCEDURE

4.1 Procedure for Taking Blood Specimen for GXM:

4.1.1 The following are the healthcare workers who can obtain blood specimen for GXM from patients:

a. Doctors
b. Staff trained and certified competent in venepuncture:
   - Advanced Practice Nurses (APNs)
   - Resident Nurses
   - Venous Access Technicians (VATs)
c. Registered Nurses (RNs) from CICU, WICU, HD and Oncology wards who are trained and certified competent in obtaining blood specimen for GXM from Hickman's Line, central venous lines, arterial lines and port-a-cath.

NOTE: Staff who takes the blood specimen must start and end the procedure: From blood taking to dispatching, it must be the same person.

NOTE: GXM is valid for 3 days from the date the blood is taken.

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4.1.2 Verify doctor's order in Clinical Documentation (ClinDoc) in Sunrise Clinical Manager (SCM).

4.1.3 Push CPOE Computer on Wheels (COWs) to bedside, log in to SCM and scan patient's identification (ID) tag.

4.1.4 Print 3 KKH Patient Info Labels (Refer to **ANNEX 2**).

Paste 2 KKH Patient Info Labels on the 'Request for Blood and Blood Products' form.

The staff must verify patient's identity using 2 patient identifiers against ID tag and 'Request for Blood and Blood Products' form before proceeding to obtain blood specimen for GXM.

4.1.5 Select the appropriate specimen tube:

a. 9 ml EDTA specimen tube for adult patients or
b. 2 ml EDTS specimen tube for neonate / paediatric patients

DO NOT pre-label any specimen tube.

Requesting Doctor to complete and sign the 'Request for Blood and Blood Products' form, indicating the test(s) or blood component(s) required.

4.1.6 Staff who obtained the specimen for GXM must indicate his/her name and the sign on the 3 printed KKH Patient Info Labels. (The name and signature have to be the same on all 3 labels.)

Paste 1 KKH Patient Info Label onto the specimen tube after blood specimen for GXM has been obtained.

DO NOT stamp/sign over the barcode on the KKH Patient Info Labels.

NOTE: Staff who signs on the KKH Patient Info Labels is the one who obtained the blood specimen from the patient, and need not be the doctor who signs off the 'Request for Blood and Blood Products' form. (Refer to ANNEX 3)

4.1.7 To ensure that the details match the intended patient, to check (again):

a. Patient's ID tag
b. Request for Blood and Blood Products form
c. Specimen tube

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NOTE: Before dispatching the blood specimen, ALWAYS check to ensure that the specimen and request form belong to the CORRECT INTENDED patient.

4.1.8 **DO NOT** use correction fluid or tape for any errors. Minor errors should be crossed out and the staff who made any correction must initial above the correction made.

4.1.9 The laboratory will reject specimens when:

(Refer to Department of Pathology and Laboratory Medicine P&P 63170-BB0301 'Blood Bank Specimen Rejection)

- Patient's particulars on KKH Patient Info Labels of the specimen and 'Request for Blood and Blood Products' form do not tally.
- There is / are no patient's KKH Patient Info / OAS (Outpatient Administration System) Labels on the specimen tubs and/or 'Request for Blood and Blood Products' form. (Strictly no usage of SAP (System Application Process) labels)
- There is no signature of the staff who collected the blood specimen on the KKH Patient Info Labels and/or 'Request for Blood and Blood Products' form.

4.2 Supply of Blood and Blood Components:

4.2.1 All blood and blood components are supplied by BSG.

4.2.2 These supplies are all tested negative for transfusion-transmittable diseases e.g. HIV, Hepatitis B, Hepatitis C and Syphilis.

4.2.3 There are 2 units of Group O Rh (D) negative red cells available in KKH Blood Bank that can be released upon request for Emergency transfusions.

Red cells, leucocyte-reduced red cells, pooled platelets, apheresed platelets paediatric (APP) and pre-pooled cryoprecipitate are available in KKH Blood Bank upon activation of Massive Transfusion Protocol (MTP) for Obstetrics and Gynaecology (O&G) massive bleeders, Paediatrics MTP and ECMO for paediatrics / neonates.

4.2.4 All other blood products e.g. platelets, single cryoprecipitate unit, reconstituted blood, washed cells or irradiated products are available upon request by KKH doctors and upon approval by BSG Medical Officer (MO).

4.3 Storage of Blood and Blood Components in KKH Blood Bank (Refer to ANNEX 8)

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4.3.1 Red cell units must be kept in the Blood Bank refrigerator between 1°C and 6°C.

4.3.2 Frozen Plasma (FP) and frozen pre-pooled cryoprecipitate must be stores in the freezer at -18°C or below, and may be kept up to a year.

4.3.3 Platelets must be kept in the platelet incubator with a flatbed agitator between the temperature ranges of 20°C to 24°C.

4.3.4 For further details, refer to Department of Pathology and Laboratory Medicine P&P 63170-BB0404 'Receiving and Storing of Blood and Blood Components from Blood Services Group (BSG).

4.4 Supplies of Blood and/or Blood Components:

4.4.1 When blood and/or blood component is required, patient's blood specimen for GXM together with 'Request for Blood and Blood Products' form are sent to Blood Bank. For FP or any specific requests that require approval from BSG, e.g. irradiated blood or platelets, the requesting doctor is to make special arrangement by telephone to the Blood Bank at extension number (ext.) 1376. The requesting doctor will then be directed to BSG MO for approval.

Once the approval is obtained, the requesting doctor must call Blood Bank to inform the details of approval. The telecommunication will be documented by the medical technologist. The patient's details, blood and/or blood component request, date and time of request will also be recorded.

4.4.2 Once the blood / blood component is ready for collection, the medical technologist from Blood Bank will call and inform the ward nurse. Before sending a porter to collect the blood / blood component, the ward nurse is to prepare a validated blood box with / without a well frozen ice pack (refer to 4.4.3) as well as the duplicate copy of the 'Request of Blood and Blood Products' form.

4.4.3 Collections of Red Cells / Frozen Plasma requires a blood box with a well frozen ice pack. To prevent haemolysis of the blood, ensure that the acrylic separator is placed above the ice pack.

Collections of Platelets / Pre-Pooled Cryoprecipitate only requires a blood box.

(Refer to Blood Bank 63170-Form-0037 'Transport Box Storage Requirement')

4.4.4 Before issuing the blood / blood component, the medical technologist will scan the barcode for the identification of the blood / blood component, blood type of donor and the recipient. The expiry date and appearance of the unit will be checked before issuing. Units with any clerical discrepancies or abnormal appearance will not be

issued for transfusion.

4.4.5 Documentation details such as unit serial number of the blood / blood component, patient's name and hospital registration number, location, expiry date and time are indicated on the Transfusion Slip and issued together with the unit of blood / blood component.

4.4.6 Date and time of issue, porter's name and location at which transfusion is to take place will be documented by the Blood Bank medical technologist.

4.4.7 If the issued unit of blood / blood component is not transfused within 30 minutes, the unit has to be returned promptly to Blood Bank with a detailed memorandum indicating the reason for return. This is for the possibility of reissuing the unit to other potential patients who need it to avoid wastages.

(Refer to 63170-Form-0159 'Memo for Blood and Blood Components Return or Wastages')

The returned blood / blood component will then be placed in quarantine for at least 24 hours before returning to the general pool to be reissued if the unit of blood / blood component is returned within 30 minutes from time of issue.

- Red cell units can be reissued if the units have not been tampered with and the temperature upon return does not exceed 10°C.
- For FP and platelets, these units may be reserved for the patient until the time of expiry if required. This must be communicated to the Blood Bank.
- If FP is no longer required, it will be reissued to the general pool if not expired.
- Platelets will not returned to BSG as BSG no longer accept return of unused platelets.

4.5 Procedure for Administration of Blood and/or Blood Components:

4.5.1 If pre-medication is required, it should be administered in advance, prior to the arrival of the blood / blood component.

For oral pre-medications, to administer 30 minutes before initiating the transfusion.

For intravenous (IV) pre-medications, to administer 10 minute before initiating the transfusion.

The pre-medications that can be given are listed below:

a. Antihistamines:

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- IV Diphenhydramine – 1-2mg/kg or
- PO Promethazine – 0.2-0.5mg/kg

b. Steroids:
- IV Hydrocortisone – 2-4mg/kg (maximum 100mg)

c. Antipyretics:
- PO Paracetamol – 10-20mg/kg, stat dose

4.5.2 Verification of patient's identity and checking of blood units must be done at the patient's bedside by two separate persons: a doctor and a RN or 2 RNs who are trained and certified competent.

- Push COW to bedside, login to SCM and scan the patient's ID tag.
- Ask the patient to verify his / her name and check this against the patient's Knowledge Based Medication Administration (KBMA) screen.
- If the patient is unconscious or unable to respond, check his / her identity from the ID tag and the 'Request for Blood and Blood Products' form.
- Check that the patient's name and hospital registration number are the same in the patient's ID tag, 'Request for Blood and Blood Products' form and Transfusion Slip.
- Check that the blood unit serial number and blood group ate the same on the Transfusion Slips and blood unit.
- Check the expiry date and time on the blood unit to ensure that the blood / blood component is not expired.
- The ultimate responsibility for correct patient identification lies with the RN and doctor or 2 RNs setting up the transfusion.
- **DO NOT CUT OR TEAR AWAY** the Transfusion Slip from the blood / blood component.

4.5.3 Details of blood / blood component transfusion must be recorded in patient's clinical notes and SCM Flowsheets. This should include:

- Blood unit serial number
- Volume transfused
- Date and Time of transfusion.
- Similar recording should be documented on the Transfusion Slip

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4.5.4 Blood / blood components should be set up for transfusion within 30 minutes from the time of arrival at the ward due to the risk of bacterial contamination. The transfusion must be completed within 4 hours. The blood administration set should be changed after transfusion of every 2 units of (same) blood component or when there is presence of clots.

Each leucocyte-reduced filter supplied by Blood Bank together with red cells can only be used for ONE unit of red cells.

NOTE: There must be no addition of drugs / fluids to any blood / blood components. ONLY IV 0.9% Sodium Chloride (NaCl) can be infused concurrently with blood / blood components.

4.5.5 If it is anticipated that the transfusion cannot be completed within 4 hours due to any unforeseen circumstances, e.g.: midway reinsertion of IV cannula, the following suggestions should be taken into consideration:

- Increase the transfusion rate so that the transfusion can be completed within 4 hours. The transfusion rate should not exceed 5ml/kg/hr.
- Stop the transfusion once it reaches the end of the 4th hour of transfusion. To bear in mind that patient may not receive the full prescribed volume.

4.5.6 Monitor and record pre-transfusion vital signs:

- Pulse rate
- Respiratory rate
- Blood Pressure
- Temperature
- SPO_2

Vital signs can be taken at least 1 hour prior to the start of transfusion.

4.5.7 For every unit of blood / blood component, the patient should be observed closely for the 15 minutes at the start of the transfusion. Vital signs (as per 4.5.6) must be recorded every 15 minutes for the first 1 hour, then hourly thereafter, up to 30 minutes after completion of the transfusion. These vital signs are to be recorded on the patient's Nursing Flowsheets in SCM.

4.5.8 On completion of the transfusion, detach the Transfusion Slip from the blood / blood component to record the volume transfused, date and time and return to the Blood Bank within 24 hours.

4.5.9 If there is / are no adverse reaction(s) 30 minutes after transfusion, place the transfused blood pack and administration set into a clear plastic bag and discard into

the biohazard bin.

4.5.10 Patients who are receiving transfusion in an outpatient setting should receive the 'Post-Transfusion Advice for Outpatient Transfusion' (ANNEX 8) upon completion of transfusion. It provides advice on post-transfusion monitoring for patients.

4.6 Administration of Blood and/or Blood Components:

4.6.1 **Red Cells:**

- Neonates / Paediatric patients < 30kg: To prescribe volume in mls
- Volume of red cells to be transfused can be calculated using the formula:
  - Volume to be transfused (ml) = (Desired Hb - Current Hb in g/dL) x (Body weight in kg) x 3.5
- Usual volume to prescribe: 10 – 20 ml/kg
- Paediatric patients > 30kg and Adults: To prescribe as number of unit(s)
- Transfused each units over 2 to 4 hours*, at a rate not exceeding 5ml/kg/hr

4.6.2 **Platelets (Single-donor apheresed unit / Pooled unit):**

- Neonates / Paediatric patients < 15kg: To prescribe 5-10ml/kg, maximum 15ml/kg
- Paediatric patients > 15kg and Adults: To prescribe 4 apheresed platelet paediatric (APP) units/m^2 OR 1 pooled platelet unit / 1 adult apheresed platelet unit (also known as Cell Separated Platelets – CSP)
- Transfuse over 30 to 60 minutes per unit*

4.6.3 **Frozen Plasma:**

- Usual volume to prescribe: 10 – 20ml/kg
- Neonates / Paediatric patients < 30kg: To prescribe volume in mls
- Paediatric patients > 30kg and Adults: To prescribe as number of unit(s)
- Transfuse over 30 to 60 minutes per unit*

4.6.4 **Cryoprecipitate:**

- Usual volume to prescribe: 5 – 10ml/kg
- Transfuse over 30 to 60 minutes per unit*

NOTE: **Duration of transfusion depends on patient's clinical indication and medical history, but the overall transfusion duration MUST NOT exceed 4 hours.**

4.7 Usage of Warming Devices on Blood and/or Blood Components:

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(Refer to **ANNEX 10** for 'Guidelines for Usage of Warming Devices on Blood and/or Blood Components)

4.7.1 Blood warmers may be used to prevent hypothermia that can be induced by rapid infusion of large volumes of refrigerated blood and/or blood components; where blood and/or blood components are being transfused at rates greater than 15ml/kg.

4.7.2 **ONLY** red cells and thawed frozen plasma can be transfused to patients through a warming device.

Routine warming of blood is not necessary unless otherwise indicated.

Blood warming may be needed depending on patient's clinical condition and the clinical setting, such as in Operating Theatres (OTs), Children's Emergency (CE), Delivery Suite, Intensive Care Units (ICUs) or High Dependency Units (HDU).

NOTE: Excessive warming of blood will cause haemolysis.

4.7.3 Staff who use the warming devices must recognize:

- The set temperature and the temperature ranges of the different warming devices.
- Warming temperatures must not exceed 42^{o}C.
- All alarms must be addressed in a timely manner.
- Prior to use, staff must ensure that the Preventive Maintenance (PM) sticker is on the device and is up to date.

4.8 Management of a Suspected Transfusion Reaction:

4.8.1 Reportable adverse events during blood transfusion are listed in **ANNEX 5**.

During each transfusion, should the patient experience any signs or symptoms, e.g. fever, chills or rigors:

- Stop transfusion and inform doctor.
- Maintain intravenous (IV) access by running IV 0.9% Normal Saline solution with a new administration set while awaiting the doctor to review patient.
- The doctor must conduct a repeat check to verify the blood unit, the patient's name and hospital registration number, the patient's ID tag and the Transfusion Slip to confirm that the details are correct and that there has been no misidentification. The expiry date on the blood unit must also be

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checked that it has not been exceeded.

- The transfusion can be resumed, if the reaction is only a simple urticarial reaction after doctor's review.

4.8.2 The following resuscitative procedure and laboratory investigations are necessary when a haemolytic transfusion reaction is suspected:

- Initiate cardiopulmonary support, including maintain IV access, patient's airway, circulation and urine output. Close monitoring of vital signs is necessary. Forced diuresis and inotropic support may be required.

- Carry out the appropriate tests, including the following investigations:
  - Full Blood Count (FBC)
  - Urea, Electrolytes
  - DIC screening
  - Repeat blood grouping and antibody screening
  - Reticulocytes
  - Direct Coomb's Test
  - Blood culture

- Return the implicated blood unit and administration set to Blood Bank. Details of the blood unit, transfusion reaction and transfusion history must be provided to the Blood Bank on the 'KKH – Report of Reactions to Blood and Blood Components' form (63170-Form-0128, refer to **ANNEX 6**) together with 1 tube of blood specimen labelled as 'Post-1':
  - 1 blood specimen in EDTA tube (9ml) for Adult or (2ml) for paediatrics
  - Send another set of sample to Blood Bank 24 hours later, labelled as 'Post-II'.

4.9 Autologous Blood Donation (ABT):

(Refer to P&P 65010-1020 'Guidelines for Autologous Blood Transfusion')

4.9.1 <u>Criteria for Potential Donor Patients for ABT</u>

As a general rule, patient who are suitable for elective procedure are suitable for ABT. Suitable operations include hysterectomy, thyroidectomy, elective Caesarean sections, surgery for Scoliosis etc.

The patient should fulfil the following criteria:

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- Weight at least 35kg
- Age up to 60
- Not have any serious cardiovascular or respiratory disorders or a history of epilepsy or any infections, e.g. HIV, HbsAg, HCV antibody carrier.
- Have a haemoglobin (Hb) level of at least:
  - 12.5g/dl for female surgical / gynaecological patients
  - 11g/dl for obstetrics patients
  - 13.5g/dl for male surgical patients

4.9.2 The potential donor (patient) will be re-assessed by the attending doctor in BSG who will make the decision regarding the suitability for ABT. Iron supplements should be started one week prior to the first phlebotomy and continues for 2 weeks after the last donation by the referring physician / surgeon / anaesthesiologist.

The usual adult dosage for Ferrous Fumarate is 200mg TDS to be taken with Antacids to prevent gastric upset.

4.9.3 <u>KKH ABT Services:</u>

- BSK provides autologous blood transfusion services for obstetrics patient every Thursday in KKH Delivery Suite. Donation sessions are listed in **Table 1** below.
- Processed autologous blood from BSG will be stored in KKH Blood Bank for patient's use.
- The patient's blood specimen must still be sent to Blood Bank for GXM to reaffirm the autologous donor's (patient's) blood group and compatibility with the processed autologous blood when the patient is admitted for the intended elective surgery.
- KKH Blood Bank will inform the nurse / doctor-in-charge if the autologous blood is not utilised. The nurse / doctor-in-charge would then have to inform the patient.

Table 1			
Department	**Schedule (Hours)**	**Venue for Donation**	**For Appointment / Information**

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Amendments:		
□ New document	⊗ Content change	□ Reviewed with no changes on _DD/MM/YY_

Obstetrics	According to appointment time given by Bloodbank@HSA	Delivery Suite – Triage Room	Ext. 1259 / 1260 Staff Nurse in-charge of Triage, Delivery Suite
Surgical / Gynaecological	Tuesday to Friday – 0900 – 1700hrs Saturday – 0900 – 1500hrs (Closed on Sundays, Mondays and Public Holidays)	BloodBank@HSA	6213 0626

5.0 REFERENCES

5.1 P&P 61260-1000 'Standard Precautions and Transmission-Based Precautions

5.2 P&P 63170-BB0301 'Blood Bank Specimen Rejections'

5.3 P&P 63170-BB0404 "Receiving and Storing of Blood and Blood Components from Blood Services Group (BSG)'

5.4 P&P 65010-1050 'Consent for Medical Treatment'

5.5 P&P 65010-1020 ' Guidelines for Autologous Blood Transfusion'

5.6 Hospital Guidelines – 'Identification and Management of Rhesus Negative Patients in Pregnancy'

5.7 Blood Bank Form – 63170-Form-0037 'Transport Box Requirement'

5.8 63170-Form-0159 'Memo for Blood and Blood Components Returns or Wastages'

6.0 RECORDS

No.	**Records**	**Filed By**	**Retention**	**Disposable Method**
1	Request for Autologous Blood Donation and Consent Form	Nurses or doctors in patient's medical record	Follows Department of Document Management Services (DDMS)	Follow DDMS patient's record disposal procedure

Title/Description:	**Clinical Transfusion Protocol**		
Department:	CMB	**Effective Date:**	01/07/2005
Procedure No:	65010-1260	**Revision No.:**	20
Revision Date:	02/06/2021	**Approved by:**	Chairman, Hospital Transfusion Committee
Applies to:	All Healthcare Staff		Chairman, Medical Board

Amendments:		
□ New document	⊗ Content change	□ Reviewed with no changes on _DD/MM/YY_

			patient's record retention requirement	
2	KKH – Report of Reaction to Blood and Blood Component Form	Blood Bank	Follows Blood Bank retention requirement	Follow Blood Bank disposal procedure

7.0 ANNEXES

7.1 **ANNEX 1 –** Workflow for Requesting, Receiving and Administration of Blood / Blood Components

7.2 **ANNEX 2 –** Steps to Print CPOE SCM Patient Info Labels

7.3 **ANNEX 3 –** Example of Signing of 'Request for Blood and Blood Products' Form and Specimen Tube

7.4 **ANNEX 4 –** Request for Autologous Blood Donation and Patient Information and Consent Form

7.5 **ANNEX 5 –** HSA-MOH Clinical Practice Guidelines 1/2011, Chapter 7 – Adverse Reactions to Transfusion, Page 62 to 68

7.6 **ANNEX 6 –** KK Women's and Children's Hospital – 63170-Form-0128 'Report of Reaction to Blood and Blood Components' Form

7.7 **ANNEX 7 –** BSG Guidelines on Managing Red Cells, Frozen Plasma, Cryoprecipitate and Platelet Requests

7.8 **ANNEX 8 –** BSG Guidelines for the Transport and Storage of Blood and Blood Products

7.9 **ANNEX 9 –** Patient Information Leaflet – 'Post-Transfusion Advice for Outpatient Transfusion

7.10 **ANNEX 10 –** Hospital Guidelines – 'Usage of Warming Devices on Blood and Blood Components'

8.0 SPECIAL INSTRUCTIONS

KKH Blood Bank Laboratory follows the guidelines from BSG on managing red cells, frozen plasma, cryoprecipitate and platelet requests. (Refer to **ANNEX 7**)

9.0 DISTRIBUTION LIST

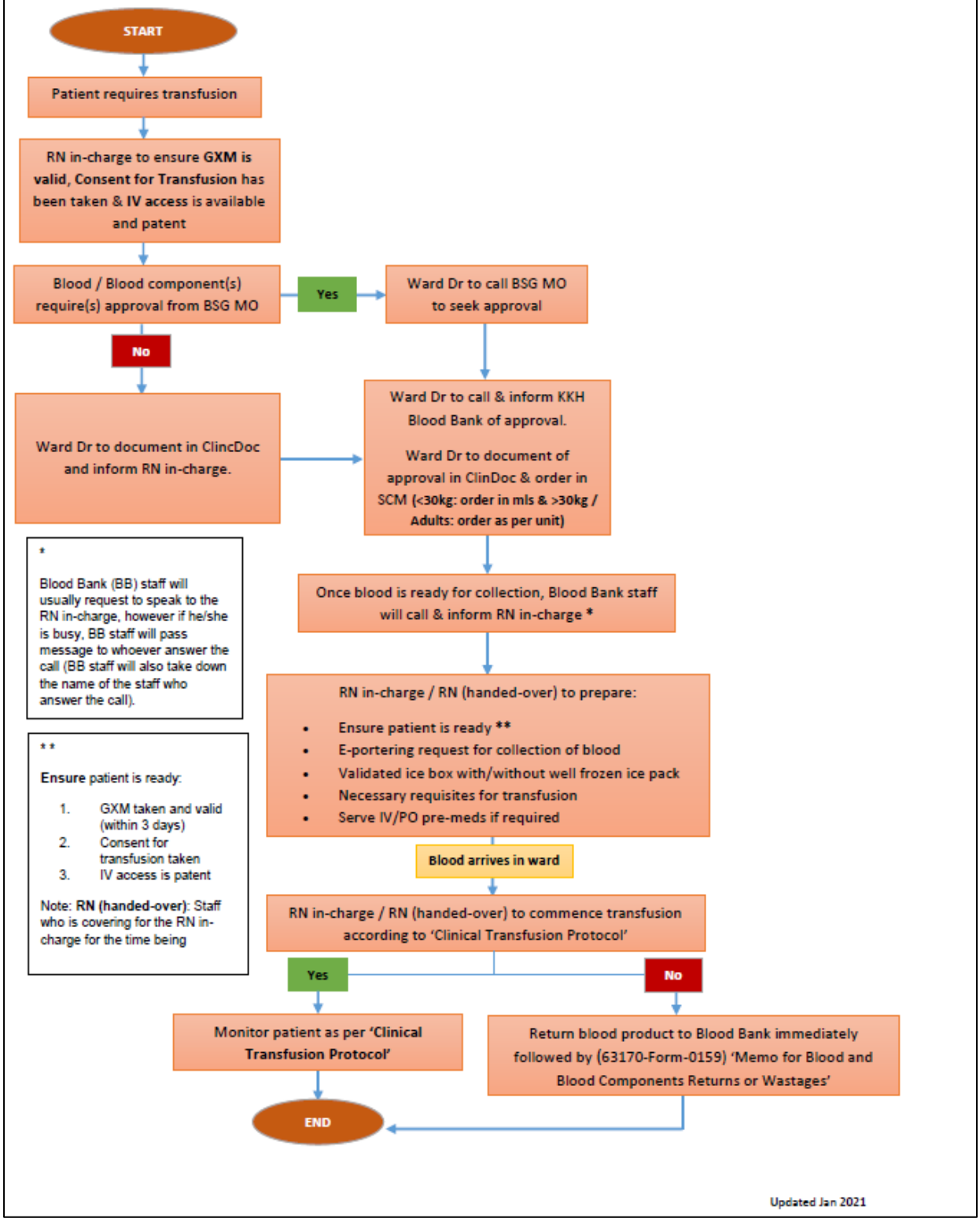
Title/Description:	**Clinical Transfusion Protocol**		
Department:	CMB	**Effective Date:**	01/07/2005
Procedure No:	65010-1260	**Revision No.:**	20
Revision Date:	02/06/2021	**Approved by:**	Chairman, Hospital Transfusion Committee
Applies to:	All Healthcare Staff		Chairman, Medical Board

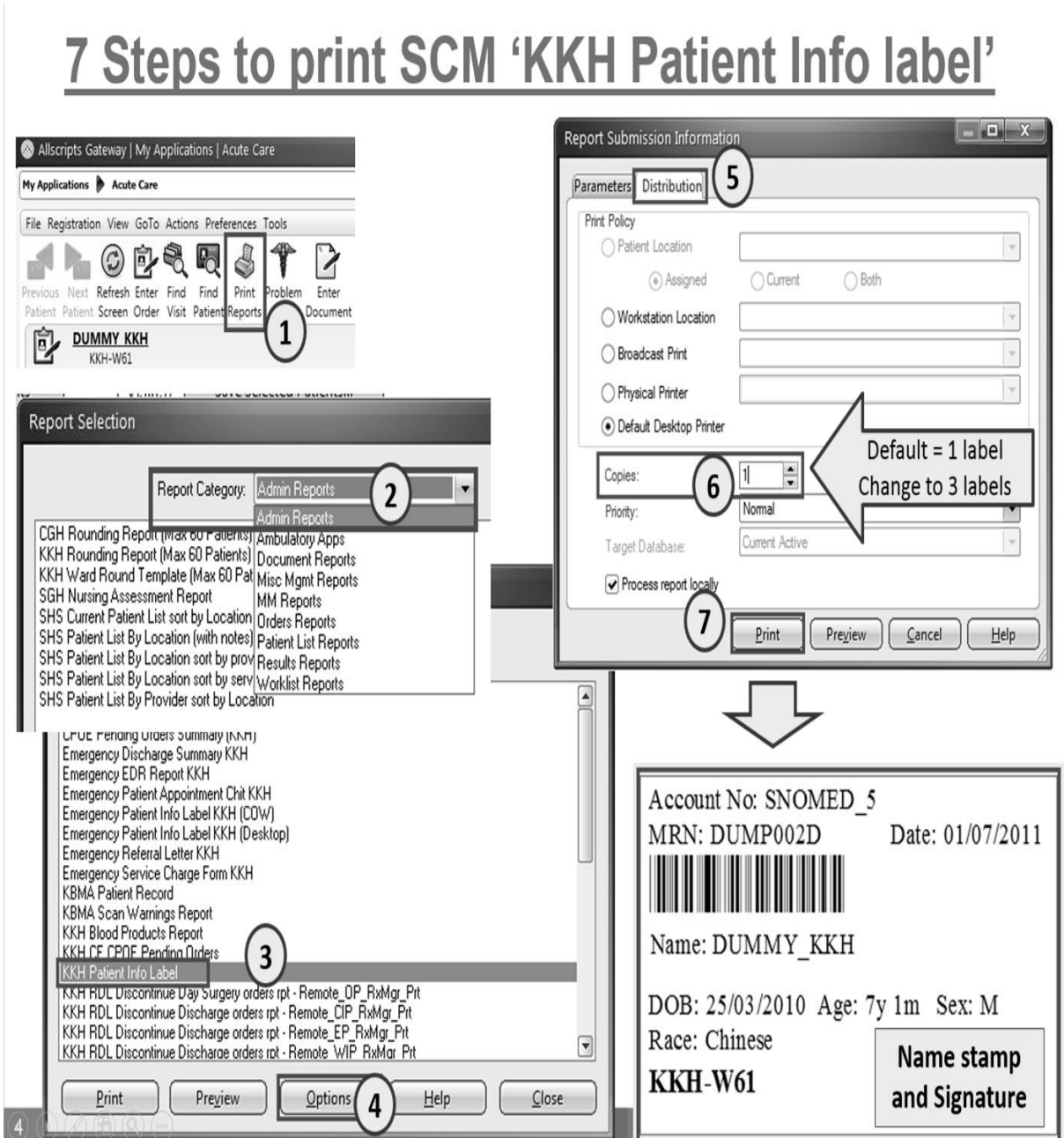
Amendments:		
□ New document	⊗ Content change	□ Reviewed with no changes on _DD/MM/YY_

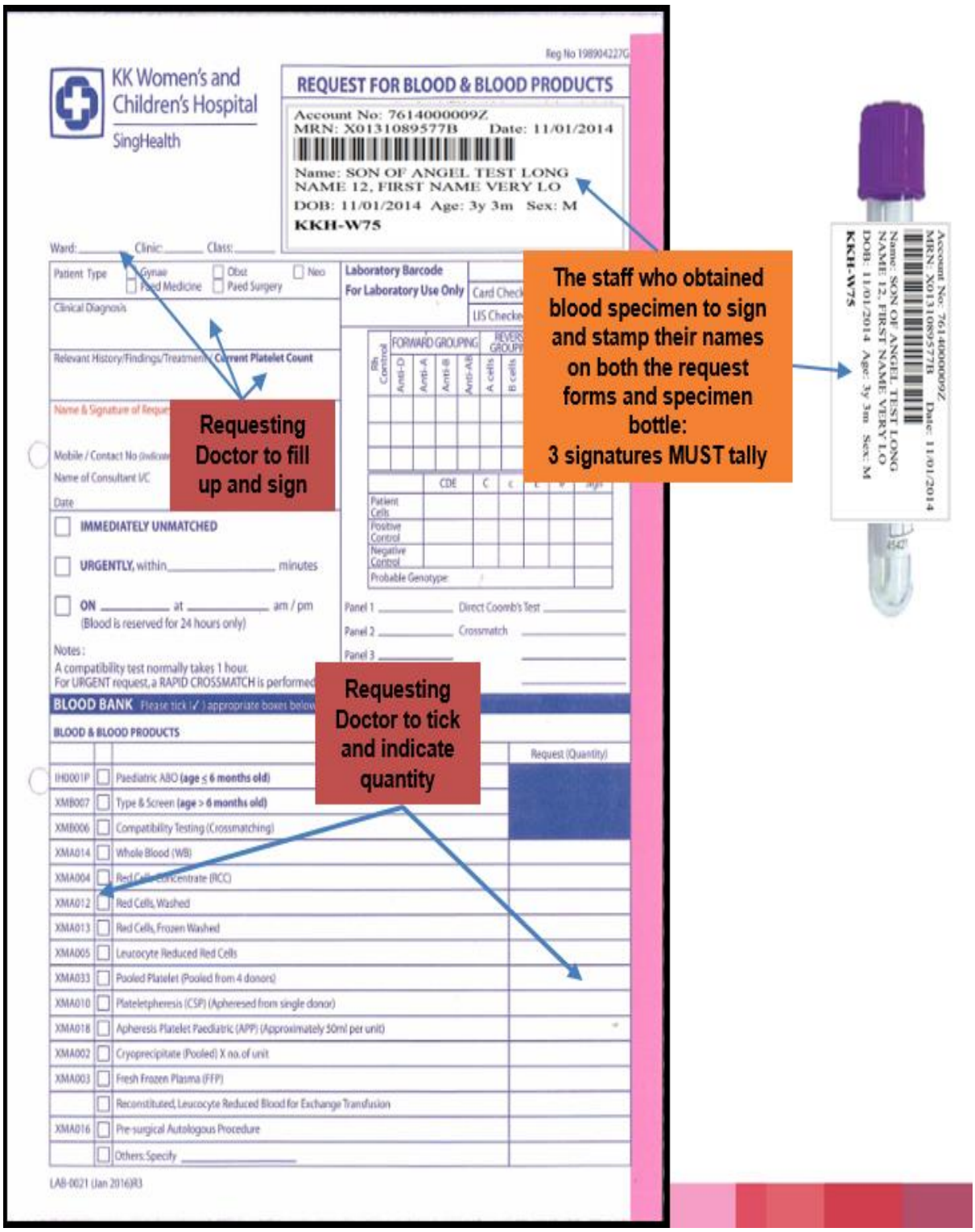
As per 'Applies to'

ANNEX 1

Workflow for Requesting, Receiving & Administration of Blood / Blood Component




7 Steps to print SCM 'KKH Patient Info label'
Allscripts Gateway | My Applications | Acute Care
My Applications Acute Care
File Registration View GoTo Actions Preferences Tools
Previous Patient
Next Patient
Refresh Screen
Enter Order
Find Visit
Find Patient
Print Reports
Problem
Enter Document
DUMMY KKH
KKH-W61
1
Report Selection
Report Category:
Admin Reports
2
Admin Reports
Ambulatory Apps
Document Reports
Misc Mgmt Reports
MM Reports
Orders Reports
Patient List Reports
Results Reports
Worklist Reports
CGH Rounding Report (Max 60 Patients)
KKH Rounding Report (Max 60 Patients)
KKH Ward Round Template (Max 60 Pat
SGH Nursing Assessment Report
SHS Current Patient List sort by Location
SHS Patient List By Location (with notes)
SHS Patient List By Location sort by prov
SHS Patient List By Location sort by serv
SHS Patient List By Provider sort by Location
Emergency Discharge Summary KKH
Emergency EDR Report KKH
Emergency Patient Appointment Chit KKH
Emergency Patient Info Label KKH (COW)
Emergency Patient Info Label KKH (Desktop)
Emergency Referral Letter KKH
Emergency Service Charge Form KKH
KBMA Patient Record
KBMA Scan Warnings Report
KKH Blood Products Report
KKH Patient Info Label
3
KKH RDL Discontinue Day Surgery orders rpt - Remote_OP_RxMgr_Prt
KKH RDL Discontinue Discharge orders rpt - Remote_CIP_RxMgr_Prt
KKH RDL Discontinue Discharge orders rpt - Remote_EP_RxMgr_Prt
KKH RDL Discontinue Discharge orders rpt - Remote_WIP_RxMgr_Prt
Print
Preview
Options
4
Help
Close
Report Submission Information
Parameters
Distribution
5
Print Policy
Patient Location
Assigned
Current
Both
Workstation Location
Broadcast Print
Physical Printer
Default Desktop Printer
Copies:
6
1
Default = 1 label
Change to 3 labels
Priority:
Normal
Target Database:
Current Active
Process report locally
7
Print
Preview
Cancel
Help
Account No: SNOMED_5
MRN: DUMP002D
Date: 01/07/2011
Name: DUMMY_KKH
DOB: 25/03/2010 Age: 7y 1m Sex: M
Race: Chinese
KKH-W61
Name stamp and Signature


KK Women's and Children's Hospital
SingHealth
REQUEST FOR BLOOD & BLOOD PRODUCTS
Account No: 7614000009Z
MRN: X0131089577B Date: 11/01/2014
Name: SON OF ANGEL TEST LONG NAME 12, FIRST NAME VERY LO
DOB: 11/01/2014 Age: 3y 3m Sex: M
KKH-W75
Requesting Doctor to fill up and sign
The staff who obtained blood specimen to sign and stamp their names on both the request forms and specimen bottle:
3 signatures MUST tally
Requesting Doctor to tick and indicate quantity
BLOOD BANK
BLOOD & BLOOD PRODUCTS
Request (Quantity)
Paediatric ABO (age ≤ 6 months old)
Type & Screen (age > 6 months old)
Compatibility Testing (Crossmatching)
Whole Blood (WB)
Red Cells, Washed
Red Cells, Frozen Washed
Leucocyte Reduced Red Cells
Pooled Platelet (Pooled from 4 donors)
Plateletpheresis (CSP) (Apheresed from single donor)
Apheresis Platelet Paediatric (APP) (Approximately 50ml per unit)
Cryoprecipitate (Pooled) X no. of unit
Fresh Frozen Plasma (FFP)
Reconstituted, Leucocyte Reduced Blood for Exchange Transfusion
Pre-surgical Autologous Procedure
Others: Specify
LAB-0021 (Jan 2016)R3

HSA
Health Sciences Authority

Blood Services Group
Health Sciences Authority
11 Outram Road Singapore 169078
Tel: 6213 0626 Fax: 6222 0085

REQUEST FOR AUTOLOGOUS BLOOD DONATION

PART 1 - TO BE COMPLETED BY THE REQUESTING REGISTERED MEDICAL PRACTITIONER

Patient's Name: _____
(Block Letters)

NRIC / Passport No: _____ Date of Birth: _____

Address : _____ Tel No: _____

_____

The above named has requested arrangements to be made for the collection of blood by the Blood Services Group (BSG) for autologous transfusion.

For Obsteric patients requiring autologous donations, please take note of the following:
(A) Blood collection is performed between 35 to 37 weeks of pregnancy.
(B) Kindly liaise with KKH Labour Ward (restructured hospital patients) or SGH Labour Ward(private hospital patients) for the blood collection appointment schedule.

Please collect **1, 2, 3 or 4** units. *(Circle as appropriate)*

Note: These units will be collected in approximate accord with the schedule below:

One unit of whole blood to be collected ☐ 30-32 days ☐ 24-26 days ☐ 17-19 days ☐ 10-12 days ☐ 3-5 days before surgery

Patient's Diagnosis: _____

It is expected that the surgical procedure of _____ will be performed at _____ Hospital on _____ (date).

I have/have not* instructed the patient to take oral iron preparation daily.

In my opinion the patient is fit to carry out this schedule of blood donations. I have explained to the patient that if the haemoglobin level is less than 11.0g/dl(obstetric patient) or less than 12.5g/dl(surgical patient), and/or due to any reason as may be determined by the BSG medical officer, it may not be possible to complete this schedule.

I confirm that the patient has read the "Autologous Blood Donation – Patient Information" (see next page) and that the risks and benefits of Autologous donation have been discussed with the patient.

Doctor's Name _____ Signature _____ Date _____
(Block Letters)

Clinic/Hospital _____ Tel No _____

Criteria for Autologous Blood Collection

- **Age up to 60 years old**
- **Parental consent if < 18**
- **Weight at least 35 kg**
- **Hb at least 11.0g (obsteric patient)**
- **Hb at least 12.5g (female surgical patient)**
- **Hb at least 13.0g (male surgical patient)**
- **No severe respiratory or CVS diseases**
- **Pulse rate 50 - 100/min with no irregularity**
- **BP - 100mmHg < Systolic < 160mmHg**
  60mmHg < Diastolic < 100mmHg
- **Not HBV or HCV carrier**
- **No h/o HIV infection**
- **No h/o or s/s sepsis**

[*Delete accordingly]

Form #CLN-140-100A/08 - 01/01/18

AUTOLOGOUS BLOOD DONATION
PATIENT INFORMATION AND CONSENT

PART 2 – TO BE COMPLETED BY THE BLOOD DONOR

Your doctor has requested that one or more units of blood be collected from you for possible transfusion back to you at the time of surgery. Receiving your own blood is the safest form of transfusion but is still not without risk. However, it is important for you to understand the following:

1. There may occasionally be some side effects associated with blood donation. The commonly known side effects include weakness, dizziness and fainting. There may also be tenderness or bruising at the site where the needle is inserted.

2. You will be informed if there are circumstances which render your blood unsuitable for transfusion including but not limited to leakage of the blood bags in the course of collecting or processing your blood.

3. You will have to pay a processing fee which covers the cost of collecting, testing and storing your blood. If you do not require transfusion of the blood that you donate, the blood will not be used by other patients but will be discarded. This is because, for safety reasons, more stringent screening criteria are applied for blood that is transfused to others.

4. Your blood will be tested for infectious diseases (including Syphilis, Hepatitis B, Hepatitis C and HIV virus which causes AIDS). This is done to protect the safety of the blood supply. Should the test results not be clearly negative, your blood may be discarded and you would not be allowed to use it and you will be informed of such event.

5. You should ensure the accuracy of your name and registration number (NRIC / Passport No) at BSG and the hospital. This is to avoid undue delay in the delivery of the donated blood to you.

Opening Hours for Autologous Blood Donation	**Tues - Fri: 9.00am - 5.00pm** **Sat: 9.00am - 12 noon** **(Closed on Mondays & Public Holidays)**

STATEMENT OF CONSENT FOR WITHDRAWAL AND TESTING OF AUTOLOGOUS BLOOD

1. I understand and agree with the information above and consent to the withdrawal(s) of my blood by authorised staff of BSG for autologous transfusion purposes. I grant BSG absolute authority to dispose of my withdrawn blood in any manner it deems fit if I subsequently do not require autologous transfusion of my withdrawn blood.

2. I further consent to such additional procedures pursuant to autologous transfusion as may be deemed necessary or desirable by BSG.

3. I confirm that I fully understand the information above which was explained to me in the

_____ (language/dialect) by _____ (name).

_____ Name of Donor (Block Letters)

_____ Signature of Donor

_____ Donor's NRIC / Passport No

_____ Date

_____ Name of Witness

_____ Signature of Witness

If patient is less than 18 years old, parental/guardian consent is required.

I, *parent/guardian of the above named have read the information herein and hereby give on behalf of *him/her the same consents as those required above and under the Health Assessment Questionnaire (HAQ). I declare the representations and information required to be provided by my *child/ward under the HAQ to be true, accurate and complete. I will bear full responsibility for this consent and declaration.

*delete as appropriate

Name of Parent/Guardian: _____ Signature of Parent/Guardian: _____

Parent/Guardian NRIC No: _____ Date: _____

*Consent for autologous blood collection should only be taken within 3 months of the date of surgery.

7 Adverse reactions to transfusion

An **adverse reaction** to transfusion is defined as an undesirable response or effect in a patient temporally associated with the administration of blood or blood component.[172] It may be the result of an incident or of interaction between a recipient and blood, a biologically active product.

Each blood or blood component transfused carries a risk of an acute or delayed effect and for this reason; physicians prescribing the transfusion should carefully select patients who will benefit from transfusion therapy according to established criteria. The indication for transfusion should be documented in the medical record.

The aim of this guideline is to provide the hospital doctor, with the necessary tools to recognize transfusion reactions and to concentrate on their immediate management. When an adverse transfusion reaction occurs, medical and nursing personnel must be prepared to recognize both acute (immediate) and delayed reactions, and be ready to provide the immediate management. Because the signs and symptoms of different types of adverse reactions overlap and their severity can vary considerably, all transfusions must be carefully monitored and stopped as soon as symptoms of a reaction appear. Early recognition is the key to minimizing serious complications.

Adverse reactions to transfusion can be categorized into acute (immediate) and delayed. Acute (immediate) reaction usually presents within minutes to hours but usually within 24 hours of the transfusion. Acute reactions can be further divided into subgroups of presenting signs and symptoms: fever and or chills, hives or urticaria, dyspnea and hypotension.173

Figure 1 An approach to diagnosing the type of likely transfusion related adverse event

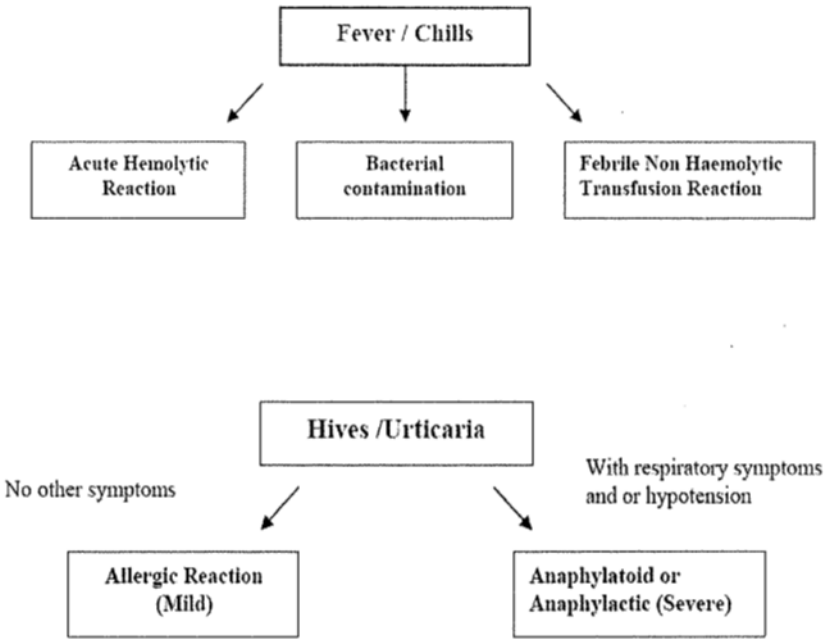
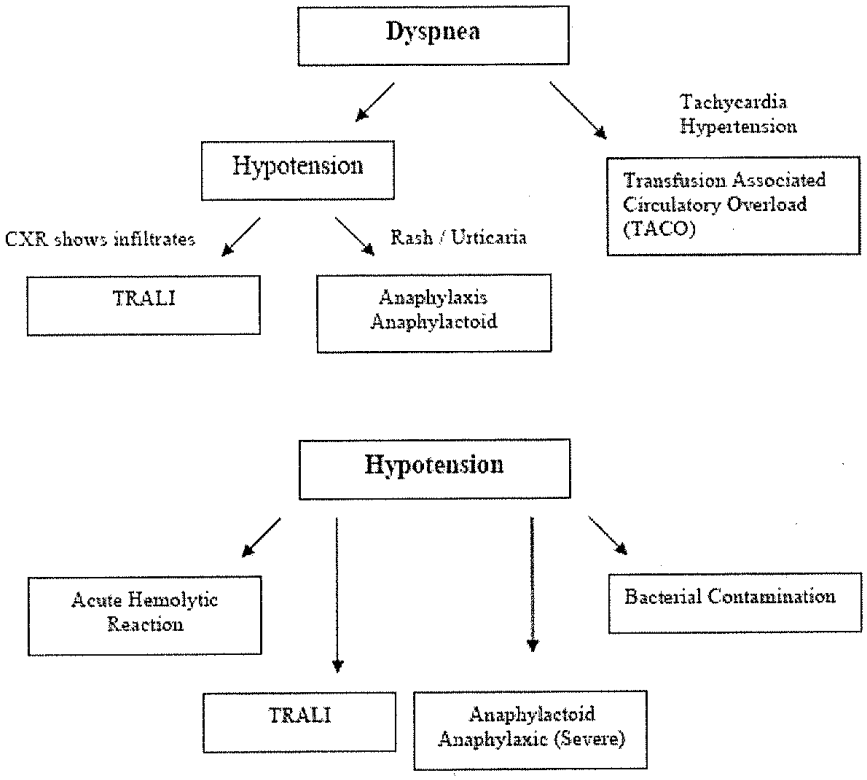


Figure 1 **An approach to diagnosing the type of likely transfusion related adverse event** (continuation)



Allergic reactions and febrile non haemolytic transfusion reactions are **common** but **less serious** whereas acute haemolytic reactions, bacterial contamination, Transfusion Related Acute Lung Injury and anaphylactic reactions are **less common** but **life threatening**.

Acute haemolytic reaction is commonly due to **misidentification** of the patient and therefore **positive identification of the patient at the bedside** when taking blood for crossmatch and before commencing transfusion is the Most Important step in the **prevention** of this complication.

Delayed transfusion reactions usually manifest **days or weeks** after the completion of blood transfusion. Recognition of signs and symptoms and correlation with an earlier transfusion can aid in the correct management of the patient and in some cases even reduce the potential complications.

GPP It is advisable that a policy be in place in each hospital for the management and reporting of adverse events following transfusion of blood and blood components. This should be regularly reviewed by the hospital transfusion committee with an aim to improving transfusion practice.

GPP

GPP Institutional policies may vary regarding the initial steps in managing an adverse reaction but the following key elements should be followed:[174]

1. The transfusion of on-going unit should be discontinued **immediately.**
2. Immediately do a **clerical check at beside to detect any misidentification and major ABO mismatch.**
3. Monitor patient's **vital signs.**
4. The intravenous access should be **kept open** for treatment if necessary.
5. The adverse reaction should be reported to the blood bank immediately.
6. Coordinate with the blood bank regarding the collecting of samples for transfusion reaction investigation workup.

7. Continue to observe and monitor the patient.
8. Do not initiate another transfusion without blood bank consultation.
9. Document all events on appropriate forms and in the patient's chart.

GPP

D Categories and management of acute and delayed adverse reactions to transfusion.[25, 172, 175-176]

Grade D, Level 3

Type	Incidence/ Aetiology	Diagnostic Criteria/ Presentation	Diagnostic testing	Management
Acute – within 24 hours of transfusion				
Allergic Reaction (Mild)/ Urticarial	• Interaction of an allergen with preformed antibodies	• Morbilliform rash with or without pruritis • Urticaria (hives) • Flushing • Localized angioedema	• N/A	• Diphenhydramine • Transfusion can be restarted if the symptoms and signs have subsided provided the incomplete unit can be completed within 4 hours of issuance • Monitor closely for other signs and symptoms
Anaphylactoid Anaphylaxis (Severe)	• Antibody to donor plasma protein (IgA, Haptoglobin, C4)	• Mucocutaneous symptoms • Hypotension • Respiratory signs and symptoms may,be laryngeal (tightness in throat, dysphagia, dysphonia, hoarseness, stridor) or pulmonary (dyspnea, cough, wheezing, bronchospasm, hypoxemia)	• Rule out haemolysis	• Maintain airway; provide oxygen and ventilatory support • Treat hypotension with fluids, dopamine if unresponsive • Initiate transfusion reaction workup • Do not initiate another transfusion without blood bank consultation • Premedicate with diphendydramine and or steroids • Use of washed red cells (and platelets) in severe anaphylaxis
Haemolytic Reaction	• Incompatible blood transfusion results in antigen/antibody response with activation of complement and subsequent intravascular haemolysis	• Chills/rigors • Fever • Back/flank pain • Hypotension • Haemoglobinuria • Oliguria / anuria • Disseminated intravascular coagulation • Pain or oozing at IV site	• Clerical Check • Check for Haemolysis - Direct Coombs test - Visual inspection - Repeat patient ABO, pre and post sample - Further tests to detect haemolysis (LDH, Bilirubin, etc.)	• Maintain airway; provide oxygen and ventilatory support • Hydration to maintain urinary output • Diuretics to promote renal perfusion • Cardiovascular support with pressor agents if needed • Treatment of disseminated intravascular coagulation • Initiate transfusion reaction workup; inform Blood Bank
Febrile Non Haemolytic Transfusion Reaction	• Cytokines • Antibody to donor white cells	• Fever (≥38C or a change of ≥1C from pre transfusion value) • Chills / Rigors • Headache • Vomiting	• Rule out haemolysis • Rule out Bacterial contamination	• Initiate transfusion reaction workup; inform Blood Bank • Leucoreduced components • Premedication with antipyretics
Transfusion Associated Acute Lung Injury (TRALI)[177]	• Anti- human leucocyte antigen (HLA) and anti-HNA antibodies in donor (occasionally in recipients)	• Acute respiratory distress within six hours of transfusion • Bilateral pulmonary infiltrates on chest xray • Hypoxemia (02 sat ≤ 90% on room air or PaO2 ≤ 300 mm Hg) • No evidence of circulatory overload • Hypotension (some cases hypertension) • Fever • Transient Leucopenia	• Rule out haemolysis • Rule out cardiogenic oedema • Human leucocyte antigen (HLA) antibody screen • Chest Xray	• Maintain airway; provide oxygen and ventilatory support • Treat Hypotension • Supportive care • Initiate transfusion reaction workup; inform Blood Bank

Type	Incidence/ Aetiology	Diagnostic Criteria/ Presentation	Diagnostic testing	Management
Acute – within 24 hours of transfusion				
Transfusion Associated Circulatory Overload (TACO)	• Volume overload	• Acute respiratory distress (dyspnea, orthopnea, cough) • Tachycardia • Hypertension • Evidence of left sided heart failure	• Rule out TRALI • Chest Xray	• Maintain airway; provide oxygen and ventilatory support • Diuretics • Initiate transfusion reaction workup; inform Blood Bank
Transfusion Associated Sepsis (Bacterial Contamina-tion)	• Sepsis is the result of transfusion of contaminated blood components • The bacteria usually originate from the blood donor either from venipuncture (e.g. Staphylococcus, Streptococcus) or unsuspected bacteremia (e.g. Yersinia) but may also result from donor unit processing	• Fever, often ≥ 2C rise from baseline • Chills / Rigors • Hypotension • Shock • Renal failure • Unexplained bleeding from mucocutaneous or infusion sites	• Rule out haemolysis • Gram stain • Component culture • Blood culture on patient	• Maintain airway; provide oxygen and ventilatory support • Hydration to maintain urinary output • Diuretics to promote renal perfusion • Broad Spectrum Antibiotics • Cardiovascular support with pressor agents if needed • Treatment of disseminated intravascular coagulation • Initiate transfusion reaction workup; inform Blood Bank
Delayed –more than 24 hours from transfusion				
Delayed Haemolytic Transfusion Reaction	• Anamnestic immune response to red cell antigens	• Decrease in haemoglobin • Fever • Jaundice (Mild) • Patient may be asymptomatic	• Antibody screen and Identification • Direct Coombs test • Elution • Test for haemolysis	• Initiate Delayed transfusion reaction workup; inform Blood Bank • Transfuse AHG crossmatch compatible blood; antigen negative if indicated
Graft Versus Host Disease (GVHD	• Donor lymphocytes engraft in recipient and mount attack on host tissues	• Fever • Gastrointestinal symptoms • Rash • Hepatitis • Pancytopenia	• Skin biopsy • Human leucocyte antigen (HLA) typing • Molecular Analysis for Chimerism	• Immunosupressive agents • Irradiation of blood components for patients at risk

Levels of evidence and grades of recommendation

Levels of evidence

Level	Type of Evidence
1^{++}	High quality meta-analyses, systematic reviews of randomised controlled trials (RCTs), or RCTs with a very low risk of bias.
1^{+}	Well conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias.
1^{-}	Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias
2^{++}	High quality systematic reviews of case control or cohort studies. High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2^{+}	Well conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2^{-}	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Non-analytic studies, e.g. case reports, case series
4	Expert opinion

Grades of recommendation

Grade	Recommendation
A	At least one meta-analysis, systematic review of RCTs, or RCT rated as 1^{++} and directly applicable to the target population; or A body of evidence consisting principally of studies rated as 1^{+}, directly applicable to the target population, and demonstrating overall consistency of results
B	A body of evidence including studies rated as 2^{++}, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1^{++} or 1^{+}
C	A body of evidence including studies rated as 2^{+}, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2^{++}
D	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2^{+}
GPP (good practice points)	Recommended best practice based on the clinical experience of the guideline development group.

ANNEX 6

KK WOMEN'S AND CHILDREN'S HOSPITAL
REPORT OF REACTION TO BLOOD AND BLOOD COMPONENTS

Name:		Date:
NRIC No:		Ward/ Bed Number:
Date of Birth:	Sex: ☐ Male ☐ Female	Race:

Clinical Diagnosis/ Indication for transfusion:	
Date and time transfusion started:	Date and time of reaction onset:

Which of the following developed during or within 6 hours following transfusion? Check all that apply:

☐ Urticaria/Rashes/ Hives (samples for investigation not required)	☐ Chills/Rigors	☐ Hematuria/hemoglobinuria
☐ Abdominal/Lumbar/Back pain	☐ Dyspnoea	☐ Rapid Breathing (>28/min)
☐ Nausea or vomiting	☐ Bronchospasm/wheezing	☐ Chest pain / Cardiac arrythmia
☐ Jugular Vein Distention	☐ Pulmonary edema	☐ Hypoxemia (O2 sat <90%, PaO2 <60)
☐ Others/ Comments/ Details:		

For symptoms associated with Transfusion Associated Circulatory Overload (TACO), consider chest X-ray and possibility of Transfusion Associated Acute Lung Injury (TRALI). Please call Blood Bank at ext.1376 to provide suspected TRALI report form from BSG, HSA.

Vital Signs	Blood Pressure	Temperature	Pulse Rate
Before transfusion			
At the time transfusion was terminated			

Unit Number (List pooled components individually)	Component Name	Modification (Indicate if washed, irradiated, leucocyte reduced, etc)	Transfusion Date	Volume Transfused
				ml
				ml
				ml
Attach additional sheets as required to report all potentially involved transfusions				

Was error in identifying the patient detected (by examining the recipient labels against the patient records)?
☐ No ☐ Yes : Indicate:

Was there an error occurred during transfusion (by Laboratory or Clinical)?
☐ No ☐ Yes : Indicate:

Was the transfusion associated with the use of any IV medication or IV solution given through the same infusion set other than Normal Saline? ☐ No ☐ Yes : Indicate:

Was the transfusion associated with the use of any of the following: ☐ No ☐ Yes:
☐ Blood warmers ☐ Infusion pumps ☐ Pressure cuffs ☐ Filter ☐ Roller pumps (cardiac surgery)

Previous transfusion? ☐ No ☐ Yes: indicate date and component given: _____
Previous Transfusion Reaction? ☐ No ☐ Yes: indicate type of component and nature of reaction:

Name of Doctor:	Date and Time:
Signature of Doctor:	Contact number:

Type of transfusion Reaction	Diagnostic Criteria/ Presentation	
Haemolytic Transfusion Reactions	• Chills/ Rigors • Fever • Hemoglobinuria • Hypotension • Renal failure with oliguria/anuria	• Disseminated intravascular coagulation (oozing from IV sites) • Back/ flank pain • Pain along infusion vein • Hypotension • Anxiety
Febrile Non haemolytic Transfusion Reactions	• Fever (≥38°C and a change of ≥1°C from pretransfusion value) • Chills/ Rigors	• Headache • Vomiting
Transfusion associated sepsis (Bacterial contamination)	• Fever, often ≥2°C rise from baseline • Chills/ Rigors • Hypotension	• Shock • Renal failure • Unexplained bleeding from mucocutaneous or infusion sites
Severe anaphylactoid anaphylaxis	• Hypotension • Urticaria • Bronchospasm • Local edema	• Respiratory signs and symptoms may be laryngeal (tightness in throat, dysphagia, dysphonia, hoarseness, stridor) or pulmonary (dyspnea, cough, wheezing, bronchospasm, hypoxemia)
Non immune haemolysis	• Hemoglobinuria	• Hemoglobinemia
Hypotension associated with ACE inhibition	• Flushing	• Hypotension
Urticarial/ Mild allergic reaction	• Urticaria (hives) • Flushing	• Localized angioedema • Morbilliform rash with or without pruritis
Transfusion Associated Acute Lung Injury (TRALI)	• Acute respiratory distress within six hours of transfusion • Bilateral pulmonary infiltrates on chest x-ray Hypoxemia (O_2 saturation ≤ 90% on room air or PaO_2 ≤ 300mmHg)	• No evidence of circulatory overload • Hypotension (some cases hypertension) • Fever • Transient Leucopenia
Transfusion Associated Circulatory Overload (TACO)	• Acute respiratory distress (dyspnea, orthopnea, cough) • Tachycardia	• Hypertension • Evidence of left sided heart failure

Procedure:

1. When a patient has reaction to blood/ blood components, discontinue transfusion and inform the attending doctor IMMEDIATELY.
2. Report all reactions to Blood Bank IMMEDIATELY. Signs and symptoms suggestive of a mild allergic reaction (e.g. urticarial) need not be investigated upon.
3. Place the blood bags with connecting infusion set inside the customized Ziploc bag (with kangaroo pouch). Other blood pack/s to be placed inside separate Ziploc bags.
4. For patient's age 10 years old and above, collect a tube of 9 ml EDTA blood.
5. Patient's age less than 10 years old, collect a EDTA tube of at least 2 ml blood.
6. Sign and paste patient identification labels onto all the tubes.
7. Send the blood specimens together with the blood bag implicated in the reaction with all the attached labels, transfusion reaction report form and one page of patient identification labels to Blood Bank IMMEDIATELY.
8. Send Post-Transfusion II blood specimen (one EDTA blood with at least 2ml) after 24 hours.

ANNEX 7

Guidelines on Managing Red Cells, Frozen Plasma, Cryoprecipitate and Platelets Requests

1. **Flowchart 1** – Red Cells Emergency Request

2. **Flowchart 2** – Red Cells Non-Emergency Request

3. **Flowchart 3** – Red Cells Elective Surgery Request

4. **Flowchart 4** – Frozen Plasma Request

5. **Flowchart 5** – Cryoprecipitate Request

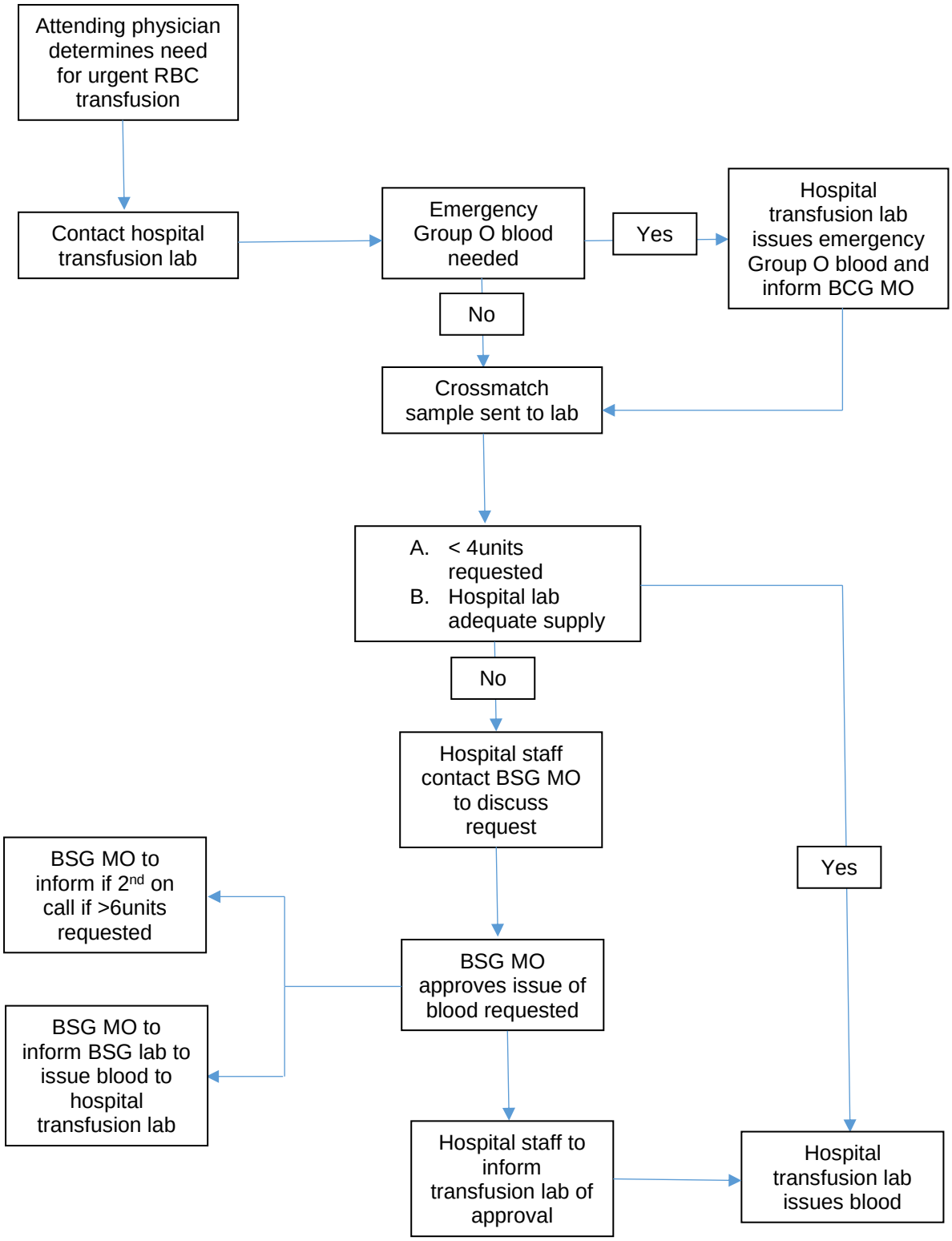
6. **Flowchart 6** – Platelets Request

7. Appending notes for managing platelet request

Flowchart 1

MANAGEMENT OF REQUESTS FOR RED CELLS

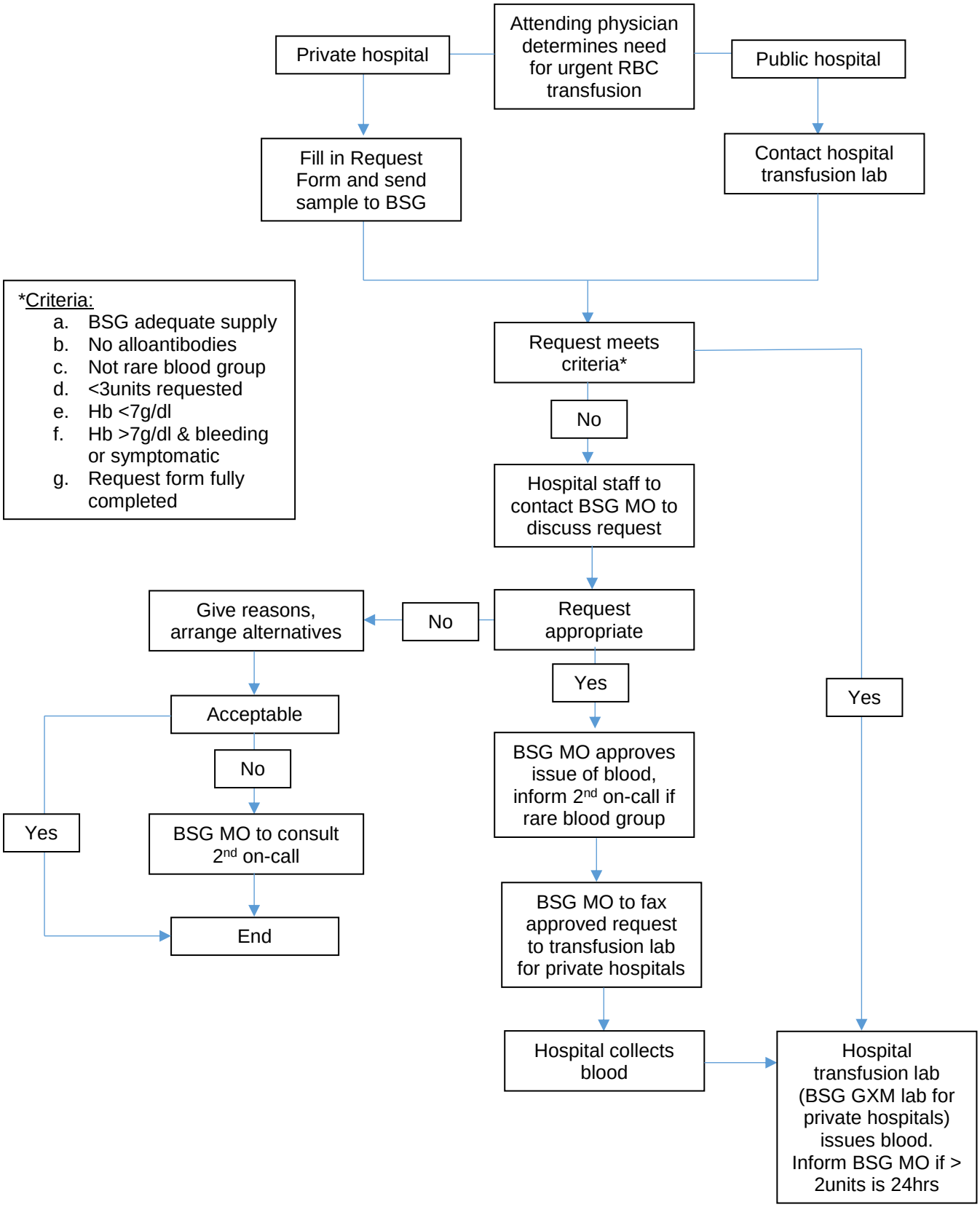
(EMERGENCIES)



Flowchart 2

MANAGEMENT OF REQUESTS FOR RED CELLS

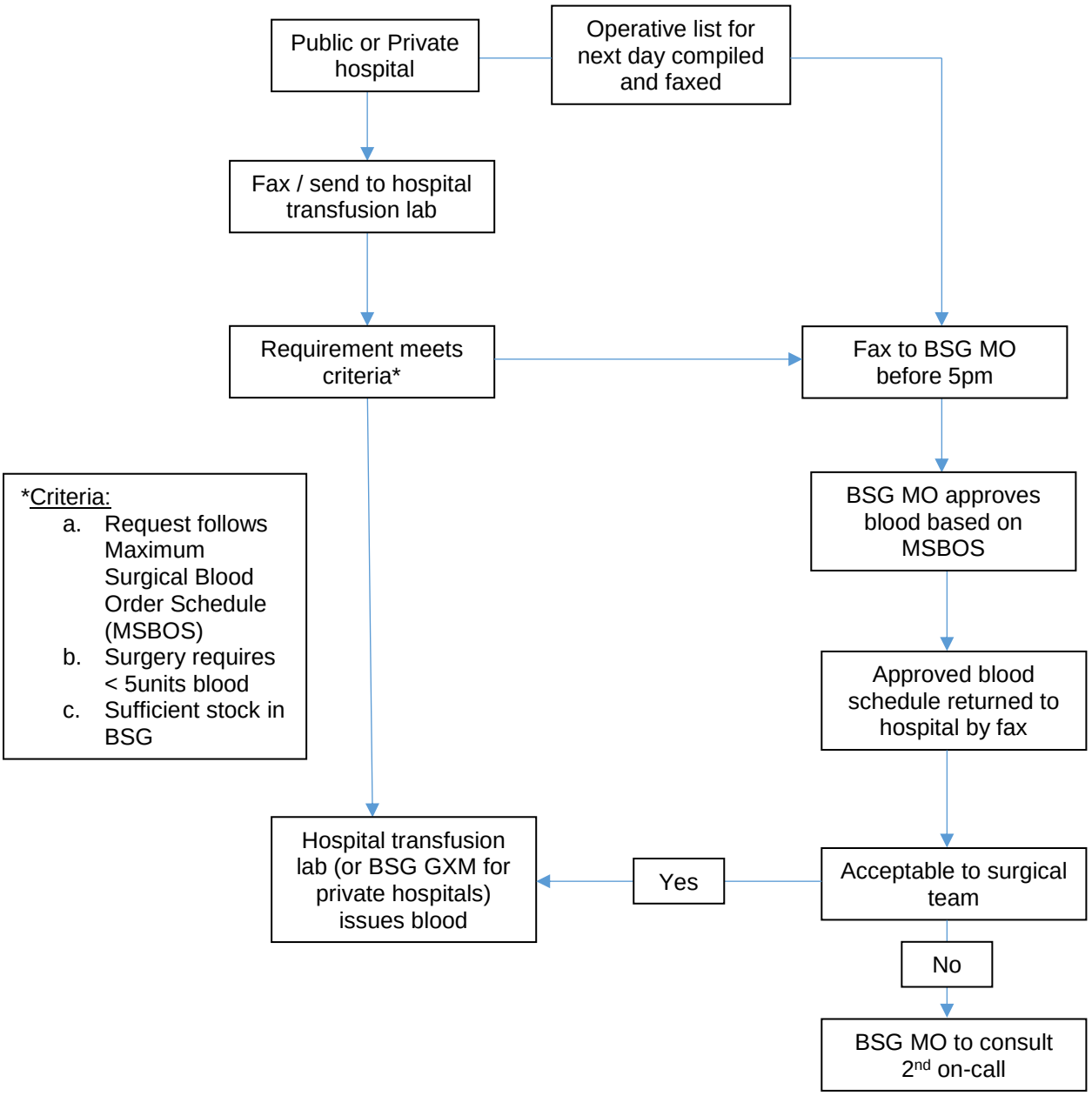
(NON-EMERGENCY TOP-UP TRANSFUSIONS)



Flowchart 3

MANAGEMENT OF REQUESTS FOR RED CELLS

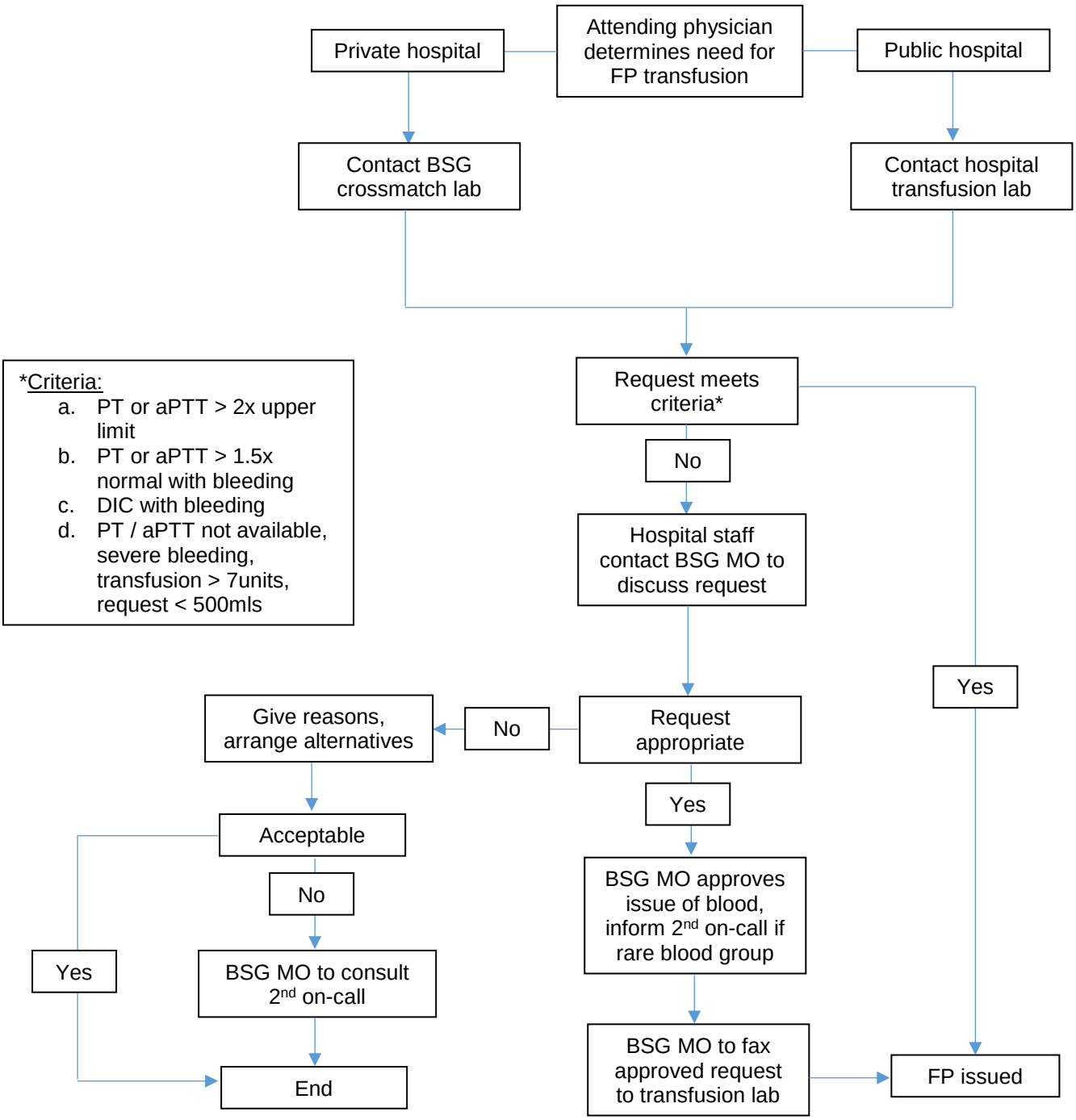
(NON-EMERGENCY ELECTIVE SURGERIES)



NOTE: BSG MO to be informed 3 days in advance for elective surgery requiring > 5units of RBC and/or PLTS and/or FP

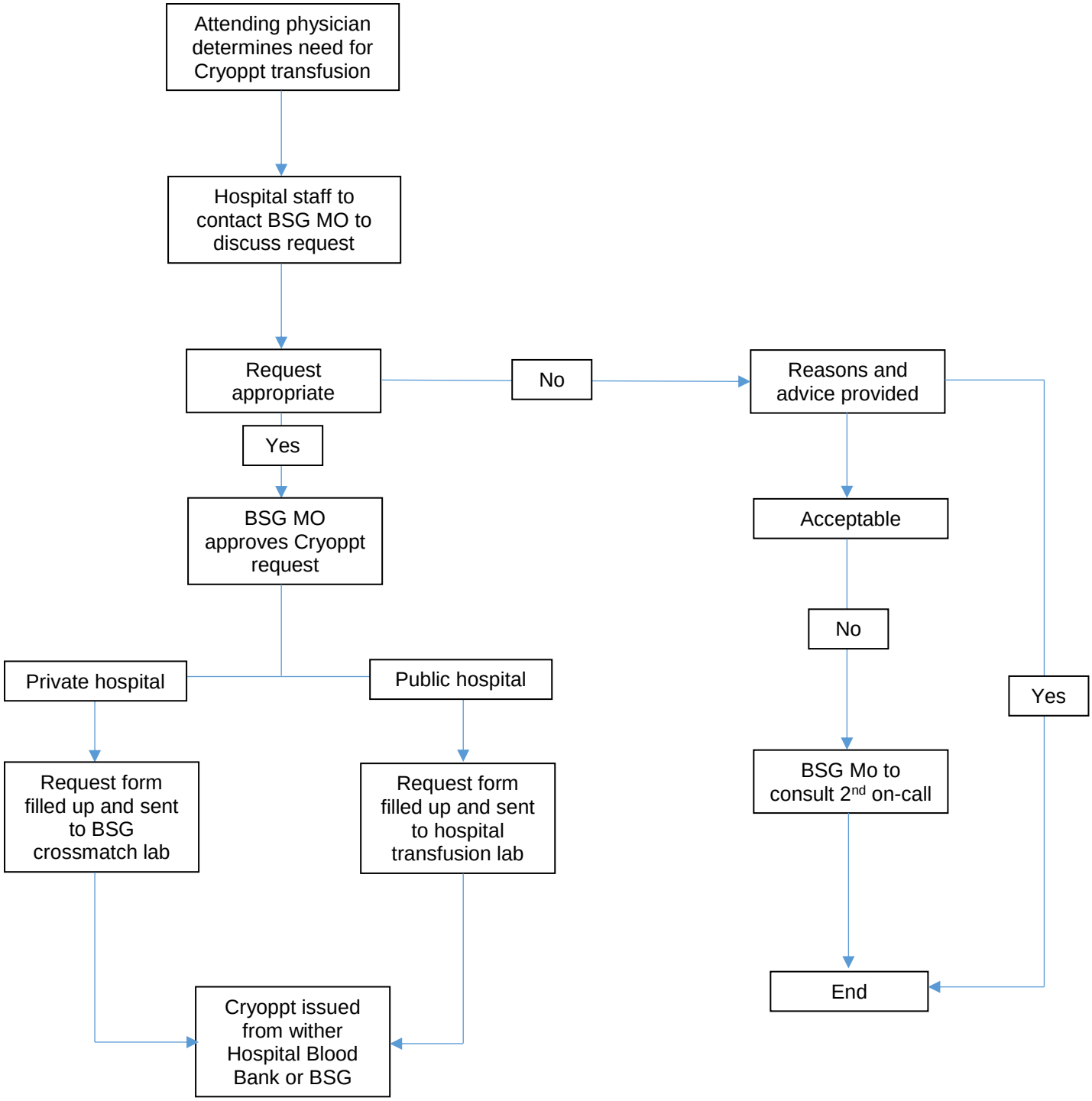
Flowchart 4

MANAGEMENT OF REQUESTS FOR FROZEN PLASMA (FP)



Flowchart 5

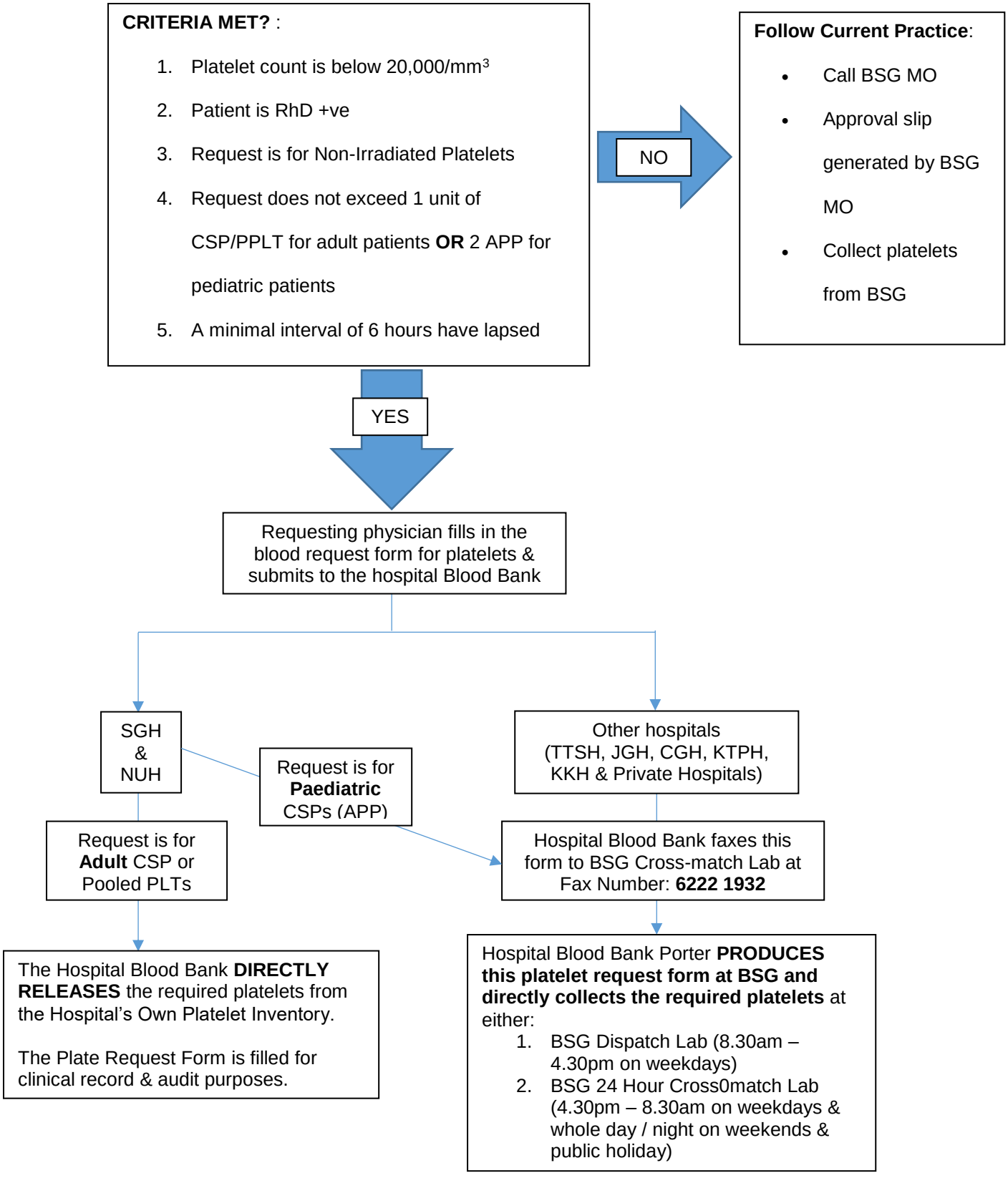
MANAGEMENT OF REQUESTS FOR CRYOPRECIPITATE



Flowchart 6

MANAGEMENT OF PLATELET REQUESTS (GENERAL)

Routine Requests for Platelet Transfusion for Patients Who Meet Platelet Criteria of < 20,000/mm^3



Appending notes for managing platelet request from other restructured hospitals

APPENDUM TO ALGORITHM for TTSH, CGH, KTPH, JGH / AH & KKH

NOTES ON WORKFLOW & ALGORITHM FOR DIRECT ISSUE OF PLATELETS USING SET PLATELET COUNT CRITERION OF 20,000/mm^3

SECTION A: TO BE READ BY **BOTH** WARD DOCTORS & HOSPITAL LAB STAFF

1. The following information must be stated on the Hospital Blood Request Form
    a. The patient's name, NRIC or Medical record number (MRN)
    b. Current platelet count
    (Recommend the platelet count should have been tested not longer than 24 hours before the blood request)
    c. The underlying diagnosis
    d. Planned date of transfusion
    e. The patient's ABO and RhD blood group: To be provided by the Hospital Blood Bank

2. The platelet request must be written on the hospital's Inpatient Blood Product Request Form or equivalent form, and sent to your hospital transfusion lab (hospital blood bank).

3. Each platelet request should not exceed 1 unit of Pooled Platelets or 1 unit of CSP.

    Each request for Paediatric patients should not exceed 2 units of APP.

    Any request for more than 1 unit of PPLT / CSP or more than 2 units of APP should be referred to the BSG MO on-call (To call BSG MO, as per previous practice).

4. ABO identical platelet units are the first choice. If an ABO identical unit is unavailable, the following recommended ABO groups for platelets are applicable (adult patients only):

Appending notes for managing platelet request from other restructured hospitals

Recipient	**A**	**B**	**O**	**AB**
Platelets – 1st choice	A	B	O	AB
Platelets – 2nd choice	AB	AB	A	A
Platelets – 3rd choice	B	A	B	B
Platelets – 4th choice	O *Group O platelets should be used only in Emergency situations or shortages.* *Should use only O Pooled Plts; Avoid O CSP*	O *Group O platelets should be used only in Emergency situations or shortages.* *Should use only O Pooled Plts; Avoid O CSP*	AB	O *Group O platelets should be used only in Emergency situations or shortages.* *Should use only O Pooled Plts; Avoid O CSP*
DURING MASSIVE BLEEDING (> 6 units of PCT / WB transfused) or during MTP	ABO compatibility is <u>not essential</u> for platelet transfusion in this situation			

5. For paediatric patients, ABO identical platelets (1st Choice) or Group AB platelets (2nd Choice) are advised.

6. Situations where direct platelet issuing algorithm is **NOT APPLICABLE**:
    a. Irradiated Platelets: Please call the BSG MO on-call directly for approval.
    b. Platelet Requests for RhD Negative Patients: Please call the BSG MO on-call directly for further discussion and approval.
    c. Requests for HLA-matched Platelets (in patients established to have platelet refractoriness) should not be made through this channel. The requesting physician must call the BSG MO on-call directly for such requests.
    d. Less than 6 hours interval between the last platelet issue and the current request for platelets: Please call the BSG MO on-call directly for approval.

Appending notes for managing platelet request from other restructured hospitals

<u>ALL REQUESTS LISTED ABOVE</u> WILL HAVE TO BE APPROVED BY BSG MO ON-CALL. A blood approval slip will be generated & faxed to the hospital blood bank, following which the platelets can be collected from BSG (as per current practice).

Massive bleeding patients who fulfil the Massive Transfusion Protocol (MTP) criteria set by the individual Restructured Hospital's should have MTP activation & be supported from the MTP inventory of the hospital for platelets & other hemostatic products, as per MTP workflow.

SECTION B: TO BE READ BY HOSPITAL TRANSFUSION LAB STAFF ONLY

1. The blood request form should be faxed by the Restructured Hospital Blood Bank Lab Officer to the BSG Cross-match lab at fax number **6222 1932** for the attention and action of the Duty Cross-match Lab Officer.

2. This request form (with the above details) must also be presented by the porter (from the respective hospital blood transfusion laboratory) to the Lab Officer on duty at BSG for collection of the requested platelets at:
    - BSG Dispatch Lab (8.30 – 4.30pm on weekdays)
    - BSG 24 Hour Cross-match Lab (4.30pm – 8.30am on weekdays & whole day / night on weekends & public holiday)

3. Hospitals who use an External Commercial Courier / Transport Agency to collect blood products from BSG may have difficulty arranging for the courier to produce a copy of the platelet request form during collection; they can follow the following procedure to ensure proper communication and documentation:
    a. Hospital Blood Bank staff faxes the platelet request form (for each individual patient) to BSG Cross-match Lab at fax number **6222 1932**, and subsequently calls BSG Lab to verify that the fax has been received.

    - BSG Dispatch Lab (8.30 – 4.30pm on weekdays)

    - BSG 24 Hour Cross-match Lab (4.30pm – 8.30am on weekdays & whole day / night on weekends & public holiday)

Appending notes for managing platelet request from other restructured hospitals

b. Hospital Blood Bank staff must inform the courier of the number of platelet units to be collected and details of each case (either through SMS or direct calling); this will help prevent errors during collection (such as units left out or wrong blood group.
c. Courier verifies these collection details with BSG staff issuing the platelets
    - Last name / Family name **AND/OR** NRIC / MRN of patient
    - ABO blood group and RhD type of platelets requested
    - Category (CSPs, PPLT, APP) and number of platelet units

4. The earliest expiring PPLT or CSP unit of the requested BAO blood group will be issued unless the stated date of transfusion is later than the date of platelet collection.

5. BSG may suspend direct platelet issuing algorithm if the National Platelet Inventory drops below a minimum critical level of platelets.

   The Lab officer of either Despatch Lab (weekday office hours) or Cross-match Lab (weekday nights or weekends / public holidays) will inform all hospital blood banks of the suspension of the platelet algorithm by telephone.

6. Upon resumption of the direct platelet issuing algorithm, Lab officer of either Despatch Lab (weekday office hours) or Cross-match Lab (weekday nights or weekends / public holidays) will inform all hospital blood banks immediately of the resumption of the platelet algorithm by telephone.

BLOOD SERVICES GROUP

GUIDELINES FOR THE TRANSPORT AND STORAGE OF BLOOD AND BLOOD PRODUCTS

Transport of Blood and Blood Products

1. Each unit of blood and blood components should be inspected for haemolysis in plasma or discolouration of red cell mass immediately before issuing or packing for shipment. Units with abnormal appearance should be quarantined and returned.

2. All blood transport containers used for transporting of blood components should be validated with a specified packing configuration before use. Revalidation of these containers should be performed yearly.

3. Whole blood and all liquid Red Blood Cell components must be transported in sturdy, well-insulated containers with refrigerant that will ensure maintenance of a temperature of 1-10° C.

4. The refrigerant recommended for transporting whole blood and red blood cell components is chemical coolant pack. Plastic divider should be used to avoid direct contact of refrigerant and blood packs. Wet ice in leak proof containers such as plastic bags may also be used.

5. Super-cooled cubed ice, canned ice and dry ice should not be used for shipping or storing whole blood or red blood cell components because they can cause local temperatures low enough that red cells in their immediate vicinity will undergo haemolysis.

6. During transport, frozen components must be maintained at or below the required storage temperature. This can be achieved with a suitable quantity of dry ice or super-cold cooling element in well-insulated containers. All frozen containers must be kept in a separate container and should not be packed together with liquid components.

7. Platelets should be maintained at temperatures of 20-24° C during transportation. Well-insulated containers without added ice is sufficient.

8. Blood transport containers should be sealed with 5 cm wide adhesive tape. All containers should be accompanied by a packing slip.

9. The temperature of each container should be checked on receipt. Thermometer may be used to check on the blood components and to

ensure the temperature of each type of component is maintained within its' specification during transportation.

10. Blood components should not be left in the insulated transport container for storage. They should be stored in a properly monitored refrigerator or freezer immediately after receipt.

Storage of Blood and Blood Products

Storage of Whole Blood and Red Blood Cell Components

1. Whole Blood and Red Blood Cell components should be stored at 1 to 6° C during storage.

2. Blood should be stored in a blood bank refrigerator which has been specially designed for the purpose. This includes blood that is kept in sites and outside the blood bank, such as surgical or obstetric units.

3. Units should be arranged so that the oldest blood is easily at hand and is used first.

Storage of Fresh Frozen Plasma and Cryoprecipitate

1. Fresh Frozen Plasma and Cryoprecipitate should be stored at -18° C or lower as quickly as possible after preparation.

2. Stocks should be rotated so that the oldest product is used first.

3. Thawed Fresh Frozen Plasma used for the correction of labile coagulation factor deficiencies should be stored at 1-6° C and infused within 24 hours after thawing. Thawed units should not be re-frozen.

4. Reconstituted cryoprecipitate should be stored at room temperature (20-24° C) until transfusion, and should be administered within 6 hours of thawing and 4 hours of open pooling. Thawed units should not be re-frozen.

Storage of Platelets

1. Platelet concentrates are to be stored at 20-24° C.

2. Continuous gentle agitation is essential.

3. If the hermetic seal of any bag is broken, the platelets must be transfused within 4 hours.

Refrigerators

1. The blood bank refrigerator must be kept under constant supervision by the officer in charge of the blood bank.

2. It should not be used for the storage of food or laboratory specimens other than those being used in the blood bank.

3. Refrigerators for storage of blood should incorporate the following :

   (i) A fan cooled cabinet in which the fan operates when all doors are closed.

   (ii) A system to monitor the temperature continuously and to record the temperature at least every 4 hours. This device can be clockwork or electrical.

   (iii) An alarm system which is not dependant on the mains electrical power supply. This should give both a visual and auditory signal at a place where there is always staff on duty.

4. The temperature in all areas of the refrigerator must be maintained at between 1-6° C. There should be a locking device on the thermostat to prevent alteration of the setting.

5. There should be no freezing compartment in a blood storage refrigerator.

6. The interior should be clean and adequately insulated and there should be clearly apparent organisation of storage areas labelled and designated for (i) cross-matched blood (ii) labelled blood (iii) outdated blood.

7. Domestic type refrigerators should not be used for the storage of blood.

Monitoring Temperatures

1. Recording thermometers and audible alarms are required for all blood storage refrigerators.

2. The sensor for these systems should be on a high shelf and must be in a liquid-filled container. These should contain water or other fluids to a volume no greater than the volume of the smallest component stored.

3. The alarm signals must be activated at a temperature that allows personnel to take proper action before the stored blood reaches undesirable temperatures. An acceptable range is 1-6° C.

4. In a large refrigerator, it is advisable to have at least two independant thermometers, one immersed with the recording sensor and the other in a similar container on the lowest shelf on which blood is stored.

5. In large walk-in refrigerators, several thermometers should be used, placed in areas determined to reflect the possible range of temperature fluctuations.

6. At the end of each time period, temperature charts from mechanical recording devices should be changed, dated inclusively and labelled to identify the refrigerator and the person changing the charts. Any departure from normal temperature should be explained in writing on the chart beside the tracing.

7. Temperature records should be retained as part of blood bank records for at least 5 years.

Freezers

1. A -20° C freezer or lower is required for storing Fresh Frozen Plasma and Cryoprecipitate.

2. Freezers must be equipped with a system to monitor the temperature continuously and to record the temperature at least every 4 hours.

3. Freezers should also have an alarm system with audible signals.

Refrigerator and Freezer Alarms

1. Refrigerator and freezer thermometers and alarms should be checked periodically to ascertain that they are functioning properly.

2. Freezers and refrigerators must have a source of electricity that operates independantly of standard house circuits.

3. The electrical source for the alarm system must be separate from that of the refrigerator.

4. There must be written instructions for personnel to follow in the event of power failure or other disruption of refrigerators.

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KK Women's and Children's Hospital
SingHealth

Post-Transfusion Advice for Outpatient Transfusion

This leaflet provides important advice for patients who have had a blood transfusion in the outpatient setting.

Are there any side effects from having a blood transfusion?

You recently received a blood transfusion in hospital. During this procedure, you were monitored closely for any signs of transfusion reactions. Do note that there is a low risk of developing a delayed transfusion reaction.

These are usually mild and cause very few problems but it is important to report any unusual or unexpected symptoms to your doctor or nurse.

What should I look out for?

Most delayed transfusion reactions occur within six to 24 hours after transfusion but can occasionally develop up to 14 days later.

If you experience any of the following symptoms, please contact the ward where you had your transfusion during office hours or proceed to the nearest GP, Children's Emergency Department (for Paediatrics) or KKH Urgent O&G Centre (for Women) after office hours.

In the event of an emergency (e.g. difficulty in breathing), please call 995.

Signs and symptoms to look out for:

- Fever above 38°C
- Feeling feverish, hot and clammy or shivering and having chills
- Breathing problems or wheeziness
- Vomiting
- Swelling of any part of body, especially around mouth, lips or face
- Extreme tiredness or generally feeling unwell
- Blood in your urine or passing less or very dark urine
- Itchy skin rash
- Pain in the limbs, chest, abdominal area or in the lower back
- Unexpected or unexplained bruising
- Jaundice

Why do I need to inform someone?

A transfusion reaction, if left untreated, can become very serious. Please inform a caregiver as you may need to be assessed by a doctor for further treatment.

Hospital Transfusion Committee,
Updated June 2019

ANNEX 10

Hospital Guidelines on Usage of Warming Devices on Blood and Blood Components

1.0 PURPOSE

To serve as a guideline for all healthcare staff who are involved in utilizing blood warmers during the transfusion process.

2.0 POLICY

2.1 Manufacturer's guidelines and instructions must be specifically followed whenever the devices are being used.

2.1 The blood warming devices must be validated by BME and end user for the administration of blood and/or blood products, and must be used as per product's specifications.

Any change of brand of blood warmers, end user has to inform Blood Bank for validation purposes.

2.2 Blood warmers may be used to prevent hypothermia that can be induced by rapid infusion of large volumes of refrigerated blood and/or blood products; where transfusing blood and/or blood products at rates greater than 15ml/kg/hr.

2.3 **ONLY** red cells and frozen plasma (FP) can be transfused to patients through a warming device.

2.4 Routine warming of blood is not necessary unless otherwise indicated.

2.5 Blood warming may be needed pending patient's clinical condition and clinical setting, such as OTs, CE, Delivery Suite, ICUs or HDU.

NOTE: Excessive warming of blood will cause haemolysis.

2.6 If pre-warming is required, **DO NOT** place blood products intended for different patients together in the same warming device. If required, to use a separate warming device.

2.7 Staff who uses the warming devices must recognize:

- The set temperature and the temperature range of the warming device:

  a. HOTLINE

  - Temperature range: 41^{o}C to 42^{o}C

- Set temperature: 41ºC

b. Barkey XPT Warming System

- Temperature range: 33ºC to 42ºC

- Set temperature: 41ºC

- Warming temperatures must not exceed 42ºC
- All alarms must be addressed in a timely manner

3.0 ABBREVATIONS

3.1 BME – Biomedical Engineering Department

3.2 CE – Children's Emergency

3.3 HDU – High Dependency Unit

3.4 ICUs – Intensive Care Units

3.5 OTs – Operating Theatres

3.6 FP – Frozen Plasma

3.7 PM – Preventive Maintenance

4.0 PROCEDURE

4.1 General Recommendations and Indications:

4.1.1 Blood warming may be indicated for:

- Massive / rapid transfusions
- Neonatal exchange transfusions
- Therapeutic plasma exchange
- Intrauterine transfusions
- Patients with clinically significant cold agglutinins
- Trauma situations in which core-warming measures are indicated
- Patients who are in rewarming phase during cardiopulmonary bypass surgical procedures

4.2 Restrictions and Other Considerations:

4.2.1

- **DO NOT** Warm red cells and/or FP by placing under running tap, on or near a radiator, heater, warming blanket, improvised water bath or conventional microwave.
- **DO NOT** allow the unit of red cells and/or FP to sit at room temperature for prolonged periods.
- **DO NOT** re-refrigerate any unit(s) that has been warmed for later use or reissued.
- Blood Bank must be informed of unit(s) that has been warmed and not utilized. The affected unit(s) must be returned to Blood Bank together with the 'Memo for Blood/Blood Component Return or Wastages'.

NOTE: Improper warming methods may cause haemolysis.

4.3 Safety Features:

4.3.1 Warming devices must have:

- A visible thermometer
- An audible alarm to detect overheating or other malfunctions

4.3.2 PM of the warming devices is to be performed yearly according to BME In-house Preventive Maintenance schedule.

4.3.3 Prior to use, the staff must ensure that the PM sticker is on the device and is up to date.

5.0 REFERENCES

5.1 P&P – 76270-1110 'Preventive Maintenance – In House Maintained Equipment'

5.2 Operator's Manual – 'Instructions for Use of Barkey XPT Warming System'

5.3 Operator's Manual – 'Level 1 HOTLINE Blood and Fluid Warmer'

5.4 63170-Form-0159 – 'Memo for Blood and Blood Components Return or Wastages'