

**Hand Book Of
National Guidelines On
'Appropriate Clinical Use of Blood'
For Doctors, Assistant Clinical
Officers and Nurses**

1st Edition 2009

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PREFACE

Presently the National Blood Transfusion Service is undergoing a process of development and improvement. In addition to improving the efficiency of the blood supply system, attention needs to be drawn to the other end of the vein to vein chain that is the clinical safety component of blood safety thereby minimizing the risks involved with blood transfusion.

This manual on the ‘National Guidelines On Clinical Use Of Blood’ for clinicians and nursing staff aims to provide information regarding blood and blood components, their use in different clinical situations and the correct clinical transfusion practice to be followed.

It has been prepared by the Blood Bank In-Charge, JDW, NR Hospital with the help of references from WHO guidelines on ‘Clinical Use of Blood’ and from guideline manuals prepared by blood transfusion services in the South East Asia and Western Pacific regions of WHO.

A series of review meetings were held involving clinicians, pathologists, anesthetists, nurses, district medical officers and personnel from Quality Assurance and Standardization division and their comments, views, recommendations incorporated in the final document which has been endorsed by the Ministry of Health.

I hope these guidelines will assist prescribers and users of blood in making appropriate decisions even during emergency situations and also help the hospital transfusion committees in monitoring the blood usage and clinical transfusion practices in their respective institutions.

I would like to thank one and all for their valuable contribution and efforts to the publication of this manual.

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Foreword

With the advances in medical and surgical specialties, blood transfusion has become an essential component of therapy for many serious and common diseases. As a result the demand for blood and blood components has increased throughout the country in the past few years.

However one has to weigh the benefits of transfusion versus the risks associated before prescribing blood because the risk is not only of transmission of transfusion transmissible agents particularly HIV but also the other serious hazards of transfusion which can be preventable.

We therefore owe a duty to use blood appropriately and judiciously only when clinically indicated at the same time be fully aware of the adverse events of transfusion and prompt management in the correct manner.

To eliminate or substantially reduce these risks and hazards of transfusion , a national quality system ,including guidelines, standard operating procedures, accurate records, monitoring and evaluation need to be established. Keeping this in view, this manual has been designed to provide useful basic information for all clinicians, nurses and laboratory personnel on the responsibilities in prescribing and administering blood and its associated reactions. I sincerely urge all the administrators of hospitals to form a hospital transfusion committee that will monitor the safety and adequate supply of blood as well as the trends in blood usage in their respective institutions. This will definitely help in ensuring quality of blood transfusion services in the country leading to safe national blood transfusion.



Director General
Department of Medical services

CLINICAL USE OF BLOOD

1. Introduction:

Blood transfusion is an essential part of modern day health care. The need for blood is presently increasing due to two reasons:

1. Improved and accurate diagnosis of complex diseases and treatment modalities.
2. Increased number of ageing population with increased blood needs.

Like any therapeutic intervention, blood used correctly and judiciously can save life, however it may carry a risk of untoward event e.g. acute or delayed reaction or the risk of transmission of infectious agents such as HIV, Hepatitis viruses, spirochetes and malaria parasites.

Blood for transfusion is considered safe when it is:

- donated by a healthy donor through a careful selection process (product safety)
- screened free from any agents that could be harmful to the patient (product safety)
- processed by modern methods of testing, component production, storage and transport (product safety)
- transfused only upon need and for the benefit of the patient's health (clinical safety).
- administered under the supervision of a staff trained in safe transfusion process and able to manage appropriately any adverse transfusion reaction.

WHO statistics show-

- 81 million units of blood are collected globally every year at a cost of at least 7.5 billion USD
- Though 80% of the world's population lives in developing countries this population has access to only 20% of safe global blood supply.

- 139 countries do not have 100% voluntary donation
- 6 million tests are not done on donated blood
- More than 50% of member countries lack quality systems and reliable supply of reagents
- Up to 50% transfusions are unnecessary

Therefore it is important that a good and open channel of communication exists between the blood providers and blood prescribers that shall ensure an effective clinical interface leading to:

- An adequate supply of safe blood and blood components accessible to all in need.
- Appropriate clinical use of blood and blood components.

2. National policy on clinical use of blood:

Bhutan has formulated its national blood policy in 2007 which includes policy on clinical use of blood as one of the strategies to provide adequate and safe blood supply in the country.

The policy states that blood and blood components should be administered only when clinically indicated and at the lowest effective dose and frequency. Safer alternatives should always be used first whenever possible.

The strategies for an effective clinical use of blood that are in place:

1. A committee comprising of specialists from various clinical departments, department of pathology and national blood transfusion service, representatives from nursing department and department of medical services, ministry of health has been formed.
2. The national policy and guidelines on clinical use of blood have been developed
4. Adequate supply of blood and blood components are met by the national blood transfusion service through the hospital blood banks
5. Training programs for all involved in blood transfusion are being conducted at regular intervals

The strategies that need to be strengthened are:

6. Formation of functional hospital transfusion committee (HTxC) in each hospital
7. Monitoring and evaluation of all transfusion activities

3. Hospital Transfusion Committee (HTxC)

It has often been observed that one of the problems in promoting appropriate clinical use of blood is the lack of regular communication between doctors and blood bank personnel.

Lack of awareness amongst doctors on judicious clinical use of blood and blood components often leads to unnecessary use of blood and increases the risk of untoward effects of transfusion to the recipient patient.

Formation of a hospital transfusion committee can thus initiate a monitoring process.

The members of the committee can be representatives from clinical departments, nursing, hospital administration and blood transfusion service with following defined functions:

- Ensuring the use of developed guidelines by all clinicians and nursing staff involved in transfusion practice.
- Imparting education, information and training to the involved staff-medical, nursing and paramedical.
- Monitoring safety and adequacy of blood supply and other alternatives to transfusion.
- Reviewing blood usage, wastage, blood ordering practices in the hospital.
- Playing a key role in hemovigilance: Monitoring, reviewing serious adverse effects of transfusion and taking corrective measures when required.
- Preparation of a Maximum Blood Ordering Schedule with the expertise of the heads of all surgical departments.

The HTxC should be operational and meet regularly or whenever required to discuss any issues related to transfusion.

It is important that each hospital management board forms this committee with representation from the above mentioned departments that will play an active role in judicious use of this scarce human resource.

4. Guidelines on clinical use of blood:

The following guidelines have been developed after a series of technical meetings and discussions between clinicians, nursing, blood transfusion service personnel and hospital administrators.

They are based on the available national information on clinical conditions and references have been taken from WHO guidelines and other national blood transfusion services in the region.

Objectives:

- To define requirements for the appropriate clinical use of blood, blood components and other alternatives to transfusion.
- To make available Standard Operating Procedures for all stages of transfusion process.
- To facilitate monitoring and evaluation of transfusion practice thereby improving the clinical use of blood.

Principles of the clinical use of blood:

Points to remember before prescribing blood transfusion:

- ✓ Transfusion is one element of patient management.
- ✓ Minimize the need for transfusion.
- ✓ Weigh the benefits versus risks of transfusion.
- ✓ Evaluate the patient in total and not just depend on Hemoglobin or other laboratory findings.
- ✓ Prescribe in accordance with the developed guidelines.
- ✓ Ensure that a trained person monitors the patient before, during and after transfusion.

The guidelines include the following key information that will assist the clinicians to make decisions on prescribing blood:

- a. Properties of blood / blood components*
- b. Clinical indications where transfusions are needed*
- c. Clinical Transfusion process*
- d. Management of adverse reactions*
- e. Alternatives to transfusion*
- f. Autologous transfusion*

5. Blood and Blood components

By virtue of internal administration, blood is considered a drug and hence its important to know its properties like: indications, dosage, storage conditions, means of administration, contraindications and precautions.

Blood component therapy:-

It is the term used where whole blood is separated into different cellular and plasma components

Advantages of blood component therapy:-

- Need based therapy
- Best utilization of whole blood
- Minimizing or eliminating some of the adverse effects of transfusion.
- Source for plasma derived products

The facilities to prepare and store components are available at Thimphu and Mongar hospital blood banks presently and later at Gelegphug hospital.

Blood components prepared are:-

- Packed red cells
- Plasma
- Platelet concentrates
- Cryoprecipitate

All donated blood units undergo mandatory screening for HIV, HCV, HBV, syphilis markers and for malaria (in endemic areas). Refer to **Table 'A'** page 12 for the properties of whole blood and its components.

5. a. WHOLE BLOOD (WB)

It is recommended not to use whole blood in hospitals where blood components are made available by the national blood transfusion service.

Properties: - Freshly drawn blood maintains all the properties for a limited period of time, usually 24 hours.

Changes in the whole blood after 24 hours: -

- Decreased unstable coagulation blood factors like V and VIII.
- Decreased platelet viability. Whole blood after 48 hours of storage contains no viable platelets.
- Decreased 2, 3 DPG levels – (However it regenerates after transfusion in the circulation of the recipient)
- Increased potassium level in plasma due to release of the intracellular potassium.
- Increased acidity of the plasma.

Precautions: - Identical ABO group or ABO compatible blood should be used. Rh negative patients should get Rh negative blood especially women in child bearing age group.

Contraindications (Relative): Use WB with caution in patients with chronic, decompensated anemia.

Side effects: -

- Circulatory overload in cases of decompensated anemia, heart and renal failure.
- Formation of antibodies in the patient against donor red cell antigens and human leukocyte antigens (HLA) leading to transfusion reactions
- Transfusion transmitted infections (TTIs).

- Citrate intoxication in neonates and in patients with impaired liver function getting massive transfusion.
- Hyperkalemia in massive transfusion.

Fresh blood: -Blood collected within last 24 hours is usually called “**fresh**” as it contains all the blood components.

Use of fresh blood should be restricted to only those conditions where all 3 components of blood are required for transfusion:

- In massive transfusion.
- In neonates or infants less than four months , blood stored for less than 5 days is advisable to reduce risk of hyperkalaemia and to maintain normal levels of 2,3 DPG.
- Patients with advanced renal or hepatic diseases.

It is advisable to the clinicians **not to prescribe** fresh blood in absence of any of the above indications due to following reasons:-

- There is no added advantage of fresh blood over stored blood if transfusion is prescribed for correcting anemia
- Many infectious agents like spirochetes, malarial parasites, bacteria do not survive at storage temperatures after few days making stored blood safer.
- It puts additional burden on the blood bank staff to look for blood donors for obtaining fresh blood when no scientific justification or indication is present.
- In many countries where blood component therapy is available, fresh blood has become a nonentity in transfusion practice. Particular component of blood that is needed for treatment is transfused

5. b. PACKED RED CELLS (PRC):-

A component obtained by removal of part of the plasma either by sedimentation method or centrifugation of whole blood.

Precautions: -Same as for whole blood.

Side effects: - Same as whole blood

Refer to **ANNEX 1** for selection of ABO compatible donor red cells for crossmatching

Selection of Rh compatible donor red cells:

- Rh positive patients can be transfused with Rh positive and Rh negative blood.
- Rh negative males or elderly females with no potential for child bearing can safely receive Rh positive blood in circumstances where Rh negative blood is not available.
- Rh negative female patient in the child bearing age must receive Rh negative blood. In circumstances where a surgery is planned or forthcoming childbirth, the blood bank should be informed at the earliest to make Rh negative blood available as Rh negative blood is not routinely stocked at the blood banks.

In case of emergency when Rh negative blood is not available, it may be necessary to use Rh D positive blood.

Following transfusion of >15ml up to 1 unit of blood, it is advisable to give IV anti-D IgG at dose of 50- 75 IU/ml of blood. All efforts should be made to make Rh negative blood available at the earliest once urgency is managed.

5. c. PLASMA COMPONENTS

Fresh Frozen Plasma (FFP)-Prepared from whole blood within 6 hours of collection and frozen immediately in a plasma freezer. It contains both stable and unstable coagulation factors like fibrinogen, factor V and VIII

Liquid plasma-plasma separated from whole blood any-time during storage period. It contains only stable coagulation factors.

Precautions: -

- It should not be used simply for volume correction in the absence of coagulation deficit nor as a source of albumin or immunoglobulin.

- FFP should not be used where a suitable alternative product is available.
- Once thawed the plasma should be used immediately especially for correction of unstable clotting factors.
- It cannot be refrozen after thawing. .
- Integrity of the bag should be checked before use.

Side effects: -

- Acute allergic reactions are common.
- Febrile, non hemolytic reaction
- Viral transmission
- Bacterial contamination – sepsis

Note: Transfusion of FFP or liquid plasma does not require crossmatching

Refer to **ANNEX 2** for selection of ABO compatible donor plasma

5. d. PLATELET CONCENTRATES (PC):-

A component obtained by centrifugation of fresh blood within 6 to 8 hours.

One unit of platelet concentrate increases the platelet count by 10,000 to 20,000/ul of blood.

Precautions:-

Repeated transfusions can lead to production of antibodies against platelets causing destruction of platelets. The clinician advising platelet transfusions should keep this in mind Presence of hypersplenism, DIC or septicemia can affect the increase in platelet count

Contraindications: -

-Not generally indicated for prophylaxis of bleeding in surgical patients, unless known to have significant pre-operative platelet deficiency.

-Not indicated in: -

- Immune/Idiopathic Thrombocytopenia (ITP)
- Thrombotic Thrombocytopenia (TTP)

Complications: -

Febrile, non-hemolytic and allergic reactions are common in patients receiving multiple transfusions.

Note: Cross-matching is not required unless gross red cell contamination is seen in the unit chosen for transfusion.

Refer to **ANNEX 3** for the choice of ABO compatible donor platelets

5.e. CRYOPRECIPITATE:-

A component prepared from FFP by thawing at +4°C and suspending it in 10 -20 ml plasma.

One unit should contain factor VIII: 80- 100iu/pack and fibrinogen 150-300mg/pack

Indications:-

- Congenital or acquired fibrinogen deficiency
- For treatment of hemophilia A and von Willebrand disease when factor concentrates are not available
- For treatment of DIC in combination with other blood components
- Treatment of bleeding tendency associated with uremia who are non-responsive to dialysis
- As a fibrin sealant in absence of commercially available products

Dose and administration:

- Each unit increases fibrinogen by 5to 10mg%. In a bleeding patient, a reasonable target for fibrinogen is 100mg%..

- ABO compatible cryoprecipitate is not required.

- No crossmatching is required

- 6 to 8 units are needed normally and they are pooled and transfused within 4 hours

Table 'A'
REQUIREMENTS FOR STORAGE, TRANSPORT, EXPIRATION AND INDICATIONS OF BLOOD AND BLOOD COMPONENTS

| Components | Properties | Storage | Transport | Expiry | Indications |
|------------------|---|--|--|--|---|
| Whole blood | Vol: 350 ml +/- 10 % Hct: 35-50% Dosage: 10ml/kg wt Increases the Hb by 1-1.5gm% | In a blood bank refrigerator at +2 to +6°C | Can be transported for next 24hrs. if maintained at +1°C to +10°C during transport | 35 days in a closed system 24 hours if open system | Acute blood loss Exchange transfusion Massive transfusion |
| Packed Red Cells | Vol: 250ml ± 30ml Hct: 60 to 70% Dosage: 5ml/kg wt Increases the Hb by 1-1.5gm% | In a blood bank refrigerator at + 2 to +6° C | Same as above | 35 days in a closed system 24 hours in a open system. | Chronic, symptomatic anemia Acute blood loss |

| Components | Properties | Storage | Transport | Expiry | Indications |
|----------------------|--|---|------------------------------|--|---|
| Fresh Frozen Plasma | Vol: 200-220ml Contains stable & 70% unstable clotting factors Dosage: 15ml/kg wt | In a plasma freezer at below -30 °C | Transported in frozen state | 1 year | Multiple factors for deficiencies, severe liver disease, DIC, Warfarin reversal |
| FFP Thawed | Same as FFP | First thawed at 37°C in a water-bath/plasma thawer and stored at +2° to +6°C in a blood bank refrigerator | Maintain between +1 to +10°C | 4-6 hours | Same as above |
| Liquid Plasma | Vol: 200-220ml Contains only stable clotting factors | +2° to +6°C in a blood bank refrigerator | Maintain between +1 to +10°C | 40 days | For deficiency of stable clotting factors |
| Platelet concentrate | Vol: 50 to 70ml Contains 5×10^{10} platelets/unit Dosage: 1 unit/10kg wt Increases the platelet count by 10,000 to 20,000/uI blood | In a platelet incubator with agitator at +20 to +24°C with continuous gentle agitation | +20 to +24°C | 5 days if closed system. 4 hours if open system | Bleeding due to low platelet count or impaired function |

6. Guidelines for use of blood and blood components in some clinical indications.

Clinical indications are: -

- Acute blood loss
- Chronic anemia
- Major surgery
- Haemostatic disorders due to deficient clotting factors
- Haemostatic disorders due to deficient or dysfunctional platelets
- Special considerations for pediatric and neonatal patients in need of blood or blood Components

6.a Acute blood loss

Guidelines:

1. Assess the volume of blood lost and classify as follows:-

Table 1

| Class | I | II | III | IV |
|-------------------------------|-----------------------------|---------------------|---------------------------|---------------------------|
| Blood loss | <750ml | 750-1500ml | 1500-2000ml | >2000ml |
| %blood loss | <15% | 15-30% | 30-40% | >40% |
| Pulse rate | <100/m | >100/m | >120/m | >140/m |
| BP | normal | Increased diastolic | decreased | markedly decreased |
| Respiratory rate | 14-20/m | 20-30/m | 30-40/m | <35/m |
| Skin changes | no change | Cool Clammy skin | Pale | Cold , pale skin |
| Urine output/hour | >30 ml | 20-30 ml | 5-15 ml | negligible |
| Mental status | Slightly anxious | Mildly anxious | Anxious, confused | Confused, lethargic |
| Recommended fluid replacement | No fluid replacement needed | Normal saline 3:1 | Normal saline + red cells | Normal saline + red cells |

2. Management of acute blood loss

- Replacement of blood volume and not red cell mass should be the first priority in managing acute blood loss.
- Losses of red cell mass are better tolerated than losses of blood volume.
- Expansion of blood volume leads to improvement in oxygen delivery to the tissues thereby reducing the need for red cell transfusions

Class I blood loss: no fluid replacement therapy is needed in an otherwise healthy individual

Class II blood loss: maintain an adequate intravascular volume by fluid replacement therapy which improves the red cell transport and thereby oxygen delivery to the tissues.

Class III blood loss: healthy, non-anemic patients may even respond well to fluid replacement, but those with pre existing anemia or with increased risk of organ ischemia will need red cell transfusion.

Class IV blood loss: urgent fluid replacement therapy and red cell transfusion is indicated since such a patient will be in a state of hemorrhagic shock.

3. Role of replacement fluids:

- Isotonic crystalloid solutions like normal saline or Ringers lactate are the first initial choice for volume expansion. Dextrose solutions do not contain sodium and are poor replacement fluids. Hence they should not be used to treat hypovolemia.
- The volume of crystalloid fluids needed to restore the intravascular volume is approximately 3 to 4 times the estimated blood loss.

- If colloids are used they are given in a volume equal to the blood volume lost. They provide longer duration of plasma volume expansion than crystalloids. But are expensive in comparison to crystalloids.

Note: When whole blood is used it fulfils two functions,

1. Increasing the intravascular blood volume
2. Increasing the oxygen carrying capacity of blood.

6. b. Chronic Anemia

Guidelines on management:

1. It is important to diagnose and treat the cause of anemia. Transfusion should be kept as last resort as it may suppress erythropoiesis.
2. Prevention of anemia is equally important through health education programs
3. Patient's clinical condition and not the laboratory result should be the determining factor for transfusion needs.
4. Chronic, asymptomatic anemic patients do not require blood transfusion.
5. Anemic patients having coexisting cardiac, pulmonary disease or both or Cerebro-vascular disease may require transfusion at higher hemoglobin levels than an otherwise healthy patient.
6. The symptoms/signs of hypoxia to be looked for in a decompensated anemic patient that needs blood transfusion are given in **Table 2**.
7. Anemic patients with hypovolemia of some etiology should be corrected by restoring intravascular volume with crystalloids.
8. Red cell transfusions should not be advised to increase colloid osmotic pressure, or used as volume expanders, substitutes for iron , B12 supplements, or to improve wound healing or sense of well being.

7. Though single unit transfusion is not recommended, administer transfusion on a unit by unit basis. Evaluate the patient clinically after each unit.

Table 2

| Signs/ Symptoms of hypoxia | |
|-----------------------------------|-----------------------|
| -easy fatigability | |
| -shortness of breath, chest pain | -postural hypotension |
| -transient ischemic attacks | |
| -angina-tachycardia | |
| -syncope, fainting attacks | |
| -swelling legs | |
| -fainting attacks | |
| -dyspnoea | |

Table 3

Hemoglobin trigger for transfusion (Hb is not the only criteria to decide)

| | |
|----------------|--|
| If Hb > 10 gm% | Red cell transfusion is inappropriate |
| If Hb <7 gm% | Red cell transfusion is likely to be appropriate |
| If Hb 7-10 gm% | May be appropriate with clinical correlation |

6. c. Major surgery:

Guidelines for blood transfusion

Available evidence does not support the use of single criteria such as preoperative Hb concentration to decide on preoperative blood transfusions.

The surgeon has to judge and decide based on each individual patient's condition.

Usually a minimum preoperative Hb concentration of 8gm% is considered acceptable for surgery in a well compensated, healthy patient even with anticipated blood loss of more than 500ml.

A higher Hb level may be required in the following conditions:-

- elderly patients
- decompensated patients
- patients with co-existing cardio respiratory disease
- patients in whom significant blood loss (>1000ml) is expected.

Assessment of blood requirement during surgery may be based on:

- Type of surgery-major/minor
- Duration of surgery
- Anesthesia and surgical technique
- Pre-operative clinical condition of patient
- Anticipated blood loss

Surgical Blood Ordering Schedule:

- The Surgical Blood Ordering Schedule (SBOS) is a table of elective surgical procedures with definite need for blood and the number of blood units routinely to be requested and kept reserved after cross-matching. It also lists those procedures where blood need is less likely, for which the blood bank follows a GSH protocol instead of a crossmatch and reserve protocol
- In these cases, if need arises for blood transfusion, blood bank can make the required number of blood units available at the earliest.
- At present the three regional referral hospitals at Thimphu, Mongar and Gelegphug have the facility to carry

out GSH protocol which requires a monthly supply of antibody screen cells from the National Blood Bank, Thimphu.

- The blood banks not supplied with antibody screen cells for GSH protocol should then keep a fixed number of blood units' crossmatched for the simple surgeries as well.
- The surgical blood ordering schedule (SBOS) with both definite and possible need for blood units for all the elective surgeries should be prepared by the HTxC in conjunction with all the respective surgical departments.

Refer to **ANNEX 5** for a sample 'Blood Ordering Schedule'

6. d. Haemostatic disorder due to deficient clotting factors

Guidelines for use of FFP:

1. Replacement of all or single clotting factors when specific or combined concentrates are not available.
2. Immediate reversal of warfarin effect in patients with risk of life threatening bleeding.
3. In Thrombotic Thrombocytopenia, FFP is used for plasma exchange.
4. For correction of prolonged prothrombin time in patients with liver disease and prior to surgery. A PT of 1.6 to 1.8 times control value is acceptable and a complete correction of PT is not required.
5. In DIC, FFP along with platelet concentrates is indicated only in presence of bleeding.
6. In massive transfusion, FFP is indicated only if PT is prolonged to 1.5 times control value due to dilutional coagulopathy.

Note:

- A PT of 1.5 times control value corresponds to an INR of 2.0.
- FFP is not effective in correcting marginally elevated INR
- FFP should be administered to the patient immediately before surgery to correct prolonged PT as coagulation factors have a very short life.
Post-transfusion PT levels are to be checked 15 to 30 minutes after infusion and further infusions are advised if significant correction of coagulopathy is needed.
- An initial dose of 15ml/kg raises the factor levels by about 25%.

6. e. Haemostatic disorder due to deficient or dysfunction platelets.***Guidelines for use of platelet concentrate:***

1. In managing thrombocytopenia it is important to treat the patient and not just the platelet count.
2. In managing platelet function defects, it is important to remove the underlying cause of dysfunction (ex. platelet toxic drugs like aspirin).
In such cases platelet transfusions may be required even with platelet counts within the normal range.
3. The decision to transfuse platelets depends on:
 - clinical condition of the patient
 - platelet count
 - cause of thrombocytopenia
4. The risk of antibody formation increases with exposure to increasing number of prophylactic administration of platelets. The patient then no longer experiences clinical benefit from platelet transfusion.

Triggers for platelet transfusions: (Table 4)

- Prophylactic platelet transfusion in absence of any type of bleeding is indicated when the platelet count is < 10,000/ul (range: 5000-<20,000/ul) e.g. acute leukemia or following cytotoxic therapy.
- In presence of fever or sepsis, platelet transfusion is indicated when count is <20,000/ul. Spontaneous bleeding rarely occurs with platelets counts greater than 20,000/ul.
- Patients having acute bleeding or on chemotherapy will require platelet transfusion when platelet count is < 50,000/ul.
- Patients undergoing major surgery or treatment for severe trauma need platelet transfusion when count is <70,000/ul. Minor procedures like bone marrow aspiration, biopsy may be performed in patients with severe thrombocytopenia without platelet transfusion.
- Patients undergoing surgery on CNS, eye or lungs, platelet transfusion will be needed if count is <100,000/ul.
- In immune thrombocytopenia, platelet transfusions should be reserved only for life threatening bleeding from gastrointestinal, genitourinary tracts, central nervous system associated with severe thrombocytopenia.

Note: A small fixed number of platelets approximately 7100/cmm are removed from the circulation per day.

Table 4

| Clinical conditions | Triggers for platelet transfusion |
|--|--|
| Stable patients | <10,000/ul in adults, <20,000/ul in infants |
| Fever, sepsis | <20,000/ul |
| Acute massive bleeding, chemotherapy or sick pre- mature infants | <50,000/ul |
| Major surgery, treatment of trauma | <70,000/ul |
| Surgery on CNS, eyes, lungs | <100,000/ul |

6. f In pediatric and neonatal patients

Guidelines for transfusion in neonatal patients:

- Two types of anemia develop in premature infants
 1. Iatrogenic anemia resulting from repeated blood sampling required for laboratory monitoring of critically ill babies
 2. Physiologic anemia resulting from declining Hb concentration
- Again the decision to transfuse must not be made on the basis of Hb concentration but multiple factors like the blood loss over time, expected Hb levels, reticulocyte count, and clinical signs are to be considered.
- Infants less than 4 months old do not produce antibodies (anti-A or anti-B) hence the blood unit chosen should be either group O or ABO compatible with **both** mother and the neonate.
- Refer to **Table 5** for choice of ABO compatible PRC for newborns.
- Packed red cell is the component of choice. Dose is 5-10ml/kg body wt

- Unit must be less than 5 days old.
- Transfusion must be done over 2 to 3 hours period and should raise the Hb level by 2-3gm%.
- Efforts should be made to minimize donor exposures for those needing multiple transfusions by using the aliquots of the same PRC unit until its expiry.
- Omit repeat testing of neonate's blood samples during any one hospital admission due to reduce iatrogenic anemia.

Guidelines for transfusion in older children

- The clinical decision to transfuse PRC or other blood components to older infants and children is based on the same indications as adults.

Exchange transfusion

Guidelines

- HDN due to materno-fetal ABO incompatibility is the most frequent indication of exchange transfusion as:
 - it corrects anemia
 - removes the harmful maternal antibodies and the unconjugated bilirubin that can cause neurological complications (kernicterus).
- Constituted whole blood (O group PRC + group AB plasma from a different donor) is used for exchange transfusion
- The volume used is two times the neonate's blood volume (about 170ml/kg) which can be obtained with one unit of whole blood.
- Blood used should be less than 7 days old
- It should result in a post transfusion Hb level of >12gm%

Table 5

| | | Mother's blood group | | | |
|-----------------------------------|-----------|-----------------------------|-----------|-----------|------------|
| | | O | A | B | AB |
| Baby's blood group | O | O (donor) | O (donor) | O (donor) | O (donor) |
| | A | O (donor) | A (donor) | O (donor) | A (donor) |
| | B | O (donor) | O (donor) | B (donor) | B (donor) |
| | AB | O (donor) | A (donor) | B (donor) | AB (donor) |

7. Requesting for blood and blood components: -

Guidelines:

The decision to transfuse blood should always be based on a careful assessment of clinical and laboratory findings.

- Record the reason for transfusion in the patient's notes.
- All relevant data of the patient and information on the transfusion should be filled in "The Blood Request Form" in a legible way by the prescribing doctor or an authorized person. (Refer to **ANNEX 4** for a sample of "Blood Request Form" in use presently.) No verbal request will be entertained by blood bank staff except in dire emergency cases.
- The blood request form should be accompanied with the patient's correctly labeled blood sample.
- Deliver the form and the blood sample to the blood bank.
- The blood bank performs the pre-transfusion compatibility tests. In case of problems with crossmatching, the blood bank may request for more blood sample.
- The blood unit will be made available for transfusion only on completion of all the tests in routine cases. .
- Blood once issued and not used should be returned to the blood bank within **THIRTY minutes** for proper storage and later usage.
- In emergency cases the following protocol should be followed:-

In life threatening circumstances, the treating doctor can decide to use un-cross-matched blood but with the necessary documentation.

1. Un-cross-matched Group "O" whole blood / packed red cell can be used in life threatening situations when time does not even permit carrying out ABO and Rh grouping of the patient.
2. Un-cross-matched but group identical blood blood/ packed red cell can be provided within 5 -10 minutes

if condition of the patient permits to perform ABO grouping

3. It is advisable to draw a blood sample for the pre-transfusion tests before the administration of blood or colloids to enable the pre-transfusion tests to be performed.

8. Guidelines on correct clinical transfusion process

8. a. Patient's pre-transfusion blood sample collection -

1. For all adult patients send 6ml of blood sample in plain tube (red cap tube) along with the blood request form.
2. In case of newborn less than 4 months requiring blood transfusion:
 - send samples from both mother and the baby., 6ml of mother's blood in plain tube and 2ml of baby's blood in the EDTA tube.
 - For repeated transfusions in the baby, only mother's sample is required.
 - In case of infants above 4 months of age, follow the instructions same as adult patients.
3. Pre-transfusion blood samples should be drawn within *following* hours of the intended date of transfusion especially in patients who have received blood earlier.

| <i>Blood /PRC is transfused</i> | <i>Sample should be taken</i> |
|---------------------------------|----------------------------------|
| 3-14 days ago | 24 hours before next transfusion |
| 14 -28days ago | 72 hours before next transfusion |
| 28 days -3 months back | 1 week before next transfusion |

For elective surgery, samples should be sent to the blood bank latest by 24 hours before the date of surgery.

4. When requesting liquid Plasma, FFP or platelet concentrates, blood sample must be sent only once (first time) for ABO & Rh grouping. For all subsequent requests only the form needs to be sent.
5. Telephone requests in a real EMERGENCY situation

shall be accepted but a written request must be followed.

6. Samples must be labeled clearly and accurately at the patient's bedside immediately after drawing blood . Never label samples from 2 or more patients at the same time.
7. In an emergency, an unconscious patient who cannot be identified correctly must be given a unique number which can be used to identify this patient until full and correct personal details are available.

Rejection of samples in the following circumstances:

- The samples are inadequately labeled, insufficient, lysed or wrong tubes.
- The request form has been inadequately filled such that the essential patient information is lacking and /or there are discrepancies between the information on sample and on the request form.
- Exceptions will be made only in life threatening situation.

Points to remember by the nurse or the transfusionist:

- The unit of blood should be collected from the blood bank just before starting the transfusion with a patent intravenous line in place. ONLY NORMAL SALINE is to be used before or after the blood transfusion
- START the transfusion within THIRTY MINUTES of receipt of the blood or packed red cells
- Blood components like FFP and platelet concentrates should be transfused IMMEDIATELY on receipt in the ward.
- If there is a delay in starting the transfusion return the bag to the blood bank without inserting the administration set.

- There is no need to warm the blood routinely unless indicated which should be done using a blood warmer.
- Check the blood for hemolysis, clots, color change, turbidity, leakage etc. Do not use it and inform the blood bank immediately

Indications for warming are:

- large volume of rapid blood transfusions in adults:
 >50ml/kg/hour,
- in children > 15ml/kg/hour
- exchange transfusions in infants
- patients with clinical cold agglutinins

8. b. The three stages of clinical transfusion process:

- Pre-transfusion
- Transfusion
- Post-transfusion

8.b.1. Pre-transfusion stage

Before starting the transfusion check the following:

- *It is obligatory to obtain an informed consent from the patient prior to transfusion and documentation done in the notes.*
- Identify the patient correctly.
- Cross check the blood group of the patient and blood group of the unit. The unit provided by the blood bank could be group specific or group compatible.
- Check all the details on the crossmatch label attached to the unit and see that all details tallies with the patient's details and with the details on the blood unit.
 In case of any discrepancy, contact the blood bank immediately.
- Check the vitals of the patient.

8. b.2 Transfusion stage

Setting up the transfusion

- Adhere to universal precautions throughout the transfusion process.
- For routine transfusion use 18 G needle and paediatric transfusion 23 G needle.
- Use the provided blood administration sets with filters for whole blood, and blood components such as PRC and FFP. Use the special platelet administration sets for PC.
- No IV fluids other than normal saline should be infused before, during or after transfusion using the same vein. If required use another venous access.
- No medication or IV fluid should be added to the blood bag as it will cause clotting or hemolysis of the blood.
- The first 30 minutes are crucial, so administer at slow rate.
- Check the vitals after 30 minutes and look for any untoward reaction.
- If no reaction, increase the rate and complete the transfusion within the stipulated time. Refer to **Table 6** below.
- During the complete process, check the vitals at regular intervals (two hourly) and for any signs and symptoms of a reaction.
- Document all the details regularly in the form “Transfusion Report”. Refer to **ANNEX 6**

Table 6

| Blood components | Rate of infusion | Transfusion should be completed within |
|------------------|------------------------------|--|
| WB or PRC | 20 d/min in first 30 minutes | 2 to 4 hours |
| | 30-40 d/min after that | Use special blood administration set with filters |
| FFP | 20 -40 d/min | 15 - 30 min |
| PC | 20 -40 d/min | 15-30 min Use platelet administration set or IV fluid set |

8. b.3 Post-transfusion stage*At the end of transfusion*

- Check the vitals at the end and an hour after transfusion is completed.
- Complete the “Transfusion Report” (ANNEX 6)
- Discard the empty blood bag along with other biohazard waste and the sharps in the appropriate containers.
- File this Transfusion Report form along with the patient’s notes

What to do for slow blood flow rate

- Elevate the blood container
- Check the size and patency of needle
- Examine the blood bag for any clots
- Examine the filter for any debris and change the set
- Shake the bag gently during transfusion to mix the settled red cells

9. Adverse Reactions to Blood and Blood Components.

- Any untoward incident that occurs during or after blood transfusion should be considered as adverse transfusion reaction unless proved otherwise.
- Early recognition and prompt management can reduce mortality
- It is the responsibility of the nurse to inform the concerned doctor and the blood bank staff at the earliest
- Refer to **ANNEX 8 and ANNEX 9** for main features, causes and management of transfusion reactions.
- All serious types of reactions should be investigated and corrective action taken for any future episodes.
- Immediate steps for all reactions Refer to **ANNEX 10**

They are :-

1. Stop transfusion
2. Keep IV line open with normal saline
3. Perform all the clerical checks on the unit and the patient
4. Notify the attending physician and blood bank in charge/staff
5. Fill the “Transfusion Reaction Form” (**ANNEX7**), and send it with the blood unit and freshly collected blood sample to the blood bank. Keep a copy in the patient’s file.

Investigation of a reaction:

- Send two blood samples of the patient, 6ml in plain tube and 2ml in EDTA tube.
- The blood bank shall carry out an investigation on the new sample and submit a report on the cause of reaction to the respective doctor the following day.
- If the reaction is due to acute hemolytic response, the blood bank will inform the doctor or nurse immediately.

10. Alternatives to transfusion therapy

- Use crystalloids and colloids for mild to moderate blood loss.
- Use appropriate hematinics for treatment of mild to moderate deficiency anemia.
- Use pharmacological products whenever possible.
- Reduce transfusion triggers
- Minimize surgical blood loss
- Use autologous transfusion

10.a. Autologous Transfusion:

- It is the blood collected from the intended recipient.
- It is considered safest as it avoids the possibility of TTIs, development of antibodies and some adverse reactions to transfusion.
- It is a good option for patients with rare blood groups.
- It should be considered only in elective surgery where there is definite possibility of blood loss needing blood transfusion.

The principal methods of autologous transfusion are:-

- Preoperative blood donation
- Acute normovolaemic haemodilution
- Intraoperative blood salvage
- Post operative blood salvage

10. a.1. *Pre-operative Autologous donation (PAD)*

- done prior to elective surgery
- all the donor screening criteria has to be applied as in a homologous donor. Minimum Hb should be 11gm%.
- 1 unit can be collected every 5-7 days.
- first donation should be 35 days prior to surgery and last donation 72 hours before surgery date.
- oral iron supplement to be given to the patient.

- screening tests to be carried out for all four infections, if found positive ,then it should not be used at all.
- prior consent is needed to put the unit in the homologous pool if not needed by the intended patient.

Criteria for medical exclusion: - (Selection of patients for PAD should be done with caution and all criteria for donor screening should apply on autologous donor)

- Presence of bacterial infection
- Positive screening results for TTIs.
- H/o epilepsy , uncontrolled hypertension, cardio-vascular disease
- Pregnancy with impaired placental flow or intra uterine growth retardation.
- Children

10. a.2 Acute normovolaemic haemodilution (ANH)

Principles are:-

- It involves removing a predetermined volume of patient's blood prior to starting of surgery and simultaneous replacement using sufficient crystalloids or colloids to maintain blood volume.
- During surgery the patient will lose fewer red cells and will be re-infused with the autologous blood containing all three components.
- The unit should be stored at correct temperature if not required to be transfused during surgery.
- Patient should be monitored regularly at all times.

11. Some of the commonly asked questions by the clinicians and their answers are compiled in this booklet for the benefit of all ordering blood.

Q1. What do you do when there is a “POWER CUT”?

If you work in an area where power cuts are frequent, you may have other sources of electrical power, such as emergency generators. It is essential that all blood and plasma storage equipment are linked to an alternative power source, where it exists. If there is no alternative power supply, you should draw up a contingency plan. This should be used when any cold chain equipment breaks down as well as during a power cut.

During a power cut, blood bank equipment usually can hold blood at required temperature for at least two hours after the power cut. During this time, avoid opening the equipment frequently to maintain the required temperature.

However, you must be ready to move the blood bags in case, the power cut continues.

You will need to know how long it takes for blood bank refrigerator to reach +8°C and how long your freezer takes to reach -20°C. This is called the ‘hold over time’. Information about this is usually included in the instruction booklet.

If you have no information about the hold-over time, you will have to assume that you have two hours to find some other equipment to store the blood or plasma.

Q 2. Can we store blood in the domestic refrigerators?

The ideal temperature for storage of blood is +4°C. In domestic refrigerator the temperature is not uniform. Blood units should therefore be stored in special blood bank refrigerators

to give a uniform temperature of +4°C. However, if necessary, blood may be stored in the compartment under the chiller of a domestic refrigerator. Freezer and chiller compartments and the shelves of the doors of the domestic refrigerators should never be used for storing blood.

Q 3. If a unit of blood was stored in the freezer of a refrigerator, can it be used for transfusion?

A frozen blood unit should never be used in transfusion as haemolysed blood may lead to fatal reactions.

Q 4. How will you transport blood and blood components from one blood bank to another or from the mobile donation site to the blood bank?

-The temperature of WB and PRC must be kept at +2°C to +10°C during transport. Special transport boxes or thermo cool boxes can be used. Blood can be transported for 24 hours if temperature is maintained below +10°C.

The coolant to be used can be the available ice packs (2 ice packs for 1 blood unit) or wet ice cubes packed in plastic bags. Ice should never come in direct contact with blood as it causes haemolysis of red cells. Ice should be placed above the blood as cool air moves downwards.

-Plasma is transported frozen at temperatures at or below storage temperatures, using equal amount of wet ice, taking extra care as the bags are brittle and can crack easily.

-Platelets are transported at +20°C to +24°C in insulated container without any ice added.

Q 5. What is the indication for warming the blood before transfusion?

In routine transfusion cases, the blood bag need not be warmed before administration. This is because, the slow rate of transfusion rises the temperature of the blood. However, in

massive or when very rapid transfusions are done or in neonatal exchange transfusion blood may be warmed either by using an automated blood warmer or at + 37°C water bath. Hot towels, electric radiators, heaters or even body heat should never be used to warm the blood. This will cause haemolysis of red cells leading to serious transfusion reactions in the patient.

12. A checklist for consideration for clinicians while prescribing blood

Ask yourself the following questions:-

- What improvement in the patient's clinical condition am I aiming to achieve?
- Can I minimize blood loss to reduce this patient's need for transfusion?
- Are there any other treatments I should give before making the decision to transfuse?
- What are the specific clinical or laboratory indications for transfusion for this patient?
- What are the risks of transmitting HIV, hepatitis, syphilis or other infectious agents through the blood products that are available for this patient?
- Do the benefits of transfusion outweigh the risks?
- What are the other options available if blood is not available on time?
- Will a trained person monitor this patient and respond immediately if an acute transfusion reaction occurs?
- Have I documented the transfusion?
- If in doubt ask the question- If this blood was for myself or my child, would I accept the transfusion in these circumstances?

13. Guidelines on blood donor management

It is important that clinicians are aware of the national standards and guidelines on the selection and deferral of blood donors to ensure adequate and safe blood supply in the country. They may be consulted when the laboratory technicians manning the donor section of blood bank have problems or doubts on the fitness of a person wishing to donate blood due to medical history.

The potential blood donor goes through a pre-donation procedure by which his fitness to donate and the safety of the blood that he is going to donate are assessed.

This includes:

1. 'Donor Registration and consent Form' which consists of list of questions on medical history and risk behavior assessment.
2. Physical examination :- body weight, and vital signs
3. Clinical tests: Hb estimation and ABO/ Rh blood group

The donor selection criteria are:

Age limit-18 to 60 years

Minimum Hb%-12gm%

Minimum body weight-45 kg

BP: - systolic BP between 90 and 180mmHg,
- diastolic BP between 50 and 100mm Hg

Should have eaten something in the last 8 hours

Last blood donation done three months back

Not under the influence of alcohol

Skin over the phlebotomy site is not infected.

Free from any major medical or surgical condition

Post donation care and advice:

Donor should be kept under observation for at least 15 minutes after donation is completed.

He /she should be given some form of fluids to drink during this observation period.

He/she should be explained about the post donation advice to be followed which is mentioned in the “Information note”
All donors should be encouraged to become regular, voluntary donors.

Management of a blood donor adverse reaction

- Remember to always stop the donation process

Different types of adverse reactions are:

A. Giddiness/Syncope or fitting

Management:-

- Raise the feet and lower the head.
- Loosen the tight clothing (belt, tie)
- Check pulse and blood pressure
- Apply cold compress to the forehead.
- Administer IV normal saline or dextrose saline infusions if low blood pressure is prolonged.
- Turn the donor’s head to any one side, so that the donor does not choke if he or she vomits.
- Tell donor not to panic and to take slow and deep breaths.
- Make him drink some sugar water or a cold drink if it’s a hot day.
- Do not let him leave the blood bank unless all his vital signs come back to normal and he feels fine.
- Advice him to have more fluids than usual on that day and to avoid any hard or strenuous work or alcohol intake.

B. Haematoma:

- Release the tourniquet/pressure cuff immediately.
- Apply pressure on the vene-puncture site and with draw the needle from the vein.
- Raise the arm above the head for a few minutes
- Apply ice over the area for 5 minutes

- Inform him about the expected change in the skin colour

C. Muscle spasm /twitching:

- This is usually due to hyper-ventilation in an anxious donor.
- Ask the donor to breathe in a paper or plastic bag. This gives relief.
- Do not give oxygen.

DONOR QUESTIONNAIRE AND CONSENT FORM

Blood unit no.: _____

| QUESTIONS | YES | NO |
|---|-----|----|
| Have you donated blood before? If yes when was your last donation? Have you been advised not to donate blood for some reason? | | |
| In the last three days have you taken medicines like aspirin, antibiotics or any vaccines like TT, hepatitis B or had any tooth extraction done? | | |
| Have you ever suffered from major disease of the heart, lungs, Kidney, thyroid, skin, liver ,jaundice, epilepsy, high blood pressure, allergy ,stomach ulcers, swollen glands, continuous fever, unexplained weight loss, continuous diarrhea, continuous cough or underwent any operation? | | |
| In last one year have you had a tattoo, ear or body piercing done? OR Received rabies vaccination or blood transfusion? | | |
| Has your blood ever been tested "POSITIVE" for Hepatitis B / Hepatitis C or for any Sexually Transmitted Disease? OR In last one year have you been treated for syphilis, gonorrhea or any sexuallytransmitted disease? | | |
| In the last one year have you been in sexual contact with anyone having jaundice, Hepatitis B, Hepatitis C or HIV positive individual, a commercial sex worker, a drug addict or done any payment in return for sex? | | |
| In the last three years have you suffered from malaria or taken treatment for malaria? OR In the last six months have you visited high malaria risk region? | | |
| Have you suffered from any bleeding tendency like easy bruising or heavy blood loss after minor cuts? | | |
| In case you are a woman are you pregnant, breast feeding or had an abortion in the last six months? | | |
| <p>Statement of consent: I, the undersigned have understood the importance of blood donation and have given the correct answers to the best of my knowledge. Blood donor's signature: _____</p> | | |

Information Note

Name of the donor and signature _____

Age /Sex: _____

For staff use only: Hb%: __ Wt: __ BP: __, PR: __ ABO & Rh: __

Donor: Fit /Unfit? If unfit donor can come after _____ or
is permanent deferral advised?

Date of donation: _____, **Donation Number:** _____

Advice to the donor after donation:

Drink lots of fluids for next 24hours

Continue your routine work, only avoid heavy exert- ional work on that
day. Leave the band-aid on the donation arm for next 24 hours.

In case after donating blood if you feel that your blood may be unsafe
to the patient who receives it , you may contact the concerned blood
bank at the earliest for its timely discard.

In case of any medical problem after bloo donation, kindly contact us
at the earliest

Your blood shall be tested for 4 infections namely HIV, Hepatitis B and
Hepatitis C, syphilis and malaria (if indicated).

You can collect the results after minimum THREE days of donation
between 9am to 3pm on producing this information note.

Thank you for your support. Kindly come again and donate the “GIFT
OF BLOOD”

Your next donation is on/after: _____

Name of the BB Staff: _____ Date: _____

Results of screening tests:

HIV: _____ (Test done is for HIV antibody detection)

Hepatitis C: _____ (Test done is for HCV antibody detection)

Hepatitis B: _____ (Test done is for HBsAg detection)

Syphilis: _____ (Test done is RPR/TPHA)

Malaria (if indicated): _____ (Test done is for MP)

Name of the BB Staff: _____ Date: _____

TABLE FOR TEMPORARY DEFERRAL.

| CONDITIONS | DEFER |
|--|---|
| (1) | (2) |
| <ul style="list-style-type: none"> • Age if less than 16 years | <ul style="list-style-type: none"> • Till the donor reaches 16 years of age |
| <ul style="list-style-type: none"> • Donor weight : 45 kg minimum for 350 ml blood collection. 55 kg minimum for 450ml blood collection | <ul style="list-style-type: none"> • If not in the mentioned weight range defer • till he reaches the required weight |
| <ul style="list-style-type: none"> • Haemoglobin between 10 -12gm% • Hemoglobin less than 10 gm% | <ul style="list-style-type: none"> • Defer for one month and provide with Iron folicacid tablets • Advice to see a doctor |
| <ul style="list-style-type: none"> • Fever | <ul style="list-style-type: none"> • Defer till the donor has fever |

| CONDITIONS | DEFER |
|---|---|
| <ul style="list-style-type: none"> • Blood Pressure: systolic reading >180mmHg < 90 mmHg • diastolic reading>100 mmHg <50 mmHg • If mild hypertension controlled with one medication | <ul style="list-style-type: none"> • Refer to a medical officer for management • Accept the donor |
| <ul style="list-style-type: none"> • Last blood donation is less than three months duration. | <ul style="list-style-type: none"> • Defer the donor till three months are passed since last donation |
| <ul style="list-style-type: none"> • Had alcohol on the day of donation | <ul style="list-style-type: none"> • Defer on that day |
| <ul style="list-style-type: none"> • Abortion | <ul style="list-style-type: none"> • Defer for 6 months |
| <ul style="list-style-type: none"> • Asthma | <ul style="list-style-type: none"> • Defer till donor is taking treatment |
| <ul style="list-style-type: none"> • Antibiotics or aspirin(If donor's blood is to be used for Platelet preparation) | <ul style="list-style-type: none"> • Defer for 3 days after the stoppage of aspirin |

| CONDITIONS | DEFER |
|---|--|
| <ul style="list-style-type: none"> • Breast feeding | <ul style="list-style-type: none"> • Defer for 12 months after delivery |
| <ul style="list-style-type: none"> • H/o blood transfusion received | <ul style="list-style-type: none"> • Defer for 12 months from date of blood received |
| <ul style="list-style-type: none"> • Cystitis (Urinary Tract Infection) | <ul style="list-style-type: none"> • 3 weeks after recovery |
| <ul style="list-style-type: none"> • Common cold | <ul style="list-style-type: none"> • After the attack of fever |
| <ul style="list-style-type: none"> • Dermatitis (Skin infection) | <ul style="list-style-type: none"> • Defer till the infection has healed and the donor has stopped all medications |
| <ul style="list-style-type: none"> • Dysentery (bloody diarrhoea) | <ul style="list-style-type: none"> • Defer for 1 month after recovery |
| <ul style="list-style-type: none"> • Dengue fever | <ul style="list-style-type: none"> • Defer for one month after recovery |
| <ul style="list-style-type: none"> • Fractures | <ul style="list-style-type: none"> • Defer for 3 to 6 months |
| <ul style="list-style-type: none"> • History of Gall stones | <ul style="list-style-type: none"> • Accept the donor if he/she has no pain, fever or jaundice on the day of donation |
| <ul style="list-style-type: none"> • Severe Gastroenteritis (watery diarrhoea) | <ul style="list-style-type: none"> • Defer for 1 month after recovery |

| CONDITIONS | DEFER |
|--|--|
| <ul style="list-style-type: none"> • Gout | <ul style="list-style-type: none"> • Defer if under medication |
| <ul style="list-style-type: none"> • Suffered from Malaria or taken anti-malarial drugs | <ul style="list-style-type: none"> • Defer for 3 years. |
| <ul style="list-style-type: none"> • Visited high risk malaria areas | <ul style="list-style-type: none"> • Defer for 6 months after leaving that area |
| <ul style="list-style-type: none"> • Donors living in endemic malarial regions | <ul style="list-style-type: none"> • Accept if rapid test for malarial antigen or MP by microscopy is negative |
| <ul style="list-style-type: none"> • Menstruation | <ul style="list-style-type: none"> • Defer till period stops. Accept if willing |
| <ul style="list-style-type: none"> • Stomach ulcer | <ul style="list-style-type: none"> • Defer if on medications other than antacids or if he /she has h/o blood in stool or vomiting |
| <ul style="list-style-type: none"> • Surgery | <ul style="list-style-type: none"> • Defer for 3 to 6 months |
| <ul style="list-style-type: none"> • Suffered from syphilis or gonorrhoea. | <ul style="list-style-type: none"> • Defer for 12 months after completion of treatment. |

| CONDITIONS | DEFER |
|--|---|
| <ul style="list-style-type: none"> • POSITIVE screening test for syphilis or for gonorrhea | <ul style="list-style-type: none"> • Defer for 12 months after the testing and refer to a doctor |
| <ul style="list-style-type: none"> • Typhoid | <ul style="list-style-type: none"> • Defer for 6 months after recovery |
| <ul style="list-style-type: none"> • Tonsillitis | <ul style="list-style-type: none"> • Defer till completion of antibiotics |
| <ul style="list-style-type: none"> • Tuberculosis | <ul style="list-style-type: none"> • Defer for 5years after complete recovery. |
| <ul style="list-style-type: none"> • Tattoo, ear piercing or any body part piercing | <ul style="list-style-type: none"> • Defer for 6 months |
| <ul style="list-style-type: none"> • Tooth extraction | <ul style="list-style-type: none"> • Defer for 3 days |
| <ul style="list-style-type: none"> • H/o close contact with Hepatitis patient (sharing same eatable items, clothes or has sexual contact) | <ul style="list-style-type: none"> • Defer for 6 months after last contact |

TABLE FOR PERMANENT DEFERRAL.

Defer the donor PERMANENTLY if the donor is suffering from any of the following diseases:

| | |
|--|---|
| <ul style="list-style-type: none"> • Cancer or H/o epilepsy any time or any type of anemia other than iron deficiency | <ul style="list-style-type: none"> • Defer permanently |
| <ul style="list-style-type: none"> • Any type of heart disease | <ul style="list-style-type: none"> • Defer permanently |
| <ul style="list-style-type: none"> • Abnormal bleeding tendencies | <ul style="list-style-type: none"> • Defer permanently |
| <ul style="list-style-type: none"> • Unexplained weight loss | <ul style="list-style-type: none"> • Defer permanently |
| <ul style="list-style-type: none"> • Diabetes - on oral medication or injection Insulin | <ul style="list-style-type: none"> • Defer permanently even if blood sugar is under control. |

| | |
|--|---|
| <ul style="list-style-type: none"> • H/o of Viral Hepatitis/Jaundice after puberty (age of 13 yrs) or blood tested Positive for HBsAg or HCV/HIV antibody, anytime in an individual OR • Individual is a regular sexual partner or spouse of HBsAg positive carrier / HIV/HCV Positive person | <ul style="list-style-type: none"> • Defer permanently |
| <ul style="list-style-type: none"> • Chronic nephritis or any chronic kidney disease | <ul style="list-style-type: none"> • Defer permanently |
| <ul style="list-style-type: none"> • Individual shows signs and symptoms suggestive of AIDS | <ul style="list-style-type: none"> • Defer permanently |
| <ul style="list-style-type: none"> • Any Liver disease ex. Alcoholic Liver Disease | <ul style="list-style-type: none"> • Defer permanently |

TABLE FOR DONOR DEFERRAL WITH VACCINATION HISTORY

| | |
|---|---|
| <ul style="list-style-type: none"> • Vaccines like live bacteria, viruses ex BCG, rubella, measles, oral polio, mumps, typhoid vaccine, or cholera vaccine | <ul style="list-style-type: none"> • Four weeks |
| <ul style="list-style-type: none"> • Vaccines like killed bacteria, or inactivated viruses cholera, typhoid, polio or influenza | <ul style="list-style-type: none"> • One day |
| <ul style="list-style-type: none"> • Toxoids | <ul style="list-style-type: none"> • One day |
| <ul style="list-style-type: none"> • Hepatitis B vaccine | <ul style="list-style-type: none"> • One day deferral if taken without any contact with HBsAg positive person • One year deferral if taken following a contact with HBsAg positive person |
| <ul style="list-style-type: none"> • Rabies vaccine | <ul style="list-style-type: none"> • One year deferral if taken after dog bite |

ANNEXURES

- ANNEX1 Selection of ABO compatible donor whole blood or red cells
- ANNEX 2 Selection of ABO compatible donor plasma
- ANNEX 3 Selection of ABO compatible donor platelets
- ANNEX 4 Blood request form
- ANNEX 5 Maximum blood ordering schedule
- ANNEX 6 Transfusion report
- ANNEX 7 Blood Transfusion reaction form
- ANNEX 8 Main types of adverse transfusion events and their initial management

- ANNEX 9 Types of adverse reactions of transfusion

- ANNEX 10 The role of a nurse once a blood transfusion reaction occurs

ANNEX 1

Selection of ABO compatible whole blood or packed red cells

| Recipient's ABO group | Donor ABO group | | | |
|--------------------------------------|------------------------|---------------------------|---------------------------|---------------------------|
| | 1st choice | 2 nd choice | 3 rd choice | 4 th choice |
| O | O | none | none | none |
| A | A | O | none | none |
| B | B | O | none | none |
| AB | AB | A | B | O |

ANNEX 2

Selection of ABO compatible donor FFP units

| Recipient's ABO group | ABO group of FFP | | | |
|--------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| | 1st choice | 2nd choice | 3rd choice | 4th choice |
| AB | AB | None | None | None |
| A | A | AB | None | None |
| B | B | AB | None | None |
| O | O | AB | A | B |

ANNEX 3

Selection of ABO compatible donor platelet

| Recipient's ABO group | ABO group of PC | | | |
|--------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| | 1st choice | 2nd choice | 3rd choice | 4th choice |
| AB | AB | A | B | O |
| A | A | AB | B | O |
| B | B | AB | A | O |
| O | O | A | B | AB |

ANNEX 4

**NATIONAL BLOOD TRANSFUSION SERVICE, BHUTAN
BLOOD REQUEST FORM**

Date of request: _____

PATIENT DETAILS

Name: _____ Age/Sex: _____ Body wt: _____

Hospital registration number: _____ Ward: _____

Blood group ABO _____, Rh _____ (if documented):

HISTORY

Diagnosis: _____

Reason for transfusion: _____

Previous transfusion: Yes/No

Hemoglobin: _____ gm%

H/o of reactions : Yes/No

Platelet count _____ /ul of blood

Pregnancy in last 3/12: Yes/No

REQUEST FOR (tick please)

URGENCY

Whole blood units

Packed red Cells units

Plasma/FFP units

Platelet concentrate units

Date/time required: _____

Name of the doctor: _____

1. Cross matched Blood

a) Routine (tick)

b) Urgent (tick)

(blood needed in next one hour)

c) Hold for surgery (tick)

2. Un-Cross matched blood

IMPORTANT: this blood request will not be accepted if any section is left blank

LABORATORY USE ONLY

Compatibility testing

Patient's blood group/ blood bank reference no: _____ / _____

Antibody Screening: POSITIVE / NEGATIVE: _____

| Donor No./type of component | group | Date & time of cross match | IS | 37°C | IA T | Result of cross match | Name of staff doing CM | Date & time of issue |
|-----------------------------|-------|----------------------------|----|------|------|-----------------------|------------------------|----------------------|
| | | | | | | | | |
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ANNEX 5

MAXIMUM BLOOD ORDERING SCHEDULE

(A guide to expected normal blood usage for surgical procedures in adult patients)

| Procedure | Action |
|--|-----------|
| General Surgery | |
| • Cholecystectomy | GSH |
| • Laprotomy, planned | G SH |
| • Liver biopsy | G SH |
| • Partial gastrectomy | XM-2 |
| • Colectomy | X-M- 2 |
| • Mastectomy: simple | GSH |
| • Mastectomy: radical | XM- 2 |
| • Thyroidectomy: partial/total | XM-2 |
| • Any cancer surgery | XM-2 to 4 |
| Urology | |
| • Ureterolithotomy | GSH |
| • Cystotomy | GSH |
| • Cystectomy | XM -4 |
| • Open nephrolithotomy | XM- 2 |
| • Open prostatectomy (RPP) | XM- 2 |
| • Transurethral resection prostatectomy (TURP) | XM-2 |
| Obstetrics & gynecology | |
| • Complications of abortions | GSH |
| • Normal delivery | GSH |
| • Caesarean section | GSH |
| • Laprotomy | GSH |
| • Retained placenta/ postpartum hemorrhage | XM-4 |
| • Ante partum hemorrhage / Placenta previa | XM- 2 |
| • Ectopic pregnancy | XM- 4 |
| • Hysterectomy: abdominal or vaginal: simple | XM-2 |
| • Myomectomy | XM- 2 |
| • Hydatidiform mole | XM- 2 |
| • Any cancer surgery | XM-4 |

| Orthopedics | |
|---|------|
| • Removal hip pin or femoral nail | GSH |
| • Osteotomy / bone biopsy (except under femur) | GSH |
| • Nailing fractured neck of femur | GSH |
| • Total hip replacement | GSH |
| • Total knee replacement | GSH |
| • Dynamic hip screw | GSH |
| • Spine surgeries | GSH |
| • Open reduction and Internal fixation of femur | XM 2 |
| • Internal fixation: tibia or ankle or ,forearm | XM-2 |
| • Open fractures | XM-2 |
| XM = Cross match GSH = ABO/Rh group and antibody screen (+) indicates additional units may be required, depending on surgical complications | |

NOTE: Local factors like existing surgical expertise in the hospital and the speed of provision of compatible blood need to be taken into consideration.

In order to decide whether GSH protocol or cross-matched blood needs to be advised, note down the total number of blood units cross-matched and total number of units transfused over 6 months period for each procedure and find the percentage as follows:

$$\frac{\text{Total No of units transfused}}{\text{Total no of units' cross-matched}} \times 100 = \text{_____} \%$$

Procedures where blood usage is less than 30% GSH is advised. For other procedures where blood usage is more than 30% , the number of units to be kept ready for surgery can be calculated based on the average number of units transfused.

ANNEX 6

TRANSFUSION REPORT

Name of patient: _____

Age / Sex: _____

Hospital Registration No: _____ Ward: _____

Pt's Blood Bank Ref No. _____ Pt's blood group: ____

Blood Unit No/ blood group: _____/____

Compatibility label checked: Yes /No

Type of component (please circle one): PRC /WB / FFP / PC

Volume transfused: _____ ml.

Name of the doctor advising: _____

Name & signature of the nursing staff performing the checks and starting the transfusion:

Name: _____ Signature: _____

Date / time of starting the Tx: _____

Any IV Fluid joined? Yes /No Any pre-medication given? Yes/ No

Vitals noted :

T: _____, P: _____, BP: _____ Time: _____

Did any reaction occur during the transfusion? Yes / No

Date / time of completing the Tx: _____

Name and signature of the nursing staff completing the Transfusion

Name: _____ Signature: _____

ANNEX 7

BLOOD TRANSFUSION REACTION FORM

Pt's name: _____, Age/sex: _____
Hospital Registration. No: _____, Ward: _____
Diagnosis: _____
Date / Time transfusion started: _____
Date / Time of onset of reaction: _____
Time of discontinuing the unit: _____
Doctor informed: Yes /No and at what time: _____
The unit is: WB/ PRC/FFP/PC (tick) Unit No: _____
Volume transfused: _____ ml

Nature of reaction:

Chills: Y / N Rigors: Y / N, Pain at site of Tx: Y / N, Breathlessness: Y / N Rashes: Y / N, Chest Pain: Y / N, Jaundice: Y / N, Bloody Urine: Y / N

Vitals:

Temperature: Before Tx _____°C. After Tx _____°C
BP: _____ mmHg, P: _____/min, R: _____/min

- Any IV Solution or drug given through the same venous line as that of the blood transfusion: Yes/ No, _____
- Previous H/o reaction to transfusion: Yes / No:
- Any pre-medication given: Yes/No, if yes what: _____
- In case of females: H/o pregnancy or abortion in last three months: Yes/No
- Name/signature of the staff reporting the reaction: _____

Date/Time: _____

ANNEX 8
MAIN TYPES OF ADVERSE TRANSFUSION EVENTS AND THEIR INITIAL MANAGEMENT

| | Adverse Events | Initial Management |
|----|---|---|
| 1 | <p><i>Acute mild adverse reaction :</i> FNHTR Allergy</p> | <p>Stop the transfusion Carry out the clerical checks on the unit, patient identification Assess the patient Seek medical advice Start necessary treatment Document the reaction</p> |
| 2. | <p><i>Acute severe adverse reaction:</i> -FHTR -Anaphylaxis -Bacterial contamination</p> | <p>Stop the transfusion ,keep the IV line open using normal saline Seek medical advice URGENTLY, Assess and resuscitate the patient Start necessary treatment Carry out the checks on the unit and patient identification Inform the blood bank Send the post transfusion blood samples of the patient to blood bank for investigation of reaction Document the reaction</p> |

| | Adverse Events | Initial Management |
|---|---|---|
| 3 | <i>Delayed Hemolytic Transfusion reaction:</i> | Send blood samples for antibody screening and DAT Liver function tests No treatment may be needed If hypotension or oliguria present treatment accordingly |
| 4 | <i>Post –transfusion Infection:</i> | To keep in mind that infection could have been due to transfusion. Manage according to the infection |

**ANNEX 9
TYPES OF ADVERSE REACTIONS OF TRANSFUSION**

| Adverse Events | Causes | Common clinical features | Specific Treatment |
|--|---|---|---|
| <p>Acute Transfusion Reactions :</p> <p>1) Febrile Haemolytic transfusion reaction (FHTR)</p> | <p>-----</p> <ul style="list-style-type: none"> -ABO incompatibility - Heating /freezing - use of 5% Dextrose IV -mechanical pressure -Bacterial contamination | <p>-----</p> <p>S/S occur with even 5 ml of blood transfused</p> <ul style="list-style-type: none"> -Fever, chills, dyspnoea, chest pain, pain at infusion site, hypotension, oliguria., DIC or even shock | <p>-----</p> <ul style="list-style-type: none"> -Start IV fluids -Inotropic drugs -O2 therapy, adequate ventilation -Use of diuretics -Rx of DIC -Antibiotics |
| <p>2) Febrile Non - haemolytic transfusion reaction (FNHTR)</p> | <ul style="list-style-type: none"> -Presence of cytokines in the donor's blood -Presence of antibodies to the leucocytes in the donor's blood | | <ul style="list-style-type: none"> -antipyretics, can be used as pre-medication for next transfusion -blood can restarted if above causes of fever are ruled out & vital signs are normal. |

| Adverse Events | Causes | Common clinical features | Specific Treatment |
|--|---|--|---|
| 3) Allergic | -Antibodies to plasma proteins | -Itching, rashes, urticaria | -antihistamines, can be used as pre-medication for next transfusion -blood can be continued at slower rate |
| 4) Anaphylaxis | -Presence of antibodies in the patient to IgA in the donor's blood | S/S occur with few mls of blood -Urticaria, dyspnoea, cough, broncho-spasm, hypotension, abdominal cramps, diarrhea, shock and unconsciousness | -Start IV fluids -SC /IV adrenaline -IV Hydrocortisone 100mg -IV chlorpheniramine 50 mg |
| Delayed Transfusion reactions: 1) Delayed Hemolytic Transfusion reaction | -Presence of warm antibodies in the patient to red cell antigens of the donor | Unexplained fall in Hb%, jaundice, dark colored urine. | Treatment is not necessary |

| Adverse Events | Causes | Common clinical features | Specific Treatment |
|---|--|--|--|
| 2) Transfusion transmitted infection | -Infectious agents in the blood | May take weeks or months to manifest depending on the virus. Jaundice ,malaise rash and fever | Treatment, counseling according to the infectious agent. Use of HBV vaccine in multi-transfused patients |
| 3) Post transfusion purpura (PTP) | -Presence of platelet antibodies in the patient | Purpura ,bleeding thrombocytopenia 5 to 12 days post transfusion | -IV immunoglobulin -steroids if Ig not available -platelet transfusion is not beneficial |
| 4) Transfusion associated Graft versus host disease (TA-GVHD) | -Engraftment of the transfused lymphocytes | Fever, rash ,raised liver enzymes, diarrhea, nausea ,vomiting , pancytopenia, occurs 1 to 6 weeks post transfusion | Irradiation of blood -Avoid blood from relatives |
| Transfusion Related Acute Lung Injury (TRALI) | -Transfusion of leucocytes antibody from the donor that reacts with recipients WBCs. | Acute respiratory distress (non cardiogenic), chills, fever, cyanosis, hypoxia, hypotension, bilateral pulmonary infiltrates | -High dose of steroids -Ventilation/O2 inhalation |

ANNEX 10

The role of a nurse once a blood transfusion reaction occurs:

1. Stop the blood or the blood component IMMEDIATELY
2. Check all the identifying information for any clerical error
3. Notify the medical officer at the earliest
4. Check the vitals and maintain IV line with normal saline
5. Notify the blood bank staff immediately
6. Conditions requiring immediate management and treatment (severe reactions like acute hemolytic reactions, anaphylaxis, TRALI, transfusion induced sepsis) need to be evaluated and so blood samples 2ml in EDTA and 6 ml in plain tube are to collected from the other hand of the patient and sent to the blood bank for investigation.
7. Fill up the ‘Transfusion Reaction form’ Annex 7, and send the new samples along with the blood bag, the administration set and any IV fluids if given. Blood bank will carry out investigations on the new blood sample and will give a preliminary report of the cause of the reaction that will guide in the appropriate management of the reaction.
8. Observe the color of the urine passed by the patient after the reaction. Report if its bloody.
9. Continue to monitor the vitals and see if any deterioration in the condition of the patient.
10. A copy of the ‘Transfusion Reaction form should be filed in the patient’s notes for documentation and follow up .

14. Glossary

| | |
|-----------------------|--|
| Albumin | The main protein in human plasma |
| Anti-D immunoglobulin | Human IgG preparation containing a high level of antibody to RhD antigen |
| Colloid solution | A solution of large molecules which have a restricted passage through capillary membranes. Used as IV fluids, e.g. gelatins, dextrans, and hydroxyethyl starch |
| Crystalloid solution | Aqueous solution of small molecules which easily pass through capillary membranes e.g. normal saline, dextrose, dextrose-normal saline |
| Decompensated anemia | Severe clinically significant anemia: anemia with Hb level so low that oxygen transport is inadequate, even with all the normal compensatory responses operating |
| DIC | Activation of the coagulation and fibrinolytic sys- |

| | |
|--------------------------------------|---|
| | tems, leading to deficiencies of coagulation factors, fibrinogen and platelets. Fibrin degradation products are found in the blood. Clinically Characterized by microvascular bleeding. |
| Fibrinogen | The major coagulant protein in plasma. Converted into fibrin by the action of thrombin |
| HLA | Human leukocyte antigen |
| Hypovolemia | Reduced circulating blood volume |
| Immunoglobulin (Ig) | Protein produced by Blymphocytes and plasma cells. All anti-bodies are immunoglobulin. Main types are IgG, IgM (found In plasma), IgA (protects mucosal surfaces) and IgE (causes allergic reactions) |
| INR (international normalized ratio) | Measures the anticoagulant effect of warfarin. Also called PT or the prothrombin time |
| Kernicterus | Damage to the basal ganglia of the brain, caused by |

| | |
|--------------------|--|
| | bilirubin caused by HDN |
| Maintenance fluids | Crystalloid solutions that are used to replace normal physiological losses through skin, lungs, feces and urine |
| Normovolemia | Normal circulating blood volume |
| Plasma derivatives | Human plasma protein prepared under pharmaceutical conditions. Includes albumin, immunoglobulin and coagulation Factor VIII and IX products |
| Prothrombin time | A test of blood clotting system. Prolonged by deficiencies of Coagulation factors like VIII, X,V, II and fibrinogen |
| Refractory | A poor response to platelet transfusion. The patient's platelet count fails to rise by atleast 10,000/ul 24 hours after platelet transfusion. Clinical factors like fever, infection, splenomegaly-DIC, antibiotics or defective platelet units are the common Causes. |

Reticulocytes

Young red cells. Indicates increased rate of red cell production.