

# BLOOD TRANSFUSION-II



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# INDICATIONS OF BLOOD TRANSFUSION

- Blood should be transfused only when required to save a life.
- When a clinician prescribes a transfusion it is to achieve one of the following:
  - Restore patient's circulating blood volume.
  - Increase the blood oxygen carrying capacity of the body.
  - To supply lost, inadequate or missing plasma coagulation other factors.
  - Supply platelets or granulocytes.
  - Dilute or remove from circulation any toxic substances as happens in exchange transfusion.

# ...INDICATIONS OF BLOOD TRANSFUSION

- Indications for transfusion will vary from patient to patient.
- In Kenya the majority of transfusions are for treatment of anaemia.
  - The component of choice for this indication is PRBC.
- Some indications for blood transfusion have changed since advent of component therapy:
  - eg. restoration of circulating blood volume have been replaced with the use of plasma expanders (ie. colloids and crystalloids).
- Component therapy is transfusion of specific parts (components) of blood, instead of whole blood.

# BLOOD COMPONENTS AVAILABLE IN KENYA



<b>Component</b>	<b>Composition</b>	<b>volume</b>	<b>Indications</b>
Whole Blood	RBC( Hct 40%), Plasma, Platelets, WBC	450 mls	Increase both red cell mass and volume. Platelets, WBC and coagulation factors inadequate or non-functional
Packed Red Cells	RBC (Hct 70%), reduced plasma, platelets and WBC	250 mls	Increase red cell mass in symptomatic anaemia
Paediatric Packed Red Cells	RBC (Hct 70%), reduced plasma, platelets and WBC	125 mls	Increase red cell mass in symptomatic anaemia
Platelets	Platelets (>5.5 x 10 <sup>10</sup> /unit), some RBC and WBC	50 mls	Bleeding due to thrombocytopaenia
Fresh Frozen Plasma	Fresh Plasma ( contains all coagulation factors)	220 mls	Treatment of some coagulation disorders; Warfarin overdose
Cryoprecipitate	Fibrinogen, Factor VIII and XIII, von Willebrands Factor	15 mls	Deficiency of fibrinogen, Factor VIII, von Willebrands

# COMPONENT THERAPY

- Advantages of Component Therapy:
  - The patient receives only the specific blood component needed.
  - More than one patient can be served by one blood donor.
  - Each component can be stored under optimal conditions for its individual use.

## NB:

- Kenyan annual blood requirement is 380,000 units but only 124,000 units are collected annually.

# GUIDELINES FOR THE APPROPRIATE USE OF BLOOD AND BLOOD PRODUCTS

## Guidelines for:

- ❑ Red Blood Cell Transfusion.
- ❑ Plasma (FFP) Transfusion.
- ❑ Platelet Transfusion.
- ❑ Clinical transfusion procedures.

# RED BLOOD CELL TRANSFUSION GUIDELINES

## 1. Acute and Perioperative Blood Loss:

- Evaluate the patient for risk of ischemia.
- Estimate blood loss:
  - If 15—30% => Give volume expanders in young health persons.
  - If 30—40 %=> Rapid volume replacement.  
=>RBC is likely needed.
  - If > 40%     => Life threatening.  
=>Requires rapid volume replacement.  
=>Requires RBC transfusion.

# ...RED BLOOD CELL TRANSFUSION GUIDELINES

## ... Acute and Perioperative Blood Loss:

- Monitor vital signs:
  - Tachycardia and hypotension not corrected with volume expanders => RBC needed.
- Measure haemoglobin:
  - If Hb > 10 g/dl: RBC rarely needed.
  - If Hb < 5 g/dl: RBC usually needed.
  - If Hb 5—10 g/dl with co-morbidity conditions:
    - RBC may be needed depending on additional clinical condition.



# ...RED BLOOD CELL TRANSFUSION GUIDELINES

## 2. Chronic Anaemia:

- Transfuse only to decrease symptoms and to minimize risk (Hb < 5 g/dl).
  - Do not transfuse above Hb 5 g/dl unless patient is symptomatic.
- Treat nutritional and mild blood loss anaemia with specific therapeutic agents as indicated (iron, folic acid, B12, etc.).
- Use specific strategies for sickle cell disease and thalassaemia.

# ...RED BLOOD CELL TRANSFUSION GUIDELINES

## 3. Transfusion in sickle cell disease:

- When develop cardio-respiratory symptoms from severe anaemia.
- When develop symptoms for anaemia due to:
  - Aplastic crisis.
  - Splenic sequestration.
  - Accelerated haemolysis (haemolytic anaemia or sickle crisis).
  - Pre-operative preparation for most types of surgery.
- Chronic transfusion
  - Prevention of recurrent occlusive stroke (<30% HbS)
  - Selected sickle cell pregnancy complications eg. recurrent foetal loss.

# ...RED BLOOD CELL TRANSFUSION GUIDELINES

## 4. Anaemia in Pregnancy:

- In pregnancy:
  - Maternal plasma volume increases by 40%.
  - Red blood cell mass increases by 25%.
  - Blood loss during vaginal delivery is 500 mls.
  - 1000 mls is lost during caesarean section.
- The blood loss is usually well tolerated, hence does not require transfusion.
- Blood transfusion should be considered for pregnant women with Hb less than 5 g/dl who become symptomatic with dyspnoea, shock or orthostatic hypotension.

# ...RED BLOOD CELL TRANSFUSION GUIDELINES

## ...Anaemia in Pregnancy:

- Blood should be ordered and made available for immediate transfusion in case of haemorrhage during delivery for pregnant women with Hb less than 7 g/dl.
- Blood transfusion is not indicated in anaemic women who are clinically stable after delivery.
- Pregnant women with Hb less than 10 g/dl should receive ferrous sulphate 200mg (60 mg elemental iron) three times a day throughout pregnancy.

# ...RED BLOOD CELL TRANSFUSION GUIDELINES

## 5. Paediatric RBC Transfusion:

- If Hb is  $< 4$  g/dl transfuse.
- If Hb is  $> 4$  g/dl and  $< 5$  g/dl:
  - Transfuse when signs of respiratory distress or CCF are present.
  - If patient is clinically stable, monitor closely and treat the cause of anaemia.

# ...RED BLOOD CELL TRANSFUSION GUIDELINES

## ...Paediatric RBC Transfusion:

- If Hb is  $> 5$  g/dl transfusion is usually not necessary.
  - Consider transfusion in cases of shock or severe burns.
  - Otherwise treat the cause of anaemia.
- Transfuse with 10 to 15 mls/kg of PRBC or 20 mls/kg of whole blood.
  - In the presence of profound anaemia or very high malaria parasitaemia, a higher amount may be needed.

# ...RED BLOOD CELL TRANSFUSION GUIDELINES

## 6. Neonatal RBC Transfusion:

- Total blood volume for:
  - Full term baby is 85 mls/kg.
  - Pre-term baby 100—105 mls/kg .

# ...RED BLOOD CELL TRANSFUSION GUIDELINES

## ...Neonatal RBC Transfusion:

- Transfuse with 10—15 mls/kg PRBC for:
  - Acute blood loss of  $> 10\%$  of blood volume.
  - Haemoglobin  $< 7$  g/dl.
  - Haemoglobin  $< 8$  g/dl in new born with apnoea, bradycardia, tachycardia, tachypnoea, or decreased vigour.
  - Haemoglobin of  $< 12$  g/dl with:
    - Moderate to severe respiratory distress.
    - Severe congenital heart disease.
    - Absence of weight gain for 7 days with no other explanation.



# PLASMA (FFP) TRANSFUSION

- ❑ FFP must be ABO-compatible with recipient's red blood cells.
- ❑ FFP is indicated:
  - ❑ Coagulation abnormalities and microvascular bleeding with prothrombin time and partial thromboplastin time greater than 1.5 times the mid-range normal reference value.
  - ❑ For treatment of bleeding due to multiple coagulation factor deficiencies.
  - ❑ Massive transfusion with coagulation abnormalities.
  - ❑ Bleeding due to warfarin therapy.
- ❑ FFP should not be used when a coagulopathy can be corrected with vitamin K.

# PLATELET TRANSFUSION

- ABO-compatibility should be insured for all patients.
- Rhesus compatibility for women in child bearing age.
- Each unit of platelet concentrate increases platelet count in adult by 7-10,000/mm<sup>3</sup>.
- 4 to 8 units of platelets concentrate are usually pooled to make an adult dose for severe thrombocytopaenia.
- Surgical and obstetrical patients with microvascular bleeding:
  - Often require platelet transfusion when platelet count is less than 50,000/mm<sup>3</sup>.
  - Rarely require transfusion if the platelet count is greater than 100,000/mm<sup>3</sup>.

# CLINICAL TRANSFUSION PROCEDURES

## Transfusion Steps:

1. Assess the patient's need for blood transfusion.
2. Complete a request form accurately and legibly.  
Including:
  - I. Patient identification.
  - II. Reason for transfusion.
  - III. Component and amount required.
  - IV. Date required and the urgency.
3. Collect and correctly label blood sample (5mls in plain tube/bottle) for grouping and compatibility testing.

# ...CLINICAL TRANSFUSION PROCEDURES

## ...Transfusion Steps:

4. Send blood sample and request form to the laboratory.
5. Collect or receive blood or blood products from laboratory.
6. Check the identity of patient and blood product by checking:
  1. Patient's name (from patient's records and ask the patient: \* use at least 3 names).
  2. Hospital number and ward number.
7. Confirm blood or plasma is compatible by checking the blood group on patient's notes and label on blood bag.
8. Check expiry date of blood or plasma.

# ...CLINICAL TRANSFUSION PROCEDURES

## ...Transfusion Steps:

9. Check blood for:

- Clots.
- Haemolysis (is the plasma pink?).
- Appearance of red blood cells (are they purple or black).

10. Check for leakage of blood bag.

11. Start transfusion of whole blood and red cells within 30 minutes of removal from the refrigerator.

12. Return unused blood or blood products to the laboratory within 30 minutes of removal from the refrigerator.

13. Complete infusion of whole blood and red cells within 4 hours, and platelets and plasma within 30 minutes.

# ...CLINICAL TRANSFUSION PROCEDURES

## ...Transfusion Steps:

14. Monitor patient before, during and after transfusion of blood product:
  - Before starting the transfusion.
  - As soon as transfusion is started.
  - 15 minutes after starting the transfusion.
  - At least every half-hour during transfusion.
  - On completing of transfusion.
  - 4 hours after transfusion.

# ...CLINICAL TRANSFUSION PROCEDURES

## ...Transfusion Steps:

15. Record the following:

- Patient's appearance.
- Pulse, blood pressure, temperature and respiratory rate.
- Fluid balance: input and output.

16. Report any adverse reactions immediately to the laboratory.

# TRANSFUSION COMPLICATIONS

## Transfusion Reactions:

- Although transfusion can be life-saving therapy, it can result in many adverse effects.
- Approximately 1% of all transfusions lead to some type of adverse reaction.
- Majority of transfusion reactions are mild and can be managed without having to stop the transfusion.
- The most common cause of serious haemolytic transfusion reaction is administration of ABO incompatible blood which may require immediate stoppage of transfusion



# ...TRANSFUSION COMPLICATIONS

## ...Transfusion Reactions:

Some of the common and serious types of transfusion reactions are:

### 1. Immunological reactions:

- Red cells—haemolysis (immediate or delayed).
- White cells—febrile reactions, pulmonary infiltrates.
- Platelets—post transfusion purpura.
- Plasma proteins—anaphylactic shock, urticaria.
- Others—graft versus disease.

# ...TRANSFUSION COMPLICATIONS

## ...Transfusion Reactions:

### 2. Non-immunological reactions:

- Disease transmission (TTIs)—HIV, Hepatitis B & C, Syphilis, Malaria, etc.
- Septicaemia.
- Air embolism.
- Fluid overload.
- Iron overload.

# ...TRANSFUSION COMPLICATIONS

## ...Transfusion Reactions:

- Symptoms and signs of Acute Haemolytic Transfusion Reactions:
  - General: - fever, chills, flushing, nausea, vomiting, headache, pain at infusion site, back or loin pain.
  - Cardiac/respiratory: - chest pain, dyspnoea, hypotension, and tachycardia.
  - Renal: - haemoglobinuria, oliguria, anuria.
  - Haematological: - anaemia, unexplained bleeding (Disseminated Intravascular Coagulation—DIC), thrombocytopaenia.

# ...TRANSFUSION COMPLICATIONS

## Transfusion Reaction Work-up:

1. Stop the transfusion but keep the iv-line open with normal saline.
2. Monitor the vital signs of the patient.
3. Check the clerical information to ensure that the patient received correct blood.

# ...TRANSFUSION COMPLICATIONS

## ...Transfusion Reaction Work-up:

4. Collect and send to the laboratory the following:

- From opposite arm, 10 mls of blood in a plain bottle and 2 mls in EDTA bottle.
- Sample of first voided urine.
- Blood that reacted, together with the attached transfusion set.
- All empty blood bags of already transfused units.
- Laboratory request form filled in.

# MANAGEMENT OF TRANSFUSION REACTION

- ❑ The definitive management will depend on severity and the underlying cause.
- ❑ For minor reactions only antihistamines and antipyretics will be required.

