

# **CONCEPTS IN TRANSFUSION**

## **A brief overview**

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# FORMAT & TOPICS

- **Anticipating the need for patient transfusion**
- **Commonly used blood components**
- **Basics of ABO compatibility**
- **Transfusion of severely anaemic children**
- **Special procedures**
- **Safe storage of blood products**
- **Safe administration of blood products**
- **Preventing and managing transfusion reactions**
- **Screening – donor and the blood**

# ANTICIPATING NEED FOR TRANSFUSION

- **Expected myelotoxicity of the chemotherapy regime**
- **Increased transfusion requirements**
  - bone marrow replacement**
  - severe anaemia at diagnosis or during therapy**
  - sepsis or DIC**
- **Secure appropriate blood products as soon as therapy is begun**
- **Blood needs during onco-surgery**

# ANTICIPATING NEED FOR TRANSFUSION

- **Limited blood supply - use of first degree relative donors - irradiation of blood products to prevent TA- GVHD**
- **No facilities for irradiation – replacement donors to ensure adequate blood supplies**
- **Anticipating need for transfusion in patients undergoing radiotherapy?**

# BLOOD COMPONENTS

- **Component therapy – gold standard of transfusion therapy in the developed world**
- **Packed red cells, FFP, platelet concentrates, cryoprecipitate**
- **Resource limited countries – whole blood**
- **Preparation, storage and administration**
- **Indications and contraindications**
- **Recommended dosages in various conditions**

# TRANSFUSION OF SEVERELY ANEMIC CHILDREN

- **Recommended transfusion trigger – 7g/dl**
- **Neutropenic fever, tachycardia, tachypnea, hypotension – 8g/dl**
- **Patients on radiotherapy – 9g/dl**
- **Intensive RBC support when patient is started on CT/RT - (need increases as intensity of therapy increases)**
- **Repeated transfusions – leukocyte depleted red cells**

# PLATELETS - PROPHYLACTIC TRIGGERS

- Asymptomatic, non-bleeding pts. with thrombocytopenia due to marrow failure -  $<10 \times 10^9 /L$
- Major surgery (neurosurgery) -  $<100 \times 10^9 /L$
- Major surgical procedures –  $<50 \times 10^9 /L$
- Minor surgery, LP, liver biopsy, transbronchial biopsy, dental extraction -  $<50 \times 10^9 /L$
- Severe mucositis, anticoagulant therapy, infection with fever  $>38\text{ C}$   $<25 \times 10^9 /L$
- APL induction, extreme hyperleukoytosis  $<50 \times 10^9 /L$
- Children with solid tumors on CT  $<20 \times 10^9 /L$

# SPECIAL CONSIDERATIONS

## LEUKOREDUCTION

- **FNHTRs**
- **Patients on long term platelet transfusions, (refractoriness to RDPs)**
- **Symptomatic CMV disease**
- **AML on induction chemotherapy**

## IRRADIATION – CELLULAR PRODUCTS - EXPENSIVE

- **Directed donation from biologic relatives**
- **Immunocompromised patients, transplant recipients**
- **Intrauterine and exchange transfusions**

# STORAGE OF BLOOD & BLOOD COMPONENTS

- **Whole blood, PRBCs**
- **Critical temperatures and shelf life**
- **Fresh frozen plasma & cryoprecipitate – frozen products, critical thawing and usage within given period**
- **Platelets – room temperature with agitation, NEVER FREEZE**
- **Only online warming of blood products if needed**

# SAFE ADMINISTRATION OF BLOOD PRODUCTS

- **Sample collection and labeling – WBIT**
- **Collection of the blood bag from the blood bank/ storage site**
- **Consent for transfusion**
- **Verification of medical order for transfusion**
- **Verification of patient identity**
- **Pre-transfusion assessment of vital signs**
- **Monitoring during transfusion**
- **Documentation**

# Transfusion reactions – presentation, management, prevention

## ACUTE COMPLICATIONS

- **AHTR**
- **FNHTR**
- **Allergic reactions**
- **Anaphylactic reactions**

## CHRONIC COMPLICATIONS

- **DHTR**
- **Infections**
- **TA-GVHD**

# SCREENING

## Donor screening

### Screening of donor blood

- **Mandatory investigations**
- **Investigations to be done as per norms of the specific country**
  - malaria screening**
  - screening for trypanosoma**
  - microfilaria**

Thank you!

# WHOLE BLOOD

- **INDICATIONS: acute blood loss with hypovolemia, exchange transfusions**
- **CONTRAINDICATIONS: chronic anaemia with incipient CCF**
- **Use ABO identical, Rh(D) compatible**
- **DOSAGE & ADMINISTRATION – within 4 hours of release, IV blood giving set with 170 $\mu$  filter**
- **1 unit of whole blood increases Hb by 1g/dl in a 70 kg person.**

# PACKED RED BLOOD CELLS

## INDICATIONS:

- anaemias due to defective bone marrow production
- chronic symptomatic anaemias
- acute blood loss > 15% of blood volume in patients with stable blood volume and normal coagulation parameters

## CONTRAINDICATIONS:

- anaemias which would respond to specific medications

**PRBCs - ABO and Rh compatible RBCs**

**Complete cross match is a must (elective vs emergency)**

# PRBCs – DOSAGE & ADMINISTRATION

- **Within 3 - 4 hours of release, IV blood giving set with 170 $\mu$  filter, 1 unit of red cells increases Hb by 1g/dl in a 70 kg. person**
- **Neonates: 10-15 ml/kg at rate of 1ml/kg/hour increases Hb by 2-3 g/dl**
- **Starting Hb <5 – start at lower dose for first transfusion**
- **On-line warmer, water bath at 37°C**

# FRESH FROZEN PLASMA

## INDICATIONS:

- **DIC with evidence of bleeding**
- **Replacement of specific coagulation factors if concentrates not available**
- **Urgent reversal of the effect of warfarin**
- **C1 esterase deficiency with angioedema**

## CONTRAINDICATIONS:

- **Volume expander, correction of prolonged coags in the absence of bleeding**

# FFP - DOSAGE & ADMINISTRATION

- **Thawed FFP stored at 1-6 °C can be used for 5 days after thawing.**
- **ABO compatibility with patients red cells, Rh compatibility not required**
- **Crossmatching not required**
- **10-15 cc/kg body weight – 20-30 minutes - increases clotting factors by 15-20%**

# PLATELETS

- **Stored at 22 C with agitation, NEVER REFRIGERATE**
- **SDP VS RDP**
- **ABO identical/compatible plts for pediatric plt. transfusions, volume reduction for non-identical/incompatible platelets**
- **Rh compatible**
- **Consider Rh alloimmunisation if not – 1 vial (300 µg) for 30 RDPs/3 SDPs**

# PLATELETS

## INDICATIONS:

- **Therapeutic – bleeding patients with low plt.cts/functionally abnormal plts.**
- **Prophylactic**

## CONTRAINDICATIONS:

**Immune mediated platelet destruction – ITP,  
TTP, HUS**

# PLATELETS

- **Transfusion thresholds – non-medical issues (eg: pt. lives very far away)**
- **Ordering practice – quantity of platelets in one order**
- **Volume reduced platelets, leukoreduction**
- **Low dose plt. transfusions versus high dose transfusions –**
  - **increased transfusion interval**
  - **decreased number of transfusion episodes**
  - **no recurrent bleeding-better haemorrhage control**

# PLATELETS - DOSAGE & ADMINISTRATION

- 6 RDP/sq.mt or 5-10 ml/kg body weight
- Post-infusion platelet counts 10 minutes – 1 hour after infusion
- Transfuse through an IV set over 20 – 30 minutes
- Platelet refractoriness
- Strategies for managing platelet refractoriness

## CRYOPRECIPITATE