Blood Components and Transfusion Alternatives

Louise Jefferies

Transfusion Practitioner

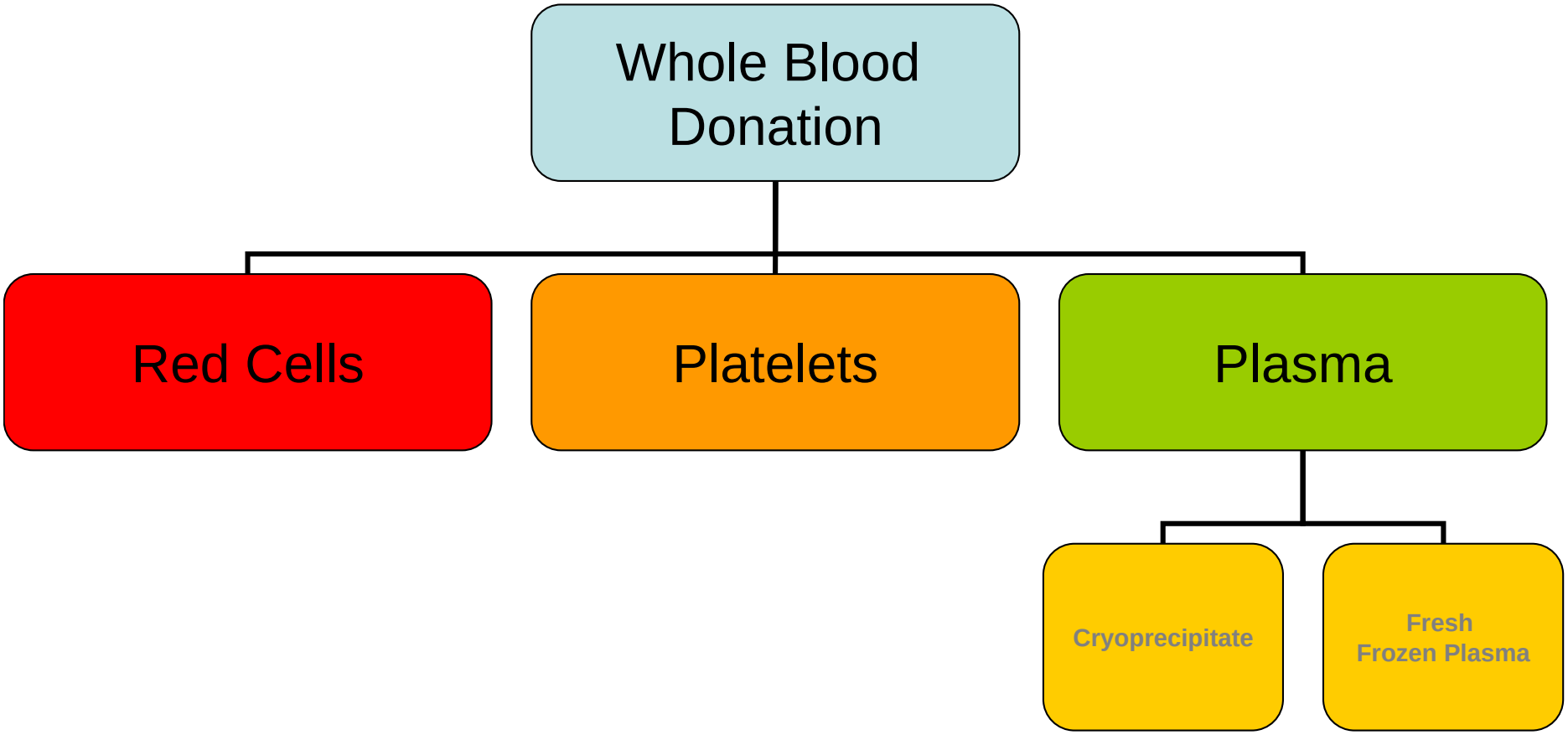
Weston Area Health Trust

Blood Components and Alternatives

- Red Cells
- Platelets
- Fresh Frozen Plasma
- Cryoprecipitate

- IV Iron
- Erythropoietin (Epo)
- Prothrombin Complex Concentrate (PCC)
- Antifibinolytics
- Haemostatic Agents
- Fibrinogen Concentrate

Blood Components



Red Cells

- Leucocyte depleted
- Stored in SAG-M
- Haemoglobin (Hb) concentration or haematocrit should be monitored peri-operatively
- Maintain Hb above 7.0g/dL
- 1 unit will increase Hb by 1g/dL (70-80kg adult)

Platelets

- Apheresis or pooled
- 1 ATD – increase platelet count by 20-40x10^9/L
- Dose – maintain count >50x10^9/L (>100 in CNS injury)

Fresh Frozen Plasma

- Preparation – plasma freezing
- Blood Group
- Source of clotting factors and fibrinogen
- Dose: 12-15ml per kg weight = 4 units for the majority of patients
- Maintain PT and APTT <1.5 x normal

Cryoprecipitate

- Prepared from plasma
- Contains factors VIII & XIII, fibrinogen, vWF and fibronectin
- ATD – 2 pooled units should increase fibrinogen by 1g/L
- Bleeding with hypofibrinogenaemia – maintain fibrinogen >1g/L

Methylene Blue Treated FFP

- Paediatric pack volume = 275ml
- Neonatal pack volume = 65ml
- Virally inactivated, sourced outside UK
- Used for patients born after 1996
- Cost: paediatric = £170

Storing & giving blood components

Component	Storage	Volume	Shelf Life	**Cost**
RED BLOOD CELLS	BETWEEN 2-6ºC	220-340ml	35 days (14 if irradiated)	**£125**
PLATELETS	20-24ºC ON AN AGITATOR	200-300ml	5-7 days	**£210**
FRESH FROZEN PLASMA	FROZEN < -30ºC	150-300ml	**2 years. Once thawed 4 hrs at room temp or 24 hrs at 4**	**£28**
CRYO-PRECIPITATE	FROZEN < -30ºC	100-250ml (pooled)	2 years. Once thawed 4 hours at room temp	**£190**

SHOT 2011

- Acute Transfusion Reactions 587
- Haemolytic Transfusion Reactions 94
- Transfusion Related Acute Lung Injury 12
- Transfusion Associated Circulatory Overload 71
- Transfusion Transmitted Infection 0

Alternative Products

- Prothrombin Complex Concentrate
- Anti-fibrinolytics
  - aprotinin
  - tranexamic acid
  - ε-aminocaproic acid
- Haemostatic agents
  - fibrin sealants
  - recombinant activated factor VII
- Fibrinogen Concentrate

Prothrombin Complex Concentrate (PCC)

- Lyophilized product
- Contains factors II, VII, IX and XI, Protein C and S
- Warfarin reversal
- Dose – dependent on INR 25-50 IU/Kg weight
- Contains activated coagulation components - potential for inducing thromboembolism

Antifibrinolytics

- Lysine analogues (TXA and EACA) and Aprotinin
- TXA and EACA are competitive inhibitors of plasmin binding fibrin
- Aprotinin at low concentrations is a powerful inhibitor of plasmin
- Dosing can be difficult
- TXA vs EACA vs Aprotinin

Haemostatic Agents

- Fibrin Sealants
  - Consist of human fibrinogen and thrombin
  - Well tolerated and useful in various types of surgery
- Recombinant Factor VII (rFVIIa)
  - Found to reduce bleeding
  - Not licensed to treat bleeding patient
  - Increased risk of thromboembolic complications

Fibrinogen Concentrate

- Lyophilized fibrinogen concentrate
- Currently licensed to treat congenital lack of fibrinogen
- Studies in Europe and USA to evaluate efficacy in reducing peri-operative blood loss
- Potential use for massive haemorrhage

Summary

- Blood components remain the routine treatment for many surgical procedures
- Pharmacological alternatives reduce blood loss but beware of causing a thrombotic state
- It is a fine balancing act!!