Non-Medical Authorisation Course

Thursday 22nd October 2015

East Midlands Regional Transfusion Committee

Decision to Transfuse

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Areas to cover

- Assessing the patient
- Risks versus benefits
- Transfusion triggers
- Amount to transfuse

Blood Transfusion

- Precious resource
- Liquid transplant
- Quick fix
- Used too freely

Assessing the Patient

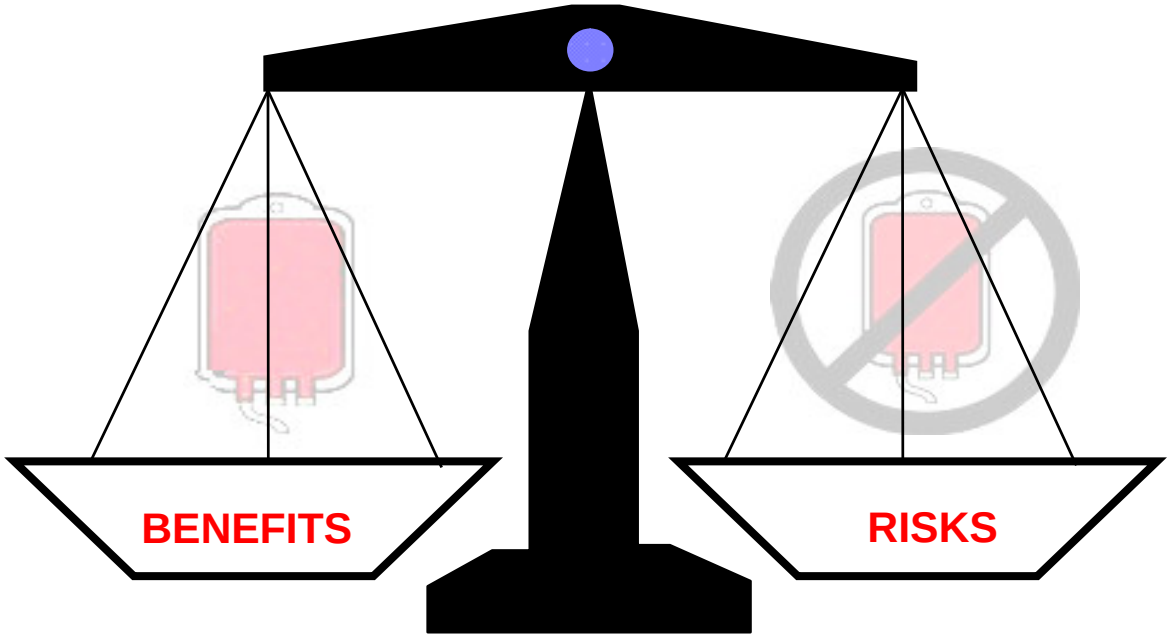
Individual assessment – **engage** with the patient

- Good patient history
- Size, weight, age, sex
- Co-morbidities
- Symptoms
- Balance risks and benefits of transfusion
- Alternatives to transfusion
  - Iron / B12 / Folate
  - Diet
  - Cell Salvage

Assessing the Patient

- Assess unstable patients e.g. those with gastro-intestinal haemorrhage
- Gain adequate knowledge of the patient
- Don’t use outdated results
- Adequate monitoring of Hb increments in an unstable patient
- Low body weight patient

Risks v Benefits



The decision to transfuse should be based on a careful assessment of patient's clinical state and must be justified as **essential** to prevent major morbidity or mortality

Risks v Benefits

What is the Greatest Risk of Blood Transfusion?

- **Transfusion of ABO-incompatible blood components**

➢ **Never event- ‘death or severe harm as a result of the inadvertent transfusion of ABO-incompatible blood components’**

Other risks

- **TACO -Transfusion associated circulatory overload**
- **ATR - Acute Transfusion Reactions**
  - Febrile, allergic, hypotensive
- **TRALI -Transfusion related acute lung injury**
- **vCJD - Variant Creutsfeldt- Jacob Disease**

Risks v Benefits

NHS
Blood and Transplant

Blood Transfusion

Size Matters!

Transfusion Associated Circulatory Overload (TACO) is a known cause of transfusion-related morbidity and mortality[1]

Before Transfusion

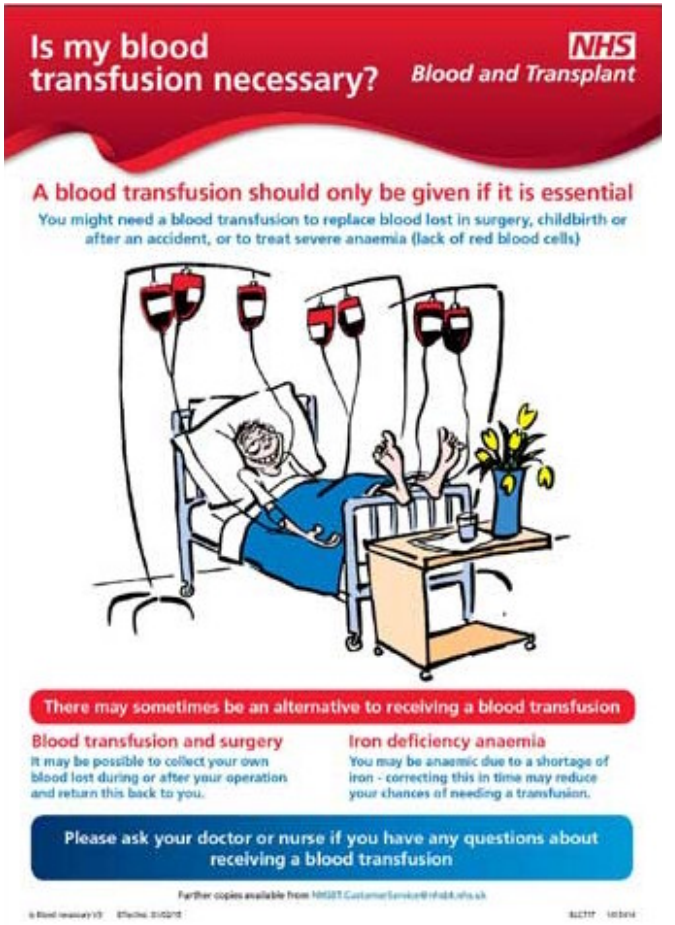
- ✓ Document the rationale for the decision to transfuse.
- ✓ Document the patients weight.
- ✓ Document the target Haemoglobin (Hb) level.
- ✓ Calculate the number of units required.
- ✓ Clinically re-assess the patient after each red cell unit transfused.

Transfusing a volume of 4ml/kg will typically give a Hb rise of 10g/L and should only be applied as an approximation for a 70-80kg non-bleeding patient.[1,2]

Note: The average volume of an adult red cell unit is 280mL

Further copies available from NHSBT.CustomerService@nhsbt.nhs.uk

1. Annual SHOT report 2012.
2. British Committee for Standards in Haematology: Addendum to Administration of Blood Components. 2012.



Transfusion Triggers and Amounts

Red Blood Cells (RBC)

Red cell concentrates

Dose – For a single transfusion episode in adult patients with a potentially reversible cause of anaemia e.g. after surgery, consider transfusing one unit only with a further Hb estimation before further units are given. Neonates and small children require doses calculated in ml of blood and require separate consideration.

R1. ***Acute blood loss***

In patients with haemorrhage and haemodynamic instability, estimation of blood loss may be difficult and Hb is a poor indicator of the need for transfusion. Empirical decisions about the immediate use of red cell transfusion are required by clinicians experienced in resuscitation, for example:

- <30% loss of blood volume (<1,500ml in an adult): transfuse crystalloid. Red cell transfusion is unlikely to be necessary.
- 30-40% loss of blood volume (1,500-2,000ml in an adult): rapid volume replacement is required with crystalloid. Red cell transfusion will probably be required to maintain recommended Hb levels.
- >40% loss of blood volume (>2,000ml in an adult): rapid volume replacement including red cell transfusion is required.

When normovolaemia has been achieved/maintained, frequent measurement of Hb (for example, by near patient testing) should be used to guide the use of red cell transfusion – see suggested thresholds below.

Surgery/medical/critical care

R2. Hb <70g/l can be used to guide the use of red cell transfusion if the patient is normovolaemic. Most patients undergoing elective surgical operations will not require transfusion support if their Hb is normal before surgery.

R3. If the patient has cardiovascular disease transfusion should be considered at a Hb of <80g/l or for symptoms e.g. chest pain; hypotension or tachycardia that is unresponsive to fluid resuscitation; or cardiac failure.

R4. If the patient has severe sepsis, traumatic brain injury and/or acute cerebral ischaemia Hb <90g/l can be used to guide the use of red cell transfusion.

Radiotherapy

R5. Limited evidence for maintaining Hb >100g/l in patients receiving radiotherapy for cervical and possibly other tumours.

Chronic anaemia

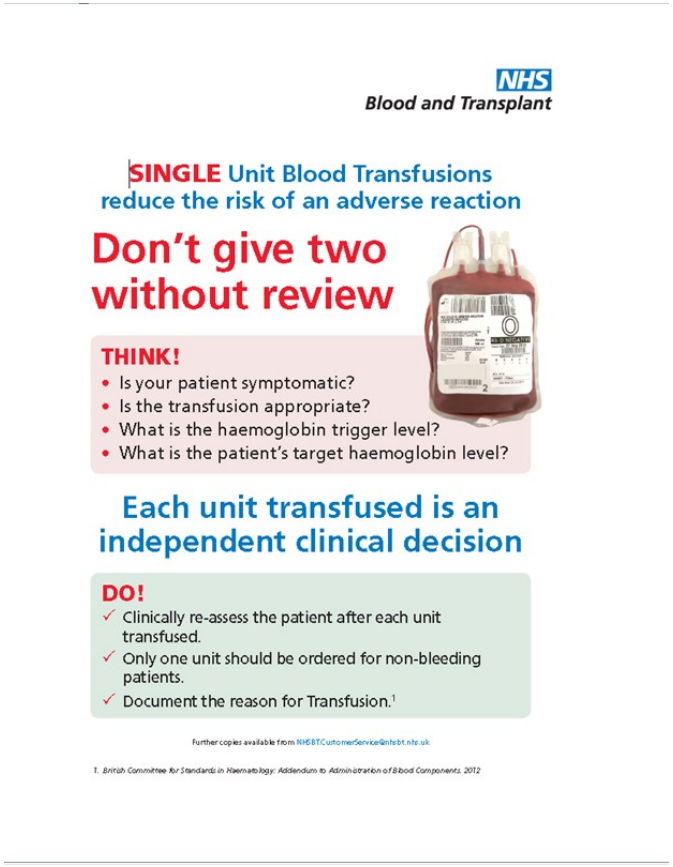
R6. Transfuse to maintain the Hb to prevent symptoms of anaemia. Many patients with chronic anaemia may only have minor symptoms with a Hb >80g/l. Haemoglobinopathy patients frequently require individualised Hb thresholds for transfusion depending on their age and the precise indication; discussion with a haematologist is advised.

R7. ***Exchange transfusion***

- In continuing haemorrhage resuscitate and manage source of bleeding
- In a normovolaemic stable patient;
  - In absence of IHD or ACS 70 – 80 g/l
  - In presence of IHD or ACS >90 g/l

Transfusion Triggers and Amounts

Red Blood Cells (RBC)



- One adult dose is one bag
- Don't give two without review

Transfusion Triggers and Amounts

Medical Anaemia – general principles

- Requires a different approach to management than simple surgical anaemia
- May be completely or partially corrected without transfusion
- Triggers should be appropriate to maintain activity levels and quality of life.

Transfusion Triggers and Amounts

Platelets (PLTS)

Platelet concentrates

(Dose – one adult therapeutic dose for adults and older children)

Bone marrow failure

P1. To prevent spontaneous bleeding in patients with reversible bone marrow failure when the platelet count <10 x 10^9/l. Prophylactic platelet transfusions are not indicated in chronic stable thrombocytopenia without a history of bleeding.

P2. To prevent spontaneous bleeding when the platelet count <20 x 10^9/l in the presence of additional risk factors for bleeding such as sepsis or haemostatic abnormalities.

P3. To prevent bleeding associated with invasive procedures. The platelet count should be raised to >50 x 10^9/l before lumbar puncture, insertion of intravascular lines, transbronchial and liver biopsy, and laparotomy; to >80 x 10^9/l before spinal epidural anaesthesia; to >100 x 10^9/l before surgery in critical sites such as the brain or the eyes. Transfusion prior to bone marrow biopsy is not usually required.

Critical care/surgery

P4. Massive blood transfusion. Empirical use of platelets, according to a specific blood component ratio, is reserved for patients with severe trauma. Aim to maintain platelet count >75 x 10^9/l and >100 x 10^9/l if multiple, eye or CNS trauma.

P5. Acquired platelet dysfunction e.g. post-cardiopulmonary bypass, use of potent anti-platelet agents such as clopidogrel, with non surgically correctable bleeding.

P6. Acute disseminated intravascular coagulation (DIC) in the presence of bleeding and severe thrombocytopenia.

P7. Inherited platelet dysfunction disorders e.g. Glanzmann's thrombasthenia with bleeding or as prophylaxis before surgery.

Immune thrombocytopenia

P8. Immune thrombocytopenia. As emergency treatment in advance of surgery or in the presence of major haemorrhage. A platelet count of >80 x 10^9/l is recommended for major surgery and a count of >70 x 10^9/l for obstetric regional axial anaesthesia.

P9. Post-transfusion purpura, in the presence of major haemorrhage.

P10. Neonatal alloimmune thrombocytopenia, to treat bleeding or as prophylaxis to maintain the platelet count >30 x 10^9/l.

- To prevent spontaneous bleeding in patients on treatment that affects their bone marrow
- To help stop bleeding in trauma / obstetric haemorrhage / theatre
- 1 bag = 1 adult dose (platelet increase of approx. 40x10^9/l
- Trigger values
  - For prophylaxis >5–10
  - Prophylaxis if septic >20
  - Pre-op minor surgery >50
  - In major surgery / trauma >75
  - In neurosurgery / head trauma >100

Transfusion Triggers and Amounts

Fresh Frozen Plasma (FFP)

Fresh frozen plasma

(Dose – 15ml/kg body weight equivalent to four units for an adult)

F1. Replacement of single coagulation factor deficiencies, where a specific or combined factor concentrate is unavailable e.g. factor V.

F2. Immediate reversal of warfarin effect, in the presence of life-threatening bleeding. Prothrombin complex concentrate is the treatment of choice. FFP has a partial effect and is not the optimal treatment.

F3. Acute disseminated intravascular coagulation (DIC) in the presence of bleeding and abnormal coagulation results.

F4. Thrombotic thrombocytopenic purpura (TTP), usually in conjunction with plasma exchange.

timely tests for coagulation including near patient testing. Aim for a PT and APTT ratio of <1.5 and a fibrinogen level of >1.5g/l.

F6. Liver disease; there is no evidence of benefit for FFP in non-bleeding patients regardless of the PT ratio.

- Increasing concern because of vCJD risk
- Importation of plasma for fractionation (1998) and selected clinical use (2003)
- Born after 01/01/1996 = Octaplas
- Mild fever/alergic reactions
- Not to reverse warfarin

Transfusion Triggers and Amounts

Fresh Frozen Plasma (FFP)

Calculations for One Adult Therapeutic Dose FFP		
Patient Weight (kg)	FFP dose – Volume/Units†	
	15mL/kg	Units FFP
50kg	750mL	3
55kg	825mL	
60kg	900mL	
65kg	975mL	4
70kg	1,050mL	
75kg	1,125mL	
80kg	1,200mL	
85kg	1,275mL	5
90kg	1,350mL	
95kg	1,425mL	
100kg	1,500mL	

†Volume of FFP in a unit is variable, mean FFP unit volume = 273mLs[3].

Transfusion Triggers and Amounts

Cryoprecipitate (Cryo)

Cryoprecipitate

(Dose – two pooled units, equivalent to ten individual donor units, for an adult (contains approximately 3g of fibrinogen)

Cryoprecipitate should be used in combination with FFP unless there is an isolated deficiency of fibrinogen.

C1. Acute disseminated intravascular coagulation (DIC), where there is bleeding and a fibrinogen level <1g/l.

C2. Advanced liver disease, to correct bleeding or as prophylaxis before surgery, when the fibrinogen level <1g/l.

C3. Bleeding associated with thrombolytic therapy causing hypofibrinogenaemia.

C4. Hypofibrinogenaemia secondary to massive transfusion. Emerging evidence suggests a fibrinogen level of 1.5g/l is required.

C5. Renal failure or liver failure associated with abnormal bleeding where DDAVP is contraindicated or ineffective.

C6. Inherited hypofibrinogenaemia, where fibrinogen concentrate is not available.

- Contains Fibrinogen
- Pooled bag from 5 donors
- 2 pooled units = 1 adult dose
- Born after 01/01/1996 = MB treated cryo