



# **Non-Medical Authorisation Course**

**Wednesday 29<sup>th</sup> November 2017**



# Decision to Transfuse

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# Areas to cover

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



# Blood Transfusion

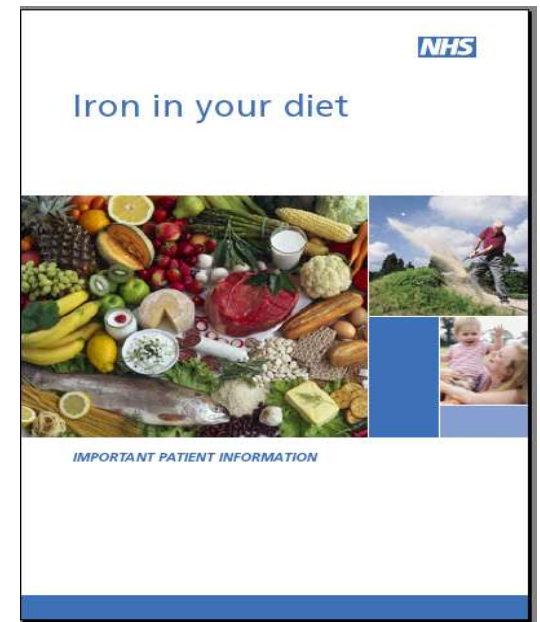
- Precious resource
- Liquid transplant
- Quick fix
- Used too freely



# 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



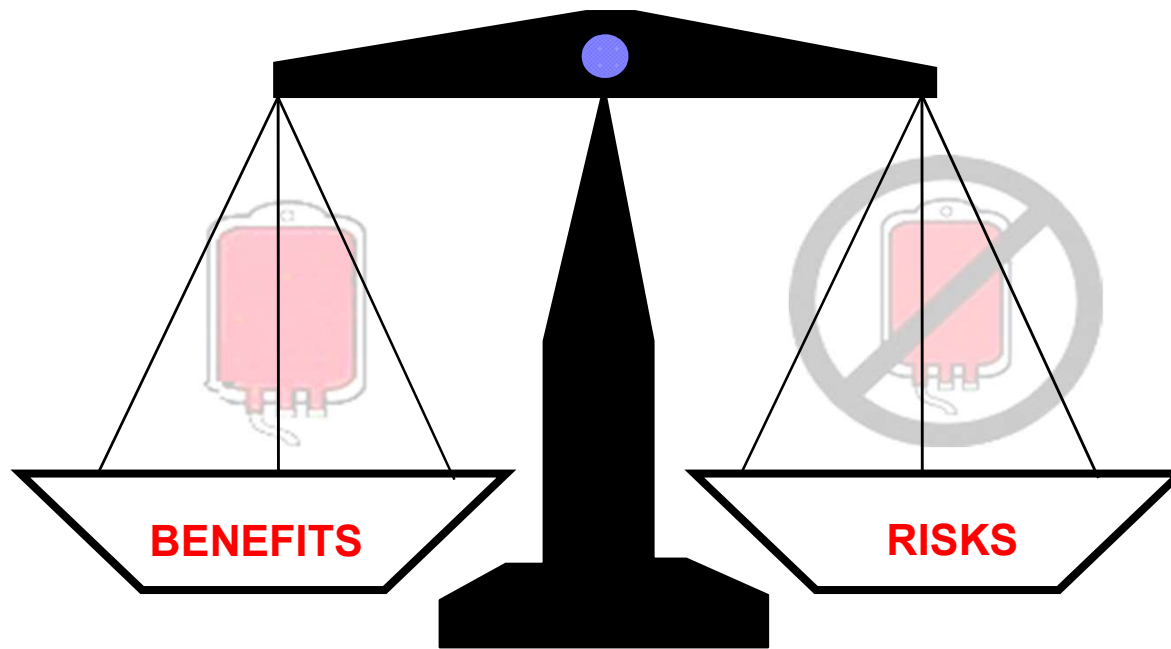


# Assessing the Patient

- Assess unstable patients e.g. those with gastrointestinal haemorrhage
- Don't use outdated results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- ‘any inadvertent transfusion of ABO-incompatible blood components’

### Key SHOT Message

ABO-incompatible transfusions are the tip of the iceberg; they most commonly result from failure to identify the patient at the time of blood sampling (wrong blood in tube) or administration to the wrong patient.










# Risks v Benefits

## Other risks

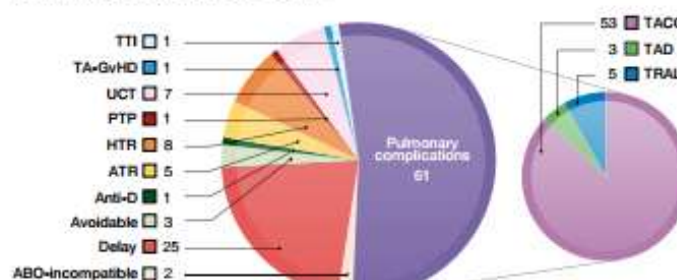
- **TACO** - **T**ransfusion associated **c**irculatory **o**verload
- **ATR** - **A**cute Transfusion Reactions
  - Febrile, allergic, hypotensive
- **TRALI** - **T**ransfusion related acute lung injury
- **vCJD** - **V**ariant Creutzfeldt- **J**acob Disease

## Key recommendation 2 – use a TACO checklist

TACO Checklist	Red cell transfusion for non-bleeding patients	If 'yes' to any of these questions
	Does the patient have a diagnosis of 'heart failure' congestive cardiac failure (CCF), severe aortic stenosis, or moderate to severe left ventricular dysfunction? Is the patient on a regular diuretic?	1
	Is the patient known to have pulmonary oedema? Does the patient have respiratory symptoms of undiagnosed cause?	2
	Is the fluid balance clinically significantly positive? Is the patient on concomitant fluids (or has been in the past 24 hours)? Is there any peripheral oedema? Does the patient have hypoalbuminaemia? Does the patient have significant renal impairment?	3

Due to the differences in adult and neonatal physiology, babies may have a different risk for TACO. Calculate the dose by weight and observe the notes above.

Pulmonary complications, particularly transfusion-associated circulatory overload (TACO), cause the most deaths and major morbidity. Delayed transfusions are an important cause of death, 25/115 (21.7%) 2010 to 2016



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Blood and Transplant

## Blood Transfusion

## Size Matters!

Transfusion Associated Circulatory Overload (TACO) is a known cause of transfusion-related morbidity and mortality<sup>1</sup>

### Before Transfusion

- ✓ Document the rationale for the decision to transfuse.
- ✓ Document the patient's 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.<sup>1,2</sup>



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

Further copies available from [NHSBT.CustomerService@nhs.uk](mailto:NHSBT.CustomerService@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 – in the absence of active bleeding, use the minimum number of units required to achieve a target Hb. Consider the size of the patient; assume an increment of 10g/L per unit for an average 70kg adult.*

#### R1. **Acute bleeding**

Acute blood loss with haemodynamic instability.

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



#### R2. **Hb $\leq$ 70g/L stable patient**

Acute anaemia. Use an Hb threshold of 70g/L and a target Hb of 70-90g/L to guide red cell transfusion. Follow local/specific protocols for indications such as post cardiac surgery, traumatic brain injury, acute cerebral ischaemia.

#### R3. **Hb $\leq$ 80g/L if cardiovascular disease**

Use an Hb threshold of 80g/L and a target Hb of 80-100g/L.

#### R4. **Chronic transfusion dependent anaemia**

Transfuse to maintain an Hb which prevents symptoms. Suggest an Hb threshold of 80g/L initially and adjust as required. Haemoglobinopathy patients require individualised Hb thresholds depending on age and diagnosis.

#### R5. **Radiotherapy maintain Hb $\geq$ 110g/L**

There is limited evidence for maintaining an Hb of 110g/L in patients receiving radiotherapy for cervical and possibly other tumours.

#### R6. **Exchange transfusion**

In continuing haemorrhage resuscitate and manage source of bleeding

In a normovolaemic stable patient;

- In absence of IHD or ACS  $<70$  (70 – 90 g/l)
- In presence of IHD or ACS  $<80$  (80 - 100 g/l)

# Transfusion Triggers and Amounts



## Red Blood Cells (RBC)


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**SINGLE** Unit Blood Transfusions  
reduce the risk of an adverse reaction

**Don't give two  
without review**

**THINK!**

- Is your patient symptomatic?
- Is the transfusion appropriate?
- What is the haemoglobin trigger level?
- What is the patient's target haemoglobin level?



**Each unit transfused is an  
independent clinical decision**

**DO!**

- ✓ Clinically re-assess the patient after each unit transfused.
- ✓ Only one unit should be ordered for non-bleeding patients.
- ✓ Document the reason for Transfusion.<sup>1</sup>

Further copies available from [NHSBTCustomerService@nhs.uk](mailto:NHSBTCustomerService@nhs.uk)

<sup>1</sup> British Committee for Standards in Haematology: Addendum to Administration of Blood Components, 2012

- 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 – for prophylaxis, do not routinely transfuse more than 1 adult therapeutic dose. Prior to invasive procedure or to treat bleeding, consider the size of the patient, previous increments and the target count.*

### Prophylactic platelet transfusion

- P1.** Plt  $<10 \times 10^9/L$  reversible bone marrow failure  
Not indicated in chronic bone marrow failure
- P2.** Plt  $10 - 20 \times 10^9/L$  sepsis/haemostatic abnormality

### Prior to invasive procedure or surgery

- P3.** To prevent bleeding associated with invasive procedures. Platelets should be transfused if:
  - P3a Plt  $<20 \times 10^9/L$  central venous line
  - P3b Plt  $<40 \times 10^9/L$  pre lumbar puncture/spinal anaesthesia
  - P3c Plt  $<50 \times 10^9/L$  pre liver biopsy/major surgery
  - P3d Plt  $<80 \times 10^9/L$  epidural anaesthesia
  - P3e Plt  $<100 \times 10^9/L$  pre critical site surgery e.g. CNS.
  - Transfusion prior to bone marrow biopsy is not required.

### Therapeutic use to treat bleeding (WHO bleeding grade 2 or above)

- P4a** Major haemorrhage Plt  $<50 \times 10^9/L$
- P4b** Critical site bleeding e.g. CNS/traumatic brain injury Plt  $<100 \times 10^9/L$
- P4c** Clinically significant bleeding Plt  $<30 \times 10^9/L$ .

### Specific clinical conditions

- P5a** DIC pre procedure or if bleeding.
- P5b** Primary immune thrombocytopenia (emergency treatment pre-procedure/severe bleeding).

### Platelet dysfunction

- P6a** Consider if critical bleeding on anti-platelet medication.
- P6b** Inherited platelet disorders directed by specialist in haemostasis.



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.  $40 \times 10^9/L$ )

Trigger values

- For prophylaxis in reversible BMF  $<10$
- Prophylaxis if septic 10-20
- In major surgery / trauma  $<50$
- In neurosurgery / head trauma  $<100$
- Major haemorrhage  $<50$

# Transfusion Triggers and Amounts



## Fresh Frozen Plasma (FFP)

### Fresh frozen plasma (FFP)

*Dose – 15ml/kg body weight, often equivalent to 4 units in adults.*

#### F1. Major haemorrhage

Early infusion of FFP is recommended in a ratio of 1 unit FFP:1 unit red cells for trauma and at least 1 unit FFP:2 units red cells in other major haemorrhage settings. Once bleeding is under control, FFP use should be guided by timely tests for coagulation as indicated below.



#### F2. PT Ratio/INR >1.5 with bleeding

Clinically significant bleeding without major haemorrhage. FFP required if coagulopathy. Aim for a PT and APTT ratio of  $\leq 1.5$ .

#### F3. PT Ratio/INR >1.5 and pre-procedure

Prophylactic use when coagulation results are abnormal e.g. disseminated intravascular coagulation and invasive procedure is planned with risk of clinically significant bleeding.

#### F4. Liver disease with PT Ratio/INR >2 and pre-procedure

FFP should not be routinely administered to non-bleeding patients or before invasive procedures when the PT ratio/INR is  $\leq 2$ .

#### F5. TTP/plasma exchange

#### F6. Replacement of single coagulation factor

- 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/allergic reactions
- Not to reverse warfarin

### Prothrombin complex concentrate

*Dose should be determined by the situation and INR. Local guidelines should be followed.*

**PCC1. Emergency reversal of VKA for severe bleeding** or head injury with suspected intracerebral haemorrhage.

**PCC2. Emergency reversal of VKA pre emergency surgery**





# 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 <sup>(3)</sup> .		



# Transfusion Triggers and Amounts

## Cryoprecipitate (Cryo)

### Cryoprecipitate

*Dose – 2 pooled units, equivalent to 10 individual units, will increase fibrinogen by approximately 1g/L. Cryoprecipitate is usually used with FFP unless there is an isolated deficiency of fibrinogen.*

- C1.** Clinically significant bleeding and fibrinogen <1.5g/L (<2g/L in obstetric bleeding)
- C2.** Fibrinogen <1g/L and pre procedure
- C3.** Bleeding associated with thrombolytic therapy
- C4.** Inherited hypofibrinogenaemia, fibrinogen concentrate not available



Contains Fibrinogen

Pooled bag from 5 donors

2 pooled units = 1 adult dose

Born after 01/01/1996 = MB treated cryo