## **Paediatric SHOT**

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### The Transfusion Cycle

#### Correct patient identification is vital at every step





# Adverse reactions and events in adults vs children



### Risk of adverse outcome of transfusion in children vs adults

Population-based epidemiological study 2004

- 4.2% red cells transfused to patients <18 yr
- 1.7% to infants <12 months

#### Incidence of adverse outcome of blood transfusion

per 100,000 red cells issued

- Children <18 yrs 18
- Infants <12 mths 37</li>
- Adults 13

Stainsby et al, Br J Haematol 2008: 141: 73-79



#### Cumulative data 1996/7 - 2012 n=11570





#### Reports - Paediatrics vs all for 2012



SERIOUS HAZARDS OF TRANSFUSION SHOT



#### Comparison between adults and children – reactions to different components 2011



#### **Platelets?**

The 2010 national audit of platelet transfusions estimates that **28%** (915) of transfusion episodes could potentially have been avoided



## Cumulative paediatric reports by component type 2007-2012

■ RBC ■ Platelets ■ FFP





## Paediatric cases where the specific requirements were not met 2007-2011



SERIOUS HAZARDS OF TRANSFUSION

SHO

# Adverse events in patients with sickle cell disease

Category	2010	2011	2012	Outcomes
Acute Transfusion Reactions	4	3	2	Minor morbidity
Haemolytic Transfusion Reactions	4	5	7	1 death 2010, 10 major morbidity
Transfusion-associated circulatory overload	0	1	0	ITU for ventilation and recovered
Transfusion-associated dyspnoea	0	1	0	
Avoidable	0	1	1	
Specific requirements not met	3	6	7	Alloimmunisation in 1
Near miss	2	2	0	
TOTAL	13	19	17	



The median age of haemoglobinopathy patients reported to SHOT was 28 yr
compared to 61 yr overall;
SCD = 20% of all delayed HTR



#### Death due to hyperhaemolysis (2010)

- A child with SCD with Hb 81g/L received a oneunit transfusion prior to tonsillectomy
- 13 days later, Hb 54g/L, transfused 2 units, deteriorated with Hb 48g/L
- Transferred to paediatric ITU, but suffered exacerbated haemolysis with further transfusion despite IVIg and steroids. No antibodies detected
- Developed multi-organ failure and died



#### Hazards of issuing new numbers

- A patient with sickle cell disease was admitted urgently through ED and issued with a new hospital ID number
- A crossmatch request for red cells was received by the laboratory and the historical record only checked under the new number
- The patient had extensive previous records under a different registration number, with known clinically significant antibodies (not detectable on current antibody screen)
- What should happen next?



### Case (cont.)

- The antibodies would have been identified by a computer check under name and date of birth
- Unselected red cells were issued but another BMS recognised the patient's name as the request forms were being filed
- An urgent recall was undertaken and the patient received only '15 drops' of the unselected blood
- It is vital to make a check of historical records, particularly with patients with haemoglobin disorders



### New observations in 2011 and 2012

- Fatal transfusion-associated graft versus host disease
- Parvovirus transmission
- Transfusion-associated circulatory overload
  - 5 cases: neonatal to aged 17 yrs
- Two cases of necrotising enterocolitis possibly related to transfusion
  - 1 death
  - 1 needed surgery and survived



# Transfusion-associated graft versus host disease





#### Death from TA-GvHD

- Fetus transfused with maternal blood at 21 weeks for parvovirus-induced anaemia
- Delivered at 32/40, pancytopenia, died at 3 months of pneumonitis with confirmed GvHD
- Staff at the fetal medicine centre did not contact haematologist or Blood Service as they believed blood for intrauterine transfusion could not be provided in under 24h

### Communication !!



#### **RISK FACTORS:**

**Not irradiated** 

**Not leucodepleted** 

**Related (HLA homozygous)** 



#### What is the normal practice?

- Survey of all 16 fetal medicine centres\*
- IUT units issued per centre 4 to 38 in 12 months
- Index centre used maternal blood more than 20 times over 5 years in about 400 IUT total without adverse events
- 1 other centre once in 5 years
- Alternatives: non-IUT exchange, irradiated or nonirradiated paedipacks

\*With thanks to Professor Mark Kilby, President of the British Maternal and Fetal Medicine Society, London



# Necrotising enterocolitis post transfusion

- A clinically stable non-ventilated 6 week old preterm infant, born at 26 weeks gestation, was given a red cell transfusion for symptomatic anaemia of prematurity (Hb 93 g/L)
- There were no adverse events during the transfusion, and the post Hb was 167 g/L. 4.5 hrs post transfusion the baby developed tachycardia, and over the next 12 hours deteriorated and developed a distended abdomen
- An X-ray was consistent with NEC, the baby continued to deteriorate and died at approximately 36 hrs post transfusion



### Repeated transfusion of nonirradiated blood to an oncology patient

- A 2 year old oncology patient was treated with cladribine (a purine analogue) and given non-irradiated red cells on 19 occasions over a 7 month period
- The error came to light when the shared care hospital checked the specific requirements having received conflicting discharge letters from the oncology centre

Communication, communication, communication



## Massive over transfusion of 1 year old child

- A 10 kg child with a gastrostomy inserted a few days previously was brought to ED, pale but alert, following an episode of vomiting blood
- His Hb was 98 g/L. He was wrongly diagnosed as having an acute arterial bleed, a major haemorrhage alert was put out and O RhD negative blood requested



- The blood was incorrectly prescribed in units rather than mL/kg and he was given 4 units (1122 mL), the first 3 given at a unit per 20 minutes, and received the 4th unit despite normal heart rate and blood pressure
- In theatre he had no evidence of fresh bleeding in his stomach, but Hb 270 g/L
- Venesection was difficult and only removed 40 mL blood. He required transfer to a paediatric intensive care unit and made a full recovery

Panic / Inexperience of paediatric transfusion



#### Clinically significant over-transfusion

- 12-month old child on PICU required 110mL red cells
- Adult unit supplied, and nursing staff transfused the complete unit, 230mL
- Post-transfusion Hb was 190g/L, requiring venesection
- 6-month old infant on ICU required 140mL red cells post-op
- Nurse asked doctor if she should give '1 unit' and he verbally agreed
- Entire unit (257mL) was transfused
- No adverse outcome apart from excessive flushing



# Lack of awareness of the need for irradiated blood following intrauterine transfusion

- A baby who had received IUT for haemolytic disease was admitted at age 7 wks with Hb 44 g/L and transfused with a non-irradiated paedipack
- Neither request form or prescription indicated that irradiated blood was required
- The laboratory SOP was unclear and the BMS believed there was no need to irradiate top-ups following IUT
- Nursing staff did not notice that irradiated blood was required



#### Confusion

- A baby was admitted to a paediatric ward for a top-up transfusion having previously received an intrauterine and an exchange transfusion.
- What are the requirements?
- The haematologist advised the ward of the need for irradiated blood. Blood was prescribed and the need for irradiation documented on the prescription pathway but not communicated with the transfusion laboratory
- Non-irradiated blood was issued and transfused. The same thing happened a second time, and the error was only noticed by a nurse at a subsequent transfusion



# Baby with haemolytic disease (HDN) due to anti-c given O RhD negative blood

- Baby born by emergency caesarean section, suffering from HDN due to high titre maternal anti-c
- Staff took an emergency O RhD negative unit for transfusion without informing the laboratory
- The baby suffered an immediate (mild) reaction, which fully resolved
- Bilirubin climbed further, requiring exchange, likely to have been exacerbated by the incompatible transfusion

It is important to teach staff that O Rh D negative blood is not safe for everybody



#### Paediatric Commentary 2010-12

- Poor understanding by lab staff of procedures for pre-transfusion compatibility testing
- Confusion among clinical staff as to blood availability for emergency transfusion and for IUT
- Over-transfusion of children prescribing in 'units' rather than mL
- Ensuring giving sets are fit for purpose and transfusions are monitored throughout



#### Conclusions

- Still many avoidable errors;
  - use of adult emergency O RhD neg blood for neonates
  - laboratory errors in neonatal and maternal grouping and antibody screening
  - failure to recognise the need for irradiated components after intrauterine transfusion
  - prescription and administration errors leading to either overtransfusion or incorrect rate of transfusion
- Poor communication and lack of checking in cases of avoidable transfusion



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