SHOT Bite No 4: Lessons in Paediatrics (including neonates)

SERIOUS HAZARDS OF TRANSFUSION

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Paediatric SHOT cases comprise all reports for patients under 18 years of age, subdivided by recipient age groups: neonates are ≤28 days; infants are aged between 28 days and 1 year old; children are over 1 year to less than 16 years, and also those aged 16 to <18 years.

Paediatric cases make up approximately 8% of the total reported to SHOT. They are disproportionately represented in the error categories: incorrect blood component transfused-wrong component transfused (IBCT-WCT), IBCT-specific requirements not met (IBCT-SRNM), and avoidable, delayed or undertransfusion (ADU). This partly reflects the increased complexity of paediatric transfusions. Neonates and children are vulnerable patient groups and may have special transfusion requirements.

Neonates are often intensively transfused and are especially vulnerable to potential adverse effects of transfusion, having immature immune and metabolic systems, and are still undergoing rapid development.

Acute side effects from transfusion may be greater for children than for adults, as a single unit of transfused blood with the potential to cause harm may represent a much greater proportion of their blood volume than in an adult.

Consideration of long-term side effects of transfusion for children is particularly important, as the majority will live for several decades afterwards.

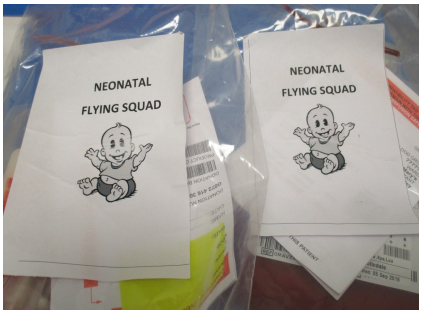
In general paediatric wards, the transfusion of blood and blood components is not common, and this may result in reduced awareness of transfusion-related hazards.

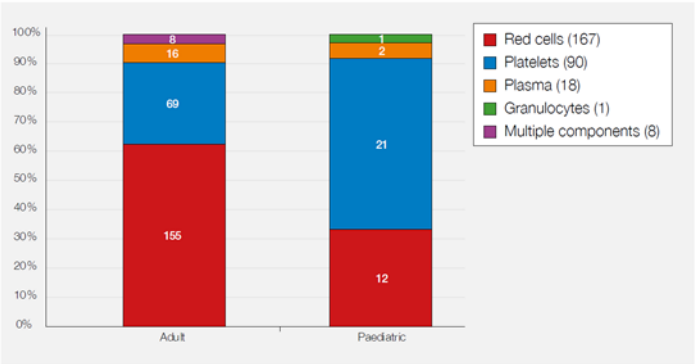
Components provided for transfusion to children less than one year of age have a particular specification, with additional safety features including being from a donor who has given blood (and been tested) at least once before, is CMV negative, HbS negative and Kell negative (see 2016 BSH guidelines[1] for further details). Red cells for neonatal exchange and intrauterine transfusions have a haematocrit that must fall between strictly defined limits. Laboratory information technology systems should be set up that they are able to automatically flag up age-related specific requirements.

Because of their small size children, especially neonates, need smaller volumes of blood than adults. In the UK, small volume 'paedipacks,' where (usually) six small packs of red cells or four smalls packs of platelets are produced from a single adult-sized donation. These packs provide enough blood for a typical neonatal transfusion and at the same time ensure that red cell transfusions can come from the same donor over a period of several weeks.

It may be that in an emergency, delay while waiting for an exact specification would be harmful to the patient and the risk of delay must be balanced against clinical need – an acceptable substitute component may have to be used and there should be pre-agreed local policies in place, but use of non-irradiated, non-leucodepleted maternal blood is NEVER an option.

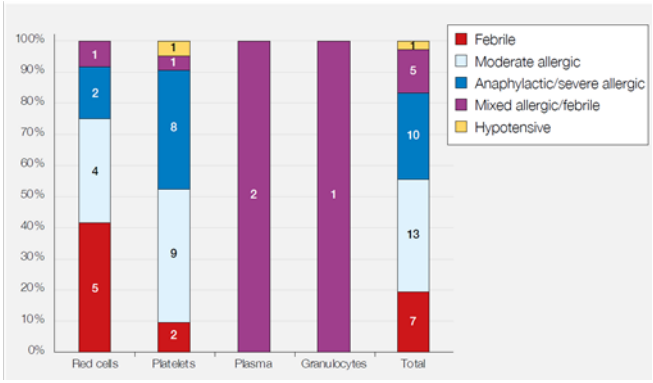
Neonates should not be resuscitated with an adult O D-negative red cells unless there is no available paedipack. Mitigations put in place by hospitals to reduce the chance of selecting the hospitals to reduce the chance of selecting the incorrect component by clinical staff include having neonatal and adult red cell units placed in containers with visual identifiers to help staff distinguish between them. (Image supplied by Rachel Moss).





Paediatric reaction type by component 2017

In 2017, an analysis of the types of components to which children had an acute reaction varied considerably from those seen in adults. In children, as previously, a higher proportion (58%) of reactions occurred with platelets than in adults, whereas in adults 62% of reactions were associated with red cell transfusion.



Adult versus paediatric febrile, allergic and hypotensive reactions (FAHR) 2017

SHOT data consistently show that transfusion with plasma-rich components such as platelets and fresh frozen plasma are associated with a higher proportion of allergic and anaphylactic reactions than transfusion with red cells alone, where the majority of reactions are febrile or mixed allergic and febrile. Prophylactic platelets should only be prescribed according to guidelines, given the risk of significant allergic reactions identified by SHOT reports.

KEY SHOT MESSAGES FOR PAEDIATRICS

- **Hospitals should have clear paediatric transfusion guidelines for different patient groups, readily available in all paediatric areas**
- **Blood components should be prescribed in volumes for children related to their weight, but not more than the standard accepted dose for an adult. Clinical staff who prescribe blood for paediatric patients should not do so unless they have been given training in weight-based prescribing of blood components**
- **Laboratory staff should be fully trained on, and be aware of the BSH guidelines regarding pre-transfusion compatibility testing and red cells selection for neonates and infants up to 4 months old[1,2]. Previous transfusions of group O red cells need to be taken into account when interpreting neonatal grouping results**
- **Patients with suspected DiGeorge syndrome should receive irradiated cellular component until immunodeficiency is excluded, and this should be communicated to the laboratory**
- **Those involved with rapid volume red cell transfusion to children should be aware of the risk of transfusion-associated hyperkalaemia (particularly for infants or those with co-morbidities)**
- **It is important for pulmonary complications (TACO & TRALI) to be considered in neonates and paediatrics as in older patients**

Additional resources that can support best practice include the 'Bookmarks' and 'Blood Component App' with key information from the British Society for Haematology (BSH) paediatric transfusion guidelines[1] (see SHOT website https://www.shotuk.org/resources/current-resources/)

References

1. New HV *et al*, British Standards for Haematology. Guidelines on transfusion for fetuses, neonates and older children. *Br J Haematol* 2016;175:784-828
2. Milkins C *et al*, Guidelines for pre-transfusion compatibility procedures in blood transfusion laboratories. British Committee for Standards in Haematology. *Transfus Med* 2013;23:3-35