Amendments and corrections to the "Transfusion Guidelines for neonates and older children.

Since the initial publication of these guidelines, the Transfusion Task Force has become aware that they contain several inconsistencies and errors. Furthermore, new information has become available. These have led to the following amendments, corrections, and updates.

a) Dose of anti-D prophylaxis in the event of RhD positive platelets being transfused to RhD negative children (para 1.1.5, p435). The dose recommended is wrong and internally inconsistent. The correct dose is 250 IU which is enough to cover five successive adult therapeutic doses of RhD positive platelets over a period of up to six weeks. Nevertheless, if a unit of RhD positive platelets has been given and followed by anti-D prophylaxis, and if further treatment with platelet concentrates is required, RhD negative platelets are preferred and recommended.

b) Selection of FFP according to RhD status. Paragraph 1.1.5 also states that there is enough red cell stroma in FFP (as well as in platelet concentrates) to stimulate RhD immunization. This is in contrast to the recommendations in the FFP Guidelines (BCSH 2004b – see also comments in the amending website notice accompanying those guidelines). A preliminary report from Turner and Cardigan (2005) indicates that the red cell stroma and microparticles residue in FFP is minimal, making negligible the risk of RhD alloimmunization to susceptible persons. (This is not the case for platelet concentrates.) The Task Force therefore endorses the recommendations in the FFP Guidelines (BCSH 2004b) which are that the RhD status of FFP is not significant, so that RhD negative recipients can receive RhD positive FFP without the need for post-transfusion anti-D prophylaxis. We also note that the UK Blood Safety and Quality Regulations 2005 continue to require that packs of FFP be labelled according to the donor's RhD status.

c) Selection of blood products according to ABO blood group (Table 1 in paragraph 1.2.1, p435). Since publication of the guideline, the UK Serious Hazards of Blood Transfusion (SHOT) scheme has reported two incidences of haemolysis after platelet concentrates of group O were transfused to non-group O children. Also, the International Forum on transfusion of apheresis platelets and ABO blood groups (Pietersz and Engelfriet, 2005) recommends that group O platelets should be avoided unless other contingencies such as HLA or HPA restrictions, or CMV status, make only group O platelets available. Hence, Table 1 of the 2004 Guidelines is amended and replaced by the accompanying Table. The Task Force feels that this is particularly important. We also comment that there is no standard method for determining what constitutes 'high titres' of ABO antibody in blood donations and – as stated in the 'Guidelines for the Blood Transfusion Services in the UK (2005a) – "Components from group O donors with 'low titres' of anti-A, anti-B, and/or anti-A,B can cause intravascular haemolysis in non-group O recipients if given in sufficiently large volumes". We are aware of work to standardise this approach for the UK which, if successful, should reduce the incidence of unexpected haemolysis due to ABO antibodies. However, some normal individuals, mostly of group O, have plasma with ABO antibodies which although highly active clinically are in relatively low titres and may escape

detection by dilution tests *in vitro*. Therefore, recipients who are not group O will remain vulnerable to ABO-related haemolysis following the administration of group O platelet concentrates suspended in plasma from such donors.

d) Haematocrit of blood for intrauterine transfusion. Paragraph 2.2.1 recommends that the red cell preparation for IUT should have a haematocrit of up to but not more than 0.75. Surveys have indicated that most UK blood centres often prepare such materials with a higher haematocrit. Furthermore the Council of Europe Guidelines recommend that the haematocrit be between 0.70 and 0.85, while the UK Blood Services' Guideline (2005b) simply states that the haematocrit not be below 0.70. The Transfusion Task Force therefore amends the recommendation to be in line with the Council of Europe, so that the haematocrit should be between 0.70 and 0.85.

e) Pre-transfusion testing for neonates and infants within the first four post-natal months. It should be realised that babies of unsensitised RhD negative mothers who have received ante-natal prophylaxis with anti-D may be born with a positive Direct Antiglobulin Test (DAT). This test should therefore only be performed on the cord blood if the mother has additional red cell allo-antibodies or as an investigation into haemolytic disease of the newborn, for example if the baby is jaundiced or anaemic. This issue is also being addressed by ante-natal guidelines currently in preparation.

f) Neonatal allo-immune thrombocytopenia – HPA-type of transfused platelets. The Task Force now recommends that if HPA1a5b platelets are not available to treat babies with NAIT, platelet concentrates selected randomly, whatever their HPA status (if known), should be given.

g) Red cell specification for transfusion in thalassaemia and sickle-cell diseases (Section 4.3). In this section, the same guidelines are made for children with either of these conditions. They include the recommendation (penultimate bullet point) that blood be "tested for HbS prior to transfusion, as sickle-trait positive red cells should not be transfused". Whereas this is a legitimate requirement for children (and adults) with a sickle-cell disease, we wish to clarify that this is not necessarily the case for children with a thalassaemia syndrome unless it be co-inherited with HbS.

h) Cardiac surgery. Paragraph 6.1.1 states "infants having bypass surgery are effectively undergoing exchange transfusion. For infants it is reasonable to apply the same recommendations as would be used in Exchange Transfusion, i.e .... not collected into optimal additive solutions, because of theoretical concerns about toxicity of the additive solution (*grade C recommendation*)". Despite these theoretical concerns, there is no direct evidence against using red cells in additive solutions such as SAG-M for neonatal cardiac surgery, and many UK centres do so without apparent problems. A recent prospective randomized trial comparing whole blood with reconstituted blood for 200 infants undergoing cardiac surgery shows apparent safety of mannitol and adenine in this situation (Mou *et al*, 2004). The reconstituted blood contained optimal additive solutions, and the patient group that received it had a better outcome than the group that received fresh whole blood, with a shorter stay in intensive care and decreased perioperative

fluid overload. Moreover there was no significant difference in the number requiring renal support therapy. Neonates (under 28 days old) constituted 39% of the study group, and there was no difference after subgroup analysis by patient age comparing those older than 28 days with those who were younger. In view of the current concerns in the UK over transfusion transmission of vCJD, and as plasma is a possible source of vCJD prion in infected persons (Gregori *et al*, 2004), it is important to consider any implications of the significantly greater plasma volume in CPD blood components when compared to SAG-M red cell components. Hence, SAG-M red cell preparations may carry a significantly lower risk than CPD preparations of transmitting vCJD although this cannot at present be ascertained directly. This lower theoretical risk of vCJD transmission by SAG-M red cells has to be balanced with the possible but unproven risk of the additives in SAG-M, also taking into account the apparent safety of blood in these additives in neonatal cardiac surgery. In this context the Task Force recommends that paediatric cardiac centres already using SAG-M blood should continue to do so and that those using CPD should consider switching to SAG-M.

Table. Choice of ABO group for blood products for administration to children

Patient's ABO group	ABO group of blood products to be transfused		
	Red cells	Platelets	FFP*
O			
First choice	O	O	O
Second choice	-	A or B	A or B or AB
A			
First choice	A	A	A
Second choice	O	B†‡	AB
Third choice	-	O†	B†
B			
First choice	B	B†‡	B
Second choice	O	A†	AB
Third choice	-	O†	A†
AB			
First choice	AB	AB‡	AB
Second choice	A or B	A† or B†‡	A†
Third choice	O†	O†	B†

*Group O FFP should only be given to patients of group O. Although group AB FFP can be given to people of any ABO blood group, supplies are usually limited

† Components which test negatively for 'high titre' anti-A and/or anti-B should be selected. The use of group O platelets for non-O patients should be avoided as much as possible

‡ Platelet concentrates of group B or AB may not be available

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Frank Boulton
Chair, BCSH Transfusion Task Force
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