Blood Transfusion for Children and Neonates Policy

V7.0

September 2019
**Red Cells needed immediately**
Check for valid G&S, send one if required. Maternal sample required for infant under 4 months old.

**Red Cells needed in 15 minutes**
Send a G&S sample (and a maternal sample if infant under 4 months) – DO NOT USE POD.

**Red Cells needed in 60+ minutes**
Check transfusion is appropriate
Send a G&S sample and maternal G&S (infant under 4 months).

**Platelets**
Completed transfusion request form (if blood group known, no sample required) for named patient.
Little stock held, delays in delivery.
Dosage = 20 ml/kg

**FFP**
Completed transfusion request form (if blood group known, no sample required).
Dosage = 15ml/kg
20 minutes required to thaw

**Cryoprecipitate**
Can be ordered via transfusion lab if fibrinogen is less than 1.5g/L in a bleeding patient.
Dosage = 15ml/kg
20 minutes to thaw

** MASSIVE HAEMORRHAGE**
Contact transfusion lab and inform them of patient details and clinical status. The appropriate massive haemorrhage pack will be prepared (see appendix 3). Issued components should be given through a blood warmer as a pack initially (1:1:1 ratio RBC:FFP:PLT alternating between component type) until coagulation tests guide appropriate component use.

**CODE RED TRAUMA**
Cascaded from ED, via switchboard allowing red cells and FFP to be made available in anticipation of bleeding trauma patient arrival in resus.
Patients must be booked as UNKNOWN.
GOOD COMMUNICATION WITH LAB IS CRITICAL IN ALL MASSIVE HAEMORRHAGE.

**SAMPLE TAKING** – staff performing this aspect must have a valid transfusion competency assessment in place
Llama must be used for all transfusion specimens if available. If samples are handwritten there need to be 2 blood group results on the lab IT system to allow issue of crossmatched blood. Infants of less than 4 months will require a maternal sample for crossmatching or at least 2ml of infant blood
ANY alterations/obliterations/incorrect information will result in the sample being rejected.
UNKNOWN patient samples must be booked in and allocated a hospital number by the Emergency Department and have gender and approximate age. If the patient is subsequently identified the UNKNOWN ID band must remain on the patient's wrist for at least 24 hrs.

**COLLECTION** - staff performing this aspect must have a valid transfusion competency assessment in place
All blood components need to be collected from a blood fridge via Bloodhound and only stored in a designated blood fridge. 30 minutes is the maximum time blood can be out of the fridge.

**ADMINISTRATION** - staff performing this aspect must have a valid transfusion competency assessment in place
All blood components need to be collected from a blood fridge via Bloodhound and only stored in a designated blood fridge. 30 minutes is the maximum time blood can be out of the fridge.

**OBSERVATIONS** - staff performing this aspect must have a valid transfusion competency assessment in place
To be performed at a minimum of baseline. 15 minutes into the transfusion and the end of unit for ALL COMPONENTS.
Table of Contents

Summary GUIDANCE FOR TRANSFUSION IN NEONATES AND CHILDREN ...........2

1. Introduction..................................................................................................................5
1.1. Purpose of this Policy/Procedure .................................................................5
1.2. Scope.........................................................................................................................5
1.3. Definitions / Glossary............................................................................................5
1.4. Ownership and Responsibilities .................................................................6
1.4.1. Role of the Managers..................................................................................6
1.4.2. Role of the Hospital Transfusion Committee ...............................................6
1.4.3. Role of Individual Staff...............................................................................6
1.5. Standards and Practice.................................6
1.5.1. General Clinical Information .......................................................................6
1.5.2. Avoiding Unnecessary Transfusion ..............................................................6
1.5.3. Neonatal Red Cell Transfusion.................................................................6
1.6. Neonatal blood products .....................................................................................7
1.6.1. Crossmatch .....................................................................................................7
1.6.2. Neonatal Red Cell Transfusion .................................................................7
1.6.3. Emergency Transfusion in Neonates ............................................................8
1.6.4. Criteria for top up blood transfusions in neonates ......................................9
1.6.5. Special hazards of transfusion in the neonatal period .................................9
1.6.6. Exchange transfusion in neonates ...............................................................10
1.6.7. Treatment of hypovolaemic shock/plasma volume expanders ...................11
1.6.8. Fresh Frozen Plasma transfusion in Neonates ............................................11
1.6.9. Indications: ......................................................................................................11
1.6.10. Platelet Transfusions in Neonates .............................................................11
1.6.11. Rates and Volumes for Blood Transfusion in Infants and children ..........12
1.6.12. Indications for blood transfusion in children ............................................12
1.6.13. Tranexamic acid .........................................................................................13
1.6.15. Blood Warmers ............................................................................................13
1.6.16. Treatment of hypovolaemic shock/plasma volume expanders ................13
1.6.17. Fresh Frozen Plasma ..................................................................................13
1.6.18. Platelet Transfusions ..................................................................................13
1.6.19. Cryoprecipitate ............................................................................................14
1.6.20. Granulocyte concentrations ......................................................................14
1.6.21. Consent for transfusion of blood components ..........................................14
1. **Introduction**

1.1. The policy should be read in conjunction with the RCHT Transfusion Policy. Information specifically relating to children and neonates is included here. Advice helps minimize blood product exposure. For the purpose of these guidelines, neonates are considered to be babies less than four weeks past their normal gestational age. Unless specifically stated as applying to neonates, other recommendations are for transfusions until the age of 16.

1.2. This version supersedes any previous versions of this document.

1.3. **Data Protection Act 2018 (General Data Protection Regulation – GDPR) Legislation**

The Trust has a duty under the DPA18 to ensure that there is a valid legal basis to process personal and sensitive data. The legal basis for processing must be identified and documented before the processing begins. In many cases we may need consent; this must be explicit, informed and documented. We can’t rely on Opt out, it must be Opt in.

DPA18 is applicable to all staff; this includes those working as contractors and providers of services.

For more information about your obligations under the DPA18 please see the ‘information use framework policy’, or contact the Information Governance Team rch-tr.infogov@nhs.net

2. **Purpose of this Policy/Procedure**

The purpose of this policy is to provide specific advice for clinical staff treating neonates and any child under 16 years. It does not replace information in the main Transfusion Policy but provides additional advice on dosage and special requirements.

3. **Scope**

The policy applies to children (0 to 16th birthday) and should be used by staff managing children requiring blood components and products.

4. **Definitions / Glossary**

- BMS - Biomedical Scientist
- CHGG - Child Health Guidelines Group
- HTT - Hospital Transfusion Team
- Hb - Haemoglobin
- CMV - Cytomegalovirus
- HTC - Hospital Transfusion Committee
- RBC - Red Blood Cell
- FFP - Fresh Frozen Plasma
- DIC - Disseminated Intravascular Coagulation
- PICU - Paediatric Intensive Care Unit
- DAT - Direct Antiglobulin Test (also known as Coombs test)
5. Ownership and Responsibilities

5.1. Policy changes need to be agreed through the Child Health Guidelines Group (CHGG) and the Hospital Transfusion Team (HTT), and escalated to the HTC.

5.2. Role of the Managers
Line Managers are responsible for:
- Ensuring all staff are aware of this policy
- Ensuring all relevant staff attend Mandatory Training and appropriate training in transfusion.

5.3. Role of the Hospital Transfusion Committee
The HTC is responsible for:
- Policy Changes
- Incident Investigation

5.4. Role of Individual Staff
All staff members are responsible for:
- Ensuring they adhere at all times to the Transfusion Policy
- Ensuring they only practise if their mandatory training and assessment are up to date.
- Highlight to Transfusion Practitioner or laboratory staff any errors or omissions from the policy

6. Standards and Practice

6.1. Staff involved in prescribing, sample taking, collecting or administering blood should undergo biennial mandatory training and one off competency assessment, with further training on Bloodhound and Llama.

6.2. General Clinical Information

6.2.1. Avoiding Unnecessary Transfusion
- Minimise tests to those clearly required
- Obtain appropriate volumes for blood tests to avoid waste or need for repeat testing.
- Prescribe volume to be transfused in mls not units

6.2.2. Neonatal Red Cell Transfusion

6.2.2.1. Avoidance of unnecessary testing can significantly reduce transfusion needs. Most transfusions are small volumes given to replace blood loss due to repetitive sampling in neonates or to alleviate the anaemia of prematurity.

6.2.2.2. Wherever possible, neonates likely to require multiple transfusions should be identified to the Transfusion Department at an early stage, so that a satellite pack can be made available for them. An entry should be made on the first request form that this baby is likely to need multiple transfusions.
6.2.2.3. Pumps may be used for administering red cell transfusions and the decision to use a pump needs to be made on a case by case basis. If you are using an adult unit consider whether a pump is required.

6.2.2.4. The duration of transfusion is 3-4 hours, as blood once removed from the fridge has to be transfused within 4 hours; after this time any remaining blood should not be used.

6.3. Neonatal blood products

6.3.1. Crossmatch

6.3.1.1. The blood group and DAT of the neonate must be established from a cord or venous blood specimen as soon as possible preferably pre-transfusion.

6.3.1.2. Any further testing will be performed against maternal specimens for the first 4 months.

6.3.1.3. Provided that there are no atypical antibodies in maternal plasma at time of delivery, a conventional crossmatch is unnecessary.

6.3.1.4. Maternal samples (post delivery):
6ml pink top EDTA specimen; to test for
- ABO and RhD group
- Antibody screen

6.3.1.5. Neonatal samples:
2-4ml pink top EDTA cord blood; to test for
- ABO and RhD group
- Direct anti-globulin test (DAT)
- Antibody screen (if maternal sample unavailable)

6.3.1.6. To avoid unnecessary sampling if uncertain of samples needed contact the transfusion lab and clarify which are required. If a maternal sample is not available approximately 2ml of blood must be obtained from the neonate.

6.3.1.7. The ‘Guthrie’ blood spot done on day five may produce inaccurate results if the baby has already received a blood transfusion, where possible this sample should be taken prior to transfusion.

6.3.1.8. After the age of four months a crossmatch sample from the infant or child should undergo standard compatibility tests.

6.3.1.9. All samples should be labelled at the bed/cotside.
### 6.3.2. Neonatal Red Cell Transfusion

6.3.2.1. Small volume replacement transfusions can be given repeatedly during the first four months of life without further serological testing providing the mother has a negative antibody screen post-delivery and the neonate has a negative DAT.

6.3.2.2. If the antibody screen and/or DAT are positive, serological investigation and full compatibility testing will be necessary and a maternal sample is needed after every 72 hours.

6.3.2.3. Units of Group O, RhD negative, K negative, CMV seronegative red cells, in 40-50ml multipacks are available for top-up transfusion in neonates. There are up to six multipacks from a single donation and, whenever possible, any one recipient should use packs from a single donor to limit donor exposure.

6.3.2.4. To identify that this baby is likely to receive multiple transfusions mark this request in the requirements section on the transfusion form. Ask that three neonatal sub-packs are reserved for further use in babies <1.5kg.

6.3.2.5. The volume to be transfused is normally 10-20ml/kg See section 9 for further information

### 6.3.3. Emergency Transfusion in Neonates

6.3.3.1. Indications
Massive foetal blood loss prior to delivery causing circulatory collapse in the newborn neonate (e.g. placental abruption).

Emergency transfusion should only be used after establishing respiratory support and the neonate failing to respond to emergency support (i.e. remaining pale, poor respiratory effort and poor pulse volume).

6.3.3.2. Blood Component Required
In this situation there may be no time for crossmatching but an EDTA pink transfusion tube blood sample MUST be taken when possible before administering any blood (from baby or cord & mum). The baby should be given O Rh (D) negative, CMV negative emergency neonatal blood.

6.3.3.3. Two neonatal emergency packs will be kept on the Delivery Suite in the blood fridge. It is essential to inform Blood Transfusion Department at this time so that further blood can be made available.

6.3.3.4. It is essential that the neonatal pack is used, and not the adult emergency O neg which is stored in the same location. These packs are in labelled bags to assist with differentiation.

6.3.3.5. Volume Required
10-20 ml/kg given rapidly are required in these circumstances. A second transfusion may be necessary.
6.3.3.6. **Criteria for top up blood transfusions in neonates**

<table>
<thead>
<tr>
<th>Post-natal age</th>
<th>Ventilated</th>
<th>CPAP/on oxygen</th>
<th>Off oxygen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st 24hours of age</td>
<td>&lt;120</td>
<td>&lt; 120</td>
<td>&lt;100</td>
</tr>
<tr>
<td>Day 2-7</td>
<td>&lt;120</td>
<td>&lt;100</td>
<td>&lt;100</td>
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<tr>
<td>Day 8-14</td>
<td>&lt;100</td>
<td>&lt;95</td>
<td>&lt;75 *</td>
</tr>
<tr>
<td>Day 15 onwards</td>
<td>&lt;100</td>
<td>&lt;85</td>
<td>&lt;75*</td>
</tr>
<tr>
<td>Recommended blood volume</td>
<td>15 mls/kg</td>
<td>15 mls/kg</td>
<td>15 mls/kg</td>
</tr>
<tr>
<td>Rate of transfusion</td>
<td>5ml/kg/h**</td>
<td>5ml/kg/h**</td>
<td>5ml/kg/h**</td>
</tr>
</tbody>
</table>

*It is accepted that clinicians may use <85g/L depending on clinical situation

**To a maximum of 4 hours for each unit after leaving the blood fridge

6.3.3.7. **Alternative guide for volume of blood required**

(Desired Hb – Actual Hb) x Wt x 0.4 = Volume to give over 3 hours
e.g. (120-80) x 1.2 (kg) x 0.4 = 19.2ml blood @ 7ml/hr
(NB check not >20ml/kg i.e. 24ml max for this example otherwise there is an increased risk of Transfusion Associated Circulatory Overload (TACO))

6.3.3.8. Clinical judgement is essential. Do not base decision to transfuse on Haemoglobin level alone.

6.3.3.9. **Other indications to consider:**
- Cumulative loss of 10% or more of blood volume within 72 hour period in a preterm infant.
- Hb <120g/L in acutely unwell infants with cardio respiratory disease.
- Hb >70 and <100g/l and clinical signs of anaemia (tachycardia, tachypnoea, apnoea, poor weight gain, poor feeding).
- In chronic O2 dependency transfusion need should be determined by clinical factors & reticulocyte response.

6.3.4. **Special hazards of transfusion in the neonatal period**

6.3.4.1. **Transfusion-associated graft versus host disease**
This is a rare problem of intra-uterine and neonatal transfusions. Irradiated products should be used for intra-uterine transfusion and for any subsequent transfusions such babies may receive; and for exchange transfusion. Infants with congenital cellular immune deficiency should have irradiated blood components.
Irradiated red cells should be used within 14 days of irradiation for top up transfusions and within 24 hours for exchange transfusions because of the accelerated potassium leak.

6.3.4.2. **Cytomegalovirus infection**
CMV seronegative donations and leucodepleted products should be considered as equally ‘CMV safe’.
6.3.4.3. **Hypoglycaemia.**
This may occur when feeds are stopped during a transfusion, BMs should be monitored in premature and small for dates infants.

6.3.4.4. **Transfusion overload**
Neonates are susceptible to volume overload. Furosemide (frusemide) is not routinely given but may be considered in some cases e.g. significant chronic lung disease or severe congenital heart disease. The neonatal registrar or consultant will decide the need for diuretics.

6.3.4.5. **Consent**
Document in the medical records that verbal consent has been obtained from the parent/guardian. This should be informed consent and discussion should cover the risks, benefits, and alternatives to transfusion. If transfusion is declined please follow the Blood and Blood Products Refusal Policy.

6.3.4.6. There may be some emergency situations where this is not possible but every effort should be made to make information available as soon after treatment as possible.


6.3.5. **Exchange transfusion in neonates**

6.3.5.1. Indications include severe anaemia particularly with heart failure, and severe hyperbilirubinaemia

6.3.5.2. **N.B.**
A Consultant Paediatrician must always be involved in the decision making & advise on the procedure for any exchange transfusion (see separate Neonatal exchange transfusion guideline).

6.3.5.3. **Product**
Plasma-reduced red cells (haematocrit 0.50 - 0.60)

6.3.5.4. **Age of blood product:**
Within 5 days of collection

6.3.5.5. **CMV status:**
CMV safe (either CMV negative or leucodepleted)

6.3.5.6. **Hb S Screen:**
Negative
6.3.5.7. **Irradiation:**
Exchange units must be transfused within 24 hours of irradiation. Units will be marked with time expiry and date. This is essential if there has been a previous intra-uterine transfusion.

6.3.5.8. **Volume:**
Volume to be transfused is usually 160ml/kg for term & 200ml/kg preterm (i.e. 1-2 blood volumes) a double volume exchange can remove 50% of available intravascular bilirubin – refer to NNU guidelines for technique.

6.3.5.9. Blood should be given through a blood warmer and a screen filter used.

6.3.5.10. Decision to treat with a **partial exchange** should be based on a central venous or free flowing peripheral venous haematocrit and presence of symptoms.

6.3.5.11. (The following numbers are general guides because the evidence for benefit of treatment is still debated--Haematocrit >0.65 in symptomatic neonates and >0.75 in asymptomatic infants.)

6.3.5.12. Partial exchange can be employed to reduce the haematocrit to 0.55. Crystalloid (0.9% saline) is an effective exchange fluid and there is no additional benefit to the use of FFP or HAS.

6.3.5.13. If any intra-uterine transfusions have been performed, the Blood Transfusion must be informed of these.

6.3.6. **Treatment of hypovolaemic shock/plasma volume expanders**
Albumin is not superior to crystalloids in the management of hypovolaemic hypotension and does not significantly alter the respiratory status of hypoalbuminaemic sick pre-term infants.

6.3.7. **Fresh Frozen Plasma transfusion in Neonates**

**Indications:**
- Haemorrhagic disease of the newborn with bleeding
- DIC with bleeding
- Replacement of single coagulation factor or coagulation inhibitor deficiencies for which a specific concentrate is not available.
- The volume to be transfused is usually 15ml/kg given at 10-20ml/kg/h
- FFP for neonates will be pathogen inactivated by methylene blue treatment (MB-FFP) from non-UK sources.

6.3.8. **Platelet Transfusions in Neonates**
Thrombocytopenia is more hazardous in neonates than adults and therapy is probably justified prophylactically at a platelet count of 20-30x10⁹/L, and if very sick and premature with signs when counts fall below 50x10⁹/L. Platelets should
be transfused if the patient is clinically bleeding and the platelet count is <50x10⁹/L.

6.3.9. **Platelets should be**
- HPA compatible in neonates with alloimmune thrombocytopenia (see separate neonatal guideline*)
- Irradiated if the child has had intra uterine transfusion
- The volume to be transfused is ordinarily 20ml/kg given at 10–20ml/kg/h

6.3.9.1. **Suggested thresholds of platelet count for neonatal platelet transfusion**

<table>
<thead>
<tr>
<th>Platelet count (x 10⁹ /L)</th>
<th>Indication for platelet transfusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 25</td>
<td>Neonates with no bleeding (including neonates with NAIT if no bleeding and no family history of ICH).</td>
</tr>
<tr>
<td>&lt; 50</td>
<td>Neonates with bleeding, current coagulopathy, before surgery, or infants with NAIT if previously affected sibling with ICH</td>
</tr>
<tr>
<td>&lt; 100</td>
<td>Neonates with major bleeding or requiring major surgery (e.g. neurosurgery)</td>
</tr>
</tbody>
</table>

NAIT, neonatal alloimmune thrombocytopenia; ICH, intracranial haemorrhage.

6.4. **Rates and Volumes for Blood Transfusion in Infants and children**

6.4.1. **Indications for blood transfusion in children**

6.4.1.1. This is usually dependent on clinical assessment and whether there are symptoms of anaemia. There are specific national guidelines for children with specific haemoglobinopathies. A threshold of 70g/L is considered safe for clinically stable children including those on PICU.

6.4.1.1.1. In children the formula for volume of blood to be transfused is Desired haemoglobin - Actual haemoglobin x weight (kg) x 0.4

6.4.1.2. Because of the risk of bacterial proliferation in non-refrigerated blood, transfusions from each blood pack must not exceed 4 hours from removal from fridge. Most transfusions are given over 3 hours.

6.4.1.3. Volumes of approximately 5 ml/kg/hour are regarded as safe. Transfusions are most conveniently given via syringe pumps, preloading the syringe with blood from the pack through a screen filter. Larger volumes are best administered via a paediatric giving set.

6.4.1.4. Furosemide (frusemide) is not routinely given, consider in cases of significant Chronic Lung Disease, cardiac failure or very large transfusion.
6.4.1.5. A maximum of 1200ml should be considered for transfusion in children >60kg in weight. Regular checks of Hb should be performed in addition to assessing clinical effects of multiple units.

6.4.2. Tranexamic acid
Is now recommended for children with major traumatic haemorrhage

6.4.3. Indications for use of irradiated blood
- Exchange transfusion
- Children with proved or suspected T lymphocyte immunodeficiency e.g. DiGeorge syndrome
- Top up transfusions after intrauterine transfusion until 10 ½ months of age
- If there is potential for haemopoietic stem cell transplantation in the future
- Children with Malignancies
  - If a child has a malignancy or there is a high index of suspicion of a malignancy, irradiated blood should be prescribed unless there is urgent need to transfuse and there would be delay in obtaining this type of blood.

6.4.4. Blood Warmers
These should be used during rapid blood replacement (>15ml/kg/hr), and for exchange transfusions.

6.4.5. Treatment of hypovolaemic shock/plasma volume expanders
Albumin is not superior to crystalloids in the management of hypovolaemic hypotension Fresh frozen plasma should not be used unless there are co-existing coagulation abnormalities.

6.4.6. Fresh Frozen Plasma
Indications:
- DIC with bleeding
- Replacement of single coagulation factor or coagulation inhibitor deficiencies for which a specific concentrate is not available
- The volume to be transfused is ordinarily 15ml/kg, given at 10 – 20ml/kg/h
- FFP for children will be pathogen inactivated by methylene blue treatment (MB-FFP) from non-UK sources
- As a component of a major haemorrhage algorithm (see Appendix 3)

6.4.7. Platelet Transfusions
- Platelets should be transfused if the patient is clinically bleeding and the platelet count is <50x10⁹/l
- For oncology patients refer to the specific paediatric oncology guideline, a lower threshold is used if unwell/bleeding/due a surgical procedure
- In cases of ITP platelet transfusions are not usually required unless there is severe bleeding or an intracranial bleed
- Platelets should be irradiated if the child has been transfused in utero
- The volume to be transfused is ordinarily 20ml/kg, given at 10-20ml/kg/h
<table>
<thead>
<tr>
<th>Platelet count (x 10⁹ /l)</th>
<th>Clinical situation to trigger platelet transfusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10</td>
<td>Irrespective of signs of haemorrhage (excluding ITP, TTP/HUS, HIT)</td>
</tr>
<tr>
<td>&lt; 20</td>
<td>Severe mucositis Sepsis Laboratory evidence of DIC in the absence of bleeding Anticoagulant therapy Risk of bleeding due to a local tumour infiltration Insertion of a non-tunnelled central venous line</td>
</tr>
<tr>
<td>&lt; 40</td>
<td>Prior to lumbar puncture*</td>
</tr>
<tr>
<td>&lt; 50</td>
<td>Moderate haemorrhage (e.g. gastrointestinal bleeding) including bleeding in association with DIC Surgery, unless minor (except at critical sites) - including tunnelled central venous line insertion</td>
</tr>
<tr>
<td>&lt; 75 -100</td>
<td>Major haemorrhage or significant post-operative bleeding (e.g. post cardiac surgery) Surgery at critical sites: central nervous system including eyes</td>
</tr>
</tbody>
</table>

* It is accepted that prior to lumbar puncture some clinicians will transfuse platelets at higher counts (e.g. 50 x 10⁹ /l) in clinically unstable children, non-ALL patients, or for the first LP in newly-diagnosed ALL patients to avoid haemorrhage and cerebrospinal fluid contamination with blasts, or at lower counts (≤ 20 x 10⁹ /L) in stable patients with ALL, depending on the clinical situation. These practices emphasise the importance of considering the clinical setting and patient factors.

6.4.7.1. ALL, acute lymphoblastic leukaemia; DIC, disseminated intravascular coagulation; HIT, heparin-induced thrombocytopenia; HUS, haemolytic uraemic syndrome; ITP, immune thrombocytopenia; LP, lumbar puncture; TTP, thrombotic thrombocytopenic purpura

6.4.8. **Cryoprecipitate**
Rarely used, consultant decision
5ml/kg; or 1 pooled unit if 15-30kg, 2 pooled units if >30kg
Methylene Blue treated non-UK. Maximum of 2 units.

6.4.9. **Granulocyte concentrations**
Sometimes used in severe sepsis; dose is 1-2 x 10⁹ granulocytes/kg, 10-20 ml/Kg to a maximum of 2 pooled units. These must be requested through a Haematology Consultant.

6.5. **Consent for transfusion of blood components**

6.5.1. Document in the medical records that verbal consent has been obtained from the parent/guardian. This should be informed consent and discussion should cover the risks, benefits, alternatives to transfusion. If transfusion is declined please follow the Blood and Blood Products Refusal Policy.
6.5.2. There may be some emergency situations where this is not possible but every effort should be made to make information available as soon after treatment as possible.


### 7. Dissemination and Implementation

7.1. Dissemination via Clinical Mandatory Training – biennial requirement for all staff involved in the process to attend to maintain competency. Training dates stored by Transfusion Practitioner Team ([rcht.transfusionadmin@nhs.net](mailto:rcht.transfusionadmin@nhs.net)) and through face to face assessment carried out by ward Transfusion Link Assessor.


### 8. Monitoring compliance and effectiveness

<table>
<thead>
<tr>
<th>Element to be monitored</th>
<th>Use of blood products/wastage and use of satellite packs monitored all the time by transfusion dept. Traceability and cold chain paperwork checked by transfusion laboratory on return from ward. Monitoring and investigation of incidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>HTC</td>
</tr>
<tr>
<td>Tool</td>
<td>Daily checks, incident reports and audit</td>
</tr>
<tr>
<td>Frequency</td>
<td>Wastage and Paperwork checks on-going Information sent to ward managers monthly Information disseminated via HTT (monthly) and HTC (3x year).</td>
</tr>
<tr>
<td>Reporting arrangements</td>
<td>Information disseminated via HTC, HTT and CHGG transfusion committee</td>
</tr>
<tr>
<td>Acting on recommendations and Lead(s)</td>
<td>Child health clinical leads and HTC</td>
</tr>
<tr>
<td>Change in practice and lessons to be shared</td>
<td>Through Child Health governance meetings and HTC</td>
</tr>
</tbody>
</table>

### 9. Updating and Review

This policy is reviewed biannually.

### 10. Equality and Diversity

10.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the [Equality, Diversity & Human Rights Policy](http://hospital.blood.co.uk/patient-services/patient-blood-management/patient-information-leaflets/) or the [Equality and Diversity website](http://hospital.blood.co.uk/patient-services/patient-blood-management/patient-information-leaflets/).

**10.2. Equality Impact Assessment**

The Initial Equality Impact Assessment Screening Form is at Appendix 2.
## Appendix 1. Governance Information

<table>
<thead>
<tr>
<th>Document Title</th>
<th>Blood Transfusion for Children and Neonates Policy V6.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Issued/Approved:</td>
<td>February 2019</td>
</tr>
<tr>
<td>Date Valid From:</td>
<td>September 2019</td>
</tr>
<tr>
<td>Date Valid To:</td>
<td>September 2021</td>
</tr>
<tr>
<td>Directorate / Department responsible (author/owner):</td>
<td>Child Health Department / Blood Transfusion Department</td>
</tr>
</tbody>
</table>
| Contact details: | Sian Harris  
| &nbsp;&nbsp;&nbsp;&nbsp; sian.harris3@nhs.net  
| &nbsp;&nbsp;&nbsp;&nbsp; Nicki Jannaway  
| &nbsp;&nbsp;&nbsp;&nbsp; Nicki.jannaway@nhs.net |
| Brief summary of contents | The policy highlights specific issues relating to the transfusion of blood products in neonates and children up to 16th birthday. It is supplemental to the Transfusion policy. |
| Suggested Keywords: | Blood, transfusion, infants, neonates, administration, children, child, massive haemorrhage paediatric MHP |
| Target Audience | RCHT | CFT | KCCG |

| Executive Director responsible for Policy: | Medical Director |
| Date revised: | August 2019 |
| This document replaces (exact title of previous version): | Blood Transfusion Policy for Children and Neonates V5.1 |
| Approval route (names of committees)/consultation: | Child health Guidelines Group.  
| &nbsp;&nbsp;&nbsp;&nbsp; Hospital Transfusion Committee  
| &nbsp;&nbsp;&nbsp;&nbsp; Major Trauma Review Group |
| Care Group General Manager confirming approval processes | Care Group General Manager |
| Name and Post Title of additional signatories | ‘Not Required’ |
| Name and Signature of Divisional/Directorate Governance Lead confirming approval by specialty and divisional management meetings | {Original Copy Signed}  
<p>|      Name: Caroline Amukusana |
| Signature of Executive Director giving approval | {Original Copy Signed} |
| Publication Location (refer to Policy on Policies – Approvals and Ratification): | Internet &amp; Intranet | ✓ | Intranet Only |</p>
<table>
<thead>
<tr>
<th>Document Library Folder/Sub Folder</th>
<th>Clinical / Paediatrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Related Documents:</td>
<td>Blood Transfusion Policy, Blood and Blood Products Refusal Policy, Guidelines for the care of a neonate receiving an exchange transfusion</td>
</tr>
<tr>
<td>Training Need Identified?</td>
<td>Yes if prescribing, sample taking, collecting or administering blood transfusion.</td>
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</table>

### Version Control Table

<table>
<thead>
<tr>
<th>Date</th>
<th>Version No</th>
<th>Summary of Changes</th>
<th>Changes Made by (Name and Job Title)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2011</td>
<td>4</td>
<td>Previous versions unavailable from archive. Change name to include children instead of infants</td>
<td>Sian Harris- Consultant Paediatrician</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Modification to guidance for management of neonatal polycythaemia</td>
<td>Sian Harris</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Include advice on minimising blood sampling in children</td>
<td>Sian Harris</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Include information on other blood products</td>
<td>Sian Harris</td>
</tr>
<tr>
<td>Dec 2011</td>
<td>4.1</td>
<td>Edit of irradiated requirements</td>
<td>Deb Thomas- Lead Transfusion Practitioner</td>
</tr>
<tr>
<td>January 2015</td>
<td>4.2</td>
<td>Adoption of new si units of g/l for haemoglobin Separation of neonates and children Change in volume to transfuse of RBC’s</td>
<td>Sian Harris</td>
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<tr>
<td>July 2015</td>
<td>5</td>
<td>Modification to guidance for management of neonatal polycythaemia Maximum ml transfused in &gt;60kg patients</td>
<td>Sian Harris</td>
</tr>
<tr>
<td>June 2018</td>
<td>6</td>
<td>Update formatting, add massive haemorrhage protocol</td>
<td>Nicki Jannaway – Lead Transfusion Practitioner</td>
</tr>
<tr>
<td>August 2019</td>
<td>7</td>
<td>Add appendix 4 – use of Belmont blood warmer procedure</td>
<td>Nicki Jannaway – Lead Transfusion Practitioner</td>
</tr>
</tbody>
</table>
Appendix 2. Initial Equality Impact Assessment Form

Blood Transfusion for Children and Neonates Policy V7.0

<table>
<thead>
<tr>
<th>Name of the strategy / policy / proposal / service function to be assessed</th>
<th>Blood Transfusion for Children and Neonates Policy V7.0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name of individual completing assessment:</strong></td>
<td>Nicki Jannaway</td>
</tr>
<tr>
<td><strong>Telephone:</strong></td>
<td>01872 253093</td>
</tr>
</tbody>
</table>

1. **Policy Aim**
   - Safe administration of blood products in children

2. **Policy Objectives**
   - Safe administration of blood products in children

3. **Policy – intended Outcomes**
   - Safe administration of blood products in children

4. **How will you measure the outcome?**
   - Monitoring through regular audit by transfusion laboratory staff

5. **Who is intended to benefit from the policy?**
   - Children and staff

6a **Who did you consult with**

   b. Please identify the groups who have been consulted about this procedure.
   - Workforce
   - Patients
   - Local groups
   - External organisations
   - Other
   - X
   - √

   **Please record specific names of groups**
   - Jehovah Witness Liaison Committee – specifically Barry Gardiner around refusal of blood

5. **What was the outcome of the consultation?**
   - Separate Refusal of Blood and Blood Products Policy in place

---

**7. The Impact**

Please complete the following table. If you are unsure/don’t know if there is a negative impact you need to repeat the consultation step.

<table>
<thead>
<tr>
<th>Equality Strands</th>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
<th>Rationale for Assessment / Existing Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>✓</td>
<td>Applies to all children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>---</td>
<td>-------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex (male, female, trans-gender / gender reassignment)</td>
<td>✓</td>
<td>Applies to all children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race / Ethnic communities /groups</td>
<td>✓</td>
<td>Applies to all children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disability - Learning disability, physical impairment, sensory impairment, mental health conditions and some long term health conditions.</td>
<td>✓</td>
<td>The transfusion lab must be contacted to obtain large print/braille leaflets from NHSBT. Leaflets are not available in languages other than English and so will need to be translated following usual Trust Policies.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religion / other beliefs</td>
<td>✓</td>
<td>Children from a Jehovahs Witness background may be impacted due to a refusal of blood, this would be covered by the refusal of bloods policy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marriage and Civil partnership</td>
<td>✓</td>
<td>Applies to all children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnancy and maternity</td>
<td>✓</td>
<td>Applies to all children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual Orientation, Bisexual, Gay, heterosexual, Lesbian</td>
<td>✓</td>
<td>Applies to all children</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

You will need to continue to a full Equality Impact Assessment if the following have been highlighted:
- You have ticked “Yes” in any column above and
- No consultation or evidence of there being consultation - this **excludes** any policies which have been identified as not requiring consultation. or
- Major this relates to service redesign or development

8. Please indicate if a full equality analysis is recommended. | Yes | No | ✓ |

9. If you are **not** recommending a Full Impact assessment please explain why.

Blood and Blood Products Refusal Policy in place. Translator required as per Trust Interpreting and Translating Policy for none English speakers.

<table>
<thead>
<tr>
<th>Date of completion and submission</th>
<th>August 2019</th>
<th>Members approving screening assessment</th>
<th>Policy Review Group (PRG)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>APPROVED</strong></td>
</tr>
</tbody>
</table>

**This EIA will not be uploaded to the Trust website without the approval of the Policy Review Group.**

A summary of the results will be published on the Trust’s web site.
Appendix 3: Massive Blood Loss in Paediatrics

Massive Haemorrhage Algorithm for children <50kg detailed below. For children of >50kg use adult massive haemorrhage pack.

Suspected massive haemorrhage
HR>normal range, BP<normal range, absent radial pulse or poor organ perfusion
No alternative cause for hypotension
Team leader declares Paediatric Massive Haemorrhage (use Code Red for trauma)
STOP THE BLEEDING – consider going to theatre and using cell salvage

- Urgently phone 2500 transfusion lab 09:00 – 17:30; bleep 3220 outside this time
- request Paediatric Massive Haemorrhage Pack and give patient’s age
- Assemble appropriate clinical team
- Designate one team member to communicate with Transfusion lab
- Give tranexamic acid 15mg/kg IV within 3 hours post bleed/injury, never after 3 hrs
- Send baseline tests by hand: FBC, G&S (use Llama), clotting (inc Clauss fibrinogen), glucose, U&E – DO NOT SEND VIA POD

If blood is required urgently and no sample is available send a Bloodhound trained staff member to fetch emergency O neg from the nearest blood fridge. Paediatric emergency O negs (for under 12 month old) are located in Delivery Suite

Initiate emergency transfusion
Emergency O negative given as a 5ml/kg bolus
ALWAYS USE A GIVING SET AND BLOOD WARMER – care to be taken if using a rapid infuser to avoid circulatory overload. See appendix 4

Lab supplies Pack A:
- RBC (to be given in 5 ml/kg)
- MB FFP (to be given in 5 ml/kg)
Given warmed in 5ml/kg bolus to achieve a 1:1 RBC:FFP ratio re-assessing after each

Once pack A has been removed from blood fridge lab will issue Pack B recurrently until stood down:
- RBC (to be given in 5 ml/kg)
- MB FFP (to be given in 5 ml/kg)
- 1 adult platelet unit to be given 5ml/kg
- Consider cryoprecipitate in 5 ml/Kg (discuss with lab)
Given warmed in 5ml/kg bolus to achieve a 1:1 ratio re-assessing after each

Stand down lab once bleeding is controlled

Contacts:
Transfusion Lab:
09:00 – 17:00: Ext 2500
OOH Bleep: 3220
Transfusion Practitioners:
Ext 3093
Bleep: 3046

ALWAYS GIVE WARMED BLOOD DRAWN THROUGH A BLOOD GIVING SET VIA A 3 WAY TAP.
REASSESS PATIENT AFTER EACH 5ML/KG BOLUS TO AVOID OVERLOAD.

Additional Aims:
- Control Bleeding
- Normothermia (or >35°C)
- Ionised Ca++ >1mmol/l
- Ph > 7.2
- Lactate < 1mmol/l

Once Lab results available continue transfusion to achieve:
- Hb >80 g/l
- Platelet count >75x10⁹/l
- Fibrinogen >1.5g/l
- APTT/PT<1.5 x midpoint of normal range
TAKE REGULAR FBC AND COAG SAMPLES TO GUIDE APPROPRIATE COMPONENT USE

Number of packs issued by lab approximate to age/weight

<table>
<thead>
<tr>
<th>Age/Wt</th>
<th>RBC units</th>
<th>MB FFP units</th>
<th>Platelet units</th>
<th>MB Cryoprecipitate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2 yrs / ≤11kg</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3-8 yrs / 12-25kg</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>9-15 yrs / 25 – 40kg</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>&gt;16 yrs / &gt; 40kg</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Blood Transfusion for Children and Neonates Policy V7.0
Page 21 of 23
Appendix 4: Procedure for Transfusing Blood in Paediatric Massive Haemorrhage

It is critical in massive haemorrhage that a balanced warmed strategy is used. This means giving blood warmed, initially at a ratio of 1:1 red cells and plasma then adding in platelets and cryoprecipitate. Ensure Tranexamic acid is given as soon as possible. There MUST be 1 person running the Belmont and a senior staff member controlling the syringe and 3 way tap. Volume for trauma resuscitation in paediatrics is calculated at 5ml/Kg for both red cells and plasma.

1. Set up Belmont Rapid Infuser. Put in giving set and prime with blood. There is no need to prime first with saline although this is an option if preparing before child arrives.

2. Add in 50ml syringe and 3 way tap at the end of the Belmont giving set after priming.

3. In patients UNDER 20kg (up to approx. 6 years old) cap off the line distal to the 3 way tap.

4. For patients OVER 20kg ensure end connected to patient is shut, and tap connects Belmont to syringe and patient is OFF.

To the patient.
Flush before connecting

Ensure clip is CLOSED

Tap turned to allow warmed blood to flow from Belmont to syringe

To the Belmont
5. Press bolus to administer and stop when 50ml syringe is full. Rate automatically set at 200ml/min

6. In patients UNDER 20kg (up to approx. 6 years old) remove the syringe to administer to avoid any risk of direct large bolus administration.

7. For patients OVER 20kg leave the syringe in line and change tap and open clip on line to patient and administer.

8. Close clip on line to patient, rotate tap to Belmont/syringe and fill syringe. Repeat from 3. until correct volume given. CARE MUST BE TAKEN TO ENSURE THAT THE BELMONT LINE IS NEVER DIRECTLY OPEN TO THE LINE GOING TO THE PATIENT.

9. When FFP arrives, waste any RBC by running into a bucket, hang FFP and RBC and prime, run both together to get 1:1 ratio