Blood Transfusion Policy for Children and Neonates

V5

January 2015
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.

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. Ownership and Responsibilities

Policy changes need to be agreed through the Child Health guidelines group (CHGG) and the Hospital Transfusion Team (HTT).

4.1. 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.

4.2. Role of Individual Staff

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

5. Standards and Practice

Staff involved in prescribing, sample taking, collecting or administering blood should undergo biennial mandatory training and competency assessment.

6. General Clinical Information-

6.1. 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. Red Cell Transfusion
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. 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. 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. 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.

Neonatal blood products

7.1 Crossmatch
The blood group and DAT of the neonate must be established from a cord or venous blood specimen as soon as possible. Any further testing will be performed against maternal specimens for the first 4 months. Provided that there are no atypical antibodies in maternal plasma at time of delivery, a conventional crossmatch is unnecessary.

Maternal samples:
6ml pink top EDTA specimen ; to test for
• ABO and Rh(D) group
• Antibody screen

Infant samples:
2-4ml pink top EDTA cord blood ; to test for
• ABO and Rh(D) group
• Direct anti-globulin test (DAT)
• Antibody screen (if maternal sample unavailable)

To avoid unnecessary sampling if uncertain of samples needed contact the Blood Transfusion Dept and clarify which are required. If a maternal sample is not available approximately 2ml of blood must be obtained from the infant. The ‘Guthrie’ blood spot done on day 5 may produce inaccurate results if the baby has already received a blood transfusion, where possible this sample should be taken prior to transfusion.

After the age of 4 months a cross match sample from the infant or child should undergo standard compatibility tests.
All samples should be labelled at the bed/cotside.
7.2 Neonatal Blood Transfusion
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.
If the antibody screen and/or DAT are positive, serological investigation and full compatibility testing will be necessary.
Units of Group O, Rh(D) negative, K negative, CMV seronegative red cells, in 50-100ml 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.
To identify that this baby is likely to receive multiple transfusions mark ‘Paed Pack’ in the requirements section, on the transfusion form. Ask that 3 Paed packs are reserved for further use in babies <1.5kg.
The volume to be transfused is normally 10-20ml/kg, below however in section 7.4, are volume guides which when used lessen the number of overall transfusions.

7.3 Emergency Transfusion in Neonates
Indications
Massive fetal blood loss prior to delivery causing circulatory collapse in the newborn infant (e.g. placental abruption).

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

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 paediatric blood.

A neonatal emergency pack will be kept on the delivery suit in the fridge. It is essential to inform Blood Transfusion Department at this time so that further blood can be made available.

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

<table>
<thead>
<tr>
<th></th>
<th>Haemoglobin threshold for transfusion g/l</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post natal age</strong></td>
<td><strong>Ventilated</strong></td>
</tr>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; 24hours of age</td>
<td>&lt;120</td>
</tr>
<tr>
<td>Day 2-7</td>
<td>&lt;120</td>
</tr>
<tr>
<td>Day 8-14</td>
<td>&lt;100</td>
</tr>
<tr>
<td>Day 15 onwards</td>
<td>&lt;100</td>
</tr>
<tr>
<td></td>
<td>&lt;85 and also clinical status</td>
</tr>
<tr>
<td></td>
<td>Depends on clinical situation (reticulocyte count, cardiac status, weight gain etc)</td>
</tr>
</tbody>
</table>

| **Recommended blood volume** | 15-20mls/kg | 15mls/kg | 10-15mls/kg (* if volume required is very small question validity of need for transfusion) |

**Alternative guide for volume of blood required**
(Desired Hb – Actual Hb) x Wt x 0.4 = Volume to give over 3 hours
E.g. (140-96) x 1.2 (kg) x 0.4 = 21ml blood @ 7ml/hr
(NB check not >20ml/kg i.e. 24ml max for this example)

Clinical judgement is essential. Do not base on Haemoglobin level alone.

**Other indications:**
- Cumulative loss of 10% or more of blood volume within 72 hour period in a preterm infant.
- Hb <120g/d 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.
7.5 Special hazards of transfusion in the neonatal period

**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, for any subsequent transfusions such babies may receive and for exchanges given to very low birth weight babies (less than 1.5 kg). 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.

**Cytomegalovirus infection**
CMV seronegative donations and leucodepleted products should be considered as equally ‘CMV safe’.

**Hypoglycaemia.**
This may occur when feeds are stopped during a transfusion, BMs should be monitored in premature and small for dates infants.

**Transfusion overload**
Neonates are susceptible to volume overload. **Furosemide** (*frusemide*), this is not routinely given but may be considered in some cases eg significant chronic lung disease or severe congenital heart disease. The Neonatal Registrar or Consultant will decide the need for diuretics.

**Consent**
Document in the medical records that verbal consent has been obtained from the parent/guardian.
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. Document reason for transfusion and calculation of volume to be transfused. (Parents should be offered appropriate information leaflets available from the blood transfusion service website. – ‘Babies receiving a blood transfusion’

7.6 Exchange transfusion in neonates
Indications include severe anaemia particularly with heart failure, and severe hyperbilirubinaemia
**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).
**Product:** Plasma-reduced red cells (haematocrit 0.50 - 0.60)
**Age of blood product:** Within 5 days of collection
**CMV status:** CMV safe (either CMV negative or leucodepleted)
**Hb S Screen:** Negative
**Irradiation:** If time allows and if so, should be transfused within 24 hours of irradiation. This is essential if there has been a previous intrauterine transfusion.
**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

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

### 7.6 Partial exchange for Polycythaemia

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

(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.)

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.

### 7.7 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.

### 7.8 Fresh Frozen Plasma

**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 10-20ml/kg. FFP for neonates will be pathogen inactivated by methylene blue treatment (MB-FFP) from non-UK sources.

### 7.9 Platelet Transfusions

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.

**Platelets should be**
- HPA compatible in neonates with alloimmune thrombocytopenia (see separate neonatal guideline*).
- Irradiated if the child has been transfused in utero.

The volume to be transfused is ordinarily 10-20ml/kg.
8 Rates and Volumes for Blood Transfusion in Infants and children

8.1 Indications for blood transfusion in children
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.

In children the formula for volume of blood to be transfused is 
Desired haemoglobin- Actual haemoglobin x weight (kg) x0.4

Because of the risk of bacterial proliferation in non-refrigerated blood, transfusions from each blood pack must not exceed 4 hours duration. Most transfusions are given over 3 hours.
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 paediatric giving set. Furosemide (frusemide) is not routinely given, consider in cases of significant CLD, cardiac failure or very large transfusion.

8.2 Tranexamic acid is now recommended for children with major traumatic haemorrhage

8.3 Indications for use of Irradiated blood
- Exchange transfusion
- Children with proved or suspected T lymphocyte immunodeficiency eg DI Georges syndrome
- Top up transfusions after intrauterine transfusion
- If there is potential for haemopoietic stem cell transplantation in the future

  CMV negative ( or leucocyte depleted)

- Children with Malignancies
  If a child has a malignancy or there is a high index of suspicion of a malignancy, CMV negative/ irradiated blood should be prescribed unless there is urgent need to transfuse and there would be delay in obtaining this type of blood.

8.4 Blood Warmers
These should be used during rapid blood replacement (>15ml/kg/hr), and for exchange transfusions.
8.5 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.

8.6 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 10-20ml/kg. FFP for children will be pathogen inactivated by methylene blue treatment (MB-FFP) from non-UK sources.

8.7 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 10-20ml/kg.

8.8 Cryoprecipitate

Rarely used, consultant decision
5mls/kg; or 5units if 15-30kg, 10units if >30kg

8.9 Granulocyte concentrations

Sometimes used in severe sepsis; dose is 1-2 x 10⁹ granulocytes/kg

9 Consent for transfusion of blood products

Document in the medical records that verbal consent has been obtained from the parent/guardian.
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.
Document reason for transfusion and calculation of volume to be transfused. Parents should be offered appropriate information leaflets available from the blood transfusion service website. ‘Babies receiving a blood transfusion’ ‘Children receiving a blood transfusion’
10 Dissemination and Implementation

The document will be available on the hospital intranet documents library. Release of the updated version will be communicated through the Child Health guidelines group and the Hospital Transfusion Committee (HTC). Minutes of both are available.

11 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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>Transfusion leads</td>
</tr>
<tr>
<td>Tool</td>
<td>Audit</td>
</tr>
<tr>
<td>Frequency</td>
<td>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>
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<tr>
<td>Acting on recommendations and Lead(s)</td>
<td>Child health clinical leads and Transfusion lead</td>
</tr>
<tr>
<td>Change in practice and lessons to be shared</td>
<td>Through Child Health governance meetings and HTC</td>
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</table>

12 Updating and Review

November 2015

13 Equality and diversity

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’ or the Equality and Diversity website.

13.1 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 Policy for Children and Neonates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Issued/Approved:</td>
<td>January 2015</td>
</tr>
<tr>
<td>Date Valid From:</td>
<td>January 2015</td>
</tr>
<tr>
<td>Date Valid To:</td>
<td>January 2018</td>
</tr>
<tr>
<td>Directorate / Department responsible (author/owner):</td>
<td>Child Health department- Dr. Sian Harris Blood Transfusion Department.</td>
</tr>
</tbody>
</table>
| Contact details:        | Sian Harris  
Sian.Harris@rcht.cornwall.nhs.uk |
| 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. |
| Target Audience        | RCHT  
PCH  
CFT  
KCCG |
| Executive Director responsible for Policy: |  |
| Date revised:          | January 2015                                      |
| This document replaces (exact title of previous version): | Blood transfusion Policy for Children and neonates V4 |
| Approval route (names of committees)/consultation: | Child health audit and guidelines group  
Hospital Transfusion Committee. |
| Divisional Manager confirming approval processes | {Original Copy Signed} |
| Name and Post Title of additional signatories | 'Not Required' |
| Signature of Executive Director giving approval | {Original Copy Signed} |
| Publication Location (refer to Policy on Policies – Approvals and Ratification): | Internet & Intranet  
Intranet Only |
| Document Library Folder/Sub Folder | Haematology  
Paediatrics |
| Links to key external standards | National Directives and Health Service Circulars which underpin this policy:  
The Serious Hazards of Transfusion Report |
(SHOT) 2007
Better Blood Transfusion 3 - Appropriate Use of
Blood.
Health Service Circular 2007/001 Department of
Health
Better Blood Transfusion 3
Blood Safety Directive
NHS Litigation Authority Inspection Standards
http://www.nhsla.com/home.htm
British Committee for Standards in Haematology
guidelines:
Blue Book Transfusion Guidelines

Related Documents:
Blood Transfusion Policy

Training Need Identified?
Yes if prescribing, sample taking, collecting or
administering blood transfusion.

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 polycytheamia</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></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 Use of tranexamic acid in major traumatic haemorrhage</td>
<td>Sian Harris</td>
</tr>
</tbody>
</table>

All or part of this document can be released under the Freedom of Information Act 2000

This document is to be retained for 10 years from the date of expiry.
Appendix 2. Initial Equality Impact Assessment Form

| Name of the strategy / policy / proposal / service function to be assessed (hereafter referred to as policy)  
| Provide brief description: Blood Transfusion Policy for Children and Neonates |
| Directorate and service area:  
| Child Health |
| Is this a new or existing Policy?  
| Existing |
| Name of individual completing assessment:  
| Sian Harris |
| Telephone: 01872 253041 |

1. Policy Aim*  
Who is the strategy / policy / proposal / service function aimed at?  
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) Is consultation required with the workforce, equality groups, local interest groups etc. around this policy?  
No

6b) If yes, have these *groups been consulted?  

C). Please list any groups who have been consulted about this procedure.

7. The Impact  
Please complete the following table.

Are there concerns that the policy could have differential impact on:

<table>
<thead>
<tr>
<th>Equality Strands</th>
<th>Yes</th>
<th>No</th>
<th>Rationale for Assessment / Existing Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>✓</td>
<td></td>
<td>Applies to all children</td>
</tr>
<tr>
<td>Sex (male, female, trans-gender / gender reassignment)</td>
<td>✓</td>
<td></td>
<td>Applies to all</td>
</tr>
</tbody>
</table>

Blood Transfusion Policy for Children and neonates

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<table>
<thead>
<tr>
<th>Race / Ethnic communities /groups</th>
<th>✓</th>
<th>Applies to all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disability -</td>
<td>✓</td>
<td>Applies to all</td>
</tr>
<tr>
<td>Learning disability, physical disability, sensory impairment and mental health problems</td>
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<td></td>
</tr>
<tr>
<td>Religion / other beliefs</td>
<td>✓</td>
<td>Applies to all</td>
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<tr>
<td>Disability -</td>
<td>✓</td>
<td>Applies to all</td>
</tr>
<tr>
<td>Marital status / civil partnership</td>
<td>✓</td>
<td>Applies to all</td>
</tr>
<tr>
<td>Pregnancy and maternity</td>
<td>✓</td>
<td>Applies to all</td>
</tr>
<tr>
<td>Sexual Orientation,</td>
<td>✓</td>
<td>Applies to all</td>
</tr>
<tr>
<td>Bisexual, Gay, heterosexual, Lesbian</td>
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</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 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.

Full statement of commitment to policy of equal opportunities is included in the policy

<table>
<thead>
<tr>
<th>Signature of policy developer / lead manager / director</th>
<th>Date of completion and submission</th>
</tr>
</thead>
</table>

Names and signatures of members carrying out the Screening Assessment

1. 
2. 

Keep one copy and send a copy to the Human Rights, Equality and Inclusion Lead, c/o Royal Cornwall Hospitals NHS Trust, Human Resources Department, Knowledge Spa, Truro, Cornwall, TR1 3HD

A summary of the results will be published on the Trust’s web site.

Signed ___S.Harris_______________
Date _____Jan 2015_______________