Doncaster and Bassetlaw Teaching Hospitals NHS Foundation Trust

Blood Transfusion Policy

Transfusion of Neonates, Infants and Children

This procedural document supersedes: PAT/T 2 v.6 – Blood Transfusion

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Executive Sponsor:	Medical Director
Author/reviewer:	Gill Bell - Chief Biomedical Scientist Transfusion
Date revised:	May 2021
Authorised by:	Atchuta Bobbili – Chair Hospital Transfusion Committee (HTC)
Approved by:	Hospital Transfusion Committee
Approval date:	14 June 2021
Date issued:	25 June 2021
Next review date:	June 2024
Target Audience:	Trust wide; all staff involved in the transfusion process

Amendment Form

Version	Date Issued	Brief Summary of Changes	Author
Version 1	25 June 2021	• This is a new procedural document, please read in full.	Gill Bell – Chief Biomedical Scientist Transfusion

Contents Page

1. INTRODUCTION

Errors in the requesting, supply and administration of blood lead to significant risks to patients.

Errors either in the collection or labelling of the sample for blood grouping and compatibility testing, or in the laboratory, or to failure of the final pre-transfusion checks account for a number of patient deaths in the UK each year.

The Massive Hemorrhage Protocol is in place to ensure the best outcome is achieved for the patient. The protocol should help to identify the key roles of team leader (often the most senior doctor directing resuscitation of the patient) and coordinator responsible for communicating with laboratories and other support services to prevent time-wasting and often confusing duplicate calls.

In an emergency situation it is essential to ensure correct transfusion identification procedures for patients, samples and blood components are performed and an accurate record is kept of all blood components transfused.

2. PURPOSE

This policy is based on recognised guidelines and provides the Trust with local procedures for the ordering and administration of blood products and the management of transfused patients.

3. DUTIES AND RESPONSIBILITIES

The member of staff responsible for the care and monitoring of the patient during the transfusion must be a nurse holding current registration of the NMC Professional Register as a Registered General Nurse (RGN), Registered Sick Children's Nurse (RSCN), a Registered Midwife (RM) or a doctor.
They must take charge of the patient during the transfusion and be responsible for ensuring that all care and monitoring of the patient is performed.

- All staff involved in the transfusion process must be aware of this policy.
- All staff involved in the transfusion process should understand their role and responsibilities.
- Role specific training requirements must be met; the competencies are mandatory.
- Ensure transfusion is appropriate and alternatives have been explored.
- All transfusion documentation must be completed.

- Recognise and manage transfusion reactions.
- Always report untoward transfusion events / reactions to Blood Bank and by Datix.
- Recognition of Massive Haemorrhage; activate the Massive Haemorrhage protocol.

4. PROCEDURE

Key Recommendations:

- After each single-unit red blood cell transfusion, clinically reassess and check haemoglobin levels, and give further transfusions if needed.
- If A&E needs to transfuse a neonate/infant/child they must contact neonatal unit or children's ward for appropriate pumping and blood tubing.
- For volumes less than 50mL use a syringe driver with appropriate blood pump tubing. For volumes greater than 50ml use Baxter or Alaris pump with appropriate tubing.
- Transfusion must be started within 30 minutes of the blood product leaving the blood fridge.

4.1. Indications for Use

Red cell transfusions are required to increase the oxygen carrying capacity of the blood by raising the haemoglobin concentration of patients with acute or chronic anaemia and avoid tissue hypoxia.

4.2. Pre-administration Checks

- Consent obtained.
- Completed prescription to transfuse.
- Check patient wearing correct wristband; confirm identifiers are correct (including cot card, notes).
- Check correct samples have been sent to the laboratory i.e. mothers group and antibody screen sample if patient is < 4 months of age.
- Check IV access patent.
- Check pre transfusion observations done.
- Check blood is ready for collection and a person trained in blood collection is available – this can be done via Teletrack.

4.3. Equipment Required

Note: For volumes **less than 50mL** use a syringe driver with appropriate blood pump tubing. For **v**olumes **greater than 50ml** use Baxter or Alaris pump with appropriate tubing.

If A&E needs to transfuse a neonate/infant/child they must contact neonatal unit or children's ward for appropriate pumping and blood tubing.

- Sterile gloves.
- Apron.
- Blood product giving set2% chlorhexidine in 70% isopropyl.
- Syringe driver or extension set and pump.

4.4. Baseline Observations

The infant should be on a heart monitor, record the following:

- Temperature,
- Pulse
- Respiratory rate
- Blood pressure
- O2 saturation

4.5. Receipt of Products and Bedside Checks

Transfusion must be started within 30 minutes of the blood product leaving the blood fridge

- Assemble equipment.
- Patient blood group to be checked on ICE.
- Blood product to be checked by 2 members of staff at the bedside.
- Check red tag donation number (G number) against donation number on the bag. If any discrepancy DO NOT proceed.
- Check red tag patient details against patient's wristband. If any discrepancy DO NOT proceed.
- Check patient details with parent or guardian (if no parent / guardian available identify patient from notes with another staff member). If any discrepancy DO NOT proceed.

- Check integrity of the blood product; expiry date, CMV status and appearance (clots / discolouration). If any discrepancy DO NOT proceed.
- Verify the product to be transfused from the prescription, check for any special requirements.
- Commence the transfusion as below.

4.6. Administering the Blood Product via a Syringe Driver

- Attach blood administration set, extension set and 50ml syringe.
- Spike blood bag and fill chamber.
- Draw blood into syringe, press purge on pump to fill lower section of giving set line. Close the white clamp.
- Ensure syringe contains volume of blood prescribed. Close red clamp to the blood bag.
- Both nurses check the pump settings, volume to be transfused and the rate as prescribed.
- Flush cannula with Sodium Chloride 0.9% to ensure it is patent.
- Use 2% chlorhexidine in 70% isopropyl to clean hub, and attach extension set to cannula using non touch technique.
- Commence transfusion.
- Both nurses should sign the adhesive portion of the red tag which is placed on the prescription sheet in the notes. The front portion of the red tag should be signed and dated and sent back to the lab immediately to Blood Bank.
- Diuretic therapy should be administered as prescribed and output recorded as necessary.
- Once transfusion is completed observation of temperature, apex and respirations should be recorded.
- Flush cannula with 2mls of normal saline for paeds or till T piece clear for neonates.
- On completion of the transfusion the empty bag and tubing are to be disposed of in a yellow bag black stripe.

4.7. Administering Blood Product Volumes Greater than 50ml via a Blood Pump for a Child

- Using Blood pump giving set.
- Spike blood bag, fill chamber and line.
- Set pump to prescribed volume and transfusion rate.
- 2 nurses to verify settings.
- Clean hub with 2% chlorhexidine in 70% isopropyl prior to connecting to patients cannula using non- touch technique.

4.8. Neonatal/ Infant/ Child Observations during Transfusion

The infant should be on a heart monitor.

Observations to be done at the start of each unit, then 15 minutes following commencement of the transfusion, **observations to be recorded every 15 minutes for the first 60 minutes, then every 30 minutes for the next hour then hourly until completion.**

Observations must be documented on PAWS or Neonatal specific paper work. During this period stay in sight and sound of the infant.

These minimum criteria for observations apply to a stable child. If the child is not stable, observations must be done more frequently in accordance with the (PAWS) Paediatric Advanced graded response strategy and clinical judgement.

4.9. Reactions

- **Pyrexia <2** degrees rise

  Inform paediatrician and Blood Bank, give paracetamol and resume infusion at a slower rate.

- **Pyrexia >2** degrees rise

  Observe for other signs and symptoms; inability to maintain saturations, bradycardia, tachycardia, respiratory distress, rigors. Hypotension, localised redness / itching / tracking.
  Any of the above, inform paediatrician and Blood Bank, stop transfusion and return unit to Blood Bank along with a blood samples. Complete transfusion reaction form (available from Blood Bank) and liaise with Blood Bank.

4.10. Additional notes

- **Embrace** – blood on route is acceptable via a syringe driver.

- **Time critical transfers**. Any other ambulance other than Embrace. Blood must be packed in a validated sealed blood transit box. Blood and blood products cannot be transfused during transfer of patient. Blood in box must go directly to the receiving hospital's Blood Bank.
- Blood product collection can be requested via Teletrack.

4.11. Transfusion of Red Cells

Red cell volume and rate for neonates and children

- Paediatric packs of O RhD negative (cde/cde) / O RhD positive) dependant on neonate's Rh D type), CMV, K, HbS and HT negative are used for neonatal transfusions.
- All blood products are HEV negative
- CMV negative blood should be used for all transfusions to infants in the first year of life.
- All intra-uterine transfusions (IUTs) and exchange transfusions in the neonatal period should be irradiated. The same applies to top-up transfusions in neonates if there has been an IUT or exchange transfusion or when the child has proven or suspected immunodeficiency

Clinical situation:	Aim for HB threshold (g/L):
Anaemia in the first 24 hours of life	>120g/L
Ventilated more than 30% oxygen	>120g/L
Ventilated less than 30%oxygen	>100g/L
NCPAP more than 30% oxygen	>100g/L
NCPAP less than 30% oxygen	> 80g/L
In low flow oxygen e.g. nasal prongs	> 80g/L
In air*	> 70g/L

Volume and rate of administration for infants <45kg	
Volume	**Rate**
Vol (mls) = ((desired Hb – actual Hb) x weight (kg) x 3) ÷10	*Total volume prescribed ÷ 4 hours =* ***hourly rate***
Children > 45kg weight	
Volume	**Rate**
1 unit (= approximately 260mls -350mls)	Total unit volume ÷ 4 hours = ***hourly rate (can be given over 3 hours if tolerated)***

4.12. Transfusion of Platelets

Platelet indications for neonates and children

- Apheresis derived and not pooled Platelets are used for children under 16 years of age.
- For neonates this component is CMV & HT negative
- All blood products are HEV negative

Suggested thresholds of platelet count for neonatal platelet transfusion	Threshold platelet count ($x10^9$/l)
Neonates with no bleeding (including neonates with NAIT if no bleeding and no family history of ICH)	**<25**
Neonates with bleeding, current **coagulopathy, before surgery**, or infants with NAIT if previously affected sibling with ICH	**<50**
Neonates with major bleeding or requiring major surgery (e.g. neurosurgery)	**<100**
Suggested thresholds of platelet counts for platelet transfusion in children	**Threshold platelet count ($x10^9$/l)**
Irrespective of signs of haemorrhage (excluding ITP, TTP/HUS, HIT)	**<10**
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	**<20**
Prior to lumbar puncture	**<40**
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	**<50**
Major haemorrhage or significant post-operative bleeding (e.g. post cardiac surgery) Surgery at critical sites: central nervous system including eyes	**<75 - 100**

Volume and flow rates

Volume and rate of administration for infants and children	
Volume	**Rate**
Children weighing <15 kg 10–20 ml/kg Children weighing >15 kg Single apheresis unit	Over 60 minutes

4.13. Transfusion of FFP

FFP Volume and rate

In order to reduce the risk of transfusion transmission of vCJD, it is recommended that non-UK plasma from countries with a low risk of vCJD is used for all patients born on or after 1 January 1996 (thus including all children).

MB FFP and MB cryoprecipitate are non-UK sourced and have additional pathogen inactivation steps to reduce the risk of viral transmission

Volume and rate of administration		
Volume		**Rate**
10 to 20 ml/kg *	Haemorrhage due to haemorrhagic DN	Over 60 minutes
	Coagulopathy and bleeding or risk from invasive procedure	

***Also consider Vitamin K**

Efficacy is unpredictable and it may be helpful to recheck clotting function after administration

4.14. Massive Haemorrhage

1. Recognise trigger and activate pathway for management of massive haemorrhage.

2. Allocate team roles

- Team leader.
- Communication lead dedicated person for communication with other teams, especially the transfusion laboratory and support services not the most junior member of the team.
- Sample taker / investigation organiser / documenter.
- Transporter - porter, member of team from clinical area.

3. Complete request forms / take blood samples, label samples correctly /recheck labelling

- U+E, FBC, Crossmatch, PT, APTT, Fibrinogen, ABG, Calcium, Lactate.

4. Request blood / blood components

Communications lead to contact laboratory and inform the BMS of the following:

- Activation of the massive haemorrhage protocol using the direct telephone numbers:
  DRI - 07775 013348
  BDGH - 07970 423121
- Your name, location and extension number / bleep number.
- The patient's details: ideally surname, forename, district number.
- Order massive haemorrhage pack 1 (MHP1).
- Contact Blood Bank if blood has been transferred in with patient from another Trust or patient is being transferred to another Trust.

5. The clinical / laboratory interface

- Communication lead to arrange for transport of samples / request form to the laboratory.
- BMS to ring communication lead when blood / blood components are ready.
- Communication lead to arrange to collect blood and blood components from the Blood Bank.

6. Communicate stand down of pathway to Blood Bank BMS

- Return any unused products to Blood Bank immediately.

7. Ensure documentation is complete

- Clinical area: monitoring of vital signs, timings of blood samples and communications, transfusion documentation in patient case notes, return traceability information to Blood Bank (Tags).
- Blood Bank: keep record of communications / telephone requests on worksheet.
- Transfusion Practitioner: completion of audit proforma, ideally within 24 hours.

Massive Haemorrhage Protocol Telephone Numbers:

DRI – 07775 013348

BDGH – 07970 423121

Massive Haemorrhage

Loss of whole blood volume in 24hrs or 50% of blood volume in 3hrs or 2-3mL/kg/min.

Consider problems when loss of Blood Volume at 50%, 40mls/kg of resus fluid given in previous hour, clinical signs of signs of shock / coagulopathy

Activate Massive Haemorrhage Protocol

Most senior clinician to co-ordinate contact with Blood Bank, to trigger *"Massive Haemorrhage Protocol"*

Contact Blood Bank to initiate activation on:
DRI – 07775 013348
BDGH – 07970 423121

STOP THE BLEEDING

RESUSCITATE
Airway
Breathing

Haemorrhage Control

- Direct pressure / tourniquet if appropriate
- Stabilise fractures
  - Surgical intervention consider damage control surgery
- Interventional radiology

Haemostatic Drugs

Tranexamic acid
IV/IO
15mg/kg over 10 mins (max 1g)
2mg/kg/hr infusion

Other haemostatic agents discuss with Consultant

Cell salvage
If available & appropriate

Consider:

- **DIC - Risk increases with acidosis and shock**
- **Volume Overload**

MHP = Massive

Take bloods and send to lab:

XM, FBC, PT, APTT, Fib, U+E, LFT & Ca^{2+}

Collect MHP 1

Red cells*	**20-40 mL/kg**
FFP (*approx. 30 mins to thaw*)	**10-20 mL/kg**
Platelets	**10-20 mL/kg**

*Emergency group O blood or group specific blood or XM blood may be issued.

Give MHP 1

Reassess
Proceed or Stand down
Suspected continuing haemorrhage requiring further transfusion
Take repeat bloods as above and deliver to lab in exchange for MHP 2

MHP 2

Red cells	**20-40 mL/kg**
FFP	**10-20 mL/kg**
Platelets	**10-20 mL/kg**
Cryopreciptate	**5-10 mL/kg**

Give MHP 2

Reassess
Proceed or Stand down
Suspected continuing haemorrhage requiring further transfusion
Take repeat bloods as above and deliver to lab in exchange for MHP

Give MHP 3

Continuous cardiac monitoring

Prevent Hypothermia

- Use fluid warming device

Low Calcium

Consider 0.14 mL/kg calcium chloride 14.7% (max 7mL)

Therapy Aims

Hb 80-100 g/L
Platelets >75 x 109/L
APPT ratio < 1.5
Fibrinogen >1g/L
Ionised ca^{2+} >1mmol/L
pH >7.35(ABG)
pH >7.25 (cap)
Temp > 36 oC
monitor potassium

STAND DOWN

- Inform lab
- Return unused components
- Complete documentation

The table below suggests when intervention may be required and the volumes needed.
In cases of massive blood loss, the use of larger volumes of products in the early stages may be more beneficial but care must be taken with volume overload.
Treatment should be guided by laboratory results as early as possible and the advice of a senior haematologist sought. Where massive blood loss occurs treatment needs to proceed on clinical grounds.

Action	**Treatment required when:**	**Volume for treatment and timescale**	**Comments**
Red Blood Cells Emergency O RhD Negative/positive* (Not crossmatched) *RhD positive will be issued if appropriate Group specific Fully Crossmatched	Blood loss approaches 50% of blood volume	**40ml/kg** (3-4 ml/kg for 1g/dl) Immediate 20 mins if Group&Saved 30 mins if no Group&Save Immediate if in fridge 45 mins if no Group&Save 30 mins if Group&Saved	Aim Hb > 8-10 g/dl Located in blood bank issue fridge - Use only if group unknown or no time. Porters will collect urgently.
Platelets	Count reaches <75 x10^9/l Or 50% blood volume loss	**10 – 20ml/kg** Immediate if in stock or *2 hrs from NHSBT*	After replacement of approx. 1.5x blood volume *expect* platelet count of <50 x10^9/l Consider disseminated intravascular coagulopathy (DIC)
Fresh Frozen Plasma	Prolonged Prothrombin (PT) Activated partial thromboplastin time (APTT)	**20ml/kg** *25 minutes to defrost and prepare.*	After replacement of approx. 1.5x blood volume *expect* clotting factor deficiency Consider DIC
Cryoprecipitate	Fibrinogen <1g/l	**5-10ml/kg** *25 minutes to defrost and prepare.*	Fibrinogen <0.5g/l strongly associated with microvascular bleeding
Recombinant Factor VIIa **Tranexamic acid** **Vit K** and prothrombin complex concentrate (PCC)	For intractable non surgical bleeding. Patients on warfarin	**90 microgram/kg** bolus over 2 minutes 15 mg/kg over 10 mins (max 1g), then 2 mg/kg/hr continuous infusion	Guidelines on intranet Find under:-Haem&Onc No.920 'Factor seven recombinant activated' **Contact Haematology Consultant for advice on use of haemostatic drugs**

5. TRAINING/ SUPPORT

Role specific competencies are in place. Staff must have the relevant competencies to perform a transfusion related task / procedure e.g. venepucture, collection of blood products, administration of blood products and prescribing blood products. Competencies are recorded on OLM. Advice regarding the relevant competencies is available from the Transfusion Practitioner.

6. MONITORING COMPLIANCE WITH THE PROCEDURAL DOCUMENT

- The Hospital Transfusion Team will ensure that systematic audit and review of the transfusion process is undertaken and will report outcomes to the Hospital Transfusion Committee.

- This will include participation in the programme for national comparative audit of blood transfusion as well as local and regional audits.

- The Hospital Transfusion Committee will review all serious adverse transfusion events / reactions which must be notified direct to blood bank staff in addition to the Trust's incident reporting system; Datix.

7. DEFINITIONS

- Neonate – child less than 28 days
- Infant – greater than 28 days but less than 1 year
- Child – age 1 year and above

8. EQUALITY IMPACT ASSESSMENT

The Trust aims to design and implement services, policies and measures that meet the diverse needs of our service, population and workforce, ensuring that none are disadvantaged over others. Our objectives and responsibilities relating to equality and diversity are outlined within our equality schemes. When considering the needs and assessing the impact of a procedural document any discriminatory factors must be identified.

An Equality Impact Assessment (EIA) has been conducted on this procedural document in line with the principles of the Equality Analysis Policy (CORP/EMP 27) and the Fair Treatment for All Policy (CORP/EMP 4).

The purpose of the EIA is to minimise and if possible remove any disproportionate impact on employees on the grounds of race, sex, disability, age, sexual orientation or religious belief. No detriment was identified. (See Appendix 1)

9. ASSOCIATED TRUST PROCEDURAL DOCUMENTS

- PAT/PA 19 Mental Capacity Act 2005 Policy and Guidance, including Deprivation of Liberty Safeguards (DoLS)
- PAT/PA 28 Privacy and Dignity Policy
- PAT/T 8 Specimen and Request Form Labelling Policy
- PAT/PS 7 Patient Identification Policy
- PAT/PA 2 Consent to Examination or Treatment Policy
- PAT/PA 24 Transfer of Patients and their Records

10. DATA PROTECTION

Any personal data processing associated with this policy will be carried out under 'Current data protection legislation' as in the Data Protection Act 2018 and the UK General Data Protection Regulation (GDPR) 2021.

For further information on data processing carried out by the trust, please refer to our Privacy Notices and other information which you can find on the trust website: https://www.dbth.nhs.uk/about-us/our-publications/information-governance/

11. REFERENCES

This policy is written in accordance with the following guidelines and policies: **BSH Guidelines**

- Transfusion for Fetuses, Neonates and Older Children 2016
- Use of Platelet Transfusions 2016
- Pre-transfusion Compatibility Procedures in Blood Transfusion Laboratories 2012
- Use of Irradiated Blood Components 2020
- Administration of Blood Components 2017
- Spectrum of Fresh-Frozen Plasma and Cryoprecipitate products 2018
- Haematological Management of Major Haemorrhage 2015

APPENDIX 1 – EQUALITY IMPACT ASSESSMENT - PART 1 INITIAL SCREENING

Service/Function/Policy/Project/ Strategy	**Division**	**Assessor (s)**	**New or Existing Service or Policy?**	**Date of Assessment**
Blood Transfusion Policy – Transfusion of Neonates Infants and Children	Pathology	Gill Bell	New Policy	14.06.2021

1) Who is responsible for this policy? Name of Division/Directorate: Pathology

2) Describe the purpose of the service / function / policy / project/ strategy? The policy provides the Trust with local procedures for pre-administration of blood products.

3) Are there any associated objectives? Legislation, targets national expectation, standards – Yes compliance with BSQR 2005, BSH & NICE guidelines.

4) What factors contribute or detract from achieving intended outcomes? Lack of compliance

5) Does the policy have an impact in terms of age, race, disability, gender, gender reassignment, sexual orientation, marriage/civil partnership, maternity/pregnancy and religion/belief? No

. **If yes, please describe current or planned activities to address the impact** [e.g. Monitoring, consultation]

6) Is there any scope for new measures which would promote equality? [any actions to be taken

7) Are any of the following groups adversely affected by the policy?

Protected Characteristics	**Affected?**	**Impact**
a) Age	No	
b) Disability	No	
c) Gender	No	
d) Gender Reassignment	No	
e) Marriage/Civil Partnership	No	
f) Maternity/Pregnancy	No	
g) Race	No	
h) Religion/Belief	No	
i) Sexual Orientation	No	

8) Provide the Equality Rating of the service / function /policy / project / strategy – tick (✓) outcome box

Outcome 1 ✓	**Outcome 2**	**Outcome 3**	**Outcome 4**	

If you have rated the policy as having an outcome of 2, 3 or 4, it is necessary to carry out a detailed assessment and complete a* **Detailed Equality Analysis form - see CORP/EMP 27.

Date for next review: June 2024

Checked by: Atchuta Bobbili **Date: 14.06.2021**