Trust Guideline for the Management of Reactions to Blood and Blood Products

Document Control:

For Use In:	All clinical areas which transfuse		
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Version	Date	Author	Reason/Change
V5.0	07.23	EPA Network Transfusion Manager	Update and inclusion with new BSH Guidelines

Consultation

The following were consulted during the development of this document:

- EPA Network Transfusion Manager
- Haematology Consultant with responsibility for transfusion
- Hospital Transfusion Committee

Monitoring and Review of Procedural Document

The document owner is responsible for monitoring and reviewing the effectiveness of this Procedural Document. This review is continuous however as a minimum will be achieved at the point this procedural document requires a review e.g. changes in legislation, findings from incidents or document expiry.

Relationship of this document to other procedural documents

This document is a policy applicable to NNUH Trust please refer to local Trust's procedural documents for further guidance.

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Quick reference

Summary overview of management of acute transfusion reactions

AGE	DOSE & ROUTE
1 month – 5 Yrs.	150mcg IM
6-11 Years	300mcg IM
≥12 Years	500mcg IM

**Into Anteroaspect of thigh. Repeat every 5 mins until stable

1. Introduction

1.1. Rationale

The 2020 Serious Hazards of Transfusion (SHOT) report reviewed 10 years of reporting data and calculated the risk of a febrile, allergic or hypotensive reactions as 1:7704 and the risk of a haemolytic reaction as 1:57425. Pulmonary complications were the foremost cause of morbidity and mortality accounting for 65% of reported transfusion related deaths.

Thankfully reactions are rare and are rarely fatal. However, they do cause major morbidity in some patients, can be life-threatening, and require specialist management during the reaction or to prevent its re-occurrence. This guideline describes the commonest reactions and what to do.

1.2. Objective

To ensure identification and appropriate management of reactions to blood and blood products. To ensure appropriate senior advice is sought when required particularly for the management of serious or very rare transfusion-associated adverse events.

To ensure all blood / blood product serious incidents are reported to the Blood Bank. (Blood Bank will subsequently report incidents to the SABRE (Serious Adverse Blood Reactions and Events) scheme of the MHRA and national Serious Hazards of Transfusion (SHOT) scheme if necessary).

1.3. Scope

1.3.1. Reporting of reactions

The Blood Safety and Quality Regulations 2005 require that all serious adverse transfusion events/reactions must be reported to SHOT; a number of these will also be reported to the MHRA. This is done via the hospital Blood Bank who use the SABRE/SHOT system of reporting.

Any reaction to blood or blood products must be reported. It may be very difficult to immediately ascertain the cause of a transfusion reaction; for example, a rise in temperature may be a simple febrile response, or be due to a major ABO incompatibility. Guidelines for the initial management of the patient are set out in the quick reference guide at the front of this document (Page 4), in detail in the following sections of this guideline and in the regional summary at the end of the document.

AGE	DOSE & ROUTE
Children 5 Yrs	150mcg IM
6-11 Years	300mcg IM
12+ Years	500mcg IM

**Into Anteroaspect of thigh. Repeat every 5 mins until stable

1.3.2. How to report a transfusion reaction

In the event of patient having a reaction staff must report this using the Blood / blood product investigation of transfusion reaction form – FORM 1 (Appendix 1) to report the event. Staff can ring the transfusion laboratory (ext 2906) during working hours, or on-call transfusion staff out-of-hours or contact the Consultant Haematologist on call (via switchboard) for advice.

An additional form may be required e.g. for suspected bacterial contamination. This form is available from the Blood Bank only. Depending on the type of reaction, further blood samples may be required from the recipient of the blood product and also the donor of the blood product.

1.4. Glossary

The following terms and abbreviations have been used within this document:

Term	Definition
ARDS	Acute Respiratory Distress Syndrome
BP	Blood Pressure
CXR	Chest X-Ray
DAT (DCT)	Direct Antiglobulin Test (Direct Coomb's test)
DIC	Disseminated Intravascular Coagulation
FBC	Full Blood Count
FFP	Fresh Frozen Plasma
FNHTR	Febrile Non-Haemolytic Transfusion Reaction
HTC	Hospital Transfusion Committee
HTR	Haemolytic Transfusion Reaction
HTT	Hospital Transfusion Team
JVP	Juglar Venous Pressure
LDH	Lactate Dehydrogenase
LFTs	Liver Function Tests
MHRA	Medicines and Healthcare Products Regulatory Agency
PCC	Prothrombin Complex Concentrate
PTP	Post Transfusion Purpura
SABRE	Serious Adverse Blood Reactions and Events
SHOT	Serious Hazards Of Transfusion
SOB	Short Of Breath
TACO	Transfusion Associated Circulatory Overload
TAD	Transfusion Associated Dysponea
TAGVHD	Transfusion Associated Graft Versus Host Disease
TRALI	Transfusion-Related Acute Lung Injury
TTI	Transfusion Transmitted Infection
U&E	Urea and Electrolytes

2. Responsibilities

All clinical areas which transfuse.

3. Types of Reactions

3.1. Mild / Non Severe Reactions

3.1.1. Febrile Non-Haemolytic Transfusion Reactions (FNHTR)

(These do not require reporting to hospital Blood Bank)

- Occur in 1-2% of patients, especially if multiply transfused or previously pregnant
- Temperature rises by >1oC towards end of transfusion or up to 2h afterwards
- May also feel unwell with rigors or shivering

Management

- Recheck the right blood is being transfused (pack details against patient's wristband and previous blood group from notes or ICE, if known)
- Check for signs of a more serious reaction and treat accordingly (see Page 4), Temperature 38oC – 39oC but < 2oC rise from baseline
    - reduce the rate of the transfusion (75ml/hr instead of 150ml/hr, for example) or stop transfusion temporarily
    - give paracetamol 1g po or prn
- Temperature >390C or > 2oC rise above baseline or rigors and/or myalgia
    - stop transfusion
    - if symptoms do not settle, consider bacterial contamination or haemolysis
    - continue with another unit
- Observe more frequently than usual i.e. every 15 minutes during each unit

Prevention

- Consider prevention if patient has had more than 2 FNHTR
- Administer paracetamol 1g po 1-3 hours before transfusion
- Reduce the transfusion rate to 75ml/hr
- Keep patient warm
- Discuss with Consultant Haematologist if persistent

3.1.2. Urticaria / mild allergic reactions

(These do not require reporting to hospital Blood Bank)

- Urticaria and/or itching is quite common after start of transfusion
- It is especially common with platelets and FFP, which contain plasma

Management

- Recheck the right blood is being transfused (pack details against patient's wristband and previous blood group from notes or on ICE, if known)
- Check for signs of a more serious reaction and treat accordingly
- Reduce the rate of the transfusion, or stop if reaction continues or becomes worse
- Give chlorphenamine 10mg iv
- Recommence transfusion after 30 minutes if symptoms subside
- See section on anaphylaxis (page 6) if symptoms do not improve

Prevention

- Administer chlorpheniramine 10mg iv before transfusion commences

- Discuss with Consultant Haematologist if reaction reoccurs

3.2. Severe Reactions

3.2.1. Allergic / anaphylactic reactions

(These MUST be reported to the hospital Blood Bank using FORM 1 Appendix 1)

- Rare but life-threatening
- Commoner with plasma containing products e.g. FFP and platelets
- Usually occur shortly after transfusion commences
- Symptoms include dyspnoea, chest pain, abdominal pain and nausea
- Signs include bronchospasm, facial and laryngeal oedema, hypotension, vomiting, urticaria and conjunctivitis

Management

- Stop the transfusion and keep line open with Sodium Chloride (NaCl) 0.9%
- Call a doctor to see the patient urgently
- Check and record pulse, BP, temperature and respirations
- Check for respiratory signs – wheeze, tachypnoea, SOB, cyanosis
- Check blood gases/oxygen saturation
- Recheck the right blood is being transfused (pack details against patient's wristband and previous blood group from notes if known)
- Refer to Trust Emergency Treatment of Anaphylaxis guideline http://www.resus.org.uk/

Prevention

- If patient has had a previous severe allergic reaction discuss with Consultant Haematologist; special washed products may be required
- Patients should also be screened for IgA deficiency if appropriate – discuss with clinical immunologist

3.2.2. Acute Haemolytic Transfusion Reaction

(These MUST be reported to the hospital Blood Bank using FORM 1- Appendix 1)

- Rare but life-threatening
- Due to intravascular lysis of incompatible red cells which leads to renal failure, DIC and occasionally death
- Reaction usually occurs within a few minutes of transfusion
- Symptoms include feeling of apprehension, flushing, agitation, pain at cannula site and pain in chest, back or abdomen
- Signs include fever, hypotension, general oozing from venepuncture/operative sites and haemoglobinuria
- In unconscious patients, ABO incompatibility may be difficult to detect

Management

- Stop the transfusion and keep line open with Sodium Chloride (NaCl) 0.9%
- Call a doctor to see the patient urgently
- Check and record pulse, BP, temperature and respirations
- Recheck the right blood is being transfused (pack details against patient's wristband and previous blood group from notes or ICE, if known)
- Inform Blood Bank immediately if ABO incompatibility suspected – another patient may be at risk if two units have been accidentally transposed
- Send urgent FBC, Direct Antiglobulin test (EDTA sample to blood bank), U and E (Sodium, Potassium, Urea, Creatinine), LFTs, LDH, haptoglobin and coagulation screen plus blood cultures.
- Send repeat cross match to Blood Bank (pink top EDTA handwritten patient details)
- Send unit of blood/blood product and giving set to Blood Bank
- Monitor urine output and manage acute renal failure
- Monitor for DIC and manage accordingly
- Discuss immediately with patient's consultant, Consultant Haematologist and consider ITU referral
- Follow Trust incident procedure for reporting

Prevention

- Majority of ABO incompatibilities are due to
    - Errors in sample taking (e.g. wrong blood in tube)
    - Errors in collection from issue fridge (e.g. collector does not have patient details with them)
    - Errors in patient identification (e.g. bedside checking omitted/inadequate)
- All relevant Trust personnel should have updated training in transfusion and adhere to Trust policies

3.2.3. Transfusion-related acute lung injury (TRALI)

(These MUST be reported to the hospital Blood Bank using FORM 1 Appendix 1)

- Rare but life-threatening
- Occurs within 6 hours of transfusion but can occur up to 24 hours after transfusion
- Occurs most often with FFP due to antibodies in donor plasma reacting with patient's white cells
- Symptoms include increasing breathlessness and cough

- Signs include hypoxia and “white out” on CXR, which is indistinguishable from Acute Respiratory Distress Syndrome (ARDS)
- Signs of TRALI also similar to transfusion associated circulatory overload

Management

- Stop the transfusion and keep line open with Sodium Chloride (NaCl) 0.9%
- Call a doctor to see the patient urgently
- Check and record pulse, BP, temperature and respirations
- Check for respiratory signs – wheeze, tachypnoea, SOB, cyanosis
- Check blood gases/oxygen saturation
- Recheck the right blood is being transfused (pack details against patient's wristband and previous blood group from notes or ICE, if known)
- Arrange CXR
- Administer oxygen; discuss patient with ITU.
- Some patients may require ventilation – majority of cases will resolve in 24-48h with support

Prevention

- FFP is now made only from the plasma of male donors
- Use Prothrombin Complex Concentrate (PCC) (Beriplex or other) for urgent warfarin reversal; this is not associated with TRALI and provides a safer, faster alternative (see Trust guideline on Anticoagulation with warfarin)

Reporting

It is very important to discuss suspected cases of TRALI with the hospital Blood Bank as further investigations of the **donor** are needed. If the donor is shown to have HLA/HNA antibodies she/he will be withdrawn from the donor panel.

3.2.4. Septic Shock

(This MUST be reported to the hospital Blood Bank using FORM 1 Appendix 1)

- Rare but life-threatening, and often fatal
- Most commonly associated with platelets, and more rarely red cells
- Due to bacterial contamination of product
- Symptoms are immediate and include collapse and death
- Signs include hypotension and cardio-respiratory arrest

Management

- Stop the transfusion and keep line open with Sodium Chloride (NaCl) 0.9%
- Call a doctor to see the patient urgently
- Check and record pulse, BP, temperature and respirations
- Resuscitate appropriately and give broad spectrum antibiotics which cover both Gram positive and Gram negative organisms
- Take blood cultures

- Blood/blood product and giving set **MUST** be sent to the Blood Bank.
- Septic shock from a blood product occurs immediately the product is given and is usually fatal or near fatal; it does not cause minor reactions. Please discuss further action with Blood Bank staff if the patient has died or is very ill immediately after commencing a blood product (usually platelets)

Prevention

- All products should be inspected for clumps, discolouration and cloudiness and leaks
- If suspicious, do not use but discuss alternatives with Blood Bank and return product to them
- Adhere to expiry date on products and do **NOT** use out of date units

3.2.5. Transfusion Associated Circulatory Overload (TACO) or dysponea (TAD)

(This MUST be reported to the hospital Blood Bank using FORM 1, Appendix 1)

- Can be mistaken for TRALI – raised JVP occurs in fluid overload and not in TRALI
- Commoner in the frail elderly patient and children
- Associated with large volume transfusions e.g. FFP

Management

- Reduce the rate if infusion; if necessary stop transfusion
- Administer oxygen and diuretics as appropriate

Prevention

- Consider Furosemide 20-40mg orally before elective transfusion in susceptible patients
- TACO is more common in underweight patients – remember that one unit of red cells will raise the haemoglobin by 10g/l in 70-80kg patients; smaller patients should be dosed according to weight :

  Weight x 4ml/kg = 10g/l rise so

  50kg x 4ml/kg = 200ml = < 1 unit required
- Consider 1 unit red cell transfusions in frail elderly patients
- Use PCC not FFP to reverse warfarin

3.3. Other Rare Reactions

3.3.1. Delayed Transfusion Reaction

(This MUST be reported to the Blood Bank using FORM 1, Appendix 1)

- Occur >24h after transfusion, and usually 5-10 days later
- Due to antibodies formed previously (after blood transfusion or pregnancy) which are no longer detectable in screening

- Antibody level boosted by further transfusion and delayed haemolysis occurs

Management

- Recognition that falling Hb, jaundice, malaise and back pain may be due to recent transfusion
- Check Hb and film, DCT, bilirubin and re-group and screen – suspect delayed HTR if evidence of haemolysis with positive DCT and new antibody detected
- Discuss management with Consultant Haematologist; steroids are not useful but further transfusion of antigen negative blood may be required

Prevention

- A review of notes/patient antibody card/old blood bank records may alert staff to previous antibodies

3.3.2. Transfusion Transmitted Infection (TTI)

(This MUST be reported to the Blood Bank using FORM 1, Appendix 1)

- May not manifest itself for years
- If acute illness e.g. hepatitis thought to be linked to transfusion then the Blood Bank should be alerted immediately to ensure recall of other products and donor tracing

Management

- As for underlying disease
- Check with Consultant Haematologist re compensation schemes

Prevention

- Careful donor selection and screening
- Transfusion of blood products only when absolutely necessary
- Increasing use of virally and bacterially inactivated components

3.3.3. Transfusion Associated Graft versus Host Disease (TAGvHD)

(This MUST be reported to Blood Bank using FORM 1, Appendix 1)

- Rare but fatal complication of transfusion of cellular products to immunocompromised patients or partially-matched recipients
- Due to engraftment of donor T lymphocytes

Prevention

- TA-GVHD is prevented by irradiation of cellular products (see national and local guidelines)
- Susceptible patients should be identified to Blood Bank using special irradiated blood products forms and issued with irradiated blood products card
- Temporary restrictions should be lifted promptly using request removal form
- Information should be shared with other hospitals involved in patient's care

3.3.4. Post Transfusion Purpura

(This MUST be reported to Blood Bank using FORM 1, Appendix 1)

- Rare and occurs 5-12 days post-transfusion
- Causes thrombocytopenia and bleeding refractory to platelets
- More common in parous women and caused by preformed anti platelet antibodies (usually anti HPA-1a)

Management

- Discuss with Consultant Haematologist
- Treat with steroids and iv immunoglobulin
- For elective transfusions, HPA compatible red cells and platelets should be obtained, but if required urgently unmatched components may be issued, and platelet count must be monitored

3.3.5. Transfusion Siderosis

- Inevitable consequence of long term transfusion programme
- Each unit of blood contains 250mg of iron which is deposited in organs

Management

- Chelation of suitable patients with desferrioxamine or oral chelators when available

Prevention

- Exploration of all other alternatives to blood transfusion;
- Transfusion only when clinically necessary

4. References

Souter R, McSporran W, Tomlinson T, Booth C, Grey S**.** Guideline on the investigation and management of acute transfusion reactions. Br J Haematol. 2023;001:1-13

5. Monitoring Compliance

Compliance with the process will be monitored through the following:

Key elements	Process for Monitoring	By Whom (Individual / group /committee)	Responsible Governance Committee /dept	Frequency of monitoring
All reportable transfusion reactions	Via Appendix 1	HTT	HTC	As required

The audit results are to be discussed at relevant governance meetings HTT, HTC review the results and recommendations for further action. Then sent to Clinical Safety and Effectiveness Sub Board via the 6 monthly HTC reports who will ensure that the actions and recommendations are suitable and sufficient.

Appendix 1: Investigation/reporting of transfusion reaction form FORM 1

Diagnosis……Reason for transfusion …….

Indicate type of reaction by ticking the appropriate box – refer to reaction table for help.

□ **Febrile Non-Haemolytic Reaction OR Mild Allergic Reaction**: manage as per table; no blood samples are required by the laboratory

□ **Possible Haemolytic Transfusion Reaction including Suspected ABO Incompatibility**

Check the identity of the recipient against the details on the unit and compatibility form – if there is a discrepancy stop transfusion immediately and tell the blood bank. DO NOT TRANSFUSE ANY MORE BLOOD PRODUCTS.

□ **Severe Allergic Reaction**

□ **Suspected Bacterial Infection of Unit – a special form will need to be completed (this is available from the blood bank)**

□ **Acute Dyspnoea / Hypotension (transfusion related acute lung injury must be considered)**

□ **Other, please specify**…….

Doctor's signature……**Bleep No**……...**Date**……

For all serious reactions:

Return implicated unit and giving set to blood bank.

Return all units transfused in the previous 24 hours to blood bank.

Send the following samples to blood bank:

6ml EDTA for repeat Group and Antibody Screen

7ml clotted for other tests if required

Send the following samples to the lab, as appropriate (see management table)

FBC with film, coag screen, U and E, LFTs, haptoglobin and blood cultures

For help and advice on transfusion reactions:

Transfusion Practitioner, bleep 0852, Haematology SpR, DECT 2919

Consultant Haematologist, DECT 6744; out of hours contact switchboard

Transfusion Laboratory, ext 2905/2906; out of hours bleep 0670

SEND THIS FORM TO TRANSFUSION LAB WITH RELEVANT SAMPLES

Consultant Haematologist's Conclusions:…….

…….

……

Signature……..**Date**……..

1. Equality Impact Assessment (EIA)

Type of function or policy	Existing

Division		**Department**	Blood Transfusion
Name of person completing form	Carol Harvey	**Date**	13/06/23

Equality Area	**Potential Negative Impact**	**Impact Positive Impact**	**Which groups are affected**	**Full Impact Assessment Required YES/NO**
Race	no	no		no
Pregnancy & Maternity	no	no		no
Disability	no	no		no
Religion and beliefs	no	no		no
Sex	no	no		no
Gender reassignment	no	no		no
Sexual Orientation	no	no		no
Age	no	no		no
Marriage & Civil Partnership	no	no		no
EDS2 – How does this change impact the Equality and Diversity Strategic plan (contact HR or see EDS2 plan)?				

- **A full assessment will only be required if: The impact is potentially discriminatory under the general equality duty**
- **Any groups of patients/staff/visitors or communities could be potentially disadvantaged by the policy or function/service**
- **The policy or function/service is assessed to be of high significance**

IF IN DOUBT A FULL IMPACT ASSESSMENT FORM IS REQUIRED

The review of the existing policy re-affirms the rights of all groups and clarifies the individual, managerial and organisational responsibilities in line with statutory and best practice guidance.