BLOOD TRANSFUSION
PROCEDURES

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NHS SHETLAND
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1. **STATEMENT ON ‘TRANSFUSION PROCEDURES’**

This document provides users with the current procedures for the safe and appropriate administration of blood and blood components within NHS Shetland. These procedures are based on current guidelines issued by the British Committee for Standards in Haematology (BCSH), Serious Hazards of Transfusion (SHOT), EU Directives and Health Service Circulars; “Better Blood Transfusion”.

The policy applies to all staff working for NHS Shetland who are involved in the “blood transfusion process”. This includes laboratory staff and all those involved with the administration of blood and blood components and taking of blood samples for transfusion.

2. **CONSENT AND INFORMATION FOR PATIENTS**

The decision to transfuse is made following consideration of the potential risks and benefits of transfusion. Where possible, the decision to transfuse is discussed between the clinician and the patient (or their legal guardian) in advance of the transfusion. A record of this discussion must be made in the patient notes using the red-edged “Record of Transfusion” form. Formal written consent is not required. Information leaflets for transfusion are available on the wards, and these should be issued to all patients (or their guardians) who are to receive a transfusion. This guidance also applies when the need for a peri-operative transfusion is considered likely (i.e. patients for whom blood is cross-matched pre-operatively).

Some patients, for example Jehovah’s Witnesses, will not be willing to consent to transfusion. Shetland Health Board will ensure that such beliefs are acknowledged and respected and that information is provided for the management of these patients. Where pre-transfusion discussion is not possible (emergency situations), every effort should be made to ensure that the decision to transfuse is in accordance with the patient’s previously declared treatment preferences. This includes compliance with advance-decision documents.
Where blood components are given in an emergency situation, the patient (or their guardian) should be informed retrospectively. The decision to transfuse should be explained to the patient (or their guardian), and a record of this discussion should be entered in the patient notes. The information leaflet should be issued to these patients (or their guardians) as a guide to why the transfusion was considered necessary, and to provide basic information on the risks inherent with transfusion.

3. REQUEST FORMS, OBTAINING SAMPLES AND LABELLING

- Only staff who have completed the appropriate training (http://nhs.learnprouk.com, Learn Blood Transfusion: Module1 Safe Transfusion Practice) may take blood samples for transfusion. Medical Students are not permitted to take blood for the purposes of transfusion.

- The request form for blood/blood component is completed, all sections of which must be accurate, complete and legible. State the urgency of the request clearly on the request form. When an urgent sample is sent, please contact the laboratory Biomedical Scientist on call (through switchboard if after hours). Detailed instruction on completion of the Blood Transfusion Request Form is found in APPENDIX A.

- The collection of the blood sample and the labelling of the container must be carried out as one continuous, uninterrupted event involving one patient only. Sample containers MUST NOT be labelled prior to collection of the sample.

- If conscious, and able to, the patient is verbally asked to give their forename, surname and date of birth. These details are checked against the patient identification band.

- If the patient is unconscious or unable to state their name, the patient's identification band must be checked against written documentation (e.g. patients medical notes) containing the patient's details (surname, forename, gender, date of birth and CHI number / TN number).
Check these details match those on the request form. Any discrepancy **MUST** be resolved before proceeding.

The sample should be in a **blue** monovette marked “**Blood Transfusion**” EDTA 7.5ml. A **red** 2.7 ml EDTA monovette (as used for FBC) can be used for children if a full 7.5ml tube cannot be obtained.

**Label the blood tube at the bedside (by hand) with the patient’s full name, date of birth, CHI number/ TN number, gender, patient location, date & time sample was taken and the signature of the person taking the blood sample.**

**Ensure that the details on the blood tube and the request form are identical.**

The signatures on the blood tube and at the bottom of the request form imply that you have ensured that the sample is accurately identified and labelled for that specific patient.

**Note: Unlabelled/Mislabelled Samples Will Not Be Accepted.** Samples that are unlabelled or mislabelled will be discarded. Addressograph labels must not be used on the sample container but may be used on the request form. **Laboratory staff are not permitted to alter or add to the patient’s details on the sample or request form.** The sample tube must not carry the details of another patient, even if these have been scored out (obliterated) and the sample relabelled. Specimens which have evidence of a previously attached addressograph label will be discarded.

- Never ask another person to label a sample for you.
- Never label a specimen that you have not taken, even if you were present at the time.

**4. COLLECTION OF BLOOD FROM BLOOD ISSUE FRIDGE**

Only staff who have been competency assessed (for collection) by a TAAP approved assessor AND have completed transfusion training
(Learnbloodtransfusion Module1, Safe Transfusion Practice) **may collect blood.** Written documentation containing the patient's details, (surname, forename, date of birth, gender and CHI number/ TN Number) must be taken by the staff member collecting blood from the blood fridge. The Hospital Transfusion Committee encourages the use of an appropriately completed Record of Transfusion form for this purpose. The patient information must be checked against the patient's identification band and must match exactly. Details on this documentation must be checked against the compatibility label attached to the blood pack.

**All blood components removed from the issue fridge must be signed for in the appropriate folder which is stored in the blood culture incubator cupboard opposite the fridge.** It is vital to know if any blood components are removed or returned and that the date and timings are recorded. Only units that have been maintained at controlled temperature throughout can be considered safe for transfusion.

**Access to Blood Fridge:**
The external Blood Bank issue fridge is located in the corridor immediately outside the Laboratory Services Department. The Fridge is locked at all times to ensure that no unauthorised access is made to the blood components and that the temperature cold chain is maintained.

**Normal working Hours:** *(Week Days 08:30 – 17:00 and Saturday 09:00 – 12:00)*
Obtain key for Blood Bank issue fridge from Staff at Laboratory Services Department reception. Ring bell at reception to summon a member of the Laboratory staff.

**Out of Hours and Sundays**
A key is held at the Main Hospital reception and should be signed out and returned after locking the issue fridge.
Blood Safety Precautions

Ensure that the Blood Bank door is open for the minimum time during removal and that all local procedures for checks and signing for components are adhered to.

Transfer of Blood Components to Clinical Area

Blood components should be transferred to the relevant clinical area in the red transit boxes provided (stored next to the blood issue fridge). These boxes should be returned to the laboratory as soon as convenient. The boxes have not been evaluated for storing components, therefore they must be used for transport only. This means that no more than one unit should be transported at a time. The only exception to this in a situation of massive blood loss, where there is absolutely no doubt that all the removed units will be transfused well within the requisite time. The envelopes containing the blue traceability stickers must not be returned in the boxes since laboratory staff will check these infrequently.

COLLECTION OF BLOOD PRODUCTS

Blood products such as anti-D are collected directly from the Pharmacy reception.

Note: Human Albumin Solutions are also issued by Pharmacy.

5. THE BLOOD TRANSFUSION PROCESS

5.1 Requirements for setting up a Blood Transfusion

- Ensure that the Record of Transfusion form and prescription (fluid chart) are appropriately completed with all required signatures. On the Record of Transfusion form, Sections A, B, C and D MUST be completed before starting the transfusion. (Note: Second entry on a fluid chart is not necessarily required for outpatient transfusions)
- Secure venous access device of suitable gauge for the desired rate of transfusion
• Drip stand and infusion device if required at bedside
• Sphygmomanometer
• Thermometer
• Observation recording sheet (The Record of Transfusion form)
• Fluid balance chart
• IV fluid prescription sheet (units are prescribed on fluid charts)
• Blood/blood component pack
• Disposable apron
• Disposable gloves - for attaching administration set to patient's venous access and for handling blood component
• Blood or platelet administration set

5.2 Procedure for Blood Transfusion

• Gather the equipment stated above
• Check the blood/ blood component has been correctly prescribed (on the fluid chart). Then check that parts A, B C of the red-edged Record of Transfusion form have been completed. (Parts B and C must be completed by a doctor). Part D must be completed by the person setting up the transfusion. Check the blood/blood component pack to ensure there are no leaks, no unusual discolouration, cloudiness or clots. (If any of these are detected, seal in two polythene bags and inform the blood bank returning the component to them).
• Record base line observations of temperature, pulse and blood pressure and respiratory rate on the Record of Transfusion form. (Report any abnormalities to medical staff and only proceed if they consider this to be appropriate).
• Check that the blood/blood component has not passed its expiry date and will not expire during the transfusion episode. (Midnight of the expiry date as stated on the bag).

5.3 Patient Identification Checks for Blood/Blood Component Transfusion
Please also see Appendix B: Traceability Poster, Pre-transfusion checks
For unidentified patients also refer to Appendix C

THE FOLLOWING CHECKS MUST BE CARRIED OUT AT THE PATIENT’S BEDSIDE IMMEDIATELY PRIOR TO TRANSFUSING ANY BLOOD OR BLOOD COMPONENTS. If there are any discrepancies DO NOT PROCEED. Inform the laboratory or the Biomedical Scientist (BMS) on call and the prescriber.

- Where possible, two people should carry out the necessary checks, this must be done independently of each other. Checks must be performed by professionally registered staff members (Registered nurse, midwife, doctor or ODP)
- (If conscious and able to, the patient is asked to verbally give their name and date of birth. These details are checked against the patient's identification band.
- If the patient is unconscious or unable to state their name, the patient’s identification band must be checked against written documentation (e.g. patient’s medical notes) containing the patient's details (surname, forename, gender, date of birth and Hospital Unit number/CHI number/TN number). Record in the patient's notes if the patient is unconscious.
- Check that the information on the patient's identification band contains:
  - Surname
  - Forename
  - Date of Birth
  - Gender
  - CHI number / TN number
And is identical to the information on the:
  - Fluid chart prescription and Record of Transfusion form.
  - Blood/ Blood component compatibility label attached to the pack
• Check that the blood group and donation number on the blood or blood component pack is identical to that on the compatibility label attached to the blood/blood component pack.

• The blood component pack must be checked for compliance with any special requirement. (e.g. CMV negative, Hepatitis E negative or irradiated)

• If at any time you are interrupted or distracted, you must recommence the patient identification checks from the beginning.

• If the checks are satisfactory, the two staff undertaking the identity checks, complete the pink portion of the compatibility label with a signature each, and add the date and the time. The pink sticky label must be attached to the “Record of Transfusion” form, which is then included in the clinical notes as part of the contemporary medical/surgical record.

Most fatal transfusion errors are made by not checking the unit of blood is being administered to the correct patient.

There will be occasions where the donor unit selected by the laboratory is not the same group as the patient. This should be compatible with the patient, but if there is any doubt, check with the laboratory or the BMS on call.

5.4 Administration of a Blood Transfusion

• Put on apron, wash hands and put on gloves.

• Blood should be transfused through a sterile administration set designed for the procedure.

• The set has a double chamber and must contain a 170-micron filter. Prime the blood administration set with prescribed 0.9% Sodium Chloride.

• Attach the administration set to the venous access device, or if using a volumetric IV infusion pump, place the administration set in the infusion pump following the manufacturer's guidelines.
- Set the rate and volume to be infused as stated on the fluid chart.
- The two staff members carrying out the patient identity checks and administering the blood must sign the fluid chart prescription, adding the date and time of the commencement of each transfusion.

Once the transfusion has commenced:
- Peel off the completed pink portion from the compatibility label and attach it to the ‘Record of Transfusion’ form, which in turn is included in the patient’s medical notes as part of the contemporary record.
- Sign and complete the blue portion of the compatibility label. Tear off this entire blue section and return to the Hospital Transfusion Laboratory in the envelope provided. **This is required by law.**

**Notes:**
1. 0.9% Sodium Chloride is the only solution that should be infused through the administration set immediately before or after blood.
2. Electronic infusion pumps can be used to transfuse red cells, but they must have been verified as safe to use for this purpose and used according to the manufacturer's instructions. Blood administration sets specific for these devices must be used.
3. When required, Red blood cells should only be warmed using a specifically designed commercial device and following the manufacturer's instructions.
4. Drugs must not be added to blood.
5. Red cells should be collected from the blood refrigerator immediately prior to transfusion. **Commence the transfusion within 30 minutes and complete within 4 hours of removal from the controlled temperature storage facility.** If the infusion is not commenced within 30 minutes, the pack must be returned to the laboratory and labelled as described in section 16.
6. A new administration set should be used if the patient has multiple transfusions over more than 12 hours to prevent bacterial growth. Administration set should also be changed between different types of
blood component, and if ABO group of blood being transfused is changed.

7. In order to meet with the legal requirements outlined in the UK Blood Safety and Quality regulations 2005, the compatibility label now incorporates the pink and blue section to ensure traceability.

8. The blue section of the traceability tag must be placed in an envelope (designated return envelopes are the preferred method of return). These must be hand delivered to the laboratory. Do not place in the internal post.

5.5 **Observations During a Blood Transfusion**

- Temperature, pulse, blood pressure and respiratory rate must be recorded prior to transfusion episode no more than 60 minutes before the start of a transfusion. The **Record of Transfusion** form is to be used to record observations during a transfusion.

- For each unit transfused check the patients: record temperature, pulse, blood pressure and respiratory rate every 15 minutes for the first hour and hourly thereafter.

- If using infusion devices, perform visual and pump volume infusion checks.

- These observations must be repeated for each separate bag transfused.

- Temperature, pulse blood pressure and respiratory rate must be undertaken on completion of transfusion episode and not more than 60 minutes after the end of the component transfusion. Patients should be observed during the subsequent 24 hours (or if discharged, counselled about the possibility of late adverse reactions. Contact cards should be given to patients receiving a transfusion as a day patient to facilitate 24-hour access to appropriate clinical advice.
Notes:
1. The first 15 minutes of each unit is the most critical for the patient.
2. Visual observation of the patient is often the best way of assessing the patient during the transfusion. Patients must be transfused in an area where they can be readily observed and they should have a call button to obtain assistance.
3. Acute transfusion reactions can occur up to six hours post transfusion.
4. Unconscious patients are more difficult to monitor for signs of transfusion reactions.
5. Transfusion reactions should be considered when assessing a change or deterioration in a patient's condition, particularly during the first 15 minutes following the start of a unit of blood. Hypotension, fever, loin pain, uncontrolled bleeding due to Disseminated Intravascular Coagulation (DIC), haemoglobinuria or oliguria may be the first indications of an acute haemolytic transfusion reaction in these patients.
6. Second and subsequent units of blood being administered will have a delay in reaching the patient due to the time taken to travel through the administration set.

5.6 Post Blood Transfusion and Discard of Blood Packs
At the end of the transfusion, it is unnecessary to flush the giving set to extract the final 10mls of blood. Keep all packs until the transfusion episode is complete.

Once the transfusion episode is complete:
- Record the time of completion on the blood component transfusion Record of Transfusion form. This form MUST be placed in the appropriate section of the patient's medical notes.
- Observe and record the patient's temperature, pulse, blood pressure and respiratory rate on the frequent observations chart. Return to standard monitoring as indicated by the patient’s general condition.
- Put on an apron, wash your hands, put on gloves
• Disconnect the administration set from the cannula, ensuring the clamp is closed.

• If the cannula is to remain in situ, flush with 5 – 10mls of prescribed 0.9% Sodium Chloride. If it is to be removed, dispose of in a sharps bin.

• Before disposal of bags, ensure pink and blue traceability labels have been removed and placed in the notes/returned to the laboratory respectively.

• Double bag the packs and dispose of them in the orange waste system.

• Place the administration set into a sharps bin.

In the following **exceptional cases bags should be returned to the laboratory.**

• Any bag of blood, which is labelled “O NEGATIVE EMERGENCY BLOOD” (which has been transfused) together with the full details of the patient to whom it has been administered - surname, first name, date of birth, gender, CHI number (or TN number) and ward - entered on the confirmation of transfusion label attached to the bag. This is for retrospective cross-matching.

• In the event of an adverse reaction to a transfusion, all blood bags (used and unused) must be returned to the laboratory. This is for further investigations to be carried out.

• If blood/ blood component bags are vented **but not fully utilised**, the bag should be **sealed** and double wrapped and returned to the laboratory for disposal.
Notes:
1. If an infusion is to continue after the blood transfusion is complete, a new administration set must be used. Infusion fluids should not be used to flush the blood through the blood administration set.

6. PLATELET TRANSFUSIONS

Platelets are not routinely stocked by the laboratory in Shetland. In the event of a clinical need for platelets, the relevant consultant or a member of his/her staff should first liaise with the duty Biomedical Scientist who will then ask you to contact the SNBTS duty Medical Officer (DMO) in Aberdeen. Contact Mon-Fri (9-5) 01224 552322 – bleep 4363. The DMO may wish to discuss the patient’s requirements with a member of the clinical staff and in exceptional circumstances will arrange an air ambulance flight to Shetland with the necessary blood components. This must be authorised by a Consultant. Remember to inform the duty Biomedical Scientist who will make the necessary arrangements for the platelets to be collected by taxi, document their receipt and make ready for transfusion. Platelet concentrates should be stored at 22°C with continuous agitation. The laboratory in Shetland does not have this facility, therefore platelets should be used as soon as possible after arrival.

6.1 Collection from laboratory:
Refer to section 3 - Blood Collection. PLATELETS ARE NOT STORED IN THE BLOOD FRIDGE. Platelet packs to be collected from the laboratory. Do not collect platelets from the laboratory until the patient is ready to be transfused.
6.2 Requirements for a Platelet Transfusion

Please refer to sections indicated:
5.1 Requirements for setting up a Blood Transfusion,
5.2 Procedure for a Blood Transfusion
5.3 Patient Identification Checks for a Blood Transfusion

6.3 Administration of Platelet Concentrates

Refer to section 5.4 – Administration of a Blood Transfusion

6.4 Observations During Transfusion

Refer to Section 5.5 - Observations During a Blood Transfusion.

6.5 Post Transfusion and Discard of Blood Packs

Refer to Section 5.6 - Post Blood Transfusion and Discard of Blood Packs.

Notes:

1. Platelets must be transfused over a period of less than 60 minutes.
2. Platelets are stored at 22°C and are continually agitated whilst in the laboratory. On arrival at the clinical area, they should be given as soon as possible and must NEVER be placed in a fridge.
3. Platelets must be administered through a blood or platelet administration set that has a 170 - 200 micron filter.
4. Platelets MUST NOT be given through an administration set that has been used for blood.
5. Platelets must only be given by gravity feed and not via a pump as this may damage the platelets.
7. **FRESH FROZEN PLASMA (FFP) AND CRYOPRECIPITATE**

Twelve units of Group AB Fresh Frozen Plasma (FFP) are held at the laboratory (which can be used for all recipients). The FFP is stored at minus 40°C and will take approximately 30 minutes to thaw prior to issue. Advice on appropriateness and dose can be obtained from the **SNBTS Medical Officer** (Contact Mon-Fri (9-5) 01224 681818 Pager: 2346).

The laboratory holds an additional 4 units of Group AB Octaplas, the plasma product for patients born on or after 1 January 1996. The laboratory also holds 4 pooled units of group AB cryoprecipitate.

7.1 **Collection of FFP/ Octaplas/ Cryoprecipitate from laboratory or fridge**
Refer to section 3 - Blood Collection.

7.2 **Requirements for a Fresh Frozen Plasma or Cryoprecipitate Transfusion**
Refer to sections:
5.1 Requirements for setting up a Blood Transfusion
5.2 Procedure for a Blood Transfusion
5.3 Patient Identification Checks for a Blood Transfusion

7.3 **Administration of Fresh Frozen Plasma or Cryoprecipitate Transfusion**
Refer to section 5.4 – Administration of a blood Transfusion

7.4 **Observations During Transfusion**
Refer to Section 5.5 - Observations During a Blood Transfusion.

7.5 **Post Transfusion and Discard of Blood Packs**
Refer to Section 5.6 - Post Blood Transfusion and Discard of Blood Packs.

**Notes:**
1. Fresh Frozen Plasma and Cryoprecipitate may be transfused over a period of 30-60 minutes and must be transfused within the time period stated on the pack.
2. At the request of the Medical Officer, Fresh Frozen Plasma and Cryoprecipitate are thawed on demand. Once thawed, these components cannot be re-frozen. If unused by the clinical area, the laboratory must be informed to ensure accuracy of patient records.
3. Fresh Frozen Plasma and Cryoprecipitate must be given through blood or platelet administration set that has a 170 - 200 micron filter.
8. **ADVERSE REACTIONS**

**IF THE PATIENT EXPERIENCES ANY TRANSFUSION REACTION, STOP THE TRANSFUSION AND SEEK MEDICAL ADVICE. A MILD REACTION MAY BE THE INITIAL STAGES OF A SEVERE REACTION, DO NOT IGNORE.**

<table>
<thead>
<tr>
<th>Type of Reaction</th>
<th>Signs and Symptoms</th>
<th>Management</th>
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<tr>
<td><strong>Mild Reaction</strong></td>
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<tr>
<td><strong>DO NOT IGNORE.</strong></td>
<td>A mild reaction may be the initial signs of a severe reaction.</td>
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<tr>
<td></td>
<td>• Temperature rise</td>
<td>• Stop the transfusion</td>
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<td>• Rash</td>
<td>• Inform the medical staff</td>
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<td></td>
<td>• Pruritis</td>
<td>• Recheck the patient and component compatibility</td>
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<td><strong>Severe Reaction</strong></td>
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<td>• Assess the patient</td>
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<td>• Rigors</td>
<td>• Commence appropriate treatment</td>
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<td>• Restlessness</td>
<td>• Document the adverse event and subsequent management in the patient’s notes.</td>
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<td></td>
<td>• Tachycardia</td>
<td>If there is no improvement within 15 minutes, or if any deterioration occurs, treat as a severe reaction.</td>
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<td>• Anxiety</td>
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<td>• Pruritis</td>
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<td>• Palpitations</td>
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<td>• Dyspnoea</td>
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<td>• Headache</td>
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<td>• Pyrexia &gt; 1.5°C from baseline</td>
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<td>• Hypotension</td>
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<td>• Haemoglobinuria</td>
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<td>• Unexplained bleeding (Disseminated Intravascular Coagulation)</td>
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<td>• Chest pain</td>
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<td>• Loin/back pain</td>
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<td>• Pain at infusion site</td>
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<td></td>
<td>• Respiratory distress</td>
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ADVERSE EFFECTS OF TRANSFUSION

Please refer to the Handbook of Transfusion Medicine, available online at: http://www.transfusionguidelines.org.uk/index.asp?Publication=HTM

The flowchart below summarises the first line management of acute reactions:

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**Symptoms/signs of acute transfusion reaction**
- Fever; chills; tachycardia; hypotension; collapse; rigors; flushing; urticaria; bone, muscle, chest and/or abdominal pain; shortness of breath; nausea; generally feeling unwell; respiratory distress

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**Stop the transfusion and call a doctor**
- Measure temperature, pulse, blood pressure, respiratory rate, O₂ saturation
- Check the identity of the recipient with the details on the unit and compatibility label or tag

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**Flowchart**

1. **Symptoms/signs of acute transfusion reaction**
   - If temperature rise less than 1.5°C, the observations are stable and the patient is otherwise well, give paracetamol
   - Restart infusion at slower rate and observe more frequently

2. **Mild non-haemoletic transfusion reaction**
   - Give chlorpheniramine 10 mg slowly iv and restart the transfusion at a slower rate and observe more frequently

3. **ABO incompatibility**
   - Stop transfusion
   - Take down unit and giving set
   - Return intact to blood bank
   - Commence iv saline infusion
   - Monitor urine output/catheterise
   - Maintain urine output at > 100 ml/hr
   - Give furosemide if urine output falls/absent
   - Treat any DIC with appropriate blood components
   - Inform hospital transfusion department immediately

4. **Severe allergic reaction**
   - Bronchoospasm, angioedema, abdominal pain, hypotension
   - Stop transfusion
   - Take down unit and giving set
   - Return intact to blood bank along with all other used/unused units
   - Give chlorpheniramine 10 mg slow iv
   - Commence O₂
   - Give salbutamol nebuliser
   - If severe hypotension, give adrenaline (0.5 ml of 1 in 1000 intramuscular)
   - Clotted sample to transfusion laboratory
   - Saline wash future components (* equivalent to 0.5 mg im)

---

**Haemolytic reaction/bacterial infection of unit**
- Stop transfusion
- Take down unit and giving set
- Return intact to blood bank along with all other used/unused units
- Take blood cultures, repeat blood group/crossmatch/ABO, crossmatch screen, biochemistry, urinalysis
- Monitor urine output
- Commence broad spectrum antibiotics if suspected bacterial infection
- Commence oxygen and fluid support
- Seek haematological and intensive care advice

---

**Other haemolytic reaction/bacterial contamination**

---

**Fluid overload**
- Give oxygen and frusemide 40–80 mg iv

---

**Acute dyspnoea/ hypotension**
- Monitor blood gases
- Perform CXR
- Measure CVP
- Pulmonary capillary pressure

---

**TRALI**
- Clinical features of acute LVF with fever and chills
- Discontinue transfusion
- Give 100% oxygen
- Treat as ARDS – ventilate if hypoxia indicates
DOCUMENTING AND REPORTING UNTOWARD AND ADVERSE EVENTS

All events relating to Transfusion, whether they occur within the laboratory or on a ward/department, **MUST** be reported to the duty Biomedical Scientist in the laboratory. All details of a reaction, treatment and subsequent investigations must be documented. This applies to ‘near miss’ situations where the patient may not have been ‘harmed’. The laboratory staff will inform the Chairman of the HTC of all such incidents.

These will be reviewed and reported to Risk Management (Datix Reporting), SHOT and where necessary to MHRA through SABRE.

9. EMERGENCY SITUATIONS AND REQUESTS

Emergency Requests

Issue of O Rh Negative Blood for Emergency Caesarean Section or Massive Blood Loss when the Duty Biomedical Scientist is not in the Laboratory:

Four units of pre-selected **O Rh Negative** Blood are located in the top drawer of the Blood Bank issue Fridge located outside the Laboratory. These are in two sealed bags containing two units labelled as “**O Negative Emergency Blood**” on the tags. Each set contains instructions as how to fill in the pink and blue portions of the labels (Appendix I).

As soon as any units are removed the Laboratory must be informed. Outside of normal working hours the Hospital Receptionist must be informed and will call in the Duty Biomedical Scientist.

In the case of emergency Caesarean Section, the policy is to take a blood sample for Group and Screen and for a Haemoglobin check to be performed on the Point of Care (‘blood gas’) analyser located in the A&E Department. Should there be a subsequent requirement for a transfusion the Consultant Anaesthetist will authorise the Transfusion of the **O Rh Negative Emergency Blood**. Check that the patient has no previous atypical antibodies. Do not use O Negative if Anti-c or Anti-e has been previously detected in the patient’s plasma.

**Issue Of Blood Without Compatibility Testing In An Extreme Emergency When Biomedical Scientific Staff Are In The Laboratory:**
In extreme emergencies, the issue of O Rh Negative blood will be immediate. The issue of Rh Positive blood may also become necessary if supplies of O Rh Negative blood are used up. However, in most cases there will be sufficient time to 'Group and Screen' and group specific blood will be issued in preference to the unscreened issue of O Rh Negative blood. In cases where it is not possible to get a sample for blood group conformation, the laboratory will issue group O red cells. **In all instances provide the laboratory with a patient blood sample to allow retrospective testing.**

Within a given 24 hour period, where 10 or more units have been transfused, blood may be issued without crossmatch. After 72 hours, a fresh blood sample from the patient is required and a cross-match performed.

After transfusing group O blood to any patient of a group other than group O, the SNBTS Duty Medical Officer must always be consulted before blood of the patients own group is issued. If a change is made the giving set **MUST also be changed and the ward or theatre staff reminded of this necessity.**

**Requesting Additional Blood And Blood Components From SNBTS In An Extreme Emergency.**

During working hours laboratory Biomedical Scientists are responsible for ensuring the supply of blood and blood components from BTS in Aberdeen. Normal supplies are reviewed daily and flown in by scheduled flights.

Outwith normal working hours, consultant staff may find themselves involved in a situation whereby large quantities of blood and blood components, particularly clotting factors, are required urgently. **In the event of such a situation the requesting consultant or a member of his/her staff should first liaise with the duty Biomedical Scientist who will then contact the SNBTS Duty Medical Officer (DMO).** Contact Mon-Fri (9-5) 01224 681818 – bleep 2346. (out of core hours via SNBTS Aberdeen Blood bank on 01224 552 322). **The DMO will need to discuss the patient’s requirements with a member of the clinical staff and arrange an air ambulance flight to Shetland with the necessary blood and blood components. The use of an air ambulance must be authorised by a member of the Senior Management Team. Remember to inform the duty Biomedical Scientist who will make the necessary arrangements for the components to be collected by taxi, document their receipt and prepare the components for transfusion.**
10. **SUBSEQUENT TRANSFUSIONS**

If a transfusion has been completed and a further transfusion is to be given after 48 hours, a fresh sample of blood from the patient must be sent to the laboratory together with a new request form fully completed. Patients who have been transfused or pregnant within the last three months will require a sample to be less than 72 hours old at the time of transfusion. For all other patients, a sample is valid for up to seven days.

11. **POSTPONEMENT OR CANCELLATION OF A TRANSFUSION**

If a transfusion is postponed, the laboratory must be informed (Ext 3011) as soon as possible because matched blood will only be held for 48 hours unless special arrangements have been made for an extension.

As soon as it is known that blood reserved for a patient is no longer required, please notify the laboratory so that the blood may be returned to stock.

12. **PATIENTS WITH ATYPICAL ANTIBODIES**

An antibody screen is performed on all samples requiring a Group and Screen or crossmatch. If atypical antibodies are detected an antibody identification must be performed.

**Routine:** The laboratory in Shetland does not perform antibody identifications. Further specimens may be requested to send to SNBTS in Aberdeen for investigation. This may take up to 3 days. Once an antibody(s) has been identified, antigen negative blood will be cross-matched by SNBTS if blood is required. All patients scheduled for theatre who have known antibodies must be discussed with the laboratory. This includes patients which may only require a group and screen, in order to ensure that adequate stocks of antigen negative blood are available to cover the operation.

**Emergency:** In emergency situations there may not be time to complete an antibody investigation and provide antigen negative blood. Here, the laboratory can provide serologically compatible blood. This does carry some risk and **MUST** only be issued if authorised by the SNBTS Duty Medical Officer.

The SNBTS issues a card to all patients where a significant Antibody has been detected. This card indicates the specific Blood Group that
should be cross-matched for holder of the card. When possible, the patient should be asked whether or not he/she possesses such a card.

13. **AUTOLOGOUS BLOOD TRANSFUSION**

At present this procedure is not available in Shetland.

14. **PERI-OPERATIVE TRANSFUSION FOR ELECTIVE SURGERY**

**Haemoglobin transfusion thresholds for Elective Surgery**

The transfusion threshold is the haemoglobin value at which transfusion will normally be indicated in stable conditions, and in the absence of other clinical signs and symptoms of anaemia.

**Pre-operative thresholds**

All patients undergoing major elective surgery should have a full blood count performed prior to surgery. There should be a sufficient time lapse between investigation and operation so that the late discovery of anaemia can be avoided.

**Intra-operative thresholds**

There is no indication that thresholds should differ during this period. However the use of intra-operative transfusion must reflect the ongoing rate of surgical blood loss, continued haemodynamic instability, and anticipated post operative bleeding.

**Post-operative thresholds**

Transfusion is required at haemoglobin levels < 70g/L.

Patients with overt cardiovascular disease or with high risk of covert cardiovascular disease (e.g. elderly patients or those with peripheral vascular disease) are likely to benefit from transfusion when haemoglobin levels < 90g/L.

Transfusion is unjustified when haemoglobin levels >100g/L.

**Predicting the need for transfusion**
Eight risk factors predicting the need for allogenic transfusion have been defined:

- Low pre-operative haemoglobin
- Low weight
- Small height
- Female
- Age >65
- Estimated surgical blood loss
- The type of surgery
- Primary vs. revision surgery.

Please see Maximum Surgical Blood Ordering Schedule APPENDIX B

15. **REQUIREMENTS FOR Cytomegalovirus (CMV) NEGATIVE, IRRADIATED, AND HEPATITIS E NEGATIVE BLOOD**

The laboratory in Shetland does not routinely stock any CMV-Negative, Hepatitis E negative or irradiated blood components. Please see the reverse side of the transfusion request form for indications for CMV negative, Hepatitis E Negative or irradiated blood components. The decision to transfuse such patients should be discussed with the relevant consultant. The laboratory should be informed as soon as possible if irradiated, CMV-Negative or Hepatitis E Negative components are to be required.

16. **RETURN OF UNUSED COMPONENTS TO THE BLOOD ISSUE FRIDGE**

**Normal Working Hours:** Hand the component directly to a Biomedical Scientist who will decide on the fate of the unit.

**Outside of Normal working Hours:** Please complete the appropriate section of the Blood Component Issue Return form, the folder is kept in the blood culture incubator cupboard. The unit is then returned to the refrigerator in the second from bottom drawer labelled “Returned”
Blood Components Only”. These units cannot be reissued without specific authorisation from the Laboratory or BMS on call.

17. **PROFESSIONAL ACCOUNTABILITY**

Every practitioner is subject to the law. As well as adhering to professional standards, drawn up by the Nursing and Midwifery Council and the General Medical Council, all practitioners are accountable to patients for the provision of safe and appropriate care during the transfusion process. They are also accountable to their employer for the provision of care appropriate to their level of knowledge, skills and competence.
Guidelines for completion of Transfusion Request Forms

The request form – front

1. PATIENT IDENTIFICATION

National guidelines require the following information as mandatory:

- Surname/family name and first name(s) in full
- Date of birth (not age or year of birth)
- CHI number (or TN number if CHI number not issued)
- Gender of patient
- Reason for request

Please note that the full 10-digit CHI number and the date of birth are *separate* identifiers. In some cases the first six digits of the CHI number do not represent the date of birth. The patient’s address is not a good identifier as this can change without notification. For patients who do not have a CHI number e.g. holidaymakers, patients from North Sea rigs etc a **TN number must be used** (issued by TrakCare).

Although addressograph type labels are not accepted on samples they can be used on the request form, providing all relevant elements are present.

Hospital Ward and the patient’s consultant should be completed.
2. **CLINICAL INFORMATION**

This should be relevant to the request e.g. pre-op is inadequate without the surgical procedure being included.

3. **REQUIREMENTS**

For surgical operations refer to the NHS Shetland Maximum Surgical Blood Ordering Schedule (MSBOS) at APPENDIX B

- When a Group and Screen is required tick the appropriate box
- When there is a definite requirement for blood write in the number of units required after ‘X MATCH’ on the form
- If other components are required e.g. platelets, FFP or irradiated blood etc write these in the after OTHER REQUIREMENTS (these should be discussed by telephone with the laboratory staff before ordering).

4. **DEGREE OF URGENCY**

This area may be appropriate for requests for Blood or Blood components. “Group and Screen” specimens are usually processed by the batch (non urgent). However, in view of the new SNBTS requirement for a second specimen to be processed prior to issue of blood components in non emergency situations: If the second specimen needs to be taken from the patient on the day of surgery, this should be indicated on the request form and discussed with the laboratory staff.

When ELECTIVE is selected please enter date and time for the transfusion or when the surgical procedure is scheduled. All urgent requests should be telephoned to the laboratory.

5. **MEDICAL OFFICER**

The Medical Officer requesting the blood components or Group and Screen testing must sign and date the request form. A bleep number or telephone contact number is also required to enable the laboratory to notify availability or problems that may occur.

6. **CONFIRMATION BY PERSON TAKING THE PATIENT’S BLOOD SAMPLE**

The person who takes the patient’s blood sample for testing must:
• Confirm the patient details on the request with the patient identification band and where possible with the patient verbally by asking the patient their full name and date of birth. Never prompt a patient by asking “are you ….”.

• Label the patient samples with Forename, Surname, DOB, Gender, CHI number (or TN number), date and time of sampling. Then initial the tube.

• Sign, date and time the request form, noting the declaration on the request form. “I confirm that the specimens attached were taken from the patient detailed on this request form and specimen labelled” and confirm the way the sample details were checked.

The request form - reverse

The reverse of the request form contains the following:

• Information on how to complete the request form.
• Clinical indications for irradiated, CMV negative and Hepatitis E Negative blood components.
• A section for Laboratory to record changes to the initial request (As required by national standards)
NHS SHETLAND

MAXIMUM SURGICAL BLOOD ORDERING SCHEDULE

These are the recommendations for cross-matching and ‘group & screen’ for elective and emergency procedures. The following groups of patients may be at risk of increased blood loss and its effects and should be discussed with the anaesthetist:

- Patients who are on/have just stopped warfarin and whose INR is greater than 1.2 at the time of surgery
- Patients who have a haemoglobin on testing which is below the normal range
- Patients who are actively bleeding or shocked
- Patients who have a history of abnormal bleeding after surgery or who have a known clotting/platelet problem (Haemophilia/Von Willbrands Disease/thrombocytopenia)
- Patients who have abnormal antibodies noted on Group and Screen (because of potential difficulty obtaining blood)

All orders in excess of the recommendations given below need to be discussed with the Biomedical Scientist on call.

General Surgery

<table>
<thead>
<tr>
<th>Breast</th>
<th>Colorectal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastectomy</td>
<td>Right and extended right colectomy (unless anaemic)</td>
</tr>
<tr>
<td>G&amp;S</td>
<td>G&amp;S</td>
</tr>
<tr>
<td></td>
<td>Left Hemicolecotomy</td>
</tr>
<tr>
<td></td>
<td>Sigmoid Colectomy</td>
</tr>
<tr>
<td></td>
<td>Anterior resection</td>
</tr>
<tr>
<td></td>
<td>Total Colectomy</td>
</tr>
<tr>
<td></td>
<td>Panproctocolectomy</td>
</tr>
<tr>
<td></td>
<td>Abdomino-perineal resection</td>
</tr>
<tr>
<td></td>
<td>Rectopexy</td>
</tr>
<tr>
<td></td>
<td>Planned exploratory laparotomy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emergency General Surgery</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Laparotomy</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Bleeding peptic ulcer</td>
<td>6 units</td>
</tr>
<tr>
<td>Bleeding from large bowel</td>
<td>6 units</td>
</tr>
</tbody>
</table>
## General

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Blood Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incisional hernia</td>
<td>G&amp;S</td>
</tr>
<tr>
<td><strong>Upper GI &amp; Hepatobiliary</strong></td>
<td></td>
</tr>
<tr>
<td>Cholecystectomy and exploration of common bile duct</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Fundoplication</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Splenectomy</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Vagotomy</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Gastric surgery</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Liver biopsy</td>
<td>G&amp;S</td>
</tr>
</tbody>
</table>

## Vascular Surgery

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Blood Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embolectomy</td>
<td>G &amp; S</td>
</tr>
<tr>
<td>Femoral endarterectomy</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Femoro-popliteal bypass</td>
<td>2 Units</td>
</tr>
<tr>
<td>Aorta-iliac endarterectomy</td>
<td>2 Units</td>
</tr>
<tr>
<td>Ruptured aneurysm</td>
<td>10 Units (Refer to Massive Blood Loss, Page 27)</td>
</tr>
</tbody>
</table>

## Urology

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Blood Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trans-urethral prostatectomy (TURP)</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Trans-urethral resection of bladder (TUR-BT)</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Nephrectomy</td>
<td>2 Units</td>
</tr>
<tr>
<td>Open prostatectomy</td>
<td>2 Units</td>
</tr>
</tbody>
</table>

## Orthopaedics

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Blood Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fractured neck of femur:</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Dynamic hip screw</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Leg amputation</td>
<td>G&amp;S</td>
</tr>
</tbody>
</table>
Obstetrics:

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Caesarean section</td>
<td>Send blood to lab (but blood not processed prior to theatre)</td>
</tr>
<tr>
<td>Elective Caesarean Section</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Trial of scar</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Retained placenta</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Placenta praevia</td>
<td>2 Units (on stand-by, G&amp;S weekly)</td>
</tr>
<tr>
<td>Ante-partum / Post partum haemorrhage</td>
<td>2 Units</td>
</tr>
</tbody>
</table>

Gynaecology:

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical management of miscarriage</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Threatened miscarriage</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Evacuation Retained Products Conception (ERPC)</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Ectopic pregnancy High risk (clinical signs of bleeding or low Hb)</td>
<td>2 Units</td>
</tr>
<tr>
<td>Ectopic pregnancy Low Risk (laparoscopy for possible ectopic)</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Tubal Surgery</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Ovarian cystectomy (small cyst) / wedge resection</td>
<td>G&amp;S</td>
</tr>
<tr>
<td>Oophorectomy</td>
<td>G&amp;S</td>
</tr>
</tbody>
</table>
Traceability poster

A copy of this poster is included with a return envelope for blue Traceability tags.
UNIDENTIFIED PATIENTS PRESENTING TO ACCIDENT & EMERGENCY

- If a patient arrives in A&E and their name and/or date of birth is unknown (e.g. unconscious), a unique hospital TN number will be allocated to the patient on their entry into the A&E electronic Database (TrakCare).
- This unique number must be on all documentation.
- The patient identification band must have the following:
  - TN Number
  - Gender
- The request form and sample must contain the TN number, gender and location of patient.
- Document in patient’s notes that a sample has been sent to the laboratory using a TN number.
- When patient identification is available, a new patient identification band must be completed with:
  - Forename
  - Surname
  - Gender
  - Date of Birth
  - CHI number
- Attach the new identification band to the patient. These patient details should be used for all future identification. Do not remove original identification band, with TN number.
- Advise the laboratory of updated information, quoting the previously issued TN number allocated for this patient. This is the responsibility of the clinical area where the patient is identified. A fresh sample and request form may be requested (complete with forename, surname, gender, DOB & CHI number).
- Document in patient’s notes that this has been undertaken.
GUIDELINES: BLOOD & COMPONENT THERAPY IN MAJOR HAEMORRHAGE

Background
This document is based on guidelines issued by the British Committee for Standards in Haematology in July 2015 and the Scottish Major Haemorrhage Template May 2010. It intends to inform the practitioner and provide a useful structure for clinical management and is not to be regarded as inclusive of all scenarios.

Objective
To facilitate communication between the clinical area and the laboratory, and to provide quick and effective delivery of blood components for patients who fulfil the criteria for massive blood loss.

Definition (any one of the following)
- 150 ml/min blood loss
- 50% blood volume (BV) loss within 3 hrs
- 4 units transfusion in 4 hours with continued major bleeding
- One blood volume loss within 24hrs
- 10 units blood transfusion within 24hrs

Obstetric Patients Only: To be used in conjunction with current obstetric guidance on management of massive haemorrhage. Royal College of Obstetricians and Gynaecologists guidelines on the management of post partum haemorrhage can be found at:

https://www.rcog.org.uk/globalassets/documents/guidelines/gt52postpartumhaemorrhage0411.pdf

Procedure
The lead clinician must ensure that the laboratory is made aware of a patient with massive haemorrhage as soon as possible. The phrase; "I want to trigger the major haemorrhage protocol" should be used. The location, for example, maternity ward or A&E department, must be stated and the name and contact numbers of a member of the clinical team nominated to be responsible for liaising with the laboratory.

General response
Control bleed; secure wide bore (14 or 16 G) venous access; avoid hypothermia - warm fluids. Take appropriate blood tests and send urgently to the laboratory.
Immediate blood tests

FBC; Crossmatch; Clotting screen (including Fibrinogen); Biochemistry (including Calcium); Blood gases, including lactate measurement (if appropriate).

Information required by Laboratory

Urgency of the situation!

Patient details -
Minimum data set:
Conscious patient - name; DOB; gender; CHI number (or other unique number - hospital No. / emergency No./ A&E No.)
Unconscious/ unidentified patient – minimum of gender, unique number and clinical area.

Major haemorrhage location
Key clinical contact
Contact number – need to establish clear lines of communication
Number and nature of components required in the first instance
Patient diagnosis, location of patient and any likely moves

Confirm which samples have been sent
Advise clinical area who is the on-call Biomedical Scientist (BMS) and give contact number

Blood Component Availability

- Immediate: O Neg blood (Four units available for immediate use in blood issue fridge)
- Urgent (15-20 minutes*) – Group specific blood (ABO + RhD grouping)
- 30-40 minutes* – fully crossmatched blood. Group O blood will be issued on first time grouping samples.
- Platelets: Not immediately available in Shetland. Request early if it is anticipated that the blood loss will exceed twice the circulating volume.
- Fresh Frozen Plasma – allow at least 35 minutes for thawing

TRAUMA

Where trauma and potential for coagulopathy (with systolic BP < 90; poor response to initial fluid resuscitation; and suspected active haemorrhage) and no results available:

Order – 6 RBC / 4 FFP in first instance
If bleeding persists and still no blood results – order 4 RBC / 4 FFP / 1 unit platelets (see above)/ 2 pools cryoprecipitate (if evidence of hypofibrinogenaemia).
Consider allowing **permissive hypotension** (SBP 80-90 mmHg) if no evidence of brain injury.

**Tranexamic Acid:** 1 gm, then 1gm every eight hours should be given to all trauma patients with significant bleeding.

Use Prothrombin Complex Concentrate (PCC) for the emergency reversal of Vitamin K Dependant oral anticoagulants.

Consider use of high dose PCC for patients on anti-Xa drugs such as Rivaroxaban.

Praxbind (idarucizumab) is available from Pharmacy for patients anticoagulated with Dabigatran (Praxada).

Consider Desmopressin 0.3 mcg/kg if on Aspirin alone.

**Once results available**, then tailor blood product support to maintain:

- **Haemoglobin:** should be kept above > 70g/L (range 70-90 g/L).
- **Transfuse RBC:FFP** in a ratio of 2:1 units.
- **Fibrinogen** should be maintained above 1.5 g/L – transfuse 2 units of pooled cryoprecipitate if fibrinogen < 1.5 g/L.
- **Platelets:** See notes above. If platelets are available and platelet count < 50 x10^9/L – transfuse 1 unit of platelets (2 units if < 30). Note: In the context of Traumatic Brain Injury, platelets should be administered if platelet count falls below 100x10^9/L.
  - Keep ionised calcium in the normal range (1.1-1.3 mMol/L).

**Massive haemorrhage, but no immediate risk for coagulopathy**

Access emergency O Negative units

Liaise with BMS for ongoing blood component support, and discuss with haematologist on-call at Aberdeen Royal Infirmary.

Anticipate need for treating coagulopathy if bleeding persists – need for Fresh Frozen Plasma (allow for defrosting time and delivery), platelets and possibly cryoprecipitate (allow for defrosting time and delivery).

**Once results available**, then tailor blood product support to maintain:

- **Haemoglobin:** > 70 g/L (range 70 – 90)
- **PT & APTT** – normalise – transfuse 4 units of FFP if APTT or PT ratio > 1.5 x normal
- **Fibrinogen** > 1.5g/L. – transfuse 2 pools of cryoprecipitate if < 1.5 gm/L.
- **Platelets:** See notes above. If platelets are available and platelet count < 50 x10^9/L – transfuse 1 unit of platelets (2 units if < 30). Higher threshold of 100 x10^9/L in the context of Traumatic Brain Injury.

**Management of complications**

The following complications should be anticipated and managed appropriately in patients receiving multiple units of blood components.
Hypothermia – monitor temperature, keep patient warm.

Hyperkalaemia – monitor potassium, initiate local protocol for treatment of any hyperkalaemia (glucose + insulin + bicarbonate).

Acidosis – monitor patient closely, take corrective action.

De-activation of Major Haemorrhage response

It is essential that the BMS is informed whenever the clinical emergency has ended, to minimise wastage of blood components. This is the responsibility of the clinical lead.

Audit

Activation of the major haemorrhage response will be audited by the local Hospital Transfusion Committee so that defects in the process can be identified, rectified, and lessons learned fed back to all staff involved in the major haemorrhage response.

Summary of Blood and Component Therapy for Massive Blood Loss

<table>
<thead>
<tr>
<th>GOAL</th>
<th>PROCEDURE</th>
<th>COMMENTS</th>
</tr>
</thead>
</table>
| • Restore circulating volume  
  (Consider permissive hypotension if no brain injury) | • Insert wide bore peripheral or central cannulae  
  • Give limited volumes of pre-warmed crystalloid as needed | • 14G  
  • Keep patient warm  
  • Concealed blood loss is often underestimated |
| • Contact key personnel | • Clinician in charge  
  • Consultant Anaesthetist  
  • Laboratory BMS  
  • Haematologist | • A named senior person must take responsibility  
  • For communication and documentation |
| • Arrest bleeding | • Early surgical intervention | |
| • Request laboratory investigations | • FBC, PT, APTT, Fibrinogen, blood bank sample, biochemical profile, ABG  
  • Ensure correct sample ID  
  • Repeat tests after blood component transfusion | • Results may be affected by colloid infusion  
  • Ensure correct patient identification  
  • May need to give components before results available |
| • Maintain HB > 80g/L | • Assess degree of urgency  
  • Give red cells  
  - Group O D negative  
  Extreme emergency  
  Until ABO and D | • D positive is acceptable of patient is male or postmenopausal female |
**NHS SHETLAND: TRANSFUSION PROCEDURES 6.10**

<table>
<thead>
<tr>
<th>Groups known</th>
<th>ABO group specific</th>
<th>Fully compatible blood</th>
<th>Further serological cross match not required after 1 blood volume replacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>When blood group known</td>
<td>Use blood warmer and/or rapid infusion device if flow rate &gt; 50ml/kg/hr in adult</td>
<td>Time permitting</td>
<td>Lab will complete cross match after issue</td>
</tr>
</tbody>
</table>

| Maintain platelets > 50x10^9/L | See notes above. Not immediately available in Shetland. Request early if it is anticipated that blood loss will exceed 2 x the circulating volume. | Allows margins of safety to ensure platelets > 50x10^9/L | Keep platelets > 100x10^9/L if multiple or CNS trauma or if platelet function abnormal |

<table>
<thead>
<tr>
<th>Maintain PT &amp; APTT &lt; 1.5 x mean control</th>
<th>Give FFP 12-15ml/kg (1 litre or 4 units for an adult) guided by tests</th>
<th>PT/APTT &gt; 1.5 x mean normal value correlates with increased microvascular bleeding</th>
<th>Keep ionised calcium &gt; 1.13mmol/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain Fibrinogen &gt; 1.5g/L</td>
<td>If not corrected by FFP give cryoprecipitate (2 packs pooled for an adult)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Should be available on site</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Allow 30 mins thawing time</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Avoid DIC | Treat underlying cause (shock, hypothermia, acidosis) | Although rare, mortality is high | |
Major Haemorrhage Flow Chart

Recognize blood loss and trigger major blood loss protocol

Take baseline blood samples prior to transfusion for:
- Full blood count, Group and Save, clotting screen including Clauss fibrinogen or
- Near-patient haemostatic testing if available
- Give FFP:RBCs in at least 1:2 ratio

If trauma and < 3 h from injury, give tranexamic acid 1 g bolus over 10 min followed by IV infusion of 1 g over 8 h and FFP:RBC in 1:1 ratio; consider a dose of platelets. Consider tranexamic acid 1 g bolus in non-traumatic bleeding

TEAM LEADER to further co-ordinate management and nominate a member of team to liaise with transfusion laboratory
State patient unique identifier & location
- Limit use of Group O RhD Neg RBC; until group known use O RhD Neg units in females < 50 years and consider O RhD Pos in males
- Use group-specific RBC as soon as available
- Request pre-agreed ratio of blood components, e.g., 4 units RBC and 4 units FFP; Send Porter to laboratory to collect urgently
- Consider blood warmer

IF BLEEDING CONTINUES

Until Laboratory results are available:
- Give FFP and red cells in a ratio of 1:1
- Consider Cryoprecipitate (2 pools)

When laboratory results are available:

<table>
<thead>
<tr>
<th>IF:</th>
<th>GIVE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falling Hb</td>
<td>Red cells</td>
</tr>
<tr>
<td>APPT and/or PT ratio &gt; 1.5</td>
<td>FFP 15-20 ml/kg</td>
</tr>
<tr>
<td>Fibrinogen &lt; 1.5 g/l</td>
<td>Cryoprecipitate (2 pools)</td>
</tr>
<tr>
<td>Platelet count &lt; 50 x 10^9/l</td>
<td>Platelets 1 adult dose (order when &lt; 100 x 10^9/l)</td>
</tr>
</tbody>
</table>

Continue cycle of monitoring and giving appropriate blood components until bleeding ceases
GUIDE TO REVERSAL OF ORAL ANTICOAGULATION ON WARFARIN

The following guideline is based on that issued by the “Grampian Medicines Committee January 2001”

The decision to reverse the anticoagulation effects of Warfarin will be based on clinical criteria. The main consideration initially is whether the patient is bleeding or not and to what extent. Also to be considered are the “at risk” patient groups as well as contraindications for use of the specific products. The following is a guide to the specific classification:

1) **No Bleeding**
   a) **Standard Risk** – These patients would not normally require reversal at INR results between 4.5 – 6.9
   b) **High Risk** - Patients whose risk of bleeding is approximately 15 fold higher. These patients have the following characteristics:

   - Increased age
   - Previous GI bleed
   - Previous CVA
   - Anaemia
   - Renal failure
   - Diabetes mellitus
   - Previous MI

2) **Bleeding**
   a) **Major Bleeding**

   - Intracranial (CT or MRI documented)
   - Retroperitoneal (CT or MRI documented)
   - Intra-ocular (excludes conjunctival)
   - Spontaneous muscle haematoma associated with compartment syndrome
   - Pericardial
   - Non-traumatic intra-articular
   - Any invasive procedure to stop bleeding
   - Active bleeding from any orifice plus either < 90mm Hg systolic, oliguria and/or > 20g/L fall in haemoglobin
b) Minor Bleeding  Any other bleeding that would not influence your
decision to anticoagulate a patient.

<table>
<thead>
<tr>
<th>Products available for reversal of anticoagulation effect of Warfarin</th>
</tr>
</thead>
</table>

1) Pharmacy products
   a) Vitamin K iv
      May rarely cause anaphylaxis. Administration should be:
      (i) Slow iv bolus
      (ii) Withheld in patients with history of previous severe
           allergic reaction
   b) Oral Vitamin K
      Preparation used is the preparation for injection (10mg/ml)
      Konakion (Roche). Dilute dose in small amount of juice/water
      after drawing up in a 1ml insulin syringe.

2) Blood Products and Components
   a) Prothrombin Complex Concentrate (PCC)
      This product is issued from the Pharmacy and is labelled as
      “Beriplex”. Where time allows, the use of this product should be
      discussed with the SNBTS Duty Medical Officer: Phone  01224
      552322.

      PCC induces a prothrombotic state and the following are relative
      contraindications to its use:
      (i)  Liver disease in the recipient
      (ii) Cardiovascular disease in the recipient
      (iii) Risk of DIC in the recipient
      (iv)  Previous allergic reaction to PCC

      Apart from (iv), none of these are absolute contraindications.

   b) Fresh Frozen Plasma (FFP)
      FFP should only be considered where there is a positive
      contraindication for the use of PCC.

Procedure Charts

Refer to the charts for guidance in the selection of the appropriate route for
reversal. The Laboratory should be contacted as soon as possible and a
check INR should be requested.
Reversal of Warfarin anticoagulation when no bleeding is present:

**No Bleeding**

- INR > 7.9
  - Vitamin K 2.5 mg orally, withhold warfarin
  - Check INR in 24 hours

- INR 5–7.9
  - High Risk
  - Low Risk
  - Reduce Warfarin Dose or withhold one or more doses as appropriate

Reversal of Warfarin when there is active bleeding:

**Active Bleeding**

- Major
  - Vitamin K 5 mg iv and Beriplex IV
  - PCC Dose: INR
    - 1.4–3.9: 25 u/kg
    - 4.0–5.9: 35 u/kg
    - > 6.0: 50 u/kg
  - Immediate Check PT and APTT
  - Adequate correction
  - Repeat clotting in 4–6 hours

- Minor
  - Vitamin K 2.5 mg orally or IV. Withhold Warfarin
  - Check INR in 24 hours, or earlier if deterioration.

  Consider: DIC, liver disease, lupus inhibitor etc. Seek Haematology advice
EMERGENCY PLANNING: Emergency Blood Management Group and contingency plans for national blood shortages.


The plan describes three phases, dependent on SNBTS stock levels - Green (sufficient stocks), Amber (stocks about 67% of normal) and Red (stocks approaching 50% of normal). The SNBTS will inform the clinical laboratory manager of a change in phase.

Hospitals are required to establish an Emergency Blood Management Group (EBMG) with a remit to produce and manage emergency blood management arrangements to cover all three phases.

The membership of the EBMG for the Shetland Health Board will be as follows:

<table>
<thead>
<tr>
<th>Role</th>
<th>Member</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chief Executive (or representative)</td>
<td>Mr R. Roberts</td>
</tr>
<tr>
<td>Medical Director</td>
<td>Dr. R. Diggle</td>
</tr>
<tr>
<td>Director of Nursing</td>
<td>Mrs K. Carolan</td>
</tr>
<tr>
<td>Chairman of the HTC/ EBMG</td>
<td>Dr B. Poulton</td>
</tr>
<tr>
<td>Laboratory lead for Transfusion</td>
<td>Mrs D Smith</td>
</tr>
<tr>
<td>Surgical Representative</td>
<td>Mr P. Mikolajczak</td>
</tr>
</tbody>
</table>

GENERAL ACTIONS:

On notification from the SNBTS of a change in code, the Transfusion lead for the Laboratory Services will inform the chairman of the Hospital Transfusion Committee. This will result in three main responses:

1. The chair of the HTC will notify by telephone all members of the EBMG. The EMBG will convene within 48 hours following the notification of ‘code Red’ status, and within five working days following the notification of ‘code Amber’ status.
2. The chair of the HTC will inform all consultants and members of HTC of the change in status, as well as the implications for service.
3. There will be a daily review of blood stocks by the Blood Bank Manager. Data on stocks will be supplied to the SNBTS. Data on stocks will also be presented to the EBMG so that decisions about levels of activity can be made. The Medical Director will be
responsible for conveying these decisions to the surgical, anaesthetic and medical consultants.

**SPECIFIC ACTIONS:**

The table below outlines the actions required for the three phases and summarises the restrictions on service likely to be imposed in amber and red phases:

<table>
<thead>
<tr>
<th>RED PHASE</th>
<th>Blood will only be issued in life threatening situations as indicated below.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Stocks reduced to &lt;50% of normal)</td>
<td>✓ Resuscitation: Life threatening situations with ongoing blood loss. All cases where there is an anticipated blood loss of more than one whole circulating volume should be discussed with the duty consultant haematologist at the Aberdeen Royal Infirmary.</td>
</tr>
<tr>
<td></td>
<td>✓ Scheduled surgery. Potentially curative cancer will be supported if at all possible.</td>
</tr>
<tr>
<td></td>
<td>✓ Non-surgical life threatening anaemia will be treated. This includes patients receiving Level 2 or 3 critical care who are otherwise expected to survive.</td>
</tr>
<tr>
<td></td>
<td>✓ Planned or elective chemotherapy should be deferred where possible (in discussion with the haematologist responsible for transfusion).</td>
</tr>
<tr>
<td></td>
<td>✓ Severe bone marrow failure will be supported, but in all cases, a lower transfusion threshold will be considered.</td>
</tr>
<tr>
<td></td>
<td>✓ Sickle cell crisis: where transfusion is required.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AMBER PHASE</th>
<th>Elective surgery will only proceed if:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Stocks reduced to around 67% of normal)</td>
<td>✓ MSBOS indicates that Group and Screen only required.</td>
</tr>
<tr>
<td></td>
<td>✓ It is expected that the patient will tolerate a haemoglobin level of 80 gm/l in the postoperative period.</td>
</tr>
</tbody>
</table>

In transfusion dependant patients, haemoglobin will be maintained at 70 gm/dl where possible.

All requests for blood where the haemoglobin is greater than 90 gm/l will be reviewed by a SNBTS haematologist.

<table>
<thead>
<tr>
<th>GREEN PHASE</th>
<th>The HTC meets every six months. BBTP Level One training for all staff involved in the transfusion process. Ongoing review of MSBOS, transfusion policy and waste levels, with dissemination to employees who are involved in prescribing blood.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Normal Stock Levels)</td>
<td></td>
</tr>
</tbody>
</table>
WOMEN OF CHILD BEARING AGE; POTENTIAL PROBLEMS RELATING TO PREGNANCY

1) **THE KELL BLOOD GROUP**

The Kell blood group system is complex and contains antigens that are highly immunogenic. Kell system antibodies should be considered clinically significant and are known to cause both transfusion reactions and haemolytic disease of the newborn.

The K antigen is expressed in approximately 10% of Caucasians but is more common in those of Arab descent.

Anti-K is described as being the next most prevalent antibody after those in the ABO and Rh systems. Anti-K is commonly IgG and non-complement binding. Transfusion reactions due to extravascular haemolysis may be severe. Anaemia resulting in hydrops fetalis may arise from intra-uterine immunological suppression of erythroid precursors in a Kell positive fetus of an immunised female. The fetus may be compromised early in development, and antibody titres are not often reflective of disease severity. For these reasons alloimmunisation is best avoided.

**Recommendations:**

Clinical scenarios where **K negative units are indicated** (listed in priority order) include:

1. Any patient with (or a history of producing) anti-K
2. Elective transfusion of pregnant females or females of child bearing potential **who have a K negative phenotype** (~90% of women)
3. Transfusion of pregnant females or females of child bearing potential who are unable to be phenotyped prior to transfusion, where possible. The clinical urgency of transfusion should be considered and emergency transfusion should not be delayed by attempts to source K negative units.

2) **RH PROGRAMME AND ANTI-D INJECTION**

The objective of the Rh programme is to prevent Haemolytic Disease of the Newborn (HDN), sometimes referred to as Haemolytic Disease of the Fetus due to Anti-D. It is therefore essential to determine the Rh D group and to screen for immune anti-D in all women who are or could be pregnant. This will decide the eligibility for Anti-D prophylaxis. (If immune Anti-D is present, prophylaxis will not be indicated).
Routine Antenatal Anti-D Prophylaxis (RAADP) for Women who are Rh D Negative

RAADP is recommended as a treatment option for all pregnant women who are rhesus D negative and who are not known to be sensitised to the Rh D antigen. Shetland has introduced this using a single dose of 1500IU at 28 weeks. This is a separate program from those described below. Full guidelines and supporting information are available from the Maternity Department.

Prophylaxis For Sensitising Events Before Delivery

Up to 20 weeks gestation: A dose of 250 IU (50 μg) of Anti-D immunoglobulin is recommended for prophylaxis following sensitising events. A Kleihauer test is not required. When bleeding continues intermittently after 12 weeks gestation, Anti-D Ig should be given at approximately 6 weekly intervals. In pregnancies<12 weeks gestation, anti-D Ig prophylaxis is only indicated following ectopic pregnancy, molar pregnancy, therapeutic termination of pregnancy and in cases of uterine bleeding where this is repeated, heavy or associated with abdominal pain.

For all events after 20 weeks: Minimum dose: 500 IU (100 μg) Anti-D Ig should be given, followed by a Kleihauer test to identify FMH > 4 ml red cells; additional anti-D immunoglobulin should be given as required. (See 25). A further dose will be required at delivery of an RhD positive infant even if antenatal prophylaxis has been given and the Kleihauer test was negative.

Post Delivery

As soon as possible after delivery a specimen from the mother is taken for group and antibody screen. A cord sample is also taken and so that the baby’s blood group can be determined. If the test results are not available within 72 hours, a dose of Anti-D should be offered regardless. The standard post-delivery dose is 1500 IU (as recommended by the RCOG for remote Maternity Units)

Dosage and Administration

For successful immunoprophylaxis, anti-D immunoglobulin should be given as soon as possible after the sensitising event, but always within 72 hours. If for some reason it is not given
before 72 hours, every effort should still be made to administer the Anti-D since a dose given within 10 days may provide some protection.

As a guide 125 IU of prophylactic Anti-D Immunoglobulin for every 1ml of Feto-Maternal Haemorrhage (FMH) is used. Where a large (i.e. >4ml) FMH is suspected the SNBTS DMO should be contacted. The standard dose is 500 IU.

Kleihauer Test (Carried out by SNBTS Aberdeen)

A Kleihauer test is of therapeutic value as a screening test for Rh (D) Negative women. This test estimates the size of the feto-maternal haemorrhage (FMH) by detecting the fetal haemoglobin (HbF) in the maternal circulation, the result may necessitate additional Anti-D immunoglobulin. This test can also be requested for clinical management of specific situations as indicated below*.

Up to 50% of large feto-maternal haemorrhages occur after normal deliveries. However, the following clinical circumstances are more likely to be associated with large feto-maternal haemorrhages and a Kleihauer test should be requested as soon as possible after the diagnosis has been made:

- Traumatic deliveries including caesarean section
- Manual removal of the placenta
- Unexplained hyrops faetalis
- Intrauterine deaths (IUD)
- Twin pregnancies (at delivery)
- Abdominal trauma during the third trimester*
- Sinusoidal fetal heart rate tracing associated with FMH*
- Stillbirths*

Note: False positive results may be obtained in conditions resulting in increased levels of HbF in the maternal cells (e.g. thalassaemia or hereditary persistence of fetal haemoglobin)
Use of Emergency O Negative Blood

Emergency O Negative blood will be supplied with a label stating the donation number as shown in figure 1. Please fill this label in as directed in figure 2. Send the bag together with the label giving the patient’s details back to the laboratory as soon as possible.

Figure 1. Fill in the pink portion of the label and stick in the patient’s notes.

Form 39 – Use of Emergency O Negative Blood
References

BCSH Guidelines a Practical Guideline for the haematological management of major haemorrhage; British Journal of Haematology 2015; 170  788-803

BCSH Guidelines for pre-transfusion Compatibility Procedures in Blood Transfusion laboratories; Transfusion Medicine 2013; 23: 3-25

BCSH guideline for the use of anti-D immunoglobulin for the prevention of haemolytic disease of the fetus and newborn. Transfusion medicine 2014

Warfarin Reversal; Grampian Medicines Committee January 2001.
# 1. Rapid Impact Checklist  **Blood Transfusion Procedures**

<table>
<thead>
<tr>
<th>Which groups of the population do you think will be affected by this proposal?</th>
<th>Other groups:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• minority ethnic people (incl. gypsy/travellers, refugees &amp; asylum seekers) ✔</td>
<td>• people of low income ✔</td>
</tr>
<tr>
<td>• women and men ✔</td>
<td>• people with mental health problems ✔</td>
</tr>
<tr>
<td>• people in religious/faith groups ✔</td>
<td>• homeless people ✔</td>
</tr>
<tr>
<td>• disabled people ✔</td>
<td>• people involved in criminal justice system ✔</td>
</tr>
<tr>
<td>• older people, children and young people ✔</td>
<td>• staff ✔</td>
</tr>
<tr>
<td>• lesbian, gay, bisexual and transgender people ✔</td>
<td></td>
</tr>
</tbody>
</table>

N.B. The word proposal is used below as shorthand for any policy, procedure, strategy or proposal that might be assessed.

<table>
<thead>
<tr>
<th>What positive and negative impacts do you think there may be?</th>
<th>Which groups will be affected by these impacts?</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What impact will the proposal have on lifestyles? For example, will the changes affect:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Diet and nutrition?</td>
</tr>
<tr>
<td>• Exercise and physical activity?</td>
</tr>
<tr>
<td>• Substance use: tobacco, alcohol or drugs?</td>
</tr>
<tr>
<td>• Risk taking behaviour?</td>
</tr>
<tr>
<td>• Education and learning, or skills?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Will the proposal have any impact on the social environment? Things that might be affected include</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
<tr>
<td>Social status</td>
</tr>
<tr>
<td>Employment (paid or unpaid)</td>
</tr>
<tr>
<td>Social/family support</td>
</tr>
<tr>
<td>Stress</td>
</tr>
<tr>
<td>Income</td>
</tr>
</tbody>
</table>

**Will the proposal have any impact on**

- Discrimination?
- Equality of opportunity?
- Relations between groups?

| No |  |

**Will the proposal have an impact on the physical environment? For example, will there be impacts on:**

- Living conditions?
- Working conditions?
- Pollution or climate change?
- Accidental injuries or public safety?
- Transmission of infectious disease?

<table>
<thead>
<tr>
<th>Positive Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidental injuries and public safety.</td>
</tr>
<tr>
<td>Effective Blood Transfusion Procedures ensure the safe administration of all blood products reducing as far as is possible any chance of a transfusion accident.</td>
</tr>
</tbody>
</table>

**Will the proposal affect access to and experience of services? For example,**

<table>
<thead>
<tr>
<th>Positive Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience of Healthcare</td>
</tr>
<tr>
<td>Health care</td>
</tr>
<tr>
<td>Transport</td>
</tr>
<tr>
<td>Social services</td>
</tr>
<tr>
<td>Housing services</td>
</tr>
<tr>
<td>Education</td>
</tr>
<tr>
<td>Positive Impacts (Note the groups affected)</td>
</tr>
<tr>
<td>------------------------------------------</td>
</tr>
<tr>
<td>All Groups</td>
</tr>
<tr>
<td>Accidental injuries and public safety</td>
</tr>
<tr>
<td>Experience of Healthcare</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

**Additional Information and Evidence Required**

No

**Recommendations**

None
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>From the outcome of the RIC, have negative impacts been identified for race or other equality groups?</td>
<td>No</td>
</tr>
<tr>
<td>Has a full EQIA process been recommended?</td>
<td>No</td>
</tr>
<tr>
<td>If not, why not?</td>
<td></td>
</tr>
<tr>
<td>No adverse impact identified.</td>
<td></td>
</tr>
</tbody>
</table>