Shropshire Community Health NHS
NHS Trust

Document Details	
Title	**Safe Transfusion of blood components and products**
Trust Ref No	1552-
Local Ref (optional)	Shrewsbury and Telford Hospital (SaTH) Policy TX001
Main points the document covers	The Trust has adopted Shrewsbury & Telford Hospitals (SATH) Blood Transfusion Policies for use in areas that carry out blood transfusions
Who is the document aimed at?	Community Hospitals and Diagnostics, Assessment and Access to Rehabilitation and Treatment (DAART) Services
Owner	Dr Emily Peer
Approval process	
Who has been consulted in the development of this policy ?	This policy has been developed by Shrewsbury & Telford Hospital Transfusion Committee, Clinical Governance Executive, Policy Approval Group
Approved by (Committee/Director)	Clinical Policy Group
Approval Date	13/05/2024
Initial Equality Impact Screening	Not required
Full Equality Impact Assessment	Completed by SaTH
Lead Director	Director of Nursing & Operations
Category	Clinical
Sub Category	
Review date	13/05/2027
Distribution	
Who the policy will be distributed to	All Clinical staff in affected services, Trust Intranet and Datix cascade . Inform/Communications Briefing
Method	Safety Alert, Email
Keywords	Blood, transfusion, community, transportation of blood, blood tracing, blood transfusions, blood bank, blood transfusion, blood components, safe transfusion, blood handling,
Document Links	
Required by CQC	
Other	MHRA

Amendments History		
No	Date	Amendment
1	March 2016	Adoption of SaTH Blood Transfusion Policies
2	December 2017	General update of policy, incorporating new platelet guidelines, Transfusion Associated Cardiac Overload (TACO) and NICE statements especially the use of Tranexamic Acid (TXA) in moderate haemorrhage. Title amended from …blood and blood components, to blood components and products
3	June 2021	No further revisions to the policy since last review date
4	December 2023	Update of references. Consultation with Paediatrics and Neonates. Information added relating to agency staff, transfusion of blood between hospitals and validity of samples.
5		

The Shrewsbury and Telford Hospital NHS Trust

SAFE TRANSFUSION OF BLOOD COMPONENTS AND PRODUCTS

Reference: TX001

Version:	V4.0
Originally issued	August 2005
V4.0 Approved by	Hospital Transfusion Committee, Clinical Governance Executive, Policy Approval Group
V4.0 Date approved	August 2017
V4.0 Ratified by:	Quality Operational Committee
V4.0 Date ratified:	September 2017
Document Lead	Specialist Practitioner of Transfusion
Lead Director	Medical Director
Date issued V5:	January 2024
Review date:	January 2027
Target audience:	Clinicians, Laboratory Staff, Nurses, Midwives, Operating Dept Practitioners, ACPs
The following guidelines relating to this policy may also be useful	▪ Guidelines for the management of blood components in Massive Haemorrhage TX004 & TX004p ▪ Transfusion Education Policy TX006 ▪ Trust Patient Identification Policy WI 45R ▪ Non-medical Authorisation of blood components, Training & Clinical Guidelines TX013

Document Control Sheet

Document Lead/Contact:	Sarah Crawford, Lead Transfusion Nurse
Document ID	TX001
Version	5.0
Status	FINAL
Date Equality Impact Assessment completed	17/05/2017
Issue Date	January 2024
Review Date	January 2027
Distribution	Please refer to the intranet version for the latest version of this policy. **Any printed copies may not necessarily be the most up to date**
Key Words	Governance / Policy / Protocol / Procedure / Guideline
Dissemination Method	Once approved by Policy Group, this updated document will be placed on the intranet and the administrator will add this policy to the monthly notification by email. The "policies" page on the intranet will be updated to reflect new policy.

Location of Copies
Trust intranet http://intranet/pathology/transfusion/protocols.asp

Version history

Version	**Date**	**Author**	**Status**	**Comment**	**Signature** (printed version)
V3.01	Oct 07	HTC	FINAL	New checking procedure for NPSA competencies, sampling times, AutoFate, ad-hoc deliveries	
V3.02	May 10	K Cooper	FINAL	Reflects the use of the new Blood track courier system (only trained & authorised personnel can access the blood fridges). In line with DoH guidance, platelet & cryoprecipitate thresholds have been added, along with Fresh Frozen Plasma guidelines & calculation grid. Maximum Blood Order Schedule used as the trust guide to ordering blood or requesting a group and save only, have been reviewed, with a recommendation to take a post op Hb column	
V3.03	Oct 11	K Cooper	FINAL	Interim review to comply with NHSLA requirements to include;- Addition of document control statement, duties and responsibilities of staff, introduction heading changed to document statement/overview, monitoring section moved to end of document and adapted to new template.	
V4.0	Sept 17	K Cooper	FINAL	General update of policy, incorporating new platelet guidelines, TACO and NICE statements especially the use of TXA in moderate haemorrhage. Title amended from …blood and blood components, to blood components and products.	
V5.0	Dec 23	S Crawford	FINAL	Minor amendments	

Review and Amendment log for minor changes

Version No	**Type of Change**	**Date**	**Description of change**
v3.03	Wording – pertaining to SaTH practice & addition of FFP calc for paediatrics appendix	Feb 12	Section 5.2 – updated fridge allocation and community hospitals policy reference. + amendment of audit wording to monitoring table
V3.04	Update of appendices as listed and minor changes as listed	May 13	Update of national practices (inc platelets, CMV & irradiated requirements) and local procedure change from new blood bag labels. Section 6 - wording re

			vitalpac to meet NHSLA recommendation, change of procedure to reflect new blood bag label. Section 7 – change of expiry date washed cells. Clarification of requirements with disconnections during procedure, change in porter collection of units, using new giving set for each bag of platelets. Update details for new haematologists. Hb to be displayed as g/L rather than g/dL as per national target to be achieved by April 2013 Changed paediatric calculation as requested by Dr Cowley. Added note on sickle patient requirement, anti-D on named pt basis and repeat samples for pts without a historic blood group
V3.05	Update of appendix	Sept 14	Updated platelet appendix in line with paediatric threshold update and also Hb in relation to radiotherapy. Added note on no Tx against point of care test results. Reference to -Guidelines for the clinical use of red cell transfusion. TX005, deleted as this guideline removed from intranet. Note on no Tx for pts in x-ray. Change of emergency O neg allocation from W&C move. Addition of collector name and 'risk of infection' on request form. Non-medical authorisation of components for staff completing appropriate training (TX013) section 4.
V3.06	Clarification of items listed	Apr 15	Minor update of the following; Take blood cultures if temperature rise of >2^{o}C. Issue of retrospective patient information leaflet. Consultant contact information update. Change of massive haemorrhage protocol. Red cell calculation for paeds changed to litres (x 0.3). Removed references to RTC training pack as no longer used. Issue of albumin
V3.07	Minor additions & clarification of CMV guideline	Mar 16 Sept 16	RSH DAART unit added as location of hard copy. Reference to Tranexamic acid in bleeding patients (1.2/1.3). National guidelines state that CMV negative components should be given to neonates < one month old. SaTH policy states that CMV negative units should be given to all neonates < four months old, to cater for premature babies. Recommendations from SaBTO re Hep E neg requirements. Note in sampling section re reporting WBIT incidents Update of appendix 10 in line with the new BCSH guideline for components for infants, neonates and older children. Red cell calculation changed back to x 0.4
V5.0	Minor additions	Dec 23	Update of references. Consultation with Paediatrics and Neonates. Information added relating to agency staff, transfusion of blood between hospitals and validity of samples.

Control and Archive arrangements:
Documentation control including archiving will be maintained in accordance with the Trusts mandatory guidance on policies and related documents, as stated in the Policy for the Development and Management of Organisation-Wide Documents, Gov 01, version 2, September 2011. Superseded versions will be retained automatically for a minimum of 15 years.

Contents

Section i Introduction

1 Document Statement

This document was written on behalf of Shrewsbury and Telford NHS Trust and endorsed by the (no longer operational) Quality and Safety Committee in 2005 through the Hospital Transfusion Committee. Recommendations contained within this document are based on a number of transfusion guidelines which are referenced at the end of this document. The purpose of this policy is to provide the basic requirements and procedures for safe and appropriate blood component administration for the multidisciplinary team. The policy also provides a template for consistent application of the procedure, guidelines and individual rights for the patient will be promoted and upheld. Transfusion training and competency is mentioned throughout this document, but please see the Transfusion Education Policy TX006 for specific training requirements in your area.

PAEDIATRICS

Much of the transfusion process in adults, paediatrics and neonates is the same, but where differences occur, these are noted in a box in the appropriate section. Paediatric recommendations are taken into consideration from the Blood Administration Policy, Birmingham Children's Hospital and the British Society for Haematology (BSH) formally BCSH.

2 Abbreviations used

BSH:	British Society for Haematology
DoH:	Department of Health
EBMP:	Emergency Blood Management Plan (Shortage)
EBMG:	Emergency Blood Management Group
EPSMP:	Emergency Platelet Shortage Management Plan
MBOS:	Maximum Blood Order Schedule
NHSBT:	National Health Service Blood and Transplant
NICE	National Institute for Care & health Excellence
NvCJD:	New variant Creutzfeldt-Jakob Disease
PBM	Patient Blood Management (DoH initiative via NHS blood & transplant
PRH	Princess Royal Hospital
RSH	Royal Shrewsbury Hospital
SHOT:	Serious Hazards of Transfusion
SABRE:	Serious Adverse Blood Reactions and Events
SaBTO	Safety of Blood Tissue & Organs (advisory group to DoH)
TACO	Transfusion Associated Cardiac Overload

3 Duties and Responsibilities of Staff

The administration of blood can have significant morbidity and mortality and therefore all staff must be aware of their responsibilities in line with their professional standards. The individual is also accountable for completing their required training as laid out in the transfusion education policy TX006. Specific responsibilities around special requirements are listed in section 1.7

3.1 The Trust Board

- Must ensure a Hospital Transfusion Committee (HTC) is in place to support good transfusion practice.
- Should support the HTC in their role within the organisation.
- Support the Laboratory to maintain accreditation and fulfill all legislation relevant to transfusion

3.2 The Hospital Transfusion Committee (HTC)

- Should meet at least 4 times a year to discuss strategies for optimising transfusion practice
- Produce all policies relevant to transfusion of blood and blood components.
- Discuss Quality performance indicators including incidents
- Monitor practice through audit
- Support the Lead Transfusion Nurse in their role
- Monitor the appropriate use of blood components

- Promote strategies encouraging the appropriate use of blood and conservation of blood stocks.
- Produce a contingency plan for blood shortages.
- Produce a Maximum Blood Order Schedule.
- Encourage the use of clinically and cost effective alternatives to donor blood.
- Produce action plans and recommendations for best practice.
- Create a Hospital Transfusion Team (HTT) to implement the policies & recommendations of the HTC
- Support the Transfusion Laboratory Manager to comply with the Blood Safety and Quality Regulations (BSQR) 2005

3.3 Head of Blood Sciences

- Ensure the Transfusion Laboratory complies with national standards and legislation
- Promote best practice through local protocols
- Facilitate the MHRA if and when they carry out an inspection
- Department Head/Operational Lead for the Blood Transfusion Department.
- Report financial impact of Blood Transfusion on the Pathology Budget
- Responsible for checking and signing off the annual compliance report for the BSQR after being prepared by the Quality Manager

3.4 Deputy Head BMS / Transfusion Laboratory Manager

- Ensure that staff who work in transfusion are appropriately qualified to carry out their role. Ensure ongoing training is maintained
- Maintain systems to comply with UKAS accreditation for the laboratory
- Be a member of the HTC
- Be a member of the HTT
- Promote and maintain compliance with the Blood Safety and Quality Regulations (BSQR) 2005.
- Is responsible for the implementation of the BSQR standards.
- Provide evidence for the MHRA if and when they carry out an inspection

3.5 The Lead Transfusion Nurse

- Promote best practice through provision of training for all staff within the organisation according to their role.
- Devise and implement audits on areas of transfusion practice agreed at HTC
- Investigate and follow up of incidents and near misses, reporting to SHOT as required
- Be a member of HTC/ HTT
- Lead in the writing and revision of policies related to Blood Transfusion.
- Collaborate with departments to improve and manage changes in practice.
- Provide information and guidance in transfusion practice within education, training and assessment of clinical and support staff and within the clinical environment
- Implementation of evidence-based practice and local and national guidelines

3.6 The Laboratory Staff

3.6.1 Senior BMS

- Promote the effective use of blood through compliance with MBOS, HTC guidelines and Better Blood Transfusion health service circulars.
- Training officer for Transfusion Laboratory staff
- Maintain a quality blood transfusion service by observing stated protocols within the Quality Management System of the Clinical Pathology Services.
- Monitoring competency of all staff working in Blood Transfusion
- Responsible for the day to day running and quality control of the Blood Transfusion Laboratory
- Lead and coordinate the production of SOPs on best laboratory practice

3.6.2 Other Laboratory Staff

- Maintain competency in Blood Transfusion Practice
- Maintain knowledge base in Blood Transfusion through CPD.
- Promote effective use of blood through working within guidelines.

- Maintain a quality Blood Transfusion service by observing stated protocols within the Quality Management System of the Clinical Pathology Services.

3.7 Consultant Haematologists

- Support the laboratory staff and Transfusion Practitioner in their role
- Assist Transfusion Practitioner in investigation of incidents and mandatory incident reporting as necessary.
- Support the HTC audit programme
- Promote effective implementation of national guidance and regulation.

3.8 Medical Staff

- Promote the appropriate use of blood through observing British Society in Haematology (BSH) guidelines, HTC recommendations and Trust policy
- Discuss risks and benefits of Blood Transfusion with the patient then obtain verbal consent wherever possible and offer leaflets.
- Use effective alternatives where indicated within the PBM programme.
- Prescribe blood components appropriately.
- Maintain patient safety throughout the transfusion process.
- Report any adverse reactions or events to the Blood Transfusion Department, or Hospital Transfusion Practitioner as soon as possible.
- Attend Induction and complete mandatory training.
- Familiarise themselves with the Trust Patient ID and Blood Transfusion policies available on the intranet.
- Record the reason for transfusion and any benefits gained in the patient's health record.
-

3.9 Managers

- Ensure all staff complete appropriate training.
- Facilitate the implementation of training and competency assessment of staff relevant to their role
- Support the HTC in implementing strategies to improve patient care in transfusion.
- Ensure all staff that look after transfused patients are trained to do so and Trust transfusion and Patient ID Policies are followed
- Ensure all adverse incidents within their area are reported through the incident reporting system.
- Responsible for compliance in traceability of blood components administered in their area utilising the electronic BloodTrack system.

3.10 Registered practitioners and support staff

- Follow Trust blood transfusion and Patient ID policies.
- Complete Induction and Mandatory training
- Ensure all adverse incidents within their area are reported to the laboratory immediately and are submitted on the Trust incident reporting system (DATIX)
- Ensure that compliance regarding traceability is followed and recorded using the electronic blood track system

3.11 Phlebotomy staff

- Follow the Trust blood transfusion and Patient ID policies re: blood sampling
- Require specific training on transfusion samples and be competency assessed
- Complete local Induction and Mandatory training requirements
- Ensure all adverse incidents are reported to nurse in charge of the ward and their line manager

3.12 Portering staff

- Follow Trust policies re collection and delivery of blood components.
- Ensure all adverse incidents are reported through the correct channels.

4 Memorandum on the Avoidance of Transfusion Accidents

MEMORANDUM ON THE AVOIDANCE OF TRANSFUSION ACCIDENTS

Staff should **NEVER** forget that any part of transfusion practice (sampling, collection, transportation, administration) is potentially dangerous and that the dangers can be minimised only if those involved in the handling, testing and giving of blood components take extreme care.

Blood components should only be transported and administered by competent staff who have successfully completed their transfusion training.

All blood components, including ad-hoc deliveries, **MUST** be delivered to the Transfusion Laboratory and then issued to named patients as per Blood Safety & Quality Regulations 2005.

Crossmatch requests must not be based on a haemoglobin level obtained via point of care testing.

WARNING

The most dangerous accidents usually follow failure to observe the simplest precautions.

The British Society for Haematology (BSH) guidelines state;

"Transfusion must only take place when there are enough staff available to monitor the patient and when the patient can be readily observed. Overnight transfusions should be avoided unless clinically essential"

Serious Hazards of Transfusion (SHOT) recommendations, along with the Health Service Circular white paper 2007/001 categorise 'overnight' as between 20:00 – 08:00

Patients should NOT be transferred to x-ray while receiving a transfusion unless it is for emergency radiological intervention. Any patient this is transferred from any location whilst receiving a transfusion must be escorted by a registered practitioner and will remain with them until their care is handed over to a suitable professional

ALWAYS

- Ask the patient to state their name, date of birth & check against the wristband to confirm correct
- Check the wristband details (full name, date of birth, and unit number) of the patient with those on the blood bag against the prescription sheet.
- Check that the Group and any special requirements of the patient is the same as that of the blood to be given, or if it is different, that this is intentional.
- Special care is necessary when changing over blood bags during transfusion. The same checking procedure should be performed and care should be taken not to pierce the bag.

The Trust requires all medical and nursing staff to be familiar with this main document.

The traceability and absolute fate of blood components is UK law, therefore the use of the AutoFate BloodTrack system in the acute hospitals and the manual form system in the community locations, is compulsory.

Access to blood fridges and cold chain records in the acute trust is managed by the BloodTrack Courier system.

Section 1 Prescribing

Red cells, platelets and fresh frozen plasma (FFP) have different storage requirements and are supplied in special porous bags, therefore should be handled and kept in as clean environment as possible.

Indication codes for the four main components are summarised in appendix 11

The Blood component administration table from BCSH guidelines can be seen in appendices 8 - 10

Routine blood deliveries are received daily (Mon – Fri) from the Regional Transfusion Centre in Birmingham. Whenever possible, requests for platelets or special products (irradiated, CMV negative, specific antigen negative blood or washed cells) should be made by 9am (and also 2pm at RSH), in order for them to come on same day scheduled transport, and save the expense of 'ad hoc' deliveries.

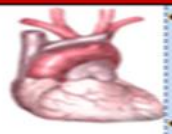
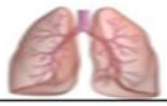
NOTE: . *Washed red cells* must be used within 14 days of being washed. Special vigilance should be given to the expiry date on arrival as they are now not processed on demand, therefore should be transfused **as soon as they are made available by the Transfusion Laboratory.** *Platelets* should still be used within 24hrs of being washed.

For massive haemorrhage guidelines see Trust policy and Handbook of Transfusion Medicine 5th edition (2014). In a massive haemorrhage setting a more pragmatic approach may be indicated as results of coagulation testing may not be readily available, and FFP and cryoprecipitate may need to be issued in an empirical manner based on the clinical severity of bleeding.

1.1 Transfusion Associated Cardiac Overload checklist

Prior to authorising any blood component, the patient should have the following considerations

Is the patient iron deficient?? Do they really need red cells? Consider the national indication triggers (SHOT & NICE recommendation)

TACO Checklist	Red Cell Transfusion for Non-Bleeding Patients
	• Does the patient have a diagnosis of 'heart failure' congestive cardiac failure (CCF), severe aortic stenosis, or moderate to severe left ventricular dysfunction? • Is the patient on a regular diuretic?
	• Is the patient known to have pulmonary oedema? • Does the patient have respiratory symptoms of undiagnosed cause?
	• Is the fluid balance clinically significantly positive? • Is the patient on concomitant fluids (or has been in the past 24hours? • Is there any peripheral oedema?
	If 'yes' to any of the points overleaf;
1	• Review the need for transfusion (do the benefits outweigh the risks)?
2	• Can the transfusion be safely deferred until the issue can be investigated, treated or resolved?
3	• Consider body weight dosing for red cells (especially if low weight) • Transfuse 1 unit red cells and review symptoms of anaemia • Measure the fluid balance • Consider giving a prophylactic diuretic • Monitor vital signs closely, including O_2 saturation

1.2 Packed Red Cells (RBC)

Blood is now plasma reduced and leukocyte depleted, therefore only requires to be transfused using a standard blood administration set (175-200 micron filter). This includes paediatric and neonatal transfusions.

Units have a shelf life of 35 day expiry. Blood is stored at 4ºC in validated fridges with continuous monitoring. Must be ABO compatible and Rh D compatible unless in an emergency. The calculation is 4ml/kg per 10g/L Hb rise Transfusion of each unit must be **completed within** 4 hours of **removal** from a blood fridge (DoH better blood transfusion 3. 2007). Planned transfusion should be over a maximum of 3.5 hours, but can be over 90min providing a TACO assessment is made.

1.3 Use of FFP

Please see appendix 6 a & b for calculation grid.

Stocks of FFP are kept in the Transfusion Laboratory stored at – 25'C and have a 36 month expiry date whilst frozen (20-30min thaw time). As FFP is a plasma component, its compatibility differs from red cells - usually allocated on a group specific basis calculated by weight.

The authorisation for thawing of FFP is preferably via a Consultant Haematologist; however, when not available the initial dose may be requested by the patient's consultant. Any patient requiring greater than an initial therapeutic dose should have Haematology Consultant input. 2 units of FFP will be issued at a time irrespective of the volume requested to prevent wastage, unless specifically ordered by a Consultant Haematologist and in the case of massive haemorrhage when two units are issued with every four units of red cells. The indication for FFP MUST be documented in the patient's notes.

FFP should **not** be used in the reversal of warfarin, unless for immediate reversal effect, in the presence of life-threatening bleeding. FFP only has a partial effect and is not the optimal treatment; **P**rothrombin **C**omplex **C**oncentrates (PCC) is preferred. Authorisation via consultant haematologist.

FFP should only be used when coagulation results are deranged (PT/APTT > 1.5 x control), or with massive blood replacement. Anticipate coagulation factor deficiency after blood loss replacement >1.5 TBV loss (or 6 units blood in 1 hour or less). *Note:* Fluid resuscitation with clear colloid will further reduce coagulation factor levels because of dilution. FFP may be required early (>0.5 TBV) if there is ongoing blood loss and fluid replacement. Fibrinogen levels of <1.5g/L (<2g/L in obstetrics) may indicate the need for fibrinogen concentrate or cryoprecipitate.

Please note that the Transfusion Laboratory needs 30 minutes notice to thaw FFP, which should be completed within 4 hours from defrosting and ideally transfused over 30 minutes. (10-20ml/kg/hr)

If not required after thawing, FFP must be returned to a blood fridge within 30mins (and the laboratory informed) as it may be used for another patient. **FFP can be used up to 24 hours after thawing if stored at 4'C.**

For massive haemorrhage guidelines see Trust policy TX004 [TX004p for paediatrics](appendix 6a for Tranexamic acid) and Handbook of Transfusion Medicine (2014).

1.4 Tranexamic Acid (TXA)

Tranexamic acid intravenously is generally advocated in bleeding patients if given within 3 hours of the start time. For use in massive haemorrhage see guideline as specified above. For use in expected or moderate blood loss, the following is taken from the NICE guidelines 2016 as indicated under; Cell salvage and Tranexamic acid;

1.1.5 Consider offering Tranexamic Acid to adults undergoing surgery who are expected to have at least moderate blood loss (greater than 500 ml).

NOTE; Use in moderate haemorrhage, but with the exception **of vascular** surgery at the discretion of the surgeon/anaesthetist and including during caesarean section after cord clamping **(not to the detriment of the mother),**

1.1.6 Consider Tranexamic acid for children undergoing surgery who are expected to have at least moderate blood loss (greater than 10% blood volume).

NOTE; Also consider TXA for children with known or suspected bleeding disorders who present with acute bleeds or who are under-going elective or emergency surgical procedures in discussion with Consultant Paediatricians according to Rotawatch or with the Consultant Paediatric Haematologist on-call at Birmingham Children's Hospital

1.1.7 Do not routinely use cell salvage without Tranexamic acid.

1.1.8 Consider intra-operative cell salvage with Tranexamic acid for patients who are expected to lose a very high volume of blood (for example in complex vascular surgery, major obstetric procedures, gynaecology and pelvic reconstruction and scoliosis surgery).

As with all drugs, contraindications exist. Absolute contraindications include;

- acute venous or arterial thrombosis,
- history of convulsions,
- hypersensitivity to the active substances,
- severe renal impairment (risk of accumulation).
- It should also be generally avoided in DIC and procedures involving the central nervous system (intrathecal, intraventricular injections and any intracerebral application)

Further caution is also advised in patients with haematuria from upper urinary tract due to the risk of urethral obstruction, upper GI bleeds, in patients with a high risk of thrombophilia, patients receiving combined oral contraceptives and also patients with certain visual impairments (see SPC)

This list is not exhaustive therefore please refer to the summary of product characteristics (SPC) available via the pharmacy site or this link to the internet. (NB; should not be given intramuscularly) http://www.medicines.org.uk/emc/medicine/29297

1.5 Use of Platelets

See Appendix 8 for transfusion thresholds/triggers (Tranexamic acid, table 1).

Stocks of platelet concentrates are not routinely available as they have a 7 day expiry from production. Platelets have to be ordered for individual patients from the Regional Transfusion Centre, therefore, except in an emergency, at least 24 hours notice of their requirement should be given. Platelets will only be ordered if authorised by a Consultant Haematologist and should be placed before 9am or 2pm Monday to Friday whenever possible for same day delivery.

Platelets aggregate if not constantly agitated and must be stored at 22'C ± 2'C and therefore not transported with cold packs or put into a blood fridge. As soon as the units arrive in the clinical area, they should be checked and transfused. One adult pack constitutes an adult therapeutic dose. Consider ordering apheresis (single donor) if patient has a known previous reactions, rather than pooled packs (4 donors). Platelets are usually irradiated – please check with the Transfusion Laboratory.

Should be ABO compatible and Rh D compatible for women with child bearing potential and transfused using a standard blood administration set - but NOT one that has been used to administer other blood components. A fresh giving set should be used if more than one unit is administered

Contraindications to platelet transfusion <u>unless</u> life-threatening haemorrhage

- Thrombotic Thrombocytopenic Purpura (TTP)

- Heparin Induced Thrombocytopenia (HIT)

See appendix 8 for full indications guide (adult and paediatric)

Small volume paediatric platelet packs can be ordered from NHSBT Birmingham

1.6 Cryoprecipitate

Usually due to large blood loss, fibrinogen levels may remain critically low (<1.5g/l <2g/L for obstetrics)), and cryoprecipitate therapy should be considered. Standard FFP contains 2–5 mg fibrinogen per ml, pooled cryoprecipitate contains approximately 1.8g per pool (range 1.6–2.0), though the minimum specification is 0.7 g. Hence 1 lit of FFP might be expected to provide 2–5g fibrinogen, whilst an adult therapeutic dose (two pools) of cryoprecipitate provides 3.2–4g fibrinogen in a volume of 150–200 ml. Cryoprecipitate also contains factor VIII, factor XIII and von Willebrand factor. It should be remembered that transfusion of cryoprecipitate exposes the patient to multiple donors and consequential risk.

Cryoprecipitate is stored frozen at -25^{o}C with a shelf life of 36 months (frozen)

The thawing of FFP should be authorised via a Consultant Haematologist Prior to the transfusion, cryoprecipitate must be thawed under controlled conditions using specifically designed equipment.

Thawing usually takes approximately 15-30 minutes.

Once thawed, cryoprecipitate must not be re-frozen and should be used immediately. If delay is unavoidable, the component must be stored at ambient temperature and used within 4 hours

Dose: typical adult dose is two five-donor pools (equivalent to 10 single donor units) which would raise the plasma fibrinogen level by about 1g/l, typically administered at 10-20ml/kg/h (or 30-60 minutes per 5 unit pool)

For massive haemorrhage guidelines see Trust policy TX004 and Handbook of Transfusion Medicine (2014). Fibrinogen concentrate is also available from Transfusion Laboratory.

1.7 Albumin (HAS)

Human Albumin solutions are available on request in the following concentrations and sizes

4.5% 500 ml (large volume requirements may need prior arrangement with the Transfusion Laboratory)
20% 100 ml

HAS is issued on an individual patient basis. If the HAS is not used, it **must** be returned to the Transfusion Laboratory for the patient record to be amended.

HAS is a human blood derived product. As such, the Trust needs to be able to determine the fate of all bottles issued. This depends on keeping accurate records, therefore any issued but un-used bottles must be returned to the transfusion laboratory within 24 hours. Refer to information leaflet with each bottle, but infusion rate should be adjusted according to the individual circumstances and the indication. In plasma exchange during paracentesis, the infusion rate may be higher and should be adjusted to the rate of removal.

1.8 Anti –D

For guidance on dosage and frequency, refer to **Anti D For Rh-D Negative Women** policy, available on hospital intranet. The use of foetal genotyping is planned to be implemented which will mean only women carrying Rh positive babies will receive Anti-D. Cell-free DNA (cfDNA) blood testing is available at SaTH.

The same donor-to-recipient traceability is required for this product. At present only the community hospital clinics have a small stock and is the responsibility of these maternity units to maintain and

store their paper record system as stipulated in the Blood Safety and Quality Regulations. All other areas are issued this product on a named patient basis using the Anti-D request forms.

NOTE - PHARMACEUTICALS MUST NEVER BE ADDED TO ANY BLOOD COMPONENT. BLOOD COMPONENTS SHOULD BE ADMINISTERED VIA A DEDICATED LINE.
Avoid flushing saline through the giving set after the transfusion is complete.

If a transfusion line becomes disconnected from the patient, the infusion must be discarded. An exception to this might be if the patient has a rare blood group or difficult to crossmatch blood component. In this instance the ward would be notified and a contingency plan must be discussed with the Lead Transfusion Nurse and senior BMS in the Transfusion Laboratory prior to commencing the initial infusion

1.9 Special Requirements - Indications for the use of Cytomegalovirus (CMV) antibody negative or Gamma-irradiated blood components (washed cells and sickle patients – see 1.9.3) *paediatrics – see 1.9.2*

1.9.1 Adults

Individuals who are immunocompromised and/or with haematological malignancies are particularly susceptible to transfusion related complications. The following measures reduce the risk of complications. (see 1.9.2 for paediatrics)

1.9.1.1 CMV Infection

Following SABTO recommendations, on the use and safety of leucodepleted and CMV unselected blood components, the recommendations are as below and are in keeping with SaBTO recommendations.

- With universal leucodepletion there is no need for CMV negative components for allogeneic bone marrow transplantation.

The following patient groups **should** still **receive** CMV negative components

- Intra-uterine transfusions
- Neonates (up to four months post expected date of delivery

Transfusion-transmitted CMV infections should be reported via the SHOT (Serious Hazards of Transfusion) system.

1.9.1.2 Hepatitis E Virus Negative Components (HEV)

HEV is not easily transmitted from person to person and although it can be passed on through blood transfusion and solid organ transplantation, transfusion/transplantation-transmitted HEV infection rarely causes acute morbidity. While the risk of HEV to the general population is negligible, there is a risk to immunocompromised/immunosuppressed patients. The Advisory Committee on the Safety of Blood, Tissues and Organs (SaBTO) has now recommended that all components are HEV negative

From May 2017 all red cell and platelet components routinely issued to hospitals will be HEV negative Non-tested frozen components will be used for patients without this special requirement and it is envisaged that all components will be issued as HEV negative the following month. It will therefore no longer be required to submit a special requirement form, or notify the laboratory when a patient is put onto a transplant list or received a transplant.

.

1.9.1.3 Gamma-irradiated Blood Components to prevent Transfusion-Associated Graft-versus-Host Disease (TA-GvHD) in haematology patients.

Transfused donor lymphocytes that are compatible with the recipient, but which recognise the recipient as foreign can engraft and cause TA-GvHD. This can be prevented by gamma-irradiated cellular blood components, as this inactivates all the donor leucocytes. Gamma-irradiated Blood components should be used for the following patients:

Table of indications is given below

Patient Condition	Indications
High dose therapy with autologous stem cell rescue	From 7 days before harvest until the harvest is completed From the initiation of conditioning therapy until 3 months post transplant (6 months if Total Body Irradiation (TBI) is used.
Allogeneic haemopoietic cell transplants	From start of conditioning therapy indefinitely
Allogeneic haemopoietic cell donors	From 56 days before harvest until harvest completed
Hodgkin's Disease	From diagnosis indefinitely
Patients treated with purine analogues e.g. fludarabine, cladribine, deoxycoformycin	From start of treatment indefinitely
Patients with congenital immunodeficiency states	From diagnosis indefinitely

1.9.1.4 Other indications for gamma-irradiated blood components

- Any granulocyte transfusion for any recipient
- Transfusions from first or second degree relatives
- HLA selected platelet units
- Exchange transfusion (provided that irradiation does not unduly delay transfusion)
- Intra-uterine transfusions

1.9.1.5 Washed cells

Severe allergic reaction associated with transfusion can be greatly reduced with the use of washed cells. The washing and removal of plasma, plasma proteins and micro-aggregates reduces the risk of further anaphylactic type reactions to subsequent transfusions. Washed red cells are resuspended in a non-nutrient containing saline which gives them a reduced shelf life of 14 days compared with the 35 days for normal red cell preparations. Washed cells are not routinely kept in the hospital stock and are only ordered from NHSBT as required. Special vigilance should be given to the expiry date on arrival as they are now not processed on demand and can therefore still have a near expiry date. Platelets should still be used within 24hrs of being washed.

There may be other special requirements for patients with significant cold agglutinins, specific or multiple antibodies. Clinicians should request these special requirements on the request form when sending samples to the Transfusion Laboratory, as well as writing on the prescription sheet.

1.9.1.6 Responsibilities:

Medical staff

- Prescribe/authorise CMV, gamma-irradiated or washed cell components as appropriate on the transfusion care pathway document and inform the Transfusion Laboratory of patient requirements in writing.

Transfusion Laboratory Staff

- Ensure CMV/irradiated, washed cell blood component requests from medical staff are recorded and stored on the laboratory information management system for future requirements
- Issue special requirement blood components upon request
- Inform the medical staff concerned when there is difficulty in supplying appropriate blood components

Nursing/midwifery/ODP/ACP staff

- Confirm that blood components are CMV/irradiated or washed cell as appropriate according to this protocol and medical authorisation. Washed cells must be completed within 24hrs of process.

1.9.2. Paediatric Indications

Further information can also be obtained from the Regional Transfusion Centre training package in every clinical area.

1.9.2.1 CMV negative requirements

All blood components (other than granulocytes) in the UK now undergo leucodepletion, which provides a significant degree of CMV risk reduction. This measure is considered adequate risk reduction for all other patients requiring transfusion (haemopoetic stem cell transplant patients, organ transplant patients, and immune deficient patients, including those with HIV) without the requirement for CMV seronegative components in addition. This includes patients who may require a transplant in the future.

The following still require CMV seronegative components;

- Red cell and platelet components for intra-uterine transfusions and for neonates (ie up to 4 months post expected date of delivery), and therefore all small sized blood packs and other cellular blood components intended for neonates should be provided as CMV seronegative.
- Granulocyte components for CMV seronegative patients.

CMV PCR monitoring should be considered for all patients (even CMV negative donor/negative recipients) to allow early detection of any possible CMV infection (whether transfusion-transmitted or otherwise acquired infection).

Transfusion-transmitted CMV infections should be reported via the SHOT (Serious Hazards of Transfusion) and SABRE (Serious Adverse Blood Reactions & Events) systems.

1.9.2.3 Gamma-irradiated component requirements

Irradiation of blood components may be necessary to prevent Transfusion associated Graft Versus Host Disease in susceptible individuals. The following groups are considered to be at risk of this complication.

- Intrauterine (IUT) and exchange transfusions in the foetus, neonate and infant.
  a) IUT: irradiate all blood
  b) IUT and subsequent exchange transfusion: irradiate all blood.
  c) Exchange transfusion: little evidence exists to support this as routine practice.
  d) Patients receiving blood from the first or second degree relative.

- Top up transfusions of infants (premature and term).

Irradiation is not necessary unless a previous IUT has been given.

- Congenital Immune Deficiencies.

Irradiation of cellular blood products should be undertaken for all patients with severe congenital T-lymphocyte immunodeficiency syndromes.

- Acute Leukaemia.
- Allogeneic Bone Marrow Transplantation.
- Donors of Allogeneic Bone Marrow Transplantation.
- Donors of Allogeneic Bone Marrow / Peripheral Blood Stem Cells.
- Autologous Bone Marrow / Peripheral Blood Stem Cells recipient.
- Hodgkin Lymphoma.
- Chemotherapy – patients treated with purine analogue drugs
- Haematology – patients treated with alemtuzumab or ATG
- Rare immune dysfunction conditions treated with T-lymphocyte-depleting serotherapy
- CAR-T therapy

1.9.3 Sickle Cell Requirements:

Patient with sickle cell disease requiring a red cell transfusion should be given HbS negative and phenotyped blood obtained from the NHSBT. Please contact the laboratory as soon as possible to ensure they are aware of the patients requirements as we do not routinely stock HbS negative blood. If they are not known to the system they will need to carry out phenotying.

Section 2 Laboratory Hours

- The Department of Pathology operates a 24-hour shift system.
- Normal working hours are Mon – Fri 09:00 to 17:30 hours.
- Outside routine hours (including B/H), it is necessary to contact shift staff via the bleep system for all crossmatches (there is one BMS covering more than one section of pathology and at PRH, all sections of pathology).

Requests for blood to be crossmatched outside routine hours should be based on clinical need only and should be via verbal contact with the BMS.

The aerocom system is **not located** in the Transfusion Laboratory, therefore any specimens sent via this route should be after talking to the BMS if urgent.

2.1. Contact details

Transfusion Laboratory Telephone numbers

RSH (01743) 261000 ext 3542/3556 fax (01743) 261488

PRH (01952) 641222 ext 4305/4306 fax (01952) 287123

Bleep Numbers for out of hours

RSH – 512

PRH – 115

Section 3 Request for a Transfusion

The use of electronic issue of blood can provide blood quicker and more cost effectively, however the patient has to fit a stringent criteria. See section 5.2 and appendix 3. Samples received for patients not known to the blood bank system, will require a second sample to confirm their blood group.

The greatest danger in blood transfusion is when blood cross-matched for one patient is inadvertently given to another. The two commonest causes of this are:

i) Carelessness in checking labels on containers or patient Identification.
ii) Not performing the bedside check correctly.

It is the Doctor's or authorised non-medical authorisers responsibility to complete the request form and provide the following essential details (those in bold are mandatory. A-C are the 3 minimum identifiers):

a) **Surname, other names,**
b) **Date of birth**
c) **NHS or Patient hospital number,**
d) **Name of collector,** name of form requestor is automatic when completing electronic request form. A box is provided to insert the name of the sampler
e) Ward and hospital location.

iii) It is preferable to use an addressograph label, if available, on hand written request forms, but NOT on the sample tube.

iv) Transfusion details of the patient should be entered on the request form in the box provided See appendix 2 for Maximum Blood Order Schedule (MBOS). If additional units are required to those indicated on the Schedule, the reason for these should be clearly indicated on the request form. The name of the authorising Practitioner must be entered.

v) Always check the details given are accurate and are confirmed with the patient. (zero tolerance on labelling error- see 5.0)

vi) This form should be sent to the laboratory with a specimen of EDTA blood in a crossmatch container (pink top), correctly labelled as defined in the next section.

Except in an emergency, adequate time, i.e. at least 24 hours notice should be given for the performance of the most reliable tests. If certain antibodies are detected, blood will need to be ordered from the regional transfusion centre.

Transfusions, or requests, should not take place out of hours (see section 4).

N.B. In an emergency it is essential that direct contact be made between the person making the request and the Transfusion Laboratory BMS.

RED 'URGENT' STICKERS MUST NOT BE USED FOR BLOOD TRANSFUSION REQUESTS. THE AEROCOM SYSTEM IS NOT SITUATED IN THE TRANSFUSION LABORATORY AREA.

Requests for blood to be crossmatched outside routine hours should be based on clinical need only. The gold standard for crossmatching blood is for the results to be checked by two members of staff, but outside core hours, there is only one member of staff in the laboratory, therefore all crossmatches are then intrinsically less safe. The slightly increased risk of error is acceptable for an emergency crossmatch, but unacceptable for non-emergencies.

Crossmatch requests must **not** be based on a haemaglobin level obtained via point of care testing. These MUST be confirmed by a patient sample sent to the laboratory.

3.1 Blood Sampling

Authorised (competency assessed as stated by NPSA action notice 14) personnel only (doctors, nurses, midwives, ODP's, HCA's or phlebotomists) must take the required blood sample from the patient. Once a patient has been bled, the identification, labelling and packaging MUST be completed at the patient bed side before moving on to the next patient.

Adult patients with capacity, should be **asked** to state their name and date of birth, checking this against their identity band (ID) for inpatients, and confirmation of this, their hospital or NHS number and address on the request form before obtaining the sample

. After taking the sample, complete the tube label from the wristband, which should contain the following handwritten information as a minimum: (for outpatients without an ID band, writing on the bottle from the form in the presence of the patient and then re-checking these details must be carried out).

a) **surname, other names,**	d) **ward or hospital location**.
b) **date of birth**	e) **Sample date/time**
c) **NHS or Patient hospital number,**	f) **Signature of sampler**

For unconscious patient's, or those who lack capacity, also check the ID band carefully against the patients notes and involve the relatives if present. There should be documentation to state that this information has been confirmed by the next of kin/registered carer. Write your name in the 'collector' box on the form, and also complete the date and time box.

Always cross check the form, bottle label, patient (& ID band for inpatient) before sealing at the bed/chair side and sending to the laboratory.

NOTE

- Pre-labelled sample tubes must never be used.
- If all details on the sample do not exactly match the form, it is not signed, dated, or there is any numerical uncertainty, the sample will be rejected.
- *When there is no historical blood group on record in the Transfusion Laboratory system, a repeat sample will be requested as per BSH guideline in order to reduce the risk of wrong blood to wrong patient from sampling errors. .
- Wrong Blood in Tube samples have the potential to be fatal and will be rejected and investigated as a high risk case review. The samplers supervisor/manager will be informed and the incident reported to SHOT
- Specimens should be sent by aerocom vacuum system, but where not available, the porter or other person collecting the specimen from the ward, should be informed if the request is urgent so that the delivery is made immediately to the laboratory and **not** left for routine collection. **High risk** samples must be clearly labelled on the request form.

***CLARIFICATION OF THE 2 SAMPLE RULE**

- Most initial transfusion samples received in the laboratory after the year 2000 will be acceptable as 'sample one' – please telephone the laboratory to check if a second sample is required.
- **Do not** send two samples from the same bleed – two samplers must take one sample each
- Two samples are NOT required for every request.
- Blood Bank will request a second sample **ONLY IF THEY DO NOT HAVE A GROUP ON FILE !!!!**

- Haemorrhaging patients without a previous known group will be either issued Oneg or a group on the first sample, but a confirmation sample will be requested

Patients whose details are not known

When a patient is admitted who is unable to give their personal details and all required fields for the patient record system are not known DO NOT ENTER FICTITIOUS/estimated DATA.

Please use the 'UNKNOWN' field which will allow you to enter only the details that are verified (minimum of unique ID number and gender). When all fields can be verified and there is an existing number, the temporary number should be amalgamated with the pre-existing number as soon as possible

Section 4 Prescription(authorisation) & consent for blood and blood components

Prescription/authorisation of blood and blood components is the sole responsibility of the medical practitioner. In specialised areas there may be designated experienced nurses and midwives who are able to make the clinical decision (within guidelines) and provide the written instruction for a blood component transfusion, but only following the agreed training and assessment process laid out in TX013

Red cell transfusion should be calculated as 4ml/kg per 10g/L rise in Hb. The target Hb should be to alleviate symptoms and the cause of anaemia treated (BSH guideline)

Crossmatch requests must not be based on a haemaglobin level obtained via point of care testing. These MUST be confirmed by a patient sample sent to the laboratory.

The Practitioner must ensure that the patient has received and understands information related to both the benefits and risks of blood transfusion and also the patients right to refuse transfusion and receive an alternative therapy. Patients **who lack capacity** should have a retrospective information leaflet clipped to their notes and given to the patient once capacity returns. Patients **with** capacity should be given an NHSBT leaflet on 'Will I need a blood transfusion' and should give verbal consent. This **MUST** be documented

On the Transfusion Record prescriptiion documentation, the Practitioner should record;

Consent;

- Reason for transfusion inc Hb (if already documented in notes, enter the date & time of entry)
- Sign as appropriate confirming risks, benefits alternatives explained and patient given verbal consent.
- For haematology patients, this may be for each transfusion programme (i.e during chemotherapy and for myelodysplasia).
    - For patients who lack capacity, this should be noted and a retrospective information pamphlet should be clipped to the front of the notes and given to the patient when they gain capacity (these can be obtained via the transfusion practitioner if none are available from the containers by the blood fridges)

Authorisation section (remember to assess for risk of TACO – see 1.1)

- the **specific component** to be transfused,
- the **quantity**, in mls or units
- the **duration** of the transfusion. Unless clinically contraindicated, blood transfusions should be administered over a **1½ - 3 hour** period, with a maximum period of 3½ hours as the transfusion should be completed within 4 hours from leaving an authorised refrigerated environment. Platelets and FFP should be given over 30-60 minutes. (handbook of transfusion medicine 2014)

- any special instructions,
- his/her signature.

Following transfusion the Practitioner **must** clearly document in the patient record along with their name and number-

- The volume transfused (also on the care pathway record)
- Any reactions or problems

Planned transfusions should occur during the hours of 08.00 – 20.00hrs and requests should be made with consideration for core laboratory staff working hours of 09.00 – 17.30hrs (only one BMS working out of hours).

NOTE - PHARMACEUTICALS MUST NEVER BE ADDED TO ANY BLOOD COMPONENT.
- BLOOD COMPONENTS SHOULD BE ADMINISTERED VIA A DEDICATED LINE

Section 5 Laboratory labelling of compatible blood

All blood components, including ad-hoc deliveries, must only be issued by the Transfusion Laboratory. Compatible blood components will be clearly labelled (luggage label attached to the unit) showing the recipient's name, unit number, date of birth, hospital, ward, date required, recipient's blood group and donor's blood group. At the top of the label will be the specific donor number***. No blood component can be transfused without this patient identification attached to the component***.

What to do when checking details don't match

Problems have arisen when patients' hospital numbers have been filled in incorrectly on cross-match request forms. These are usually simple transcription errors on handwritten forms from A&E, theatres etc, but theoretically a pre-printed patient identification label or form, could also have an incorrect number due to computer error, or an incorrect form printed. This can also occur when the 'UNKNOWN' field has not been used and estimates have been made.

This problem has been highlighted since computerisation of the Transfusion Laboratory management system because the patient's hospital number is the essential item of identification and once entered into the computer cannot be changed. The situation can therefore arise where cross-matched blood, labelled with the unit number supplied on the request form is found not to correspond with the unit number on the patient's wristband.

Both Transfusion Laboratories have a zero tolerance policy on sample labelling errors. When this arises the clinical area/person requesting the cross-match will be asked to re-sample the patient.

This is time-consuming and frustrating for all concerned, but it is the only safe way to guarantee correct patient identification.

In a life threatening emergency where patient identifiers are missing or discrepant, the Transfusion Laboratory will issue appropriate group 'O' blood until a correctly labelled sample is provided.

REMEMBER, correct patient identification is vital if a tragic mistake is to be avoided.

The responsibility for correctly identifying the patient lies with the person who initiates the request - Transfusion Laboratory staff are instructed not to process incorrectly labelled requests

5.1 Reservation of Cross matched blood

Cross-matched blood will be reserved for a particular patient for 24 hours, after which if it has not been used, it will be routinely de-reserved by 9am and can be used for another patient.

It is the responsibility of the Medical officer to state when blood cross-matched for a patient needs to be kept available for longer than the standard 24 hours - It will not be kept for longer than this unless the Transfusion Laboratory is contacted.

Note that a fresh form will always be required post transfusion if further blood is required and an additional crossmatch specimen depending on when the transfusion took place.

The timing of sample requirement for crossmatch is given in the following table.Further components can be made available but outside of these times, a fresh sample is required

Patients pregnant or transfused in the last 3 months sample active for	Up to 3 days
Patients **not pregnant** and **not** transfused in the last 3 months sample active for	Up to 7 days

5.2 Issue of Blood

Electronic Issue (EI) is a process where blood (red cells components) are allocated to the patient and are issued on the basis of serological testing which does not involve the actual crossmatch process.

There are a number of criteria which must be matched before EI can be considered:

- The latest blood group performed on a fully automated blood group analyser with data being transferred to the host laboratory computer electronically.
- A previous historical blood group on file which matches the most recently derived.
- A negative antibody screen.
- No known significant antibodies on file.
- No editing or modifying of the blood group manually.

It should also be noted that the time limit for EI eligibility is based on the transfusion history of the patient. EI is not available for blood required longer than 3 or 7 days from the date the last sample was taken (see table in previous section), but this time may be shortened if there has been a recent transfusion.

Electronic issue of red cells provides a secure system of ensuring ABO compatibility through computer verification of donor and recipient groups. It cannot prevent transfusion reactions caused by patient antibodies missed by the antibody screen or those due to patient misidentification errors. It is however nationally accepted that EI is safer than routine crossmatching because it removes the potential for human error which outweighs any potential failures mentioned above.

This procedure simplifies the process of red cell issue, makes more efficient use of red cell stocks and improves the speed of blood issue.

Pre-operative assessment staff must ask the patient if they have *ever* received a transfusion, especially in another hospital (see flowchart appendix 3)

For more in-depth information please refer to the Transfusion Laboratory standard operating procedure called *Electronic Issue of Red Cell Components* within the protocol section of the transfusion intranet site.

Blood would be issued under EI conditions following computer software control prompts except in the following situations:

a) When the patient's plasma contains, or has been known to contain clinically significant red cells antibodies.
b) The patient has had an ABO incompatible solid organ transplant, and is being transfused within 3 months of that transplant.

If the above criteria is not met or any doubt exists, a serological crossmatch will be carried out.

During laboratory working hours, the wards may collect blood components from the transfusion laboratory by contacting the porter, or a staff member who has been trained to use the electronic access system.

They will require the following information to remove blood from the issue fridge, (plus a current BloodTrack barcode for fridge access.)

- Full Name of Patient
- Date of Birth
- Hospital Number
- Clinical area/Ward
- Degree of urgency
- Name of person to receive blood

For collecting blood components, see 5.4.2. Blood will be transported by porters to the nearest satellite fridge in a dedicated container. It is the clinical area's responsibility to collect each unit when ready to transfuse. The exception to this would be if the patient's clinical condition required all units

left to be commenced within 30 minutes. Emergency blood collection can be requested via switchboard using the 3333 or activating the massive haemorrhage protocol by ringing 2222.

Blood may only be removed from Blood fridges by staff who have completed their transfusion theory, Courier training, and competency assessment. Only one patient's unit(s) can be removed from the fridge at one time.

Platelets must not be cooled and should be transported in a container without a cool pack, if the unit is not visible through the container, it must be clearly marked 'PLATELETS'.

Platelets can only be issued by Bloodbank therefore the person collecting must contact the BMS via the hatch and book them out via the electronic fridge management system (kiosk) FFP once defrosted will be placed in the blood fridge by the BMS and can be accessed in the usual way

Satellite fridges are situated as follows:-

PRH Maternity (opposite Delivery Suite theatre)
Monday to Friday, excluding bank holidays, a member of the Transfusion Laboratory will collect unused units from the blood fridge and return them to the laboratory Blood Bank. Only blood for known placenta praevias will be left in the fridge and replaced with fresh re-crossmatched units twice weekly if requested to do so by Maternity.

RSH Theatre and PRH Theatre
The Transfusion Laboratory no longer take blood for routine surgery to the theatre fridge each morning. It is the responsibility of the theatre practitioners to check availability and location of blood cover for their patients using the 'blood available' facility on AutoFate and organise collection from the blood bank issue fridge as required. Monday to Friday, excluding bank holidays, a member of the transfusion laboratory will collect and return any unused blood from the previous day, unless an appropriate and valid note to leave them is attached to the fridge. This note must be clearly signed and dated - however, such units will only be left if within the reservation time period of 24 hours or longer by prior agreement.

The theatre satellite fridges on both sites are located behind swipe card / key code pad locked doors. The blood must only be removed by trained and authorised staff.

Community hospitals supplied by RSH Transfusion Laboratory
See supplementary 'Protocol for the transfusion of blood and blood components at community hospitals'. Reference TX001a.

"Flying Squad" or Emergency Blood
Units of NHSBT blood group guaranteed 'O' Rh D negative, K negative blood are always available in:

- RSH Theatre (2)
- RSH Laboratory issue fridge (2)
- PRH Maternity Blood Bank. (2) + one neonatal pack
- PRH Laboratory Issue Blood Bank foyer. (2)

The use of flying squad blood must be authorised by a Medical Officer only and patients may still show a transfusion reaction to less common antibodies.

A&E Department
On the personal instruction of the A&E Consultant only, up to 2 units at a time of uncrossmatched group 'O' Rh D negative, K negative blood may be obtained from the Blood Bank's issue fridges (also in Theatre fridge at RSH). The use of the A & E 'attendance number' is not acceptable. Note that on request forms, a patient ID number must be used. If there is any uncertainty about any patient details then the 'UNKNOWN' field should be utilised.
DO NOT ENTER ESTIMATED DATA, i.e. DOB.

The Transfusion Laboratory should be informed immediately, by any department, if any of the emergency O Neg blood is removed so that replacements can be arranged as soon as possible. This should be part of the massive haemorrhage protocol.

The attached red card luggage label should be completed with the patient details. The barcode from the label should be removed and put into the patient's notes/A&E records and then the card returned to the appropriate Transfusion Laboratory in the envelope provided. This is required by law for traceability. Non-compliance will be recorded as a clinical incident.

5.3 Time Constraints for Leaving Blood out of a Controlled Environment

Care Of Blood After Leaving Blood Bank (general notes)
The interval between removal of blood from a Blood Bank fridge and the beginning of the transfusion should be reduced to a minimum (less than 30 minutes is recommended). Length of time out of the fridge statistically increases the risk of bacterial contamination and growth. Blood **components can still be transfused** if commenced later than 30min, but cannot be re-refrigerated (see table on next page) The time of arrival of blood on the ward should be recorded using the electronic AutoFate system, along with the time of commencement and completion of transfusion.

- Blood must only be stored in specifically designed blood fridges. Ward and drug refrigerators must **never** be used.

- Blood must never be warmed before transfusion, except in special circumstances. This should occur using approved blood warmer units supplied by the theatre department or equipment library. Advice can always be sought from the Transfusion Laboratory or the Specialist Practitioner of Transfusion.

- For internal transport, blood should be carried in the designated red transport bags. Blood cannot be returned to a controlled blood fridge if it has been out longer than 30 minutes. If for any reason this limit is exceeded, blood must be transfused within 4 hours of leaving the blood fridge or wasted.

- If blood is kept for more than 30 minutes at room temperature and is **not** going to be used, it is potentially unsafe for transfusion and should be wasted. The laboratory must be informed (recorded on ward AutoFate) and advice will be given. Contact the laboratory if blood has been out of the fridge for >30 minutes but <60 minutes.

- For external transport of blood, please seek advice from blood bank**. Blood cannot be transported outside the hospital in the red internal transport bags.** (see appendix 4). The traceability and storage conditions of blood is imperative, therefore no blood component should be transported outside the hospital without being packed and documented by blood bank, with appropriate faxes sent to the receiving hospital.

- After transfusion of blood components, the empty bags should be retained on the clinical area for 24 hours. This should be in a sluice area in a clear plastic bag with the label visible through the bag. If no reactions have taken place, the bags should then be safely disposed as clinical waste and not returned to the laboratory.

- Any problems encountered with the blood transfusion process should be discussed with the Transfusion Laboratory staff or the Specialist Practitioner of Transfusion (contact via switchboard on mobile phone or the transfusion laboratory). Staff involved in the transport of blood components should be competency assessed biennially using the adapted NPSA framework and those involved in the administration process should be assessed at least once. Competency is dependent on the completion of an on-line theory assessment every two years

Maximum time from leaving controlled storage to completing infusion		**Recommended infusion time**
Red blood cells	4 hours	<3 hours
Platelets	Not applicable	30-60 minutes
Fresh Frozen Plasma	4 hours	30 minutes
Cryoprecipitate	4 hours	30 minutes to an hour depending on volume.

5.4 Requesting & Collection of Blood Components

Positive patient identification is equally as important when requesting blood from the issuing Blood Bank, or collecting from a satellite fridge, as when checking blood and components before administration. Therefore you must supply full patient details which have been verified by patients with capacity (as per competency assessment framework), to minimise error at point of issue. Only collect blood for a single patient from the blood fridge – if more than one patient requires a transfusion, collect one unit, check and attach to the patient, then return to the fridge to collect for the next patient. The exception to this is porters delivering to satellite fridges.

5.4.1. Requests to the Transfusion Laboratory.

For non-routine cross-matches, phone the issuing hospital Transfusion Laboratory to inform them of the request that will follow. All verbal (followed up by a written request) must identify:

- Patient's full name
- Address
- Date of birth
- Hospital/NHS number
- Ward or department
- The number of units and type of component required
- The name and contact details of the person requesting
- Degree of urgency / time required
- Risk of infection

5.4.2. Prior to requesting collection of blood components,

- Ensure the patient ID band information is correct with the patient, including consent where applicable.
- Ensure blood component is prescribed/authorised and the information matches the patient ID band and the reason for transfusion is documented on the patient record.
- Procedure must be carried out by a Registered Doctor, Nurse, Midwife, ACP or ODP.
- Ensure the patient has patent IV access and baseline vital signs completed.

5.4.3 Requests to porters

The same information as listed in 5.4.1 above is required when requesting collection by porters. The information given to porters will be that checked from the patient and must be transcribed onto pre-printed note pads. This will be used to match patient information on the units being collected. Red cells will be taken to the nearest satellite fridge for collection by clinical staff when ready to transfuse.

Any other person collecting blood from any blood fridge must have written patient demographics (see section 5.2) which has been checked with the patient/ID band. The collection of anti-D by anyone requires them to be given the patient's name, unit number and DOB beforehand.

This information should be used to match the patient information on the fridge kiosk in the acute trust and on the blood bag in the community hospitals.

5.5 Receipt of Blood in the Clinical Area

Any staff taking a blood component to the clinical area should physically hand over the component to a registered practitioner. The receiving practitioner and the person transporting the component must both check the following details from the blood bag against the patient details on the prescription/authorisation

- Patient's name, date of birth, hospital identification/NHS number (which also matches the patient identification on the medical prescription).
- ABO blood group, Rh D type and any special requirements.
- Expiry date of the unit **and** any signs of leakage, discoloration or haemolysis
- NHSBT donor number on the unit matches the number on the Blood Bank label

If they do not it must be returned to the blood fridge immediately

Once checked as correct, the unit should be electronically 'arrived' in the clinical area using the AutoFate blood track system in the acute trust. In the event this is not available, staff must use the manual form (which can be obtained from the Transfusion Laboratory or printed from the procedure on the intranet) and return to the Transfusion Laboratory once the transfusion has been commenced and therefore the fate of the unit confirmed. Only staff who have completed their transfusion training should handle and administer blood components. Agency staff must not be involved in the transfusion process unless they have completed SaTH training and theory package.

The patient checking procedure (2nd part) and transfusion should be commenced as soon as possible at the patient's bedside.

NB

Platelets must be checked and transfusion commenced immediately as they need to be constantly agitated.

Section 6 The Transfusion - Checking Protocol

All blood components, including ad-hock deliveries, **MUST** be delivered to the Transfusion Laboratory and then issued to named patients as per Blood Safety & Quality Regulations.

- On receipt in the clinical area, the donor and recipient blood groups. expiry date, and any signs of leakage, discoloration or haemolysis (often a sign of bacterial contamination) should have already been checked and does not require repeating at the bedside.

1 Blood components should always be administered against a written authorisation.

2 In this Trust, two people, who must be a Registered Nurse, Midwife, Medical Practitioner, ACP or ODP, must check all units of blood components given to a patient.

3 Each person must check all details against the blood bag label and not over rely on the other person.

4 Information from the patient's identity band must be checked at the bedside against the blood bag.

5 Ask the patient to state their name and date of birth (unless their clinical condition does not allow a response. Demographics should have been checked with next of kin previously).

6 Check the following information from the patient's wristband

- **patient's name,**
- **NHS/unit number**.
- **date of birth**

AGAINST

- the patient's authorisation documentation,

WITH

- the label attached to the blood component.

This means **both** staff have to check that information on the patient ID band matches **both** the information on the blood bag patient label, **and** the authorisation document

The two registered staff involved in checking the unit for transfusion, must sign and date the relevant boxes on the label and the prescription/authorisation documentation. The **person connecting** the blood component should;

- Peel off the signature section label, entering the time started once the component is infusing and this should be fixed in the patients notes (current clinical entries section).
- The smaller peel off section containing the donor bag number, should be fixed in the 'donor number' section of the transfusion care pathway record, anaesthetic sheet or A&E sheet, where both staff have also signed confirming exposure to the blood component. They should also enter the start time against the entry at this point.

Note any instruction from the Transfusion Laboratory made in the 'comment' box on the blood bag luggage label.

If a defect is suspected, do not transfuse and contact the Transfusion Laboratory for advice.

IF IN DOUBT, DO NOT TRANSFUSE!

6.1 Observations during Transfusion:

The following observations should be recorded for all components on the Transfusion Record prescription document or vitalpac, as long as the data is inputted real-time due to auditing.

- Before starting any transfusion, pulse, respiration, blood pressure and temperature should be taken as a baseline reading (within 60min of commencement).
- Fifteen minutes after the start of each unit, a further recording of pulse, respiration, blood pressure and temperature should be recorded (statistically, any reaction related to an incompatibility usually occurs during this time). A tolerance of + or – 5minutes is given when audited.
- At the end of each transfused unit, pulse, respiration, blood pressure and temperature should be recorded (if another unit is to be transfused, this set of observations serves as the baseline for the next bag to be transfused if commenced within 60 minutes).
- There is no need to take more frequent recordings unless the patient becomes unwell, or is indicated by the patients underlying condition / status.
- Any variations in the observations, or any complaint by the patient, must immediately be reported to the nurse in charge of the Ward and the doctor informed. If no problems arise after transfusion, the bag should be discarded after 24 hours as clinical waste and should not be returned to the laboratory.
- Manual records, of observations at the set times, should be made on the critical care charts, in areas where patients are continually monitored.
- New regulations state that the end time of transfusion of each bag should also be recorded. This may be an addition to existing paperwork, please note on the transfusion care pathway record.
- UK law states that the absolute fate of the unit has to be recorded and details kept for 30 years. Once transfused, the bag should be re-scanned using the AutoFate blood track electronic system in the acute trust and on the relevant form in the community hospitals.

6.2 Transfusion Reactions

If a moderate to severe reaction occurs, the transfusion should be **stopped immediately** and a member of the medical team requested to review the patient. Meanwhile, repeat pulse, respiration, blood pressure, temperature, saturation. Transfusion Laboratory staff can advise and contact a consultant Haematologist and/or the Specialist Practitioner of Transfusion if there is a severe reaction

The following symptoms suggests a **major reaction which requires immediate action:**

- Dyspnoea, chest pain (not due to cardiac problems or pulmonary oedema – can be indications of transfusion related acute lung injury –TRALI / TACO).
- Back pain/loin tenderness
- Profound hypotension / circulatory collapse
- Haemoglobinuria

This list is not exhaustive see handbook of transfusion medicine.
This can also be found in digital format on the blood transfusion section of the intranet in useful links. Click on the following **www.transfusionguidelines.org.uk/index.asp?Publication=HTM**

Types of reaction

- Less severe reactions which may occur during the transfusion are urticarial and Febrile (non-haemolytic)
- Major reactions such as septic shock, anaphylactic shock, TRALI,TACO and ABO incompatibility.

Management of minor reactions

These are pyrexias of an increase greater than 2° from baseline and uticarial rashes

- Stop blood, flush access with NaCl, but leave giving set attached.
- Call doctor and repeat observations.
- Consider paracetamol for pyrexia and chlorpheniramine/ /hydrocortisone for urticaria.
- Blood cultures should be taken for pyrexial reactions
- Review in 30 minutes
- Continue transfusion if reaction settling
- If symptoms recur contact doctor & if necessary seek transfusion practitioners advice

Management of major reactions
Symptoms as listed above.

- Stop blood, DO NOT FLUSH ACCESS, or allow further blood to enter patient (aspirate if possible).
- Call doctor and complete a full set of vital signs.
- Pulse oximetry
- Oxygen via face mask
- Get 0.9% NaCl ready (may require a 500-1000ml fluid challenge if profound hypotension) and maintain circulating volume, following Trust resuscitation procedure. Colloid should be avoided, inotropes may be required to increase B/P
- Retain unit & giving set for sending to laboratory

In the case of severe reactions, or reactions that necessitate stopping a transfusion, please contact the Transfusion Laboratory, who will advise on the reporting procedure. This normally involves completing a 'reaction investigation request form', which is obtainable from the laboratory or in the blood transfusion protocols section on the intranet, with a post-transfusion specimen of EDTA blood in a crossmatch container and for severe reactions, a urine sample. Blood cultures should be taken for pyrexial reactions of rapid rise and for those >2 degrees from baseline.

The blood component bag with the giving set attached must be returned to the Transfusion Laboratory, (please ensure the bag is adequately sealed before transporting). A clinical incident form should also be completed and will be reported to SABRE and SHOT (see 6.4).

6.3 Serious Hazards of Transfusion Reporting (SHOT) and Serious Adverse Blood Reaction and Events Reporting (SABRE)

The Trust has a mandatory commitment to participate in SHOT reporting. Any transfusion incident that ***could*** harm a patient must be referred to the Transfusion Laboratory staff and the Specialist Practitioner of Transfusion (this includes near misses). All incidents are reported via SHOT who decide if they need to be reported to SaBRE (MHRA).

6.4 Administration of blood outside of hospital grounds

If a patient requires a transfusion en route to another hospital (via ambulance), at least one registered healthcare professional should perform the bedside checks to ensure the right blood is given to the right patient. Preferred practice is for two registered healthcare professionals to check the blood unit with the patient where two staff are available. Extreme care must be taken if a single staff member is checking the blood with the patient.

Section 7 Additional Information and Contact Details

- **Hospital Transfusion Committee**
  The Trust has a Hospital Transfusion Committee (HTC), which meets every three months. Any proposed changes in Hospital policy or new initiatives which will affect blood transfusion requirements must be referred to the Chairman of the committee.

- **Autologous Blood Transfusion Service**
  Autologous blood transfusion is not available in this Trust. For exceptional circumstances, such as rare or multiple antibodies, this must be discussed with a Consultant Haematologist.

- Other useful information can be found on the hospital intranet (clinical services/pathology/blood transfusion) All haematologists are contactable via switchboard on their mobile phones
- **Useful Contacts**

Dr George Cherian
Consultant Haematologist for Transfusion
Blood Transfusion Department
Department of Pathology
Royal Shrewsbury Hospital
Mytton Oak Road,
Shrewsbury SY3 8XQ.
Tel (01743) 261000

Sister Sarah Crawford
Lead Transfusion Nurse
Blood Transfusion Department
Department of Pathology
Royal Shrewsbury Hospital
Mytton Oak Road,
Shrewsbury SY3 8XQ.
Tel (01743) 261000, ext 3543/4369
Mobile 07581 639516

Ms Eve Wilson
Deputy Head BMS
Blood Transfusion Department
Department of Pathology
Royal Shrewsbury Hospital
Mytton Oak Road,
Shrewsbury SY3 8XQ.
Tel (01743) 261000 ext 3547

Section 8 Training, Monitoring and Review Process

8.1 Training

The education of staff in this subject is defined in the transfusion education policy TX006. Training required to fulfil this policy will be provided in accordance with the Trust's Training Needs Analysis. Management and monitoring of training will be via the Transfusion Practitioner, with compliance discussed via the Hospital Transfusion Committee.

The training needs analysis can be accessed via the Learning and Development pages on the Trust intranet.

8.2 Audit of transfusion practice

The Trust will continue its involvement in appropriate national and regional transfusion audits as a benchmark in addition to local audits in this policy.

- Breaches in safe transfusion practice will be reported and investigated via the clinical incident reporting system

8.4 Review

This document will be reviewed three-yearly unless there are significant changes at either national or local policy level. In order that this policy retains currency, any of the appendices to this document can be amended during the lifetime of the document, without having to review the entire document.

Section 9 References

1. Handbook of Transfusion Medicine 5th Edition (2014) The Stationery Office. WWW.transfusionguidelines.org.uk/index.asp?Publication=HTM&Section=9&pa.4/4/06.
2. Guidelines for the Blood Transfusion Services in the United Kingdom 8th Edition (2023) http://www.transfusionguidelines.org.uk/index.aspx?Publication=RB
3. Serious Hazards of Transfusion (SHOT) reports 2022.
4. BSH Guidelines for the administration of blood and blood components (2017) https://b-s-h.org.uk/guidelines/guidelines/administration-of-blood-components
5. British Society for Haematology, guidelines (fetuses, babies and older children, use of platelet transfusions, both 2016) http://www.b-s-h.org.uk/guidelines/
6. The SaBTO recommendations regarding the requirements to use Cytomegalovirus tested blood components - position statement and SaBTO report of the Cytomegalovirus Steering Group can be found via this link

   www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_132965
7. Drug and blood transfusion policies, Hammersmith hospitals NHS Trust (1999)
8. BCSH Guidelines for Neonates and Older Children (April 2004) erratum (2007)
9. Patient Blood Management 2015 www.transfusionguidelines.org.uk/uk-transfusion-committees/national-blood-transfusion-committee/patient-blood-management
10. Home | NHS Blood Components
11. SaBTO position statement (2016) - Cytomegalovirus tested blood components

Appendix 1 Checklist for Safer Blood Transfusion

Medical staff responsibility

- Patients should have *(& documented on carepathway)*
  - Informed consent.
  - Patient information leaflet.
  - The right to refuse transfusion and receive an alternative therapy.
- The reason for transfusion documented on pathway
- The volume to be transfused documented in notes.
- A request form that is completed appropriately.

Sampling

- Ensure the patient has the correct wristband
- Ensure the request form is pre-printed
- Ensure the sample tube is correctly hand labelled

The form must be checked prior to sampling & the tube is to be labelled at the bedside from the information on the wristband.

Prior to requesting the blood

- Ensure blood is prescribed and the reason documented
- Procedure must be carried out by a Registered Doctor, Nurse, ACP, Midwife or ODP
- Baseline vital signs performed.
- Ensure patient has correct ID band & patent IV access.

Requesting a unit of blood for the ward/department

Staff including porter will need to know (& have a valid autofate barcode):

- Full Name of Patient
- Date of Birth
- Hospital Number
- Clinical area/Ward
- Degree of urgency
- Name of receiving nurse

Receiving a blood component on the ward/department

Check component & label for correct details with prescription

- Full Name of Patient
- Date of Birth
- Hospital / NHS Number
- bag Nº on label & tag
- Arrive the unit, using the AutoFate tracking system

DO NOT GIVE BLOOD TO ANY PATIENT WITHOUT A NAME BAND

Checking procedure (at the patient's side).

- **Checking must take place at the patient's bedside,**
- Double check by asking the conscious patient to state their full name, address (on carepathway record) and date of birth
- Details must correspond exactly with the name band attached to the patient, label attached to unit of blood & details on the **Transfusion Record**
- Sign, **date, time** unit started on the patients Transfusion Record & bag label,
- Fix pink donor number from bag label against the authorisation entry.

NB The time completed of the previous unit must be entered in the appropriate column of the carepathway record.

- File the signed, timed and dated peel off label in the pt records

Observation of The Patient

- Patients undergoing blood transfusion **must** remain in the clinical area
- Patients should be **closely observed** for the first 15-20 mins and asked to **report** any strange or unusual **symptoms** such as chills, rigors, flushes, headache, agitation, nausea, diarrhoea, breathlessness & loin pain (these are just a few examples)
- Record **TPR & BP** pre transfusion, **15 mins** after commencement of and **on completion** of each unit.
- Enter **time unit completed** on the carepathway record.
- Fate the blood component using the AutoFate tracking system or paper version.

General Points

- Blood components should be preceded by flushing cannula with 0.9% NaCl
- Use the correct administration set (170-200micron filter)
- Change giving set every 12 hours & before a new infusion of a different component
- Blood should be administered through a dedicated IV cannula.
- 5% Dextrose, Lactated ringer's solution and Calcium (Ca) will haemolyse blood components, creating clots.

Appendix 2 Maximum Blood Order Schedule (MBOS)

MAXIMUM BLOOD ORDER SCHEDULE (MBOS)

GUIDE TO BLOOD TRANSFUSION REQUESTS

* Intra-operative cell salvage should be routinely considered to preserve blood stocks.

It has been clinically proven to benefit patient outcomes. This procedure can be used on any clean surgery (see policy TX007 & TX008 for obstetrics)

If the risk of bleeding necessitates a patient to be crossmatched, then a post op Hb check should be performed

General Surgery	Check Hb post-op	Number of units to be crossmatched or Group and Screen only
Abdomino-perineal resection	✓	2
Amputation	✓	2
Anterior resection	✓	2
*Aortic aneurysm (planned)	✓	4
Bowel resection (including large bowel)	✓	G+S
Breast biopsy/lump excision		Not required
Bilateral mastectomy/mastectomy and reconstruction		G+S
Cholecystectomy		G+S
Femoro-popliteal bypass		G+S
Gastrectomy – partial		G+S
Gastrectomy – total	✓	G+S
Ileostomy		G+S
Laparotomy (This should be reviewed on a case-by case basis)	✓	G+S
All laparoscopic surgery		G+S
Liver biopsy		G+S
Mastectomy		G+S
Renal biopsy		G+S
Splenectomy (open or laparoscopic)		G+S
Thyroidectomy		G+S (except EET)
Bariatric surgery		G+S
Vagotomy and Pyloroplasty		G+S

*__Maxillo-facial/EET__ (cell salvage can be used in this field if required)

Bone flaps	✓	2
Block dissection of neck	✓	G+S
Ca maxilla and tongue	✓	3
Laryngectomy	✓	2
Maxillary fractures	✓	2
Osteotomies	✓	2
Soft tissue flaps	✓	G+S

__Orthopaedics__	__Check Hb post-op__	__Number of units to be crossmatched or Group and Screen only__
*Fractured neck of femur	✓	2
Hemiarthroplasty or Dynamic Hip Screw	✓	G+S
Femoral Nail	✓	4
Proximal or distal femoral replacements	✓	2
Revision/replacement for periprosthetic fractures	✓	2
Palliative fixation/endoprosthetic replacement for bone metastasis	✓	4
*THR	✓	G+S
*TKR	✓	G+S

__Urology__ * refer to cell salvage policy

*Cystectomy – partial	✓	2
*Cystectomy – total	✓	4
Cystoscopy and TUR of bladder lesion		G+S
*Nephrectomy	✓	3
Nephrolithotomy	✓	2
Percutaneous nephrolithotomy	✓	2
Percutaneous Nephrostomy		G+S
*Prostatectomy	✓	2
TURP		G+S

Obstetrics and Gynaecology * refer to cell salvage policy

*APH/PPH	✓	4
Bilateral tubal ligation		G+S
Caesarean section (Dependent on individual patient – may require units crossmatching)		G+S
Colpocleisis		G+S
Colposuspension		G+S
*Ectopic pregnancy	✓	2
Fascial sling		G+S
Hysterectomy - abdominal or vaginal		G+S
*Hysterectomy - Wertheim's	✓	4
Laparopscopic or open BSO		G+S
Laparoscopy- ? proceed to laporotomy		G+S
Myomectomy	✓	2
Manual removal of placenta		G+S
Oophorectomy/ovarian cyst		G+S
Prolapse – repair		G+S
Sacrocolpopexy		G+S
Sacrospinous ligament fixation		G+S
Termination of pregnancy		G+S
Vulvectomy, radical	✓	2
Primary placenta praevia (may be dependent on other factors – anterior/posterial, starting Hb)	✓	6
Placenta accreta	✓	6

Notes:

1 Where possible, blood should be ordered against one of the National Indication Codes

2 "Pre-operative" or "surgery" is not acceptable on a request form.

3 These represent expected requirements in routine cases - there may be specific local variations.

4 If more than the agreed tariff is required, the reason for this should be clearly stated on the request form to ensure the patient has adequate blood cover.

5 On group and screen samples, crossmatched blood for urgent cases can be provided within 45 minutes of a request being made.

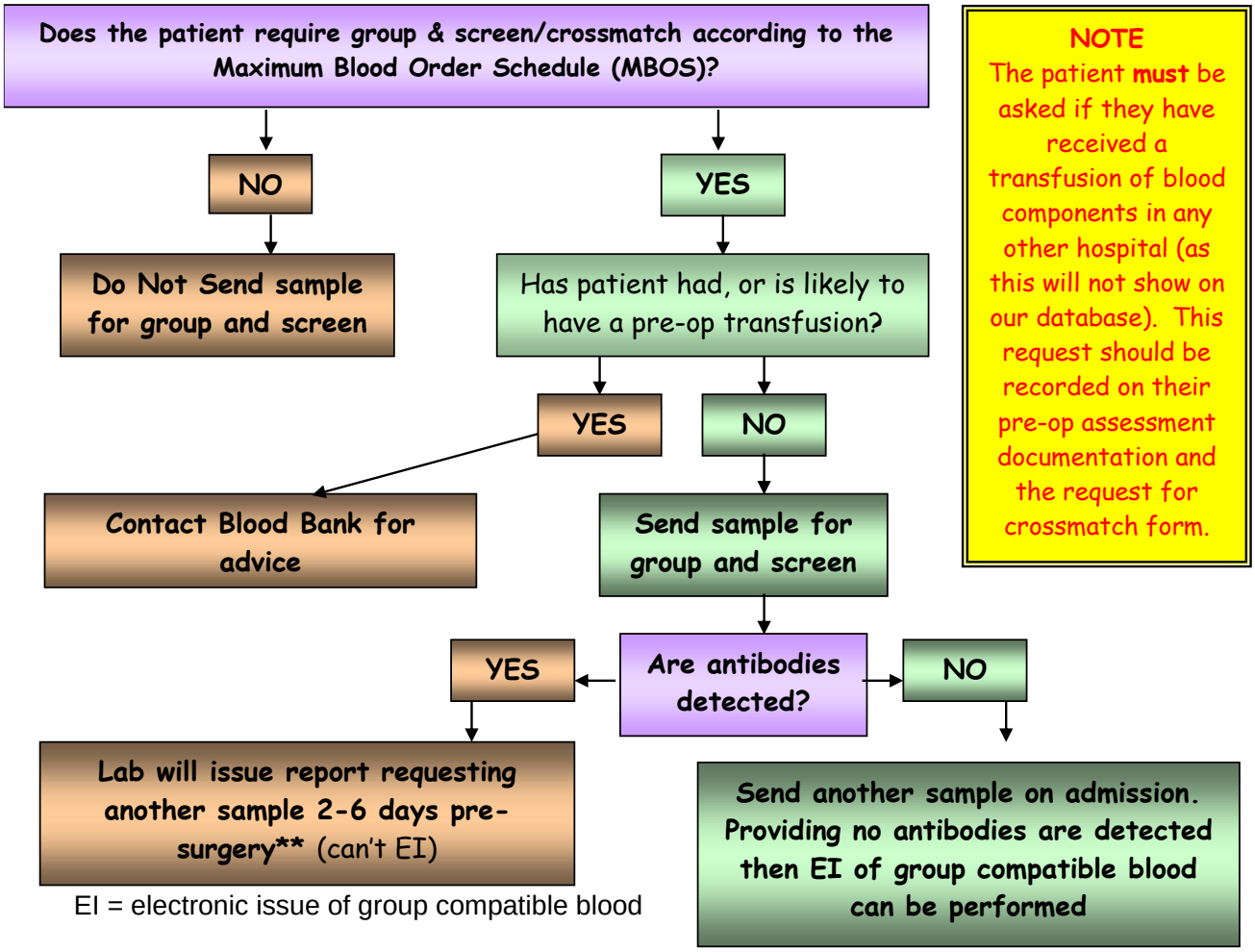
6 Immediate issue of red cells is potentially available, dependant on meeting set criteria for electronic issue.

7 Ensure <u>two</u> samples have been received in the laboratory – a historical sample, if available, is adequate for ‘sample one’ (taken any time since the year 2000) and the sample prior to surgery will be classed as ‘sample two’. Telephone Blood Bank to see if one sample is required, or if two samples are needed for unknown patients.

**** if two samples are required for unknown patients, they MUST be taken by two <u>different</u> samplers at two different times. Two samples CANNOT be taken at the same time under ANY circumstance**

Clinical services/pathology/blood transfusion/protocols/safe transfusion policy APPENDIX 3

Guidelines for Pre-Operative Assessment of Requirement to Group & Save/Crossmatch Patients (& EI)



EI = electronic issue of group compatible blood

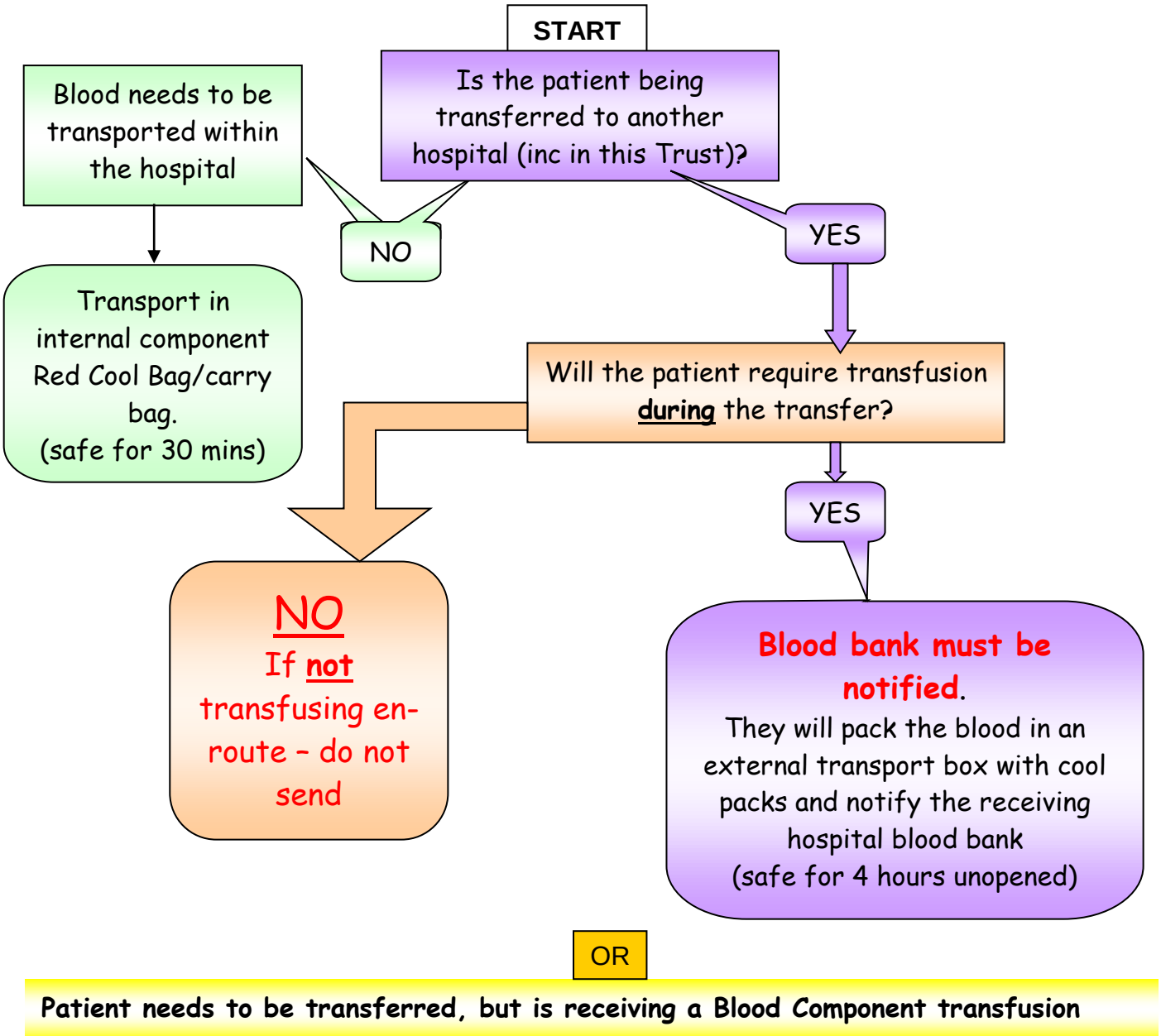
NOTE

1) The Trust Maximum Blood Order Schedule (MBOS) should be used as guidance for group and screen/crossmatch requirements.
2) Samples can be taken at pre-op assessment, but if **surgery date** is longer than **7 days**, a repeat sample will be required **on admission** (sample can only be kept for maximum 7 days if the criteria is met). Transfusion samples are valid for either 3 or 7 days, based on the patient's personal circumstances – please check with Blood Bank
3) If patients are admitted on the day of surgery, an accurate time required MUST be entered on the request form (not ASAP).
4) The initial pre-op sample should be taken within three months prior to operation date.
5) **Patients with known or detected antibodies may need to have blood specially ordered from the National Blood Service and must be fully x-matched. In an emergency this takes a minimum of 45 minutes providing suitable antigen negative blood is available (routine samples are dealt with on a batch basis and will therefore be in a queue system).
6) Samples for operations not on the MBOS will be saved, but not processed (7 day limit)

Appendix 4 Transport Guidelines for Blood Components

Due to EU blood directives, the transport of blood to other hospitals is not recommended. Unless the patient requires blood en-route to another Trust, it is preferable not to transport blood components to another hospital. Exception may be made if agreement is made between the sending and receiving hospital Transfusion Laboratory under stringent protocols.

Transfusion Laboratory MUST package all blood for external transport. Trust soft red cool bags/carrier bags MUST NOT be used to transport blood components to other hospitals.



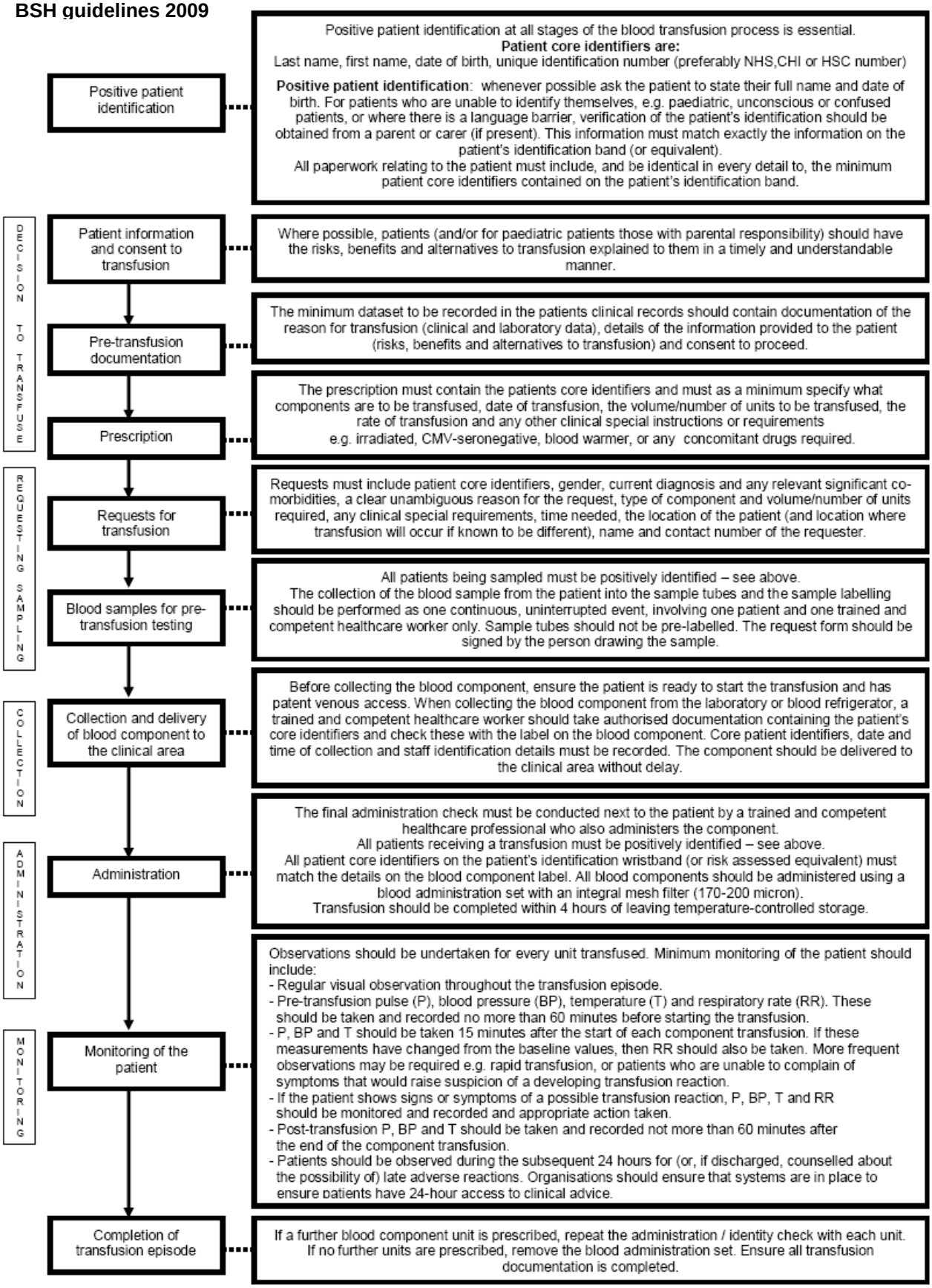
Good practice guidelines

- Do not transfer during the first 15 minutes of commencing a blood component.
- Transfer the patient as soon as possible to the area of care where they have been allocated a bed.
- Complete the traceability forms for units given en-route and ensure receiving hospital blood bank is sent any transport boxes
- Follow the flowchart above depending on that location.

See 6.4: Administration of blood outside of hospital grounds for further information.

Appendix 5 Flow Chart of the Transfusion Process –key action points

BSH guidelines 2009



Appendix 6a Guideline Calculation Grid for Administration Dose of Fresh Frozen Plasma (FFP) -ADULT

Fresh-frozen plasma has optimal value when transfused at the appropriate dose.

The **recommended adult therapeutic dose of FFP is 15-20 ml/kg** (1), and the dose of FFP should always be **at least 10 ml/kg** (2); however a recent report showed in clinical practice 40% of adults received an FFP dose <10 ml/kg (2).

Notes.

- If the patient's weight is in between the categories below use the next weight up.
- In ADULTS transfuse in whole numbers of units.
- In very obese patients, and those over 100Kg the calculation should be based on IDEAL BODY WEIGHT, as this is better likely to reflect intravascular volume, and avoid potential fluid overload.

Paediatric dose – see next page. For children >60kg use adult regime.

FFP DOSE FOR ADULTS		
Weight	**Average Volume (12ml/kg)**	**Number of units**
60 kg	**720 ml**	**3**
65 kg	**780 ml**	**3**
70 kg	**840 ml**	**3**
75 kg	**900 ml**	**4**
80 kg	**960 ml**	**4**
85 kg	**1020 ml**	**4**
90 kg	**1080 ml**	**4**
95 kg	**1140 ml**	**4**
100 kg	**1200 ml**	**5**

1. Blood Components - Adults | NHS Blood Components (2023)

Adapted from NHSBT FFP poster v1 01/10

Appendix 6b Guideline Calculation Grid for Administration Dose of Fresh Frozen Plasma (FFP) - PAEDIATRIC

Children > 1 month

The use of FFP in children is rare and discussion with the on-call consultant haematologist or Dr Cowley / Dr Parsons is required prior to issuing.

- The prescribed dose of FFP should be guided by clinical situation and coagulation results –
  - Specifically Prothrombin Time (PT) & Activated Partial Thrombin Time (APTT).

- If no active bleeding and no evidence of DIC - repeat clotting to confirm accurate results.
- If concerns re: active bleeding – Intravenous Vitamin K is often given as first line at a dose of 300mcg/kg (maximum 10mg) and a repeat sample (larger sample obtained) prior to FFP being given.
- If concerns re: active bleeding and Trauma and there is a coagulopathy with a normal platelet count – FFP at 10mls/kg should be used first. Please refer to Trust massive haemorrhage guidelines for appropriate use.

Fresh-frozen plasma has optimal value when transfused at the appropriate dose.

The **recommended therapeutic paediatric dose of FFP is 15mls/kg** (see section 1.2 of the main transfusion policy TX001 & safe Tx practice for paediatrics, learnpro elearning suit), however a range can be used depending on pack size. The minimum dose of FFP should always be **at least 10 ml/kg up to a maximum of 20mls/kg.**
Rate from 10-20mls/kg/hr and depends on clinical circumstances.

Children weighing over 4kg should receive solvent detergent plasma (Octaplas). Under this weight methylene blue treated FFP is used as for neonates.

E.g Calculations below round up to the nearest whole Adult Therapeutic Dose bag of FFP
This document is intended as a guide to the correct dose of FFP, it is not a directive, and should not be used in place of clinical assessment.

FFP DOSE FOR CHILDREN >1 MONTH			
Patient Weight (kg)		**Number of units FFP**	
15 - 30 kg		**1**	**15ml/kg should be considered in massive haemorrhage – Please refer to Trust Massive Haemorrhage Guidelines for appropriate use.**
30 – 60 kg		**2**	
> 60kg		**3**	

Neonates

The use of FFP in neonates is not common and discussion with the on-call consultant neonatologist and/or haematologist is required prior to issuing.

Follow neonatal guideline:- COAGULATION PROBLEMS IN NEONATES found on the intranet under neonatal guidelines or click on the guideline title for the link. Ref No: 3846

Methylene blue neonatal packs are available for infants up to 4kg in weight.

Derived from the adult calculation grid by Dr Andrew Cowley, Consultant Paediatrician (SaTH)

Appendix 7 Guideline calculator for Red Blood Cell volumes

RED BLOOD CELL (RBC) CALCULATOR

This is a guide to aide your decision-making when prescribing RBC. RBC are not the treatment of choice for iron deficiency or other haematinic deficiencies. The BSH recommended adult therapeutic dose of RBC is 4ml/kg, which should lead to an approximately 10g/L rise in haemoglobin. The historic 'One unit of RBC to give a Hb rise of 10g/L' is for a 70kg person. Patients who weigh less, or more, than 70kg are at risk of under, or over-transfusion. The latter may lead to 'Transfusion Associated Circulatory Overload' (TACO). If you suspect TACO has occurred, report urgently to the Transfusion Laboratory who will investigate and report to 'Serious Hazards of Transfusion' (the national haemovigilance organisation).

The paediatric dose uses the same calculation; 4ml/kg for a 10g/L Hb rise or (Desired Haemoglobin-Actual haemoglobin) x weight x 0.4 = mls to be prescribed. A suggested infusion rate of 5ml/kg/hr is advocated but will depend on the clinical situation.

Main National Indications, and transfusion 'triggers', for red cell transfusion (form part of the electronic requesting system)

1. Acute blood loss (especially if > 1.5L in an adult).
2. Symptomatic anaemia with no easily treatable cause (remember to treat the iron deficiency as well)
   e.g. Hb <70g/L (age <75yrs), *or* Hb <80g/L (age >75yrs, or co-morbidities)
3. Long-term transfusion-dependent anaemia – aim to keep Hb > 80g/L
4. Radiotherapy patient (keep Hb >100g/L, children >110g/l)
5. Chemotherapy patient (keep Hb >80-90g/L dependent on symptoms). Children keep Hb >70/80g/L

Patient wt in Kg[#]	**Red blood cell volume/units calculator**			
	4ml/Kg	**ml or units of RBC per 10g/L rise**	**ml or units of RBC per 20g/L rise**	**The prescribed dose of RBC must be guided by the clinical situation. The target haemoglobin in non bleeding patients should be to alleviate symptoms and elevate to just above the national transfusion trigger:**
25kg	100ml	100ml	200ml	
30kg	120ml	120ml	240ml	
35kg	140ml	140ml	280ml	
40kg	160ml	140ml (based on mean volume)	1	
45kg	180ml	140ml (based on mean volume)	1	
50kg	200ml	140ml (based on mean volume)	1	
55kg	220ml	140ml (based on mean volume)	1	
60kg	240ml	1	2	
65kg	260ml	1	2	
70kg	280ml	1	2	
75kg	300ml	1	2	
80kg	320ml	1	2	
85kg	340ml	1	2	
90kg	360ml	1.5	3	
95kg	380ml	1.5	3	
100kg	400ml	1.5	3	

[#] If weight between thresholds, use the next tier up.
The volume of a RBC unit is variable: mean =280mls. Clinical judgment is required.

This is only a guide to dosing of RBC transfusion. Ensure you complete a clinical assessment.

BSH: Guidelines for administration of blood components, addendum 2012. Patient Blood Management 2014/15

Appendix 8 Indication for Platelet transfusion Guideline

Prior to prescribing a platelet transfusion consider

- Platelet count is an indicator, however, it does not measure function, therefore platelet transfusions should take into consideration, count and physical signs of bleeding.
- What are the indications for transfusion in this patient?

  *Prophylactic transfusions **must** have a platelet count taken with 24hrs (up to 48hrs for outpatients)*

  If in the background of bone marrow failure (BMF), no haematological diagnosis is established, platelets MUST only be given AFTER consultation with a haematologist.
- Are there alternatives which could be used in preference to platelet transfusion? (*see table 1 below*)
- Has the patient consented to receive a platelet transfusion? (Transfusion reactions are more likely with this blood component. *See table 2 below*)
- Has the indication been documented in the patients transfusion carepathway record and on the transfusion request form? *(see table 3 below divided for adults and children/neonates*)

Contraindications to platelet transfusion <u>unless</u> life-threatening haemorrhage

- Thrombotic Thrombocytopenic Purpura (TTP)
- Heparin Induced Thrombocytopenia (HIT)
- Post Transfusion Purpura (PTP)

Table 1 **Possible alternatives to platelet transfusions**

General measures	Specific patient populations
Stop all anti-platelet agents whenever possible	Liver disease –drainage of ascites / endoscopy, give vitamin K. Check coagulation, discuss with haematologist if necessary.
Apply surface pressure after superficial procedure	Ureamia – dialyse, correct Hct to 0.3%, consider DDAVP (desmopressin)
Treat any surgical cause for bleeding	Inherited platelet function disorders – specialist haematology advice required. Consider DDAVP
Consider Tranexamic Acid if bleeding or anticipated (500ml blood loss in adults, 10% in children)	Splenomegaly/hypersplenism – consider splenectomy or splenic irradiation
Severe bleeding, check fibrinogen concentration (cryoprecipitate if <1.5g/L or 2g/L in obstetrics)	If suspicious diagnosis of DIC or TTP/HUS discuss with haematologist.

Table 2 **Risks associated with platelet transfusion**

Reduced effectiveness of future platelet transfusion Alloimmunisation In the absence of alloimmunisation, increment reduces as the number of platelet transfusions increase
Adverse effects ♦ Febrile non-haemolytic transfusion reactions. Incidence approximately 3%. May require investigation to exclude other causes e.g. bacterial infection (see below) and prolong hospital stay. 1 in 6,000 ♦ Allergic reactions 1 in 6,000. Incidence is 3 times more frequent than with red cells Anaphylaxis rare (1 in 20,000 to 1 in 50,000 of all transfusions). ♦ Transfusion-transmitted bacterial infection (TTBI)/bacterial sepsis is rare since bacterial screening introduced 2010, but is more likely compared to other components due to storage required at 22^0c. ♦ Transfusion related acute lung injury. 1 in 1,000,000 This is a serious but unusual complication of transfusion but platelets are around 8 times more likely to be implicated than red cellsOther risks are; ABO incompatible plasma, 1 in 600,00, Hepatitis B 1 in 1,000,000, Hepatitis C 1 in 30,000,000, HIV 1

in 7,000,000

Table 3 **Indications for use of platelet transfusion**

(Differences/additions to indications for neonates & older children are shown at the end of this section)

(*Adapted from the BSH guideline & the national indication codes, see references section***)**

Indication categories in adults	**Indicated /Transfusion threshold, when count is**
Prophylactic use (No bleeding or WHO grade 1) **One adult dose required**	
♦ Reversible bone marrow failure including allogeneic stem cell transplant	≤ 10 x 10^9/L
♦ Reversible BMF with autologous stem cell transplant	≤ 10 x 10^9/L
♦ Critical illness	≤ 10 x 10^9/L
♦ Chronic BMF receiving intensive therapy	≤ 10 x 10^9/L
♦ Acute Promyelocytic Leukaemia (APML)	≤ 50 x 10^9/L
♦ Chronic stable BMF without risk factors	Not indicated *(can discuss with haematologist)*
♦ Immune Thrombocytopenia (ITP), *HIT,* PTP, *TTP	Not indicated *(* see contraindications section)*
Prophylactic use in the presence of risk factors, e.g	
♦ Sepsis / fever / antibiotic treatment	≤ 10-20 x 10^9/L
♦ Coagulopathy / disseminated vascular coagulopathy (DIC)	≤ 10-20 x 10^9/L
♦ Reversible/chronic bone marrow(BMF) with critical illness to prevent persistent bleeding of grade ≥ 2	Count variable
Platelet Transfusion Procedures	
♦ Central venous catheter (CVC) excluding PICC line	≤ 20 x 10^9/L
♦ Lumbar puncture	≤ 40 x 10^9/L
♦ Percutaneous liver biopsy	≤ 50 x 10^9/L
♦ OGD in the setting of chronic liver disease if high risk of bleeding (varices)	≤ 50 x 10^9/L
♦ Major surgery	≤ 50 x 10^9/L
♦ Epidural anaesthesia, insertion & removal	≤ 80 x 10^9/L
♦ Neurosurgery or ophthalmic surgery involving the posterior segment of the eye	≤ 100 x 10^9/L
Bone marrow aspirate or trephine biopsies, PICC line insertion, traction **removal** of central venous catheters (CVC's), cataract surgery	Not indicated
Therapeutic use (WHO bleeding grade 2 or above)	
♦ Severe bleeding	≤ 50 x 10^9/L
♦ Bleeding (WHO grade >2) but not severe	≤ 30 x 10^9/L
♦ Multiple trauma, brain or eye injury, spontaneous intracerebral haemorrhage	≤ 100 x 10^9/L
Bleeding in specific conditions	
♦ ITP, (if other modalities Rx modalities failed & pt bleeding/ or urgent lifesaving procedure needed)	Discuss with haematologist
♦ *HIT,* PTP, *TTP (platelet are **contraindicated** unless life-threatening bleeding)	
♦ Platelet function defect/inherited platelet dysfunction disorder; - *Congenital* – Pre procedure or therapeutic use. When alternative therapy contraindicated or ineffective. Directed by specialist in haemostasis. - *Acquired* (anti-platelet agents, uraemia)- only indicated for severe bleeding	Count variable (Discuss with haematologist)

Differences/additions to indications above for neonates & older children *(Continued on next page) taken from* ***BCH guideline on transfusion for fetuses, neonates and older children***

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

2. a *Note*: routine screening by standard coagulation tests not advocated without clinical indication; for laboratory evidence of DIC 'Disseminated intravascular coagulation '
   b It is accepted that prior to lumbar puncture some clinicians will transfuse platelets at higher counts (e.g. 50 × 10^9/l) in clinically unstable children, non ALL patients, or for the first LP in newly-diagnosed ALL patients to avoid haemorrhage and cerebrospinal fluid contamination with blasts, or at lower counts (≤20 × 10^9/l) in stable patients with ALL, depending on the clinical situation. These practices emphasise the importance of considering the clinical setting and patient factors.

Routine prophylaxis in neonates	
♦ Sick preterm or term infant, no bleeding (inc with NAIT, no history of ICH)	≤ 25 x 10^9/L
♦ Neonates with bleeding, current coagulopathy, before surgery, or infants with neonatal alloimmune thrombocytopenia (NAIT) if previously affected sibling with intracranial haemorrhage (ICH)	≤ 50 x 10^9/L
♦ Birth weight <1000gms and < one week old, Previous major bleed, Current minor bleeding eg. venepuncture oozing, Invasive procedures eg. lumbar puncture, chest drain or central line, Platelet count is falling and likely to fall below 30, PDA treated with indomethacin or ibuprofen	≤ 50 x 10^9/L
♦ Neonates with major bleeding or requiring major surgery (e.g neurosurgery)	≤ 100 x 10^9/L
Clinical situation to trigger platelet transfusion;	
a. Irrespective of signs of haemorrhage (excl ITP, TTP/HUS, HIT)	< 10 x 10^9/L
b. Severe mucositis	< 20 x 10^9/L
c. Sepsis	< 20 x 10^9/L
d. Laboratory evidence of DIC in the absence of bleeding [2a]	< 20 x 10^9/L
e. Anticoagulant therapy	< 20 x 10^9/L
f. Risk of bleeding due to a local tumour infiltration	< 20 x 10^9/L
g. Insertion of a non-tunnelled central venous line	< 20 x 10^9/L
h. Prior to lumbar puncture [2b]	< 30 x 10^9/L
i. Insertion of naso-gastric tube	< 30 x 10^9/L
j. Moderate haemorrhage (e.g. gastrointestinal bleeding) including bleeding in association with DIC	< 50 x 10^9/L
k. Surgery, unless minor (except at critical sites)including tunnelled central venous line insertion	< 50 x 10^9/L
l. Major haemorrhage or significant post-operative bleeding (e.g. post cardiac surgery)	< 75-100 x 10^9/L
m. Surgery at critical sites: central nervous system including eyes	< 100 x 10^9/L
Bleeding child with thrombocytopenia CHECK COAGULATION/CLINICAL DECISION IN LIASION WITH HAEMATOLOGY CONSULTANT ON CALL (Dr Cowley/Dr Parsons)	NO THRESHOLD

Alternative support and information for platelet transfusion guidelines

NHS blood and transplant have developed a platelet transfusion mobile device site and is designed to give quick, easy access to national guidelines on platelet transfusion and is specifically designed for smartphones and tablets. Blood Component Indication Code App- for Adults, Children, Infants & Neonates Home | NHS Blood Components

Appendix 9 Blood Component Administration (Adults)

Taken from the BSH guidelines 2009 APPENDIX 4 with updates from current NHSBT guidance

COMPONENT	COMMENT
All blood components	• All blood components should be administered using a blood component administration set which incorporates a 170 – 200 micron filter
Red Cells Volume: 180-350ml (mean 282 ml)	• Storage: designated temperature controlled refrigerator 4 ±2 oC • Shelf life: 35 days • Dose: 4ml/kg (equivalent to 1 unit per 70kg adult) typically raises Hb concentration by about 10g/l • All red cell units should be transfused within 4 hours of removal from designated temperature controlled storage • For routine administration, there is extensive experience of safely administering a red cell unit over 90-120 minutes per unit • Patients less tolerant of increased blood volume should be transfused more slowly with careful haemodynamic monitoring. For some patients it may be appropriate to give a diuretic (e.g., furosemide 20 to 40mg orally), though this is not necessary as a routine • During major haemorrhage, rapid infusion (1 unit over 5-10 minutes) may be required (with appropriate clinical and haemodynamic monitoring)
Platelets Volume: Apheresis: 180-300ml (mean 215ml) Pooled: 250-400ml (mean 310ml)	• Storage: temperature controlled 22 ±2 oC – with continuous gentle agitation • Platelets must not be refrigerated • Shelf life: 7 days (In certain controlled circumstances 7 day platelets may be supplied) • Dose: 1 adult therapeutic dose (ATD) typically increase the platelet count by at least 20-40x10^9 ml • Platelet concentrates should not be transfused through administration sets which have already been used to administer other blood components • The infusion should be commenced as soon as possible after the component arrives in the clinical area • Typically administered over 30-60 minutes per adult therapeutic dose (ATD)
FFP (Fresh Frozen Plasma) Volume: 240-300ml (mean 273ml)	• Storage: designated temperature controlled freezer. Core temperature -25 oC • Shelf life: 36 months (frozen) • Prior to the transfusion FFP must be thawed under controlled conditions using specifically designed equipment. Thawing usually takes approximately 15-30 minutes • Once thawed, FFP must not be re-frozen and should be transfused as soon as possible. Post-thaw storage will result in a decline in the content of labile coagulation factors • If stored at 22 ±2 oC post thawing, the transfusion must be completed within 4 hours of thawing • If stored at 4 ±2 oC post thawing (in a designated temperature controlled refrigerator), the transfusion must be completed within 24 hours of thawing (NHSBT 2007) • Pooled solvent-detergent treated plasma is also commercially available • Dose: typically 10-15ml/kg. This dose may need to be exceeded in massive haemorrhage depending on the clinical situation and its monitoring (BCSH 2004) • Typical infusion rate 10-20ml/kg/hr (approximately 30 minutes per unit) • Rapid infusion may be appropriate when given to replace coagulation factors during major haemorrhage There is anecdotal evidence that acute reactions may be more common with faster administration rates
Cryoprecipitate Volume: 100-250ml (pooled unit) (mean 152mls) (NHSBT 2007)	• Storage: designated temperature controlled freezer. Core temperature -25 oC • Shelf life: 36 months (frozen) • Prior to the transfusion cryoprecipitate must be thawed under controlled conditions using specifically designed equipment. Thawing usually takes approximately 15-30 minutes • Once thawed, cryoprecipitate must not be re-frozen and should be used immediately. If delay is unavoidable, the component must be stored at ambient temperature and used within 4 hours • Dose: typical adult dose is two five-donor pools (equivalent to 10 single donor units) which would raise the plasma fibrinogen level by about 1g/l • Typically administered at 10-20ml/kg/h (or 30-60 minutes per 5 unit pool)
Granulocytes Volume: Variable	• Storage: granulocytes should be administered as soon as possible after their preparation. If storage is unavoidable, the component must be stored, without agitation, at a core temperature of 22 ±2 oC • Shelf life: 24 hours • Specialist component: use must be discussed with the Hospital Transfusion Laboratory and Blood Service • Must be irradiated • Typically administered over 1-2 hours (NHSBT 2006)

Blood component volumes and dosage are for guidance and are taken from the Handbook of Transfusion Medicine (Norfolk (ed) 2013) unless otherwise stated.

Appendix 10 Blood Component Administration (Neonates, Infants and Children)

Taken from the BSH guidelines 2009 APPENDIX 5

COMPONENT	COMMENT
All Blood Components	• All blood components should be administered using a blood component administration set which incorporates a 170 – 200 micron filter. A paediatric blood administration set may be used.
Packed Red Cells for neonates and infants Volume: 324ml (mean) Volume: 294ml (mean) Volume: depends on size of paedipak split	**All red cell transfusions:** • All red cell units should be transfused within 4 hours of removal from designated temperature-controlled storage (4 ±2 ◦C) **Neonatal Exchange transfusion:** • Plasma reduced whole blood in citrate phosphate dextrose (CPD) anticoagulant • Haematocrit 0.5-0.6 (NHSBT, England 0.5-0.55) • Irradiated (unless this would unduly delay transfusion and there has been no prior intrauterine transfusion) • < 5 days old, 24 hrs post-irradiation • Typical dose: 80-100ml/kg (for anaemia), 160-200ml/kg (for hyperbilirubinaemia) • Administration rate: depends on stability of baby, discuss with Neonatal Intensive Care consultant • Local units should have their own exchange transfusion guidelines **Large-volume transfusion:** • Red cells in additive solution (SAG-M – a saline solution containing adenine, glucose and mannitol)* ▪ Hct 0.5-0.6, ▪ < 5 days old • Typical dose: - emergency neonatal transfusion: 10-20ml/kg ▪ surgery (e.g. cardiac) consult local guidelines for volumes and transfusion rates **Top-up transfusions** • Red cells in additive solution (SAG-M), • Hct 0.5-0.7, shelf-life 35 days • Use of „Paedipaks should be discussed with the hospital transfusion laboratory in order to allocate packs appropriately • Typical dose - 10-20ml/kg, or Vol (mls) = desired Hb rise (g/l) x weight (kgs) x 0.4 (ideally max 15ml/kg) • Typical administration rate: 5ml/kg/h
Packed Red Cell transfusion for children Volume: 180-350ml (mean 282ml)	• Typical dose: Vol (mls) = desired Hb rise (g/l) x weight (kgs) x 0.4 • Typical administration rate 5 ml/kg/h (usual max rate: 150ml/hr)
Platelets Volume: Neonatal (apheresis): 55mls (mean) Full packs: Apheresis: 180-300ml (mean 215ml) Pooled: 250-400ml	• Apheresis platelets should be used for all children < 16 yrs where possible to reduce donor exposure • Typical dose: Children < 15 kg: 10-20 mls/kg Children > 15 kg: single apheresis concentrate (approx 300mls; actual volume recorded on pack label) • Typical administration rate 10-20ml/kg/h • Platelet concentrates should not be transfused through administration sets which have already been used to administer other blood components
FFP (Fresh Frozen Plasma) Volumes of MB FFP: Neonatal 56ml (mean) Paediatric 233ml (mean)	• Methylene-blue (MB) treated, single donor FFP, sourced from „low prevalence BSE regions" such as the USA for all children < 16 years of age (MB FFP) • Pooled solvent-detergent treated plasma is also commercially available • Typical dose: 10-20 mls/kg • Typical administration rate 10-20ml/kg/h
Cryoprecipitate Volume of MB Cryo: 1 unit 38ml (mean)	• Methylene-blue (MB) treated, sourced from „low prevalence BSE regions, such as the USA for all children < 16 years of age • Typical dose is 5-10ml/kg. Transfusion of this volume of MB cryoprecipitate is estimated to raise the plasma fibrinogen by approximately 0.5-1.4g/l. Fibrinogen levels should be measured post transfusion to confirm the outcome. 1-2 pools of 5 single-donor units (approx volume 190 mls, actual volume recorded on pack) may be used for larger children as appropriate for their weight • Typical administration rate 10-20 ml/kg/h - i.e. over approximately 30 mins
Granulocytes Volume: variable	• Granulocytes should be administered as soon as possible after their preparation • Specialist component: must be discussed with the Hospital Transfusion Laboratory and Blood Service • Must be irradiated
Administration rate: dependent on volume of the component and the weight of the child. Discuss with specialist consultant	

Continued on next page

- For storage details see adult table appendix 4.

- Component volumes are for guidance and taken largely from the NHSBT (2024) Portfolio of Blood Components.
- Dosage and transfusion rates are for guidance and mostly from Norfolk (2013)
- Components for younger children are often available in smaller volume neonatal and paediatric packs. Please refer to your Hospital Transfusion Laboratory or UK Blood Service for further details.

Appendix 11 National Indication Codes for Blood Components

it is accepted that clinical judgment plays an essential part in the decision to transfuse or not, the purpose of drawing available transfusion guidelines together into one short document is to help clinicians decide when blood transfusion is appropriate and to facilitate documentation of the indication for transfusion.

The indication codes in review are based on these national indication codes produced by the National Blood Transfusion Committee (NBTC) The current guidelines (2020) are available here: INDICATION CODES FOR TRANSFUSION (nationalbloodtransfusion.co.uk) and may change depending on new evidence.

Red cell concentrates

Dose – in the absence of active bleeding, use the minimum number of units required to achieve a target Hb. Consider the size of the patient; assume an increment of 10g/L per unit for an average 70kg adult.

R1. ***Acute bleeding***
Acute blood loss with haemodynamic instability.
After normovolaemia has been achieved/ maintained, frequent measurement of Hb (including by near patient testing) should be used to guide the use of red cell transfusion – see suggested thresholds below.

R2. ***Hb ≤ 70g/L stable patient***
Acute anaemia. Use an Hb threshold of 70g/L and a target Hb of 70-90g/L to guide red cell transfusion. Follow local/specific protocols for indications such as post cardiac surgery, traumatic brain injury, acute cerebral ischaemia.

R3. ***Hb ≤ 80g/L if cardiovascular disease***
Use an Hb threshold of 80g/L and a target Hb of 80-100g/L.

R4. ***Chronic transfusion dependent anaemia***
Transfuse to maintain an Hb which prevents symptoms. Suggest an Hb threshold of 80g/L initially and adjust as required. Haemoglobinopathy patients require individualised Hb thresholds depending on age and diagnosis.

R5. ***Radiotherapy maintain Hb ≥110g/L***
There is limited evidence for maintaining an Hb of 110g/L in patients receiving radiotherapy for cervical and possibly other tumours.

R6. ***Exchange transfusion***

Fresh frozen plasma (FFP)

Dose – 15ml/kg body weight, often equivalent to 4 units in adults.

F1. ***Major haemorrhage***
Early infusion of FFP is recommended in a ratio of 1 unit FFP:1 unit red cells for trauma and at least 1 unit FFP:2 units red cells in other major haemorrhage settings. Once bleeding is under control, FFP use should be guided by timely tests for coagulation as indicated below.

F2. ***PT Ratio/INR >1.5 with bleeding***
Clinically significant bleeding without major haemorrhage. FFP required if coagulopathy. Aim for a PT and APTT ratio of ≤1.5.

F3. ***PT Ratio/INR >1.5 and pre-procedure***
Prophylactic use when coagulation results are abnormal e.g. disseminated intravascular coagulation and invasive procedure is planned with risk of clinically significant bleeding.

F4. ***Liver disease with PT Ratio/INR >2 and pre-procedure***
FFP should not be routinely administered to non-bleeding patients or before invasive procedures when the PT ratio/INR is ≤2.

F5. ***TTP/plasma exchange***

F6. ***Replacement of single coagulation factor***

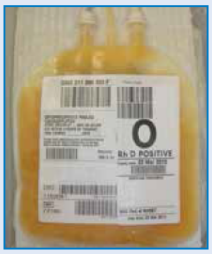
Prothrombin complex concentrate

Dose should be determined by the situation and INR. Local guidelines should be followed.

PCC1. **Emergency reversal of VKA for severe bleeding** or head injury with suspected intracerebral haemorrhage.

PCC2. **Emergency reversal of VKA pre emergency surgery**

Cryoprecipitate



Dose – 2 pooled units, equivalent to 10 individual units, will increase fibrinogen by approximately 1g/L. Cryoprecipitate is usually used with FFP unless there is an isolated deficiency of fibrinogen.

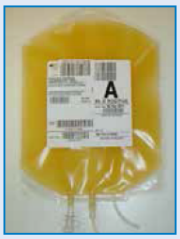
C1. **Clinically significant bleeding and fibrinogen <1.5g/L (<2g/L in obstetric bleeding)**

C2. **Fibrinogen <1g/L and pre procedure**

C3. **Bleeding associated with thrombolytic therapy**

C4. **Inherited hypofibrinogenaemia, fibrinogen concentrate not available**

Platelet concentrates



Dose – for prophylaxis, do not routinely transfuse more than 1 adult therapeutic dose. Prior to invasive procedure or to treat bleeding, consider the size of the patient, previous increments and the target count.

Prophylactic platelet transfusion

P1. **Plt <10 x 10^9/L reversible bone marrow failure Not indicated in chronic bone marrow failure**

P2. **Plt 10 – 20 x 10^9/L sepsis/haemostatic abnormality**

Prior to invasive procedure or surgery

P3. **To prevent bleeding associated with invasive procedures.**
Platelets should be transfused if:

- **P3a Plt <20 x 10^9/L central venous line**
- **P3b Plt <40 x 10^9/L pre lumbar puncture/spinal anaesthesia**
- **P3c Plt <50 x 10^9/L pre liver biopsy/major surgery**
- **P3d Plt <80 x 10^9/L epidural anaesthesia**
- **P3e Plt <100 x 10^9/L pre critical site surgery e.g. CNS.**
- **Transfusion prior to bone marrow biopsy is not required.**

Therapeutic use to treat bleeding (WHO bleeding grade 2 or above)

P4a **Major haemorrhage Plt <50 x 10^9/L**

P4b **Critical site bleeding e.g. CNS/traumatic brain injury Plt <100 x 10^9/L**

P4c **Clinically significant bleeding Plt <30 x 10^9/L.**

Specific clinical conditions

P5a **DIC pre procedure or if bleeding.**

P5b **Primary immune thrombocytopenia (emergency treatment pre-procedure/severe bleeding).**

Platelet dysfunction

P6a **Consider if critical bleeding on anti-platelet medication.**

P6b **Inherited platelet disorders directed by specialist in haemostasis.**

References

British Committee for Standards in Haematology (2012). Guidelines on the management of anaemia and red cell transfusion in adult critically ill patients. *British Journal of Haematology,* **160**, 445-46.

British Committee for Standards in Haematology (2015). A practical guideline for the haematological management of major haemorrhage. *British Journal of Haematology,* **170**, 788-803.

British Committee for Standards in Haematology (2016). Draft guidelines for the use of platelet transfusions.

British Society of Gastroenterology (2015). UK guidelines on the management of variceal haemorrhage in cirrhotic patients. *GUT,* **0**, 1-25.

British Society of Gastroenterology, Clinical Services, Care Bundles. British Society of Gastroenterology & British Association for the study of the Liver Decompensated Cirrhosis Care Bundle – First 24 Hours. www.bsg.org.uk

European Society of Anaesthesiology Guidelines (2013). Management of severe perioperative bleeding. *European Journal of Anaesthesiology,* **30**, 270-382

National Institute for Health and Clinical Excellence (2015). Blood transfusion NG24. nice.org.uk/guidance/ng24

Royal College of Obstetricians & Gynaecologists (2015). Blood Transfusion in Obstetrics. *Green-top Guideline No.47.*