

A drop of knowledge



Guidance for New and Developing Transfusion Practitioners

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Version 10.1

FOREWORD

The authors have taken care to ensure that the information contained in this document is accurate and up to date at the time of print. However, we do not accept any legal responsibility for any errors or omissions.

I am grateful for the feedback received on previous versions of this document. This new version has been reviewed taking into account comments received. As always, any feedback is most welcome.

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1. Transfusion Team Infrastructures in England and North Wales

The aim of this section is to provide an overview of the different transfusion committees and teams who work collaboratively to improve transfusion practice.

1.1 National Blood Transfusion Committee (NBTC)

The NBTC was established in 2001. Its remit is to promote safe and appropriate transfusion practice. The committee provides a forum to discuss national transfusion issues and to channel information to Regional Transfusion Committees (RTCs) to share with hospitals in their region.

The NBTC is made up of representatives from:

- NHS England
- Royal Colleges e.g. Royal College of Nursing, Royal College of Surgeons
- Specialist Societies e.g. British Society for Haematology (BSH), British Blood Transfusion Society (BBTS)
- Other organisations e.g. Serious Hazards of Transfusion (SHOT) scheme, Institute of Biomedical Sciences (IBMS), Medicines and Healthcare products Regulatory Agency (MHRA).
- NHS Blood and Transplant (NHSBT)
- Patient / lay representatives
- All Regional Transfusion Committee Chairs.

The NBTC aims to meet twice a year. The minutes from each meeting are available via the NBTC website on the UK Blood Transfusion and Tissue Transplantation Services website: www.transfusionguidelines.org.uk. The Executive Working Group is a subgroup of the NBTC, it ensures that the momentum of the committee's activities is maintained between full committee meetings; this group also meets up twice a year.

1.2 Regional Transfusion Committee (RTC)

The RTCs are responsible for implementing actions of the NBTC in England and North Wales. They oversee the activities of the local Hospital Transfusion Committees (HTCs) and provide a link between the HTCs and NBTC.

The RTC is usually made up of representatives from:

- The region's HTCs (including NHS and private hospitals)
- The NHSBT Regional Team
- Patient.

There are up to four meetings of the RTC per year; minutes and actions are disseminated to Chairs of all HTCs in the region. The work of the RTC is co-ordinated by the Regional Transfusion Team (RTT). Information on RTCs can be accessed at: www.transfusionguidelines.org.uk

1.3 Hospital Transfusion Committee (HTC)

Every Trust involved in blood transfusion should have an established HTC as stated by the DH in the Health Service Circular 2007/001: Better Blood Transfusion - Safe and Appropriate use of Blood. The HTC should have the authority to take the necessary actions to improve transfusion practice.

A HTC should:

- Promote safe and appropriate blood transfusion practice through local protocols based on national guidelines
- Audit the practice of blood transfusion against the NHS Trust policy and national guidelines, focusing on critical points for patient safety and the appropriate use of blood
- Lead multi-professional audit of the use of blood within the NHS Trust, focusing on specialities where demand is high, including medical as well as surgical specialities, and the use of platelets, plasma, and other blood components as well as red cells

- Provide feedback on audit of transfusion practice and the use of blood to all NHS Trust staff involved in blood transfusion
- Regularly review and take appropriate action regarding data on blood stock management, wastage and blood utilisation provided by the Blood Stocks Management Scheme (BSMS) and other sources
- Develop and implement a strategy for the education and training for all clinical, laboratory and support staff involved in blood transfusion
- Promote patient education and information on blood transfusion including the risks of transfusion, the use of alternatives and the need to be correctly identified at all stages in the transfusion process
- Consult with local patient representative groups where appropriate
- Modify and improve blood transfusion protocols and clinical practice based on new guidance and evidence
- Be a focus for local contingency planning and management of blood shortages
- Report regularly to the RTC, and through them, to the NBTC
- Participate in the activities of the RTC
- Actively promote the implementation of Patient Blood Management
- Contribute to the clinical governance framework.

Although no recommendation is made from the DH regarding actual HTC membership, it is suggested that the committee membership should include:

- Chair
- Transfusion Laboratory Manager (TLM)
- Transfusion Practitioner (TP)
- Haematologist with responsibility for transfusion
- Senior nursing and midwifery representation
- Representatives from clinical high users of blood components
- Anaesthetist
- Member of risk management
- Representative from finance
- Representative from Primary Care or an equivalent organisation.

The committee should aim to meet at least 3 times per year. The HTC should report to senior management within the Trust, usually via the Risk Management Committee. A suggested organisational structure for HTC feedback is shown below:



1.4 Hospital Transfusion Team (HTT)

In accordance with the recommendations from the Health Service Circular (HSC 2007/001): Better Blood Transfusion – Safe and Appropriate use of Blood, Trusts should establish a HTT for promoting good transfusion practice through the development of an effective local clinical infrastructure. The team should consist of the Lead Consultant for Transfusion (with sessions dedicated to blood transfusion), Transfusion Practitioner, Transfusion Laboratory Manager and possibly other members of the Hospital Transfusion Committee (HTC). There should be identified clerical, technical, managerial and IT support, the team should also have access to audit and training resources to promote and monitor safe and effective use of blood and alternatives. The HTT should aim to meet on a monthly basis.

The role of the HTT is to:

- Implement the HTC's objectives
- Promote and provide advice and support to clinical teams on the safe and appropriate use of blood
- Promote patient information and education on blood transfusion safety and use of alternatives
- Actively promote the implementation of good transfusion practice
- Be a source for training all NHS Trust staff involved in the process of blood transfusion
- Produce an annual report including its achievements, action plan and resource requirements for consideration by senior management at Board level through the HTC and the Trust's clinical governance and risk management arrangements.
- Actively promote the implementation of Patient Blood Management

1.5 NHS Blood and Transplant (NHSBT) Regional Team

A priority for NHSBT is to 'provide NHS hospitals with a safe, sustainable, timely and cost-effective blood supply with a high level of availability for routine and specialist components. In addition, providing leadership in transfusion medicine with a high level of technical, clinical and patient blood management support' (NHSBT Blood 2020).

The Regional Team structure has been in place for many years and is made up of representatives from the Customer Services, Patient Blood Management Practitioner and Patient Blood Management Clinical teams. A regional team is linked to every Trust and hospital in England. Each team works with the local healthcare community to ensure that the service provided by NHSBT is of the highest possible standard, to support clinical colleagues in Trusts to promote PBM and support the activities of the RTC.

The teams also work in partnership with the other UK Blood Services and input into many national groups such as the NBTC, SHOT, National Comparative Audit (NCA) and Blood Consultative Committee (BCC). They contribute to the development and dissemination of evidence based transfusion guidelines and policies.

Consultant Haematologist - The Consultant Haematologist is a member of the PBM Clinical Team. The primary focus of this role is to provide clinical support and advice to hospitals. The PBM Clinical Team provide 24 hour on call support across England and North Wales. Posts are often joint with a local large trust.

Customer Service Manager (CSM) - The CSM is a member of the Customer Services Team. The CSM has a scientific background and is the primary link between the blood centre and hospital customers, interpreting their needs, managing communication, handling complaints and helping improve service to hospitals and the patients they serve.

Patient Blood Management Practitioner (PBMP) - The role of the Patient Blood Management Practitioner Team is to support and promote Patient Blood Management initiatives to optimise the care of patients who may need transfusion. By acting as a resource and by facilitating networking, each regional PBMP works with hospitals staff to identify specific areas of support required. This support may involve 1:1 visits or attendance at HTTs or HTCs. The PBMP also facilitates regional training and educational events.

2. European Agenda and Legislation

The European Union Directives 2002/98/EC and 2004/33/EC have been transposed into UK law by the Blood Safety and Quality Regulations 2005 (Statutory Instrument 2005/50) and amendment (Statutory Instrument 2005/1098). These documents may be accessed at the MHRA (Medicines and Healthcare Products Regulatory Agency) web site:

<http://www.mhra.gov.uk/Howweregulate/Blood/index.htm>

The regulations came into force on 8 February 2005 and were implemented on 8 November 2005; the amendment to the regulations came into force on 8 April 2005. The regulations set standards for quality and safety for the collection, testing, processing, storage and distribution of human blood and blood components. Aspects of the regulations apply to 'Blood Establishments' (BEs) (principally the UK Blood Services, but some hospitals also have blood establishment (BE) status) and Hospital Transfusion Laboratories.

Two further EU directives, 2005/61/EC and 2005/62/EC, set out the specific technical requirements on quality management systems, traceability requirements and notification of serious adverse reactions and events have also been transposed into UK law by Statutory Instrument 2006 No.2013, which came in to force on 31 August 2006.

There are two aspects of the Blood Safety and Quality Regulations (BSQR) 2005 which directly impact on practitioners involved in the clinical transfusion process:

1) Traceability mandates that we must have unambiguous evidence of the final fate of every blood component issued from the transfusion services, and that the record of this is kept for 30 years

2) Adverse event reporting states that any event that might lead to death or life-threatening, disabling or incapacitating conditions for patients or which results in, or prolongs, hospitalisation or morbidity must be reported to the competent authority via the Serious Adverse Blood Reactions and Events (SABRE) system:

<http://www.mhra.gov.uk/Safetyinformation/Reportingsafetyproblems/Blood/index.htm>

The competent authority for overseeing compliance with the BSQR 2005 is the MHRA.

Recognising the challenges of compliance for hospitals, the DH established an NHS Operational Impact Group (OIG) to advise them on major issues and how hospitals might proceed to comply with the regulation. This group has now completed its work and exists only as a virtual group for the time being, however communications, updates, information and 'tools' to aid hospital implementation programmes can continue to be found at: <http://www.transfusionguidelines.org.uk/regulations>

The Blood Consultative Committee (BCC), convened by the MHRA, meets once a year to disseminate information across the transfusion world. There is also an Adverse Events sub-committee of the BCC which provides a forum for discussion of technical and operational issues relating to transfusion incident reporting, and provides information to the BCC to enable it to take appropriate action. Membership from both committees constitutes people from all parts of the transfusion community, plus those in the blood services, across the 4 countries.

3. Transfusion Guidelines and Publications

There are many guidelines, policies and publications relating to transfusion. Listed in tables 3.1 and 3.2 are some which may initially help inform your practice.

3.1 Publications & Guidelines

Title	Citation	Year of publication
Patient Blood Management – An evidence based approach to care	http://www.transfusionguidelines.org.uk	2014
Detecting, managing and monitoring haemostasis: viscoelastometric point-of-care testing (ROTEM, TEG and Sonoclot systems)	http://www.nice.org.uk NICE Diagnostics guidance [DG13]	2014
Right blood, right patient, right time. RCN guidance for improving transfusion practice	http://www.rcn.org.uk RCN Publication Code 220306 Tel – 0345 772 6100	2013
Guidelines for the Blood Transfusion Services in the UK, 8 th edition ('The Red Book')	http://www.transfusionguidelines.org.uk Available from The Stationery Office http://www.tsoshop.co.uk/ ISBN 9780117081673	2013
Handbook of Transfusion Medicine, 5 th edition	Available from The Stationery Office http://www.tsoshop.co.uk/ ISBN 9780117068469	2013
A framework to support nurses and midwives making the clinical decision and providing written instruction for blood component transfusion.	http://www.transfusionguidelines.org.uk	2009
Routine antenatal anti-D prophylaxis for women who are rhesus D negative	http://www.nice.org.uk NICE – Technology Appraisal guidance (TA) 156	2008
Intraoperative red blood cell salvage during radical prostatectomy or radical cystectomy	http://www.nice.org.uk NICE – Interventional Procedure Guidance (IPG) 258	2008
Health Service Circular 2007/001: Better Blood Transfusion – Safe and Appropriate Use of Blood	http://www.dh.gov.uk Department of Health	2007
NICE Intraoperative blood cell salvage in obstetrics	http://www.nice.org.uk NICE – Interventional Procedure Guidance (IPG) 144	2005

Additional NHS Blood and Transplant clinical guidelines are available and can be located at: http://hospital.blood.co.uk/safe_use/index.asp

3.2 Guidelines Published by the British Committee for Standards in Haematology (BCSH)

BCSH Blood Transfusion guidelines can be downloaded from the BCSH website:

<http://www.bcsguidelines.com>

Listed below are guidelines most applicable to the Transfusion Practitioner role.

Title	Year of publication
Guideline on the clinical use of apheresis procedures for the treatment of patients and collection of cellular therapy products	2015
IT in Blood Transfusion	2014
Guidelines for the use of anti-D immunoglobulin for the prevention of haemolytic disease of the fetus and newborn	2014
Guidelines on the management of anaemia and red cell transfusion in adult critically ill patients	2013
Guidelines for pre-transfusion compatibility procedures in blood transfusion laboratories	2013
Guideline on the investigation and management of Acute Transfusion Reactions	2012
Guidelines for validation and qualification, including change control, for hospital transfusion laboratories	2012
Addendum to guidelines on the use of irradiated blood components	2012
Addendum to administration of blood components	2012
UK Guidelines on the management of iron deficiency in pregnancy	2011
Guidelines on the use of irradiated blood components	2011
Appendices to the guidelines on validation and qualification, including change control, for hospital transfusion laboratories	2010
Guidelines on the administration of blood components	2009
Guidelines for the estimation of feto-maternal haemorrhage	2009
Summary of amendments to the guideline on the estimation of fetomaternal haemorrhage	2009
2007 amendment to the guidelines for the use of fresh-frozen plasma, cryoprecipitate and cryosupernatant (clarification on storage after thawing)	2007
2007 amendment to the transfusion guidelines for neonates and older children (specification of imported FFP)	2007
Guideline for blood grouping and antibody testing in pregnancy	2006
The specification and use of information technology (IT) systems in blood transfusion practice	2006
Guidelines for the use of fresh frozen plasma, cryoprecipitate and cryosupernatant	2004
Transfusion guidelines for neonates and older children	2004
Guidelines for the use of platelet transfusions	2003
Guidelines for the clinical use of red cell transfusions	2001

BCSH guidelines also exist on Haemostasis and Thrombosis, Haemato – Oncology and General Haematology.

See: <http://www.bcsguidelines.com>

4. Blood Donation

Donors and Blood Donation

Blood donation in the UK relies on volunteer, unpaid donors. Each donor has his or her own motivation for donating, but altruism, an unselfish concern for other people, is repeatedly quoted as the prime motivation. It is therefore of paramount importance that donors feel valued and that they are treated with respect.

Donors are encouraged to make an appointment or they can just simply turn up at a donation session. NHSBT holds donor information on a database, called 'Pulse'. This maintains donor records, allows NHSBT to call donors up when needed and helps manage blood stocks. As a safety feature, Pulse will not allow donors to donate too frequently. Female whole blood donors can donate at an average of 16 weeks or more to reduce the risk of iron deficiency. Male whole blood donors can donate 4 times in 12 months with a minimum interval of 12 weeks between donations.

Platelet donation can also be made by apheresis, a process in which platelets are collected but red cells are returned to the donor; this can be done fortnightly up to a maximum of 24 donations per year (donors are encouraged to donate at least 8 times a year).

The INTERVAL study was set up in 2012 by the Universities of Cambridge and Oxford in collaboration with NHSBT. The aim is to compare different intervals between blood donations (INTERVAL) with the goal is to find the optimum interval for which it is safe for different donors to give blood. The study will look at whether intervals should be tailored to donors by age, gender, genetic profile and other characteristics. The study's findings should help to improve the well-being of blood donors in England and enhance the country's blood supplies. The study reached its goal of 50,000 participants in June 2014. In order to make the most scientific use of the time until the end of the study participants will be invited to take part in Interval phase II and continue donating at their assigned interval until the end of the study in 2016. More information can be found at: <http://www.intervalstudy.org.uk/>

Donor Selection

Before a donor can donate blood they must complete a 'Donor Health Check'. This is a combination of a written questionnaire and an interview with a member of NHSBT staff who is trained in the selection of donors. The process is designed to protect not only the health and well being of the donor, but also the patients who will receive the blood components. Following satisfactory completion of the checks, the donor must sign the Donor Health Check form to confirm their consent to donation, and to the investigations that their donated blood will undergo e.g. testing for blood-borne infections. First time donors of both blood and components must be over the age of 17 and below 66 years; returning donors (i.e. donors who have not donated in the past 2 years) must be below the age of 70. Regular donors (those who donate at least once every 2 years) may continue to donate after the age of 70 as long as they are fit and well.

Guidelines for the selection of blood donors in the UK are published on the following website:

<http://www.transfusionguidelines.org.uk>

Blood Collection and Testing

The normal blood volume taken from a donor is 470-475 ml – donors must weigh over 50 kgs (7st 12lbs) to ensure that they are not put at risk by donating this volume. A quick and simple Copper Sulphate test using blood from a pricked finger is used to indicate if donors are above the minimum haemoglobin threshold for donation: 125g/l for women and 135g/l for men. Samples failing this test are rechecked using a Hemocue Hb analyser to give a precise haemoglobin measurement. Donations are not taken below this threshold to protect the health of the donor.

The use of local anaesthetic may be used for apheresis platelet donors. This is carried out by an appropriately trained member of the donation team.

The first 20 - 30ml of every donation is diverted into a pouch, which is used to obtain samples for testing. This also acts as a mechanism for separating blood containing the skin plug created by venepuncture, and therefore reduces the risk of skin contaminants infecting the donated blood. Blood samples are tested for markers of HIV, hepatitis C, hepatitis B, human T-cell lymphotropic virus (HTLV) and syphilis. Donations are only released to the blood supply if none of these markers are detected. Additional testing may be carried out depending on the donor's history, for example, malaria testing if the donor has recently travelled to a country where malaria is endemic. If donors react positively to any tests, they are contacted by an NHSBT doctor for further tests and counselling.

As blood is collected into the main bag, it is weighed to calculate the volume bled and agitated to mix in the anticoagulant already present. Whole blood donation must not take longer than 15 minutes; component donation of platelets (apheresis) may take up to 90 minutes.

Donor Recruitment and Marketing

Donor marketing is used to boost the recruitment of blood and platelet donors, and to recruit to the bone marrow register. Marketing also use media such as TV and radio to rapidly recruit donors in times of blood shortages. There is a fine balance in the strategies used by marketing however, as collection needs to be maintained at a certain level throughout the year, and over-donating at times of crisis can cause potential reduced availability later. Donor retention is a more cost-effective way of maintaining the donor base than donor recruitment. The most important factor in donor retention is availability of convenient opportunities to donate. Therefore, known donors are sent an invitation at the appropriate time to make an appointment to attend a session at their convenience.

The website for finding out more about blood donation is: <http://www.blood.co.uk/>
It gives details of how to register, how to make and manage appointments online and how to become a platelet donor. Donor helpline number 0300 1232323 is available for queries which cannot be answered online.

NHSBT also have a Facebook and Twitter page:

<http://www.facebook.com/NHSBlood>

<https://twitter.com/givebloodnhs>

5. Blood Facts

The ABO Blood Groups

There are four different types of ABO blood groups, determined by whether or not the individuals' red cells carry the A antigen, the B antigen, both A and B antigens or neither. Normal healthy individuals, from early in childhood, make antibodies against the A or B antigens that are not expressed on their own cells. These naturally occurring antibodies in the plasma attack and rapidly destroy "incompatible" cells. Anti-A attacks the red cells of group A or AB; Anti-B attacks the red cells of group B or AB.

If incompatible red cells are transfused into a patient, these cells are attacked and destroyed by the antibodies in the patient's plasma. This may cause intravascular haemolysis to occur which can initiate acute renal failure and Disseminated Intravascular Coagulation (DIC). This reaction can be fatal. The transfusion of even a few mls of ABO incompatible blood can cause serious problems and a reaction may occur within a few minutes.

Blood Group	Antigens	Antibodies	Can give Blood to	Can receive Blood from
AB	A and B	None	AB	AB, A, B, O
A	A	B	A and AB	A and O
B	B	A	B and AB	B and O
O	None	A and B	AB, A, B, O	O

The Rh D antigen is also important as this determines whether someone is Rh D positive (carries the Rh D antigen) or Rh D negative (the Rh D antigen is not present). Antibodies may develop in response to this antigen. This is clinically significant in pregnancy for Rh D negative women, when these antibodies can cross the placenta and destroy foetal red cells if the foetus is Rh D positive.

Blood Components

All blood collected by the UK Blood Services is leucodepleted (white blood cells are reduced) as a precaution against variant Creutzfeldt Jakob Disease (vCJD), and no further filtration is needed prior to transfusion. However, a standard sterile blood administration set with an integral filter (blood giving set) should always be used to transfuse any blood component.

- *Whole Blood*

The transfusion of whole blood is rarely indicated in current practice in the UK except in cases of autologous blood donation. This is not routine practice but may happen in rare cases when it is difficult to find compatible donated blood because of rare antibodies. This practice should be carried out on an individual patient basis and in collaboration with NHSBT or a hospital that holds a Blood Manufacturing License. This is when a patient donates their own blood prior to surgery, for transfusion back to themselves during or immediately after their operation.

- *Red Cells*

Red blood cells are disc shaped cells with no nucleus. They contain haemoglobin that allows oxygen to be transported within the cell to the tissues. Red cell transfusions are required to increase the oxygen carrying capacity of the blood, by raising the haemoglobin concentration of patients with acute or chronic anaemia. Red cells are separated from whole blood and a solution is added to preserve and nourish them. Red cells have a shelf life of 35 days and should be stored at between +2°C and +6°C.

Once removed from the transfusion laboratory refrigerator the transfusion should commence within 30 minutes but must be completed within 4 hours. Failure to store blood correctly increases the risk of bacterial proliferation. Blood must never be stored in a domestic or ward fridge.

Red cells should be transfused using a sterile blood administration set with an integral filter (blood giving set) which must be changed at least 12 hourly. Local guidelines may require the administration set to be changed

more frequently than this. If another fluid is to be infused following the red cell transfusion, the giving set should always be changed.

Red cells must be compatible with the recipient's ABO and usually Rh D type.

- *Platelets*

Platelets are tiny cell fragments that form an essential part of the blood clotting process. When, as a result of injury, blood comes into contact with any tissue other than the lining of the blood vessel, platelets stick together and form a plug that seals the wound. Platelets then release chemicals, which assist in coagulation.

Platelet transfusions are indicated for the prevention and treatment of major haemorrhage, in patients with thrombocytopenia or in patients with inherited disorders of platelet function.

Platelets are prepared in a concentrate with anticoagulant and some plasma, derived either from manufacturing platelets from four whole blood donations or by component donation by aphaeresis (collected on a cell separator machine). In 2007 the Department of Health requested that at least 80% of all platelets are collected by single component donation. This was a risk reduction strategy which responded to the need to reduce the risk of vCJD transmission by platelet transfusion. This requirement was removed in December 2013 after a review by SaBTO and better understanding of the prevalence of vCJD in the population. It was also recommended to suspend platelets in additive solution (PAS). NHSBT are working towards a level of 60% Aphaeresis platelets by the end of 2015/16.

Bacterial screening of all platelets now takes place to reduce the risk of bacterially transmitted infection to patients. This process has increased the shelf life to 7 days, however, platelets are not issued to hospitals until day 3.

Platelets are stored at between +20°C and +24°C in a platelet agitator. Platelets must *never* be placed in a refrigerator.

Once collected from the transfusion laboratory, platelets should be transfused immediately using a sterile blood administration set or a platelet infusion set. If other blood components have been transfused first then a new giving set must be used. An "adult therapeutic dose" (ATD) of platelets is usually transfused over 30 minutes.

- *Fresh Frozen Plasma (FFP)*

Plasma is the fluid in which the cellular components of blood are transported. Plasma also contains proteins, enzymes, electrolytes, hormones, nutrients, antibodies and some waste products. Plasma is separated from whole blood and frozen within a few hours of the blood being collected from the donor. It is frozen to a core temperature of -25°C or below and can then be stored for up to 24 months. Because it is frozen so quickly after collection it still contains high levels of coagulation proteins.

As an added safety precaution patients born after 1st January 1996 will receive methylene blue treated FFP sourced from Austria or solvent-detergent treated plasma (SDFFP) sourced from the USA. The FFP is treated to inactivate viruses such as HIV and Hepatitis C, to reduce the risk of viral transmission to this vulnerable group. The plasma is sourced from these countries as an added precaution against vCJD transmission through blood, as these patients should not have been exposed to vCJD in the food chain.

Prior to use, FFP is thawed in the transfusion laboratory using a technique that avoids risk of bacterial contamination. It takes up to 30 minutes but once thawed FFP can be stored in a transfusion laboratory fridge at 4°C for up to 24 hours.

- *Cryoprecipitate*

This is prepared from plasma that has been frozen rapidly and then thawed slowly at +1°C to +6°C leaving behind the precipitated protein. This is then re-suspended in a small amount of residual plasma. Cryoprecipitate contains some clotting factors, primarily fibrinogen and factor VIII, in higher concentrations than are found in plasma (FFP). Its main use is as a source of fibrinogen.

Cryoprecipitate must be thawed in the transfusion laboratory and transfusion should begin as soon as possible after thawing.

Fractionated plasma products

Fractionated plasma products are a range of therapeutic preparations, manufactured from human plasma. They are obtained by a process of selective separation and purification of target proteins or groups of proteins.

Large amounts of plasma are required for the production of plasma derivatives by fractionation. As a precaution against the possible transmission of vCJD these are not manufactured from UK plasma. Although they are manufactured from plasma, they are either infused through a non-blood giving set or injected.

- *Anti-D immunoglobulin*

Anti-D is an intramuscular or intravenous immunoglobulin with a high concentration of Anti-D. It is prepared from plasma of donors who have high levels of plasma anti-D, usually as the result of an immunisation programme. It is administered to Rh D negative women who may have been exposed to Rh D positive foetal red cells which have crossed the placenta as a result of:

- Delivery of a Rh D positive baby
- Miscarriage
- Termination of pregnancy
- External cephalic version
- Invasive procedures e.g. amniocentesis
- Ante partum haemorrhage
- Abdominal trauma
- Ectopic pregnancy
- Intrauterine death
- Molar pregnancy.

Anti-D should be given within 72 hours of these events (although some benefit may occur up to 10 days if treatment is inadvertently delayed). Rh D negative patients who are not sensitised should be given routine prophylactic Anti-D (RAADP) in the third trimester to prevent sensitisation because at this stage there is some spontaneous passage of foetal red cells across the placenta.

The Anti-D destroys the Rh D positive (foetal) cells in the mother's circulation and therefore prevents production of Rh D antibodies by the mother. This prevents Haemolytic Disease of the Newborn (HDN) for any future Rh D positive babies the mother may carry.

New guidelines for Anti-D were published in January 2014. See www.bcshguidelines.com

- *Other human immunoglobulins*

These can be made from the plasma of donors with high titres of specific antiviral antibodies and used prophylactically to give protection from these viruses e.g. varicella zoster.

Human IgG (immunoglobulin) can be collected from large pools of unselected donors. This can then be given to patients with immunological disorders or deficiencies in antibody formation. It is important to follow the manufacturer's instructions especially for recommended infusion rates. Intravenous immunoglobulins are in globally short supply and it is thus important that they are used within Department of Health guidelines.

- *Clotting Factor Concentrates*

- Factor VIII for treatment of Haemophilia A
- Factor IX for treatment of Haemophilia B
- Prothrombin Complex Concentrate for replacement of multiple clotting factor deficiencies, used for the emergency reversal of warfarin
- Others such as Recombinant Factor VIIa.

These must all be given under guidance from a specialist clinician.

- *Human Albumin Solution*

Available as 100 mls at 20% solution. Main clinical use is in treatment of hypoproteinaemic oedema with nephrotic syndrome and for patients with ascites in chronic liver disease.

Available as 100, 250 and 500 mls at 4.5% solution. Main clinical use is for acute volume replacement.

Human Albumin solution should be administered via an intravenous fluid administration set with a 15µm filter, a blood transfusion administration set is NOT required.

More information on fractionated plasma products can be obtained from the Handbook of Transfusion Medicine 5th edition, (Norfolk 2013), published by TSO, email customer.services@tso.co.uk and from the following website:

<http://www.transfusionguidelines.org.uk>

Potential Complications of Blood Transfusion

- *Incorrect blood component transfused (IBCT)*

One of the most serious potential hazards of transfusion is a patient receiving blood which is incompatible with their own. The important thing to remember is that all these cases are preventable. SHOT is the UK's confidential haemovigilance system for reporting serious adverse events and near misses associated with transfusion. In their 2013 Annual Report (published July 2014) the category of Incorrect Blood Component Transfused (IBCT) represented the highest proportion of all reports received between 1996 – 2013.

Multiple errors are a consistent feature of IBCT incidents. Errors occur at all stages of the transfusion process; in prescribing, taking of blood samples from the patient, in the transfusion laboratory, in the collection of blood from storage and at the bedside. By far the most common error contributing to IBCT was failure of the bedside checking procedure. The bedside check is the final chance to spot errors which may have occurred earlier in the transfusion process. If this check is not carried out correctly, the possibility of 'wrong blood' being transfused is compounded. The use of Information Technology (IT) systems, although a useful tool in helping to prevent errors, is not foolproof. In the SHOT Annual Report (2013) there were 187 reported incidents of IBCT errors relating to IT systems.

The most common type of event for IBCT continues to be special requirements not met (SRNM) (clinical); of the 190 reports analysed there were 119 omissions for irradiated components. The 2012 SHOT Report recommends that all patients, who require irradiated and other special products, should be provided with an appropriate alert card and be educated about their meaning and importance.

- *Infusion of a bacterially contaminated unit*

This is likely to cause a severe acute reaction with rapid onset of hypotension, rigors and collapse. It is important to store blood components correctly and to adhere to time limits for transfusion so that components are not damaged and bacterial proliferation does not occur. It is also important to visually inspect each unit for leaks, signs of contamination, clumps, discolouration or unusual appearance.

Bacterial contamination is most common in platelet components as they are stored at room temperature. If in doubt about whether to transfuse, do not use the unit - always contact the transfusion laboratory first.

- *Transfusion associated circulatory overload (TACO)*

This occurs when too much fluid is transfused or transfusion is too rapid. Acute left ventricular failure may occur. Patients with chronic anaemia are usually normovolaemic or hypervolaemic and may have signs of cardiac failure prior to transfusion. Blood given at 4mg/kg should raise the Hb by 10g/l

A key learning point from the SHOT Report, repeated each year since 2009, suggests careful assessment must be made of the pre-transfusion fluid balance status and the tolerable rate of transfusion, followed by very careful monitoring during transfusion to prevent the potential transfusion complication of TACO. Low body weight (i.e. 70kg) and renal impairment are risk factors for TACO

It can be difficult sometimes to distinguish TACO from a Transfusion Related Acute Lung Injury (TRALI) in the acute stages.

- *Severe allergic reaction or anaphylaxis*

This is a rare but life threatening complication, which usually occurs in the early part of the transfusion. There is more of a risk of this occurring with the transfusion of components containing larger volumes of plasma, e.g. FFP or platelets.

- *Transfusion-related acute lung injury (TRALI)*

This should be suspected when respiratory symptoms occur within 6 hours of a transfusion. It is thought to be caused by a reaction between white cell antibodies present in the plasma of the blood component and the patient's white cells. It presents as acute onset of shortness of breath and hypoxia during or soon after a transfusion. It occurs more commonly after the transfusion of plasma or platelets.

- *Symptoms / signs of acute transfusion reactions:*
 - Fever
 - Chills
 - Tachycardia
 - Hypertension
 - Hypotension
 - Rigor
 - Collapse
 - Flushing
 - Urticaria
 - Shortness of breath
 - Bone, muscle, chest or abdominal pain
 - Nausea
 - Generally feeling unwell or anxious.

What to do if you suspect a patient is having a transfusion reaction:

- STOP the transfusion and keep the venous access patent with a new IV giving set and 0.9% Sodium Chloride infusion
- Call a doctor immediately
- Assess the patient's Airway, Breathing and Circulation (ABC)
- Record temperature (T), pulse (P), blood pressure (BP), respiration rate (R), oxygen saturation (SaO₂) and urinary output
- Check the identity of the recipient against the details on the blood pack
- Perform a visual inspection of the component
- Inform the transfusion laboratory and return the unit and administration set to the laboratory
- Record the adverse event in the patient's clinical record
- Report the adverse event according to local hospital policy.

A BCSH Guideline on the investigation and management of acute transfusion reactions was published in July 2012. Trusts should provide ready access to procedures for the treatment of patients with a suspected reaction.

Implications for Staff Involved in the Transfusion Process

A blood transfusion is, in effect, a liquid transplant - a transfer of tissue from one person to another. Transfusions save lives but are not without risk. Hospital staff have a responsibility for many aspects of the transfusion process; taking and labelling of blood samples, collection of blood from the transfusion laboratory, checking, administration and documentation of transfusions and monitoring the patient.

The most basic principle of patient care during transfusion is to ensure the patient's safety. Staff should be aware, at all stages, of the steps necessary to safeguard the patient. All staff should receive appropriate training and be assessed as competent as recommended in the NPSA Safer Practice Notice 14 (2006) "Right patient, right blood".

- *Taking & labelling samples:*
 - Only bleed one patient at a time to minimise risk of an error
 - Positively identify the patient by asking them to state their full name and date of birth
 - Check these details match those on the patient's identity band (or risk assessed equivalent) and the sample request form
 - Unconscious patients or those unable to communicate should have a unique patient identification number and their gender as minimum patient identifiers on an identity band
 - Label the sample tube immediately after the blood has been collected and at the patient's bedside. It should be labelled by hand, with the patient's full name, date of birth, gender and identification number and the date bled
 - Avoid taking samples from a patient's arm if they have an IV infusion running into that arm. If this is impossible, switch off infusions prior to taking blood and then restart them.
- *Informing the patient:*
 - Wherever possible, information should be given to the patient in a timely manner before transfusion takes place about the risks and benefits of blood transfusion. The Advisory Committee on the Safety of Blood, Tissues and Organs (SaBTO) published recommendations on Consent for Blood Transfusion in 2011 (see chapter 6). [Patient consent for blood transfusion - Publications - GOV.UK](#)
 - Any alternatives to transfusion that are available, such as pre-operative iron therapy, intra-operative and post-operative cell salvage should also be explored and discussed

- Patients receiving blood should be aware of the importance of having the correct blood component transfused and the need to report any adverse symptoms immediately
- NHSBT supplies a patient information leaflet, "Will I Need A Blood Transfusion?" which deals with the above issues.
- *Collection of blood components from the transfusion laboratory or satellite fridge:*
 - Ensure that the member of staff collecting the blood has documentation containing the patient's identification details (collection slip, prescription chart or patient's notes)
 - The member of staff must check the details on the above document and ensure that they match the details on the compatibility label on the unit
 - When blood components are delivered to the ward or operating theatre a member of appropriately trained staff should be responsible for checking that the correct blood component has been delivered and that it is stored correctly and used within the correct timescale.
- *Checking at the bedside:*
 - Either one or two members of staff (depending on hospital policy) have a responsibility for carrying out the identity check of the patient and the unit of blood at the patient's bedside
 - The patient must be positively identified by being asked their full name and date of birth, if they are capable of responding
 - Patients undergoing transfusion must have an identification (ID) band with their full name, date of birth and patient identification number on. [Additionally in Wales only - first line of the patient's address]
 - The details on the ID band must be checked and be identical with the details on the blood pack and prescription
 - The blood group on the unit must be compatible with the blood group of the patient as indicated on the blood pack label. The blood group may not be identical but it must be compatible and in cases where the blood groups may differ, a specific comment should have been made on the compatibility form or laboratory report to indicate that the blood is compatible
 - The unit must be checked for compliance with any special requirement on the prescription chart e.g. CMV seronegative or gamma/x-ray irradiated
 - The unit must be checked to ensure it has not passed its expiry date, shows no signs of leakage, unusual colour or haemolysis (clumping or cloudiness in the case of platelet transfusions)
 - The person who has carried out the above checks must sign relevant documentation according to local policy.

If any discrepancies are found during the bedside checks the unit should not be transfused and the transfusion laboratory should be informed immediately. The unit and traceability information should then be returned to the transfusion laboratory.

- *Monitoring the patient during transfusion:*
 - Start and finish times of each unit should be recorded so that any adverse events can be correctly identified and reported, and so that the cold chain timings can be demonstrated for MHRA purposes.
 - Vital signs (T, P, R and BP) should be measured and recorded within 60 minutes before the start of each unit of blood component and at the end of each transfusion episode. These observations should be recorded separately from routine observations so that they are clearly related to the transfusion
 - Patient's T, P and BP should be taken and recorded 15 minutes after the start of each unit of blood component. If these measurements have altered significantly from the baseline values, then respiratory rate should also be taken. NB: any routine patient observations should be continued
 - Visual observation of the patient is the best way of assessing their condition during the transfusion
 - Further observations are necessary only if the patient becomes unwell or shows signs of a transfusion reaction. For rapid transfusions, more frequent observations may be required
 - Patients should be observed for the 24 hours following the transfusion as on occasion, transfusion reactions can occur many hours after the transfusion has been completed
 - Unconscious patients are more difficult to monitor for signs of a transfusion reaction. Routine observations should continue and transfusion reactions should be considered if there is a change or deterioration in the patient's condition
 - Patients who are discharged from hospital within 24 hours of receiving a transfusion (e.g. day case or short stay patients) should have access to clinical advice at all times. It is recommended they are issued with a contact card facilitating 24-hour access to appropriate clinical advice.

Transfusions should take place in clinical areas where patients can be readily observed throughout the procedure and can alert ward staff if they experience any adverse effects. It is good practice, when possible, to avoid transfusing patients out of core hours unless clinically essential.

- *Documenting the transfusion episode:*
 - The patient's consent to transfusion should be documented in patient's notes
 - The SHOT Report 2008 made a recommendation to discontinue the use of the compatibility for checking patient identification. Most transfusion laboratories do not issue compatibility reports with the blood component to avoid errors with the bedside checking procedure.
 - A permanent record of the administration of the blood or components and any relevant observations must be kept in the patient's notes
 - The blood transfusion prescription chart and the nursing observations made during the transfusion episode should be retained in the patient's notes
 - A record of the reason for the transfusion and the result of the transfusion (i.e. whether the transfusion achieved the desired result) should be kept in the patient's notes
 - A record of any adverse events occurring during or after the transfusion and the management of those events should be kept in the patient's notes. Any adverse events must be reported immediately to the transfusion laboratory
 - The fate of the donation must be recorded and the transfusion laboratory must have a system in place to meet the requirements of the EU directive 2002/98/EC.

List of References and Further Reading

BCSH (2014) Guideline for the use of anti-D immunoglobulin for the prevention of haemolytic disease of the fetus and newborn

<http://onlinelibrary.wiley.com/doi/10.1111/tme.12091/pdf>

[http://www.bcshguidelines.com/documents/BCSH_Anti_D_guidelines_-_Amendment_4_8_14_\(2\).pdf](http://www.bcshguidelines.com/documents/BCSH_Anti_D_guidelines_-_Amendment_4_8_14_(2).pdf)

BCSH (2012) Guideline on the investigation and management of Acute Transfusion Reactions, BCSH Approved Guideline

http://www.bcshguidelines.com/documents/ATR_final_version_to_pdf.pdf

BCSH (2009) Guideline on the Administration of Blood Components, BCSH Approved Guideline

http://www.bcshguidelines.com/documents/Admin_blood_components_bcsh_05012010.pdf

http://www.bcshguidelines.com/documents/BCSH_Blood_Admin_-_addendum_August_2012.pdf

BCSH (2004) Guidelines for the use of Fresh Frozen Plasma, Cryoprecipitate & Cryosupernatant, British Journal of Haematology 126, 11-28

http://www.bcshguidelines.com/documents/FFP_28020604.pdf

http://www.bcshguidelines.com/documents/FFP_Amendments_09122005.pdf

http://www.bcshguidelines.com/documents/FFPAmendment_2_17_Oct_2007.pdf

BCSH (2003) Guidelines for the use of platelet transfusions, British Journal of Haematology 122, 10-23

http://www.bcshguidelines.com/documents/platelettrans_bjh_04072003.pdf

BCSH (2001) Guidelines for the Clinical Use of Red Cell Transfusions, British Journal of Haematology 113, 24-31

http://www.bcshguidelines.com/documents/red_cell_transfusion_bjh2001.pdf

DH Health Service Circular 2007/001: Better Blood Transfusion – Safe and Appropriate use of Blood

<http://www.transfusionguidelines.org.uk/uk-transfusion-committees/national-blood-transfusion-committee/better-blood-transfusion>

NHSBT Patient Information Leaflets available at:

<http://hospital.blood.co.uk/patient-services/patient-blood-management/patient-information-leaflets/>

Norfolk D (Ed.) (2013) Handbook of Transfusion Medicine, 5th Edition, the Stationery Office

ISBN 978-0-11-706846-9

<http://www.transfusionguidelines.org.uk/index.aspx?Publication=HTM&Section=9>

NPSA Safer Practice Notice No. 24 (2007) Standardising wristbands improves patient safety

<http://www.nrls.npsa.nhs.uk/resources/?entryid45=59824>

RCOG Green-top Guideline No. 38 (2010) The Management of Gestational Trophoblastic Disease

<http://www.rcog.org.uk/files/rcog-corp/GT38ManagementGestational0210.pdf>

SHOT (2016) Annual Report 2015, Serious Hazards of Transfusion Steering Group, ISBN 978-0-9558648-8-9
<http://www.shotuk.org/shot-reports/>
The Blood Typing Game on the Nobel Prize website:
http://nobelprize.org/educational_games/medicine/landsteiner/

6. Patient Consent for Blood Transfusion

The Advisory Committee for Blood, Tissues and Organs, (SaBTO) advises Ministers of the UK Government and the Devolved Administrations as well as UK Health Departments on the most appropriate ways to ensure the safety of blood, cells, tissues and organs for transfusion/transplantation.

In October 2011, following a consultation exercise, SaBTO published consent for blood transfusion recommendations. There were 14 recommendations in total. The key recommendations relating directly to clinical practice are:

- Valid consent for blood transfusion should be obtained and documented in the patient's clinical record by the healthcare professional - a standardised information resource for clinicians indicating the key issues to be discussed during this consent process is available at:

<http://www.transfusionguidelines.org.uk/transfusion-practice/consent-for-blood-transfusion-1>

- There should be a modified form of consent for long term multi-transfused patients, details of which should be explicit in an organisation's consent policy
- Patients who have received a blood transfusion and who were not able to give valid consent prior to the transfusion should be provided with information retrospectively – a good practice guidance to help identify the most effective way of providing information retrospectively when patients were unable to give prior consent

<http://www.transfusionguidelines.org.uk/transfusion-practice/consent-for-blood-transfusion-1>

A retrospective patient information leaflet titled 'Information for patients who have received an unexpected transfusion' is available from:

<http://hospital.blood.co.uk/media/2379/a6cc8e12-34b6-4494-baad-03fa381bb1e4.pdf>

The other recommendations from SaBTO relate to clinical governance issues and the publication of UK-wide patient information and education strategies for patients, the public and healthcare professionals including the e-learning package LearnBloodTransfusion patient consent module).

A full list of all recommendations, plus additional implementation documents is available on the Transfusion Practice Website at:

<http://www.transfusionguidelines.org.uk/transfusion-practice/consent-for-blood-transfusion-1>

There are a number of patient information leaflets to support the information giving and consent process for transfusion. These can be ordered via the on-line ordering system: <https://hospital.nhsbtleaflets.co.uk/>

The NCA of Patient Information and Consent 2014

This was the largest UK audit to date of practice around the provision of patient information and consent for blood transfusion. Audit standards were taken from the SaBTO recommendations in 2011. Findings from this audit showed that evidence for documentation of consent was poor with only 43% documenting clinical indication for transfusion, 37% that the reason for transfusion had been explained, 23% that information on risks given and 17% that information on alternatives had been discussed.

The lack of provision of written information to patients was also very poor with only 19% documented as receiving these demonstrating a major discordance with written policies within Trusts.

Despite the deficiencies as highlighted above, 75% of patients felt they had been given enough information on transfusion and had been able to ask questions. However 21% stated that they did not feel at all involved in the decision making process around receiving a blood transfusion.

Key recommendations from the audit were;

- 1) All Trusts must have a policy for patient information and consent for transfusion in line with the SaBTO 2011 recommendations.

- 2) The indication for transfusion should be documented in the patient records in all cases as a minimum requirement.
- 3) Written consent is not needed but the patient should be informed of the indication for transfusion, risks, benefits and alternatives with documentation of the above in the clinical records.
- 4) Hospitals should review systems for improving their practice in relation to obtaining valid consent such as incorporation of consent in patient pathways for different disciplines in the medical and surgical setting.
- 5) Hospitals should review training provided for blood transfusion to all healthcare professionals prescribing blood to ensure inclusion of the provision of valid consent.
- 6) Trainee doctors in particular FY1 and FY2 grades seem to prescribe a large proportion of blood. Hospitals and professional bodies (i.e. medical undergraduate and foundation schools) must ensure that they receive transfusion training – in addition to patient consent this should include appropriate prescribing to overall improve appropriate use and transfusion safety.
- 7) There is limited awareness and use of the LearnBlood Transfusion patient consent eLearning module. This should be promoted as part of transfusion induction and training for nurses and doctors.
- 8) While the blood services produce comprehensive patient information leaflets on transfusion, these are largely not being used as shown by the feedback from healthcare professionals and patients. It is now timely to review the development and dissemination of written patient information leaflets.

Update on the UK law on consent

The importance of providing patients with accurate, up to date information about their upcoming medical or surgical procedure is now greater than ever. All staff who prescribe should be aware of the landmark decision in *Montgomery v Lanarkshire Health Board*, given by the UK Supreme Court on 11 March 2015. The so called Bolam test, which asks whether a doctor's conduct would be supported by a responsible body of medical opinion, no longer applies to the issue of consent.

As a result of this case, the following test regarding informed consent now applies;

"The doctor is... under a duty to take reasonable care to ensure that the patient is aware of any material risks involved in any recommended treatment, and of any reasonable alternative or variant treatments. The test of materiality is whether, in the circumstances of the particular case, a reasonable person in the patient's position would be likely to attach significance to the risk, or the doctor is or should reasonably be aware that the particular patient would be likely to attach significance to it".

This decision endorses current 2008 GMC Guidance, "Consent: patients and doctors making decisions together".

Further information:

Sokol D. K. Update on the UK law on consent *(2015) *BMJ* 2015;350:h1481 doi: 10.1136/bmj.h1481 (Published 16 March 2015)

7. Blood Administration

All blood components (excluding granulocytes) in the UK are leucocyte depleted (leucodepletion) within 48 hours of collection to minimise the theoretical risk of transmission of vCJD. Supplemental micro-aggregate filters are not required for any blood component transfusions (including granulocytes) supplied by NHS Blood and Transplant (NHSBT).

Component	Instructions for adult administration. (For paediatric administration see next page)
Red Cells	<ul style="list-style-type: none"> • Administer using a standard blood administration set containing a 170 – 200 micron filter • Routine administration: transfuse over 90-120 minutes. Patients less tolerant of increased blood volume should be transfused more slowly with careful haemodynamic monitoring • The transfusion must be completed within 4 hours of the component being removed from temperature controlled storage.
Platelets	<ul style="list-style-type: none"> • Administer using a standard blood administration set or a platelet administration set containing a 170 – 200 micron filter • Platelet administration sets have a smaller priming capacity than a blood administration set • Platelet concentrates should not be transfused through administration sets which have already been used for red cell transfusions • An adult therapeutic dose (ATD) unit of platelets is usually administered over 30 – 60 minutes.
FFP (Fresh Frozen Plasma)	<ul style="list-style-type: none"> • Administer using a standard blood administration set containing a 170 – 200 micron filter • 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 <ul style="list-style-type: none"> - For products stored at 22 +/-2 °C post thawing, the transfusion must be completed within 4 hours - For products stored at 4 +/-2 °C post thawing, the transfusion must be completed within 24 hours • A unit of FFP is usually administered over approximately 30 minutes (equivalent to 10-20ml/kg/h); more rapid transfusion may be appropriate in major haemorrhage.
Granulocytes	<ul style="list-style-type: none"> • Administer using a standard blood administration set containing a 170 – 200 micron filter • The whole dose should be transfused over 1-2 hours.
Cryoprecipitate	<ul style="list-style-type: none"> • Administer using a standard blood administration set containing a 170 – 200 micron filter • Administration rate is typically 30-60 minutes per 5 unit pool (equivalent to 10-20ml/kg/h) • Once thawed, cryoprecipitate must not be re-frozen and should be used immediately. If delay is unavoidable, the component should be stored at ambient temperature and transfused within 4 hours.
Product	
Human Albumin Solution (HAS)	<ul style="list-style-type: none"> • Administer using a 15 micron filter vented giving set (most standard intravenous fluid administration sets have a 15 micron filter). See hospital guide for administration rate.
IV Immunoglobulin	<ul style="list-style-type: none"> • Administer using a 15 micron filter vented giving set (some manufacturers supply a giving set in the product packaging). See hospital guide for administration rate.

Priming the Administration Set

The administration set must be primed with the blood component prior to attachment to the patient. The use of 0.9% Sodium Chloride to prime the set is unnecessary and other fluids must be avoided (see below). There are a variety of blood administration sets available. Manufacturers instructions on how to prime the line should always be followed.

Changing the Administration Set

The administration set should be

- changed at least every 12 hours to prevent bacterial growth or
- between transfusion of different components, on completion of transfusion and before administration of any other intravenous fluids/medication.
- Flushing of the administration set is unnecessary.

Some administration set manufacturers may provide different instructions or your hospital policy may vary. In these cases you should follow the manufacturer's instructions or your hospital policy, as appropriate.

Intravenous solutions that must be avoided:

- Hypotonic solutions such as 5% dextrose. These can cause haemolysis and must not be mixed with blood components
- Calcium-containing intravenous solutions such as Ringer Lactate, calcium-containing colloids such as Haemaccel or Gelofusine may antagonise the citrate anticoagulant in components and allow clots to form.

Drugs

Drugs must not be added to any blood component pack.

There is a however lack of consensus on the safety of the co-administration of drugs and red blood cells through an intravenous device (Murdock et al 2009). The 2009 British Committee for Standards in Haematology (BCSH) guidelines advised that no other intravenous fluids should be co-administered through an infusion line that is being used for a blood component. Whenever possible drugs should be administered between transfusions, via another venous access device (or a separate lumen of a multi-lumen central venous access catheter) If not possible the transfusion should be stopped and the line/cannula flushed with 0.9% saline before and after administration of the drug and then restart the transfusion.

Infusion Devices

Individuals using any type of infusion device should be able to demonstrate competency in their use. The pre-administration checking procedure should include a check of the device and device settings and the infusion device should be regularly maintained in accordance with manufacturers and/or organisational guidelines. Only blood component administration sets that are compatible with the infusion device should be used (check manufacturers recommendations).

Infusion rate devices

Infusion rate devices may be either gravity or electronic. They should only be used if the manufacturer verifies them as safe for this purpose and they are CE marked. The volume delivered should be monitored regularly throughout the infusion to ensure that the expected volume is delivered at the required rate.

Pressure Devices

External pressure devices make it possible to administer a unit of red cells within a few minutes. They should only be used in an emergency situation together with a large gauge venous access cannula or device.

External pressure devices should:

- Exert pressure evenly over the entire bag
- Have a gauge to measure the pressure
- Not exceed 300mm Hg of pressure
- Be monitored at all times when in use.

Blood Warmers

Hypothermia impairs haemostasis and reduces red cell oxygen delivery to the tissues. Rapid transfusion of blood at 4°C can lower the patient's core temperature by several degrees. Cold blood infused faster than 100 ml/minute has been reported to cause cardiac arrest in adults; special consideration should be given when rapidly transfusing large volumes to neonates, paediatrics, elderly patients, and patients susceptible to cardiac dysfunction.

Rapid infusion devices may be used when large volumes have to be infused rapidly. Rapid infusers usually incorporate a blood warming device.

Guidance from the National Institute for Health and Clinical Excellence (NICE) on *inadvertent perioperative hypothermia – The management of inadvertent perioperative hypothermia in adults* (NICE Clinical Guidance E5, April 2008) recommends that, in all adults undergoing elective or emergency surgery (including surgery for trauma) under general or regional anaesthesia, blood components should be warmed to 37°C.

Blood warmers are also appropriate in the transfusion of patients with clinically significant cold antibodies. In most other clinical situations where there is concern, it is sufficient to allow blood to come up to ambient temperature before transfusion. Each patient should be assessed and the risks of potential heat loss considered.

Blood should only ever be warmed using a specifically designed commercial device with a visible thermometer and audible warning. Only CE marked commercial blood warmers should be used and the manufacturer's instructions strictly followed. Some blood warmers are designed to operate up to and including 43°C but a re safe, provided they are used and maintained according to manufacturers instructions.

Blood and blood components should not be warmed using improvisations such as putting the pack into hot water, in a microwave or on the radiator. Fatalities have occurred due to haemolytic transfusion reactions and/or bacterial contamination of the blood component following the use of inappropriate blood warming procedures.

Paediatric Administration

The principles are the same as for adult administration. Blood administration sets containing an integral 170-200 micron filter should always be used. Paediatric blood administration sets are appropriate for small volume transfusions. Neonatal blood administration systems come with an integral 3 way tap which can then be used to attach a syringe driver if required. The component bag should be left attached during the transfusion even if using a syringe driver.

A new syringe and administration set should be used when administering different components and blood from more than one donation should also not be mixed together. This ensures that the relevant donation is identifiable in the event of a reaction.

Transfusion volumes and rates for paediatrics should be carefully calculated and prescribed in mL not units.

Intrauterine Transfusions

Intra transfusion of red cells or platelets (and neonatal exchange transfusion) are complex procedures requiring multidisciplinary expertise and should only be performed in specialist units.

Red cell preparations for Intrauterine Transfusion (IUT) should not be transfused straight from 4°C storage, the component is warmed to 37°C immediately before transfusion.

The transfusion volume should be calculated by a fetal medicine specialist and is based on:

- fetoplacental blood volume, the haematocrits (red cells only) of the donor blood, and fetus and the target haematocrit for red cell transfusion
- Fetoplacental blood volume, fetal platelet count and platelet concentrate platelet count for platelet transfusion.

On completion of the Transfusion

Flushing through the remainder of the blood in the line with 0.9% Sodium Chloride is unnecessary and is not recommended because it may result in particles being flushed through the filter. If another IV infusion is to take place after the blood transfusion, including the administration of another blood component, a new administration set must be used. This is to reduce the risk of incompatible fluids or drugs causing haemolysis of any residual red cells which may be left in the administration set.

If a transfusion is completed uneventfully the empty blood component pack and administration set should be discarded according to the organisations policy for disposing of clinical waste.

Any paperwork required for the traceability of the component must be completed prior to the disposal of the component pack.

References

BCSH (2004) Transfusion Guidelines for Neonates & Older Children
http://www.bcsguidelines.com/documents/transfusion_Neonates_bjh_124_4_2004.pdf

BCSH (2009) Guideline on the Administration of Blood Components, BCSH Approved Guideline
http://www.bcsguidelines.com/documents/Admin_blood_components_bcsb_05012010.pdf

National Patient Safety Agency (2010) Alert reference number 1264: Prevention of over infusion of intravenous fluid and medicines in neonates. DH gateway: Reference 14470
<http://www.nrls.npsa.nhs.uk/resources/?entryid45=75519>

National Institute for Health and Care Excellence (2008) Inadvertent perioperative hypothermia: The management of inadvertent perioperative hypothermia in adults, CG65
<http://publications.nice.org.uk/inadvertent-perioperative-hypothermia-cg65/key-priorities-for-implementation>

Norfolk D (Ed) (2013) Handbook of Transfusion Medicine. 5th edition. The Stationery Office ISBN 9780 1170 68469

The Royal College of Nursing (2013) 'Right blood, right patient, right time', RCN pub. code 002 306
<http://www.rcn.org.uk>

This information regarding the practice of transfusion of blood components and blood products is sought from national guidance but please consult your Hospital Transfusion Policy for local variation.

8. Appropriate Use and Alternatives to Blood Transfusion

Key objectives from The Health Service Circular 2007/001: Better Blood Transfusion – Safe and Appropriate Use of Blood that specifically refer to appropriate use and alternatives state that hospitals should:

- *Avoid the unnecessary use of blood and blood components (fresh frozen plasma and platelets) in medical and surgical practice*
- *Avoid unnecessary blood transfusion in obstetric practice and minimise the risk of haemolytic disease of the newborn.*

Patient Blood Management superseded Better Blood Transfusion in 2012 and national guidelines place greater emphasis on avoidance of transfusion where possible.

Blood conservation strategies and alternatives to blood transfusion are also discussed in length in the following references:

Norfolk D (Ed.) (2013) Handbook of Transfusion Medicine, 5th Edition, The Stationery Office
ISBN 978-0-11-706846-9

Murphy MF and Pamphilon DH (Eds) (2005) Practical Transfusion Medicine 2e, Blackwell Science Ltd
ISBN 140511844X

Thomas D, Thompson J and Ridler B (Eds) (2004) A Manual for Blood Conservation, tfm publishing
ISBN 1-903378-24-9

The Transfusion Practice Website is being developed to update the previous Better Blood Transfusion – Appropriate Use of Blood Toolkit. This can be found at: <http://transfusionguidelines.org.uk/transfusion-practice> and has detailed guidance on cell salvage.

NBTC recommendations on the appropriate use of Group O Rh D Negative red cells April 09

<http://www.transfusionguidelines.org.uk/uk-transfusion-committees/national-blood-transfusion-committee/responses-and-recommendations>

8.1 Patient Blood Management

Patient Blood Management (PBM) is a joint initiative between NHS England, NHSBT and The National Blood Transfusion Committee. It is a multidisciplinary, evidence-based approach to optimising the care of patients who might need blood transfusion. Patient Blood Management puts the patient at the heart of decisions made about blood transfusion to ensure they receive the best treatment and avoidable, inappropriate use of blood and blood components is reduced. PBM represents an international initiative in best practice for transfusion medicine.

Patient Blood Management needs leadership and support at every level, from national and regional leaders to trust management, health professionals and their colleagues within the hospitals. Evidence shows that there is inappropriate use that can be reduced. The risk of serious complications of blood transfusion is very low but patients should only receive blood they really need. While the demand for red cells is falling, the demand for platelets is still increasing. This is projected to continue due to a number of factors such as medical advances and an aging population. Only 4% of the eligible population give blood and new donors are always needed to replace regular donors who can no longer donate.

Patient Blood Management: An Evidence-based approach to patient care was published by the NBTC in 2014. These recommendations on measures to aid the appropriate use of blood are supported by NHS England and NHS Blood and Transplant. They can be accessed here:

<http://www.transfusionguidelines.org.uk/uk-transfusion-committees/national-blood-transfusion-committee/patient-blood-management>

An action plan template to assist NHS Trusts has been developed and your PBMP will be able to provide you with a copy of this.

Some key points from the PBM Recommendations for Hospitals to consider:

- All NHS Trusts should establish a multidisciplinary PBM programme through the HTC or as a subgroup of the HTC
- Analyse case mix and clinical services to determine the main targets for PBM
- Identify PBM champions to help educate staff and patients
- Establish a PBM committee (either stand-alone or within the Hospital Transfusion Committee) to oversee the PBM programme
- Obtain a mandate for PBM from hospital management
- Educate clinicians about PBM and evidence-based transfusion practice
- Adopt a PBM scorecard to share with senior NHS Trust members to monitor adherence to guidelines for blood avoidance and the use of blood, including the use of benchmarking to identify clinicians/clinical teams who are consistently well outside of average blood use for a specific procedure

Further information can be found at:

<http://www.transfusionsguidelines.org.uk/uk-transfusion-committees/national-blood-transfusion-committee/patient-blood-management>

Other countries such as Australia and the USA are also driving forward with Patient Blood Management. See:

http://ww2.health.wa.gov.au/Corporate/Articles/N_R/Patient-blood-management

<http://www.nataonline.com/>

The PBMP team also have a Twitter account promoting information and updates of interest on PBM. PBM England https://twitter.com/PBM_NHS/

Some RTCs also have their own Twitter accounts promoting regional PBM initiatives and updates.

9. Issue Data and Planning for Blood Shortages

9.1 Blood Issue Data and the Blood Stocks Management Scheme

The PBMP team monitor issue data on a monthly basis to identify trends and significant changes in issues. A PBMP/CSM may contact Trusts to gain further information and understanding of changing clinical demands and offer support as appropriate. The intelligence gained is then used to inform demand predictions and ensure availability of components.

The 'Blood Stocks Management Scheme (BSMS) for Transfusion Practitioners' has been produced with the support of the BSMS Steering Group, to give background information about the Blood Stocks Management Scheme and explain how data is contributed. It promotes the full range of reports which can be utilised by Transfusion Practitioners, they are able to extract data and charts to be utilised as a visual aid for education, training and inter hospital meetings which could lead to changes in practice, reduced wastage and promote appropriate use.

Further information can be found at: <http://www.bloodstocks.co.uk>.

9.2 Development of an Integrated Blood Shortage Plan for NHS Blood and Transplant and Hospitals

NHS Emergency Planning requires the development of contingency plans to ensure the effective use of available blood and blood components when blood stock levels fall to very low levels, and will be critical to ensure transfusion support remains available for the patients who most need it.

Blood shortages are rare in the UK, however the possibility of blood shortages is a very real one. Shortages may be short or long term. For example, a severe influenza epidemic may result in a short-term shortage where as a significant reduction in the number of blood donors could result in a long-term shortage.

With support from the NBTC a summary plan for the management of blood during shortages was issued to Chief Executives of Trusts in July 2004. In that document reference was made to a longer version of the plan that was issued in January 2005, following consultation with the NBTC and Department of Health. This document included further guidance for hospitals asking them to review the contents and make any amendments they considered necessary to their own Emergency Blood Management arrangements. This was revised in October 2009 and is currently under review again, the main changes being: a) the removal of benchmarking arrangements and b) adopting a less prescriptive framework.

The original integrated plan for the management of blood shortages includes a framework to manage shortages in a variety of situations including:

- Short term shortages caused by, for example, bad weather or an influenza outbreak
- Very acute shortages caused by, for example, security issues which stop donors coming forward to donate
- Prolonged blood shortages which could result from a number of circumstances e.g. the introduction of further measures to reduce the risk of disease transmission by transfusion or changes in processing
- Unexpected increases in demand.

The plan is designed to ensure that:

- Blood is available for all essential transfusions to all patients equally across the country
- Overall usage is reduced to ensure the most urgent cases receive the supply which is available.

The plan has three phases that are dependent on NHSBT stock levels.

- Green phase - Stocks are at 'normal' levels where supply meets demand. The main focus for hospitals plans in this phase is to prepare their Emergency Blood Management Arrangements (EBMA) based on the guidance in the document and to implement the recommendations of Health Service Circular 2007/001: Better Blood Transfusion – Safe and Appropriate Use of Blood.
- Amber phase - Stocks are reduced for a short or prolonged period. Hospitals will reduce stockholding to 67% of their average stockholding level and in more prolonged shortage to also reduce usage.

- Red phase - Stocks are reduced for a severe, prolonged shortage. Hospitals will reduce stockholding to 40% of their average stockholding level and it is likely only patients in Category 1 (see overleaf) of the EMBA will be treated.

To simplify the management of patients in a general red cell shortage a traffic light system has been created using three broad patient categories. This is to assist hospitals with prioritising patients to achieve the required reduction in red cell usage. It is recognised that clinical judgement is an essential part of decision-making for individual patients.

Category 1	Category 2	Category 3
These patients will remain highest priority of transfusion	These patients will be transfused in the Amber but not the Red phase	These patients will not be transfused in the Amber phase
Resuscitation Resuscitation of life-threatening /on-going blood loss including trauma.		
Surgical support Emergency surgery* including cardiac and vascular** and organ transplantation. Cancer surgery with the intention of cure.	Surgery/Obstetrics Cancer surgery (palliative). Symptomatic but not life-threatening post-operative or post-partum anaemia. Urgent*** (but not emergency) surgery.	Surgery Elective surgery which is likely to require donor blood support (Patients with >20% chance of needing 2 or more units of blood during or after surgery)
Non-surgical anaemias Life-threatening anaemia including patients requiring in-utero support and high dependency care/SCBU. Stem cell transplantation or chemotherapy**** Severe bone marrow failure. Thalassaemias (but consider lower threshold). Sickle cell disease crises affecting organs. Sickle cell patients aged ≤ 16 with past history of CVA.	Non-surgical anaemias Symptomatic but not life-threatening anaemia.	

* Emergency – patient likely to die within 24 hours without surgery.

** With the exception of poor risk aortic aneurysm patients who rarely survive but may require large volumes of blood.

*** Urgent – patient likely to have major morbidity if surgery not carried out.

**** Planned stem cell transplant or chemotherapy should be deferred if possible

9.3 An Integrated Plan for the NHS Blood and Transplant and Hospitals to Address Platelet Shortages

In September 2006 an extension to the blood shortage plan was issued by the Department of Health: “An Integrated Plan for the National Blood Service and Hospitals to address Platelet Shortages”. This was also revised in October 2009 as per the red cell shortage plan.

As with the blood shortage plan, the platelet shortage plan is designed to ensure that hospitals and NHSBT can work within a consistent, integrated framework across England and North Wales, to provide equal access for patients to available units of platelets on the basis of need. This will be achieved by making sure that those patients most in need receive the available supply and ensuring that any reduction in usage is made from those patients who will be least affected.

The plan has the following two key aims:

- That the national pool of platelets is available for all essential transfusions to all patients across the country.
- That overall usage is reduced to ensure the most urgent cases receive the supply that is available.

Like the red cell shortage plan, the platelet plan is structured to provide a framework of actions for NHSBT and hospitals at three phase levels – Green, Amber and Red.

- Green phase - Platelet stocks are at normal levels where supply meets demand. The main focus for hospitals plans in this phase is to ensure the additional EMBA arrangement requested for platelet shortages are incorporated into their EBMA's based on the guidance in the document and to implement the recommendations of Health Service Circular 2007/001: Better Blood Transfusion – Safe and Appropriate Use of Blood.
- Amber phase - There is a reduced availability of units of platelets. Hospitals are requested to stop any stockholding of platelets and where required, to reduce usage.
- Red phase - Severe shortage, no platelet stockholding and where required, reduced usage should continue.

Due to the much smaller numbers of platelets used in England and North Wales the plan to provide equal access for patients to available units of platelets on the basis of need, will be achieved by making sure those patients most in need receive the available supply. A framework to categorise patient types to support decision making is provided in the document (see below).

Category 1 patients are those with the greatest clinical need for platelet transfusion support and should therefore be given priority when considering allocation of platelets. Category 2 and 3 patients should be given lower priority.

The use of platelets should be considered as one element in the overall management of these patients. Use should be guided by the clinical condition of the patient and laboratory/near patient testing.

Category 1 (Patients to be treated in Red Phase)	Category 2 (Patients to be treated in Amber Phase)	Category 3
<p>Massive haemorrhage & Critical Care Massive transfusion for any condition including obstetrics, emergency surgery and trauma, with on-going bleeding, maintain $>50 \times 10^9/l$. Aim for $>100 \times 10^9/l$ if multiple trauma or CNS trauma.</p> <p>Bleeding in the presence of sepsis/acute DIC maintain $>50 \times 10^9/l$.</p>	<p>Critical care Patients resuscitated following massive transfusion with no on-going active bleeding, maintain $>50 \times 10^9/l$</p> <p>Surgery Urgent but not emergency surgery for a patient requiring platelet support</p> <p>Transfusion triggers for invasive procedures Invasive monitoring or biopsy work, maintain platelet count $>50 \times 10^9/l$ General surgery – maintain count $>50 \times 10^9/l$ Operations in critical sites such as brain or eyes maintain $>100 \times 10^9/l$</p>	<p>Surgery Elective, non-urgent surgery likely to require platelet support for thrombocytopenia or congenital/acquired platelet defects</p>
<p>Bone marrow failure and immune thrombocytopenia Active bleeding associated with severe thrombocytopenia or functional platelet defects</p>	<p>Bone marrow failure Prophylactic transfusion for thrombocytopenia (platelet count $<10 \times 10^9/l$) in patients who are not infected and haemodynamically stable. Consider support if platelet count is $<20 \times 10^9/l$ for patients at higher risk of bleeding.</p>	
<p>Neonates For neonatal alloimmune thrombocytopenia or severe thrombocytopenia in an otherwise well neonate, platelet transfusions are required when the platelet count falls to between $20 - 30 \times 10^9/l$. Higher target levels should be maintained if extremely low birth weight or unwell/bleeding or intra-cranial haemorrhage suspected/confirmed</p>		

More information

The National Blood Transfusion Committee. A plan for NHS Blood and Transplant and Hospitals to address Red Cell and Platelet shortages are available to be viewed from:

http://hospital.blood.co.uk/contingency_planning/emergency_planning/index.asp

9.4 Recommendations for Organisations of Hospital Transfusion Services following July 2005 London Bombings.

The Emergency Planning Working Group was set up with representation from Hospital Transfusion Laboratories, Accident and Emergency and NHSBT with the objective of reviewing lessons learned in relation to the organisation of transfusion services following the July 7th 2005 London bombings.

The recommendations of this group are separated in the following categories:

- a. Communication
- b. Patient Identification
- c. Use of Blood and Blood Components
- d. Maintaining the Cold Chain for Blood and Blood Products
- e. Traceability of Blood and Blood Components
- f. Hospital Transfusion Laboratory Staffing
- g. Major Incident Plans for other sections of Pathology
- h. Antidote Pods in Chemical and Biological Incidents
- i. Skin and Tissues.

References

National Blood Transfusion Committee 'Recommendations for Organisations of Hospital Transfusion Services following July 2005 London Bombings' – Nov 2006

<http://www.transfusionguidelines.org.uk/uk-transfusion-committees/national-blood-transfusion-committee/responses-and-recommendations>

National Blood Transfusion Committee

'A plan for NHS Blood and Transplant and hospitals to address platelet shortages' – Oct 2009

http://www.transfusionguidelines.org.uk/docs/pdfs/nbtc_platelet_shortages_plan_09_10.pdf

National Blood Transfusion Committee

'A plan for NHS Blood and Transplant and hospitals to address red cell shortages' – Oct 2009

http://www.transfusionguidelines.org.uk/docs/pdfs/nbtc_red_cell_plan_09_10.pdf

NHS Commissioning Board, Emergency Preparedness Framework 2013

<http://www.england.nhs.uk/wp-content/uploads/2013/03/epr-framework.pdf>

10. Risk Assessment and Management

Assessment and management of risk is an important part of the work of a Transfusion Practitioner.

10.1 Haemovigilance in the UK

The term Haemovigilance describes the systematic surveillance of the transfusion process, with the aim of detecting serious adverse, unexpected events or reactions in blood donors or recipients, and the epidemiological follow-up of donors. The UK was one of the first countries to implement such a system and since 1996, the SHOT scheme has successfully undertaken those aspects of haemovigilance relating to recipients.

The Blood Safety and Quality Regulations (2005) and SABRE

The EU Blood Safety Directive introduced a legal requirement for serious adverse reactions (SAR) and serious adverse events (SAE) occurring within EU Member States to be reported to the relevant Competent Authority. The Department of Health has designated the MHRA as the UK Competent Authority. It was, therefore, the MHRA's responsibility to put in place by 8 November 2005, a mechanism for the reporting and recording of these incidents. For this purpose the MHRA developed an online reporting system: Serious Adverse Blood Reactions and Events (SABRE). In addition to satisfying the requirements of the EU Directive for reporting to MHRA, SABRE has been developed to allow reporters to SHOT to use the same portal and this provides a single reporting route for UK haemovigilance.

The Directive also requires that each reporting establishment submit to the Competent Authority an annual summary report of serious adverse reactions and serious adverse events. MHRA facilitate this process. The Competent Authority submits an annual summary report to the EU Commission.

SABRE, the on-line reporting system, can be accessed via the SHOT website: <http://www.shotuk.org> or via the MHRA website: <http://www.mhra.gov.uk>

MHRA has produced two guidance documents to help to clarify what incidents are reportable and information on how to submit reports. These are:

- 'Background and Guidance on reporting Serious Adverse Events and Serious Adverse Reactions'
- 'SABRE – a User Guide'.

These documents are available on both the websites above.

Medicine and Healthcare Products Regulatory Agency,
151 Buckingham Palace Road,
Victoria,
London SW1W 9SZ
Tel: 020 3080 7336
E-mail: sabre@mhra.gsi.gov.uk
Website: <http://www.mhra.gov.uk>

Serious Hazards of Transfusion (SHOT)

SHOT is a confidential, anonymised, UK wide scheme that aims to collect data on adverse events of transfusion of blood and blood components (red cells, platelets, fresh frozen plasma, and cryoprecipitate, autologous blood, and the administration of anti-D Immunoglobulin).

At hospital level, adverse events are usually reported to the local clinician responsible for transfusion and then a member of the HTT notifies the SHOT office.

SHOT findings are used to:

- Inform policy within transfusion services
- Improve standards of hospital transfusion practice
- Aid the production of clinical guidelines for the use of blood
- Educate users on the hazards of transfusion and their prevention.

An annual report is published by SHOT and several recommendations are made which aim to improve transfusion safety. These recommendations are aimed not just at Trusts, but at each and every member of

hospital staff involved in the transfusion process, as there is evidence of errors in the transfusion process at all stages from taking the initial blood sample to administration.

Funding for SHOT is provided by the four United Kingdom Blood Transfusion Services on a pro-rata basis according to the number of red cell units issued. The strategic direction of SHOT comes from a steering group (SG) with wide representation from Royal Colleges and professional bodies representing medical, nursing and laboratory staff as well as health service managers. The operational aspects of the scheme and the actual writing of the report are the responsibility of the Working Expert Group (WEG).

An 'Introduction to SHOT' toolkit, list of current definitions, and educational documents are available to download from the SHOT website (<http://www.shotuk.org>) or as hard copies from the SHOT Office (contact details below).

Reporting to SHOT remains voluntary, but is required for compliance with Health Service Circular 2007/001: Better Blood Transfusion – Safe and Appropriate Use of Blood, and active participation in SHOT by all hospitals was recommended by the Chief Medical Officer for England in his 2003 Annual Report. A number of blood safety initiatives depend on continuity of SHOT data for monitoring and evaluation and it is therefore vital that hospitals use the SABRE system to continue to report to SHOT.

In May 2007 SHOT employed a Transfusion Practitioner to help analyse data, liaise with reporters, draft reports and provide educational materials. This position is divided equally between SHOT and NHSBT Patient Blood Management team. For further information and contact details please contact your local Patient Blood Management Practitioner.

More information can be obtained from:

The SHOT Office, Manchester Blood Centre

Plymouth Grove, Manchester

M13 9LL

Tel: 0161 423 4208, Fax: 0161 423 4395

Email: shot@nhsbt.nhs.uk Website: <http://www.shotuk.org>

10.2 Monitoring and Inspection of Clinical Standards

The responsibility for monitoring, inspecting and rating NHS organisations comes under the remit of The Care Quality Commission (CQC). They are the independent regulator of health and social care in England. They inspect against a set of 'Fundamental Standards' which were developed following the Francis report. They carry out both comprehensive and focussed inspections. Inspection reports are published on their website.

Further information about the CQC can be found on the CQC website:

<http://www.cqc.org.uk/>

Prior to March 2014 Trusts were assessed against standards developed by The NHS Litigation Authority (NHS LA), a Special Health Authority. This system ceased after review of the NHS LA when it was decided to no longer update or assess against the standards. The standards are no longer used by NHS organisations.

10.3 National Patient Safety Agency (NPSA)

The NPSA was a Special Health Authority established to co-ordinate the efforts of healthcare staff to learn from patient safety incidents occurring in the NHS but was disbanded in June 2012. The patient safety and reporting arm of the agency moved under the auspices of the new NHS Commissioning Board.

Further information can be found on the NHS Commissioning Board website at:

<http://www.commissioningboard.nhs.uk/index.php?s=NPSA>.

Doctors and other staff are encouraged to report incidents and 'near misses' (when errors are detected before they cause harm). A key aim is to encourage staff to report incidents without fear of personal reprimand and know that by sharing their experiences they will be able to learn lessons and improve patient safety. The change of emphasis is more about 'how' than 'whom'.

NPSA Safer Practice Notice Number 14 'Right blood, right patient'

This Safer Practice Notice was released in November 2006. It followed on from a project involving the NPSA, the NBTC and SHOT originating in December 2004 with a blood safety stakeholders meeting. This initiative offered a range of long and short-term strategies to ensure blood transfusions were carried out safely. It required all hospitals in England and Wales to implement competency-based training and observed assessments for all staff involved in the blood transfusion process. Action 2 in the SPN referred to ensuring the final bedside check is done next to the patient by matching the blood pack with the patient's wristband, prior to commencing a transfusion.

Other actions asked hospitals to systematically examine their local blood transfusion procedures using formal risk assessment processes and appraise the feasibility of using barcodes or other electronic identification and tracking systems for patient samples and blood components, photo identification cards for patients who undergo regular blood transfusions and a labelling system for matching samples and blood for transfusion to the patient concerned. In April 2008 a statement was released clarifying that formal observed assessment was required and that self assessment was not an adequate form of competency assessment; the deadlines for compliance were extended by 12 months i.e. 50 percent of all relevant staff should have been formally assessed against these competencies by May 2009. By Nov 2010 all initial competency assessments should have been undertaken. This was only applicable to hospitals in England; the deadline for implementation in Wales was not extended. These competencies and the process of assessment are currently under review by the NPSA SPN14 review group – a working group of the NBTC.

The NPSA SPN Working group of the NBTC continue to review the original NPSA competencies in response to concerns expressed over their original application and implementation.

For more information on the NPSA see their website: <http://www.npsa.nhs.uk>

Root Cause Analysis

The NPSA worked to help identify solutions to blood errors identified by SHOT and train NHS staff to find the root cause of errors. Root cause analysis (RCA) is a retrospective review of a patient safety incident undertaken in order to identify what, how, and why it happened. The NPSA developed an interactive e-learning tool all NHS staff can access and use, to raise their awareness of patient safety. It is a modular online training programme with support materials and tools available to download and use. It is divided into six modules; the first four provide an overview of RCA for those who need to undertake a RCA of a patient safety incident. The last two modules are more specialised for anyone wanting to obtain a deeper understanding of the theory behind RCA. If you would like to conduct a RCA of a specific transfusion incident, or near-miss, the NPSA recommend a multi-disciplinary team of 3-4 people should be established, of which at least one should be competent in RCA and one should act as lead co-ordinator. Information will need to be collected from the people directly involved, documentation (such as patient's notes, blood results, training records, policies and procedures) and any equipment used, as well as from the site the incident took place at.

The information then needs to be 'mapped' to organise what is relevant, clarify what is known and to help identify any gaps there may be. A 'Timeline Chart' showing the chronological chain of events that occurred in an incident is a technique often used to help achieve this.

Influencing or causal factors that contributed to the incident are then identified, perhaps using a 'Fish-bone' diagram (a diagrammatical tool used to capture causes contributing to a single problem under nine classification headings), to try and identify the root cause(s); the fundamental contributory factor(s) which, if resolved, will eradicate or have the most significant effect on reducing the likelihood of reoccurrence. Key learning points can be identified, recommendations made and areas requiring change identified.

A 'RCA Toolkit' to help investigate transfusion incidents is available from your PBMP Practitioner. For more information see the website:

<http://www.nrls.npsa.nhs.uk/resources/type/toolkits/?q=0%c2%acroot%c2%ac&entryid45=59847>

Many Trusts utilise these systems for investigations. If you are not familiar with RCA talk to your Risk Management Team and ask for training.

11. Clinical Benchmarking

Clinical Benchmarking offers a way to monitor transfusion practice within hospitals and provide an effective service targeted at patients needs.

The BSMS is a partnership between hospitals and blood services with the purpose of leading best practice in blood inventory management by enabling both hospitals and blood services to benchmark their service against their peers. This is achieved by collecting data and providing real time data and charts to participants. This information can be used to benchmark practice on usage and wastage data. Data provided allows hospitals to monitor how they use blood with data charts that can be used as a visual aid for discussions at HTTs and as a reporting tool to HTC's. This allows for peer review against hospitals with similar clinical practice and usage profiles, with the addition for comparisons to be made on a regional and national basis.

The PBMP team in addition to monitoring BSMS data also provide comparative data and reports to hospitals to enable them to benchmark their own practice

Participation in local, regional and national audits and surveys is also an important method which enables hospitals to compare and identify practice for improvement. The use of benchmarking to identify clinicians / clinical teams who are consistently well outside of average blood use for a specific procedure is a good practice measure included in a 'Patient Blood Management: An Evidence-based approach to patient care' (NBTC 2014).

Future developments in Clinical Benchmarking aim to include using a process involving the collection of data on patients undergoing transfusion. Data on clinical blood usage would be collected by hospitals by the use of a minimum dataset. This data could then be analysed and reported back so that hospitals could use the data to monitor the impact of PBM initiatives and to benchmark transfusion practice between different clinical specialities or other hospitals. The data could also be used by NHSBT to aid demand planning and stocking levels, including for rare blood groups.

12. Pathology Modernisation and Integrated Transfusion Services

Pathology Modernisation

The Department of Health launched a Pathology Modernisation Programme in 1999, with the key goals of improving the quality and efficiency of NHS pathology services and encouraging the introduction of new technologies and practices to deliver high quality care for patients. Pathology Modernisation is now a national Quality, Innovation, Productivity and Prevention (QIPP) work stream.

In 2006, an independent review of pathology was commissioned by the Department of Health (DH). The Carter review team carried out a thorough and systematic evaluation of pathology and laboratory medicine services in England. In formulating recommendations for the future the team looked at examples of good practice from around the world. The report from the Carter review team was published in August 2006.

The Carter report of the second phase of the review (2008) considered that there was potential to rationalise the repertoire/complexity of testing based on hospital size/clinical services provided, which has opportunities for transfusion laboratories.

In 2012 an independent review of quality assurance arrangements in pathology was commissioned and was carried out by the National Clinical Director for Pathology, Dr Ian Barnes. This group published the Published Quality Assurance Review in January 2014.

Links for further information and reading:

- Department of Health (2004) Modernising Pathology Services. Available at:
http://webarchive.nationalarchives.gov.uk/20130107105354/http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4073112.pdf
- Department of Health (2005) Modernising pathology: Building a service responsive to patients.
http://webarchive.nationalarchives.gov.uk/20130107105354/http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4119778.pdf
- Independent review chaired by Lord Carter of Coles (2008) Report of the second phase of the review of NHS pathology services in England. Available at:
http://webarchive.nationalarchives.gov.uk/20130107105354/http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_091984.pdf
- Independent review chaired by Dr Ian Barnes (2014) Pathology Quality Assurance Review
<http://www.england.nhs.uk/wp-content/uploads/2014/01/path-qa-review.pdf>
- Sear F, Asher D (2015) The Changing Face of Pathology Services and how this is Impacting on Blood Management. Blood and Transplant Matters. January 15; 44: 9-11

Integrated Transfusion Services (ITS)

ITS is the term used to describe an extended service and greater partnership between NHSBT and hospitals. The objective is to improve NHSBT service across both diagnostics, including H&I, RCI and product supply and encompasses a range of existing and new initiatives. It has been developed in response to the changing pathology structure and environment.

Building and expanding on tried and tested models already operating in the UK and other countries, ITS has the potential to enable more effective and efficient management of blood and component stocks throughout the entire donor to patient supply chain, as well as helping to facilitate wider Pathology Modernisation.

The key components of ITS are as follows:

- **Integration of the blood supply** chain through NHS Blood and Transplant managed stock inventories and hospitals
- **Integration of patient care pathways** through a single national database of transfusion-related information
- **Integration of transfusion diagnostics and donation selection** through the creation of NHS Blood and Transplant managed laboratory networks

Essential paths in this process include;

- The Formation of transfusion networks using a Hub and spoke model centred around NHSBT hosted Hub laboratories with RCI services where Spoke laboratories would provide local urgent testing and the Hub laboratory elective, routine and specialist services, managing stock across the network.
- Integrating patient care pathways, which will involve prospectively genotyping multi-transfused patients to minimise sensitisation through improved product selection. Patient's results will be held nationally and made available via Sp-ICE when required. Along with this there will be improved availability of extensively typed blood components from a larger cohort of donors from Black and Minority Ethnic groups from donors of Black and Ethnic minority groups

As well as reducing costs and contributing to improving patient safety, potential advantages include reduced blood wastage, better demand and collection planning, fresher blood by reducing inventory and reduced turnaround times for access to blood and component products, better opportunities for staff training, centralised support, regulatory compliance, better patient outcome through access to a national database of transfusion related information, and the provision of better matched blood used more appropriately.

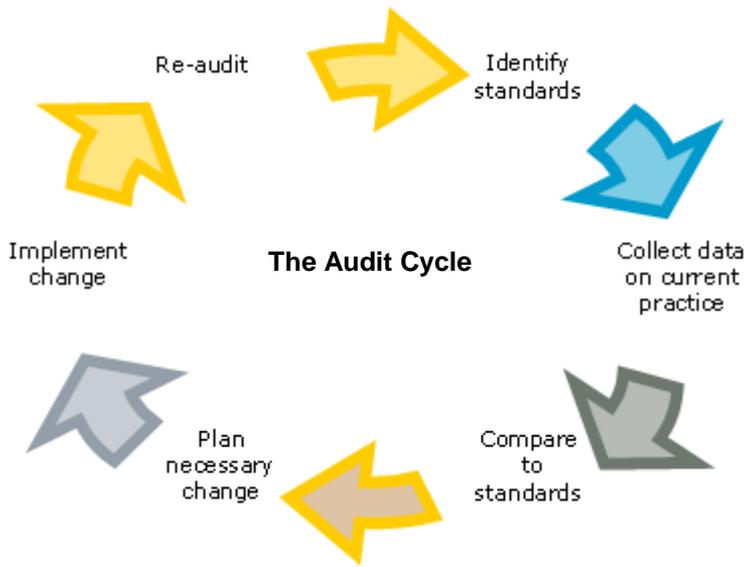
Business cases and more detailed plans are still under development but more details on ITS can be found at: <http://www.nhsbt.nhs.uk/download/blood-2020.pdf>

13. Clinical Audit and National Surveys

Clinical Audit

Audit is a quality improvement and educational tool. Its aim is to ensure that the best possible care is delivered to patients by measuring clinical performance/practice against identified standards. Audit is an important component of the clinical governance framework.

NHS England describes clinical audit as 'a way to find out if healthcare is being provided in line with standards and lets care providers and patients know where their service is doing well, and where there could be improvements'. (NHS England, 2013)



To find out what should be happening and the evidence for best practice look at national and local standards. Research, systematic reviews and guidelines should provide you with the evidence needed.

The following are useful sources for guidelines on transfusion:

- British Committee for Standards in Haematology
- Royal Colleges (including Royal College of Nursing)
- National Institute for Health and Clinical Excellence
- Nursing & Midwifery Council
- Medicines and Healthcare Products Regulatory Agency.

The above provide explicit recommendations. Sometimes however, you may need to develop standards for your audit that are not covered by guidelines. In these circumstances some standards may need to be developed from scratch and it is important that only reliable sources of information are used. One route to information is the Transfusion Evidence Library and another is the NHS Evidence portal managed by NICE.

The Transfusion Evidence Library

This is a database of systematic reviews (since 1980) and randomised controlled trials (since 2002) relevant to transfusion medicine. It is fully searchable, updated monthly and aims to be a key resource for medical practitioners, policy makers and researchers both in the UK and around the world. The Library is produced by the Systematic Review Initiative, supported by the UK Blood Services.

Areas covered

- Blood donors and donation practice
- Fractionated blood products
- Management of anaemia
- Red cells, platelets, FFP, granulocytes, cryoprecipitate

- Transfusion adverse events
- Transfusion alternatives
- Use of blood components

<http://www.transfusionevidencelibrary.com/>

The NICE Evidence Portal

This is a “value added” database and is free to use. From here you can access specific sources of information such as Cochrane Reviews. It should be stressed however that even on these resources a degree of interpretive skill is required to assess the quality of information and you should seek expert guidance if you feel new standards are appropriate.



After identifying best practice and the standards you should be achieving, break each one into criterion (short statements) describing what makes up best practice. You should be able to measure each criterion, they will be about:

- Structure (resources, staff training)
- Process (what staff actually do)
- Outcome (results of health care)

For example - “The indication for every transfusion episode is written in the patient’s notes”.

Now decide how often that should happen - in many cases the level of performance you expect is 100%.

For some audit standards it may be necessary to include “exceptions”. These are usually specific clinical circumstances that make it necessary to deviate from the standard.

When setting standards in this way, it is a good idea to assemble a small team of appropriately trained staff to agree on both the standard and any exceptions that may be necessary. The sorts of questions you will be asking in your audit are:

- Do we adhere to protocols/guidelines for managing patients with particular conditions
- Do we observe and monitor patients during transfusion to reduce the risk of allergic reactions
- Is what we are doing Appropriate, Relevant, and Effective?

Listed here are some of the tools that you might use to measure practice:

- Proforma/checklist – retrieve information from existing documents e.g. patient case notes
- Questionnaires for staff and patients
- Direct observation of practice.

It is often useful to prepare an audit template that lists your standards, what you expect the compliance level should be and any exceptions. Keep your audit simple and don’t try to cover too much in one audit.

Some areas, such as whether or not patients are happy with the services they receive, are better covered by well constructed surveys and should not be conflated with audit. Good advice on how to distinguish between reviews, surveys, research and audit are available from the Healthcare Quality Improvement Partnership (HQIP) and are free to download.

A frequent question is how many cases should you include in the audit? In general, as many as it is practical to do. There are formal methods to do this and numbers are often restricted by practicalities. Bear in mind however, that an audit of 5 cases will not carry much conviction!

Making Changes

Once you have collected and analysed your data you need to decide what needs to be improved, you may identify:

- That the process needs to be changed
- A need to train or educate a particular group of staff
- A need to alter documentation
- A need to alter local guidelines.

Tips for audit

- Audit takes time
- Be clear about your aims and objectives
- Involve anyone that might be affected by your audit
- Involve the people who can make change happen
- Test out your audit on a small sample first – pilot
- Collect **only** essential data – there is generally no requirement to collect patient identifiers for audit purposes
- Decide how you want to analyse your data
- Ensure patient confidentiality
- Analyse and compare with your identified standards
- Make recommendations involving all the people who you talked to at the beginning
- Write an ACTION plan showing who is responsible for which actions
- Make friends with your clinical effectiveness (audit) dept!

Closing the Cycle

It is very important that once you have made changes on the basis of what you found out the first time around; the audit is repeated to see if compliance with the standards has improved. Make sure you use the same audit tool as before and resist the temptation to add in a “bit extra”. It is only by repeating the cycle that you can demonstrate that the audit has been successful.

Regional Transfusion Committee Audit

Support for RTC audits is provided by the Data Analyst and Clinical Audit Manager who can provide advice and support for all stages of the audit cycle. Completed audits are available on the RTC web pages:

<http://www.transfusionguidelines.org.uk/uk-transfusion-committees/regional-transfusion-committees>

For further information and contact details please contact your local PBMP.

National Comparative Audit

The National Comparative Audit of Blood Transfusion is an ongoing programme of clinical audits that are operated jointly by NHSBT and the Royal College of Physicians. The programme develops and conducts audits that look at the use of blood in a variety of clinical settings, examining the clinical decision to prescribe red blood cells and other blood components, as well as looking at the administration of blood components in clinics, wards and theatres.

- To date there have been many National Comparative Audits (NCA) since the first one in 2003 looking at Bedside Transfusion Practice.
- Audits are open to all hospitals, NHS and Independent, in England and participation by hospitals in Wales, Northern Ireland and Scotland is invited.

For further information see the link:

<http://hospital.blood.co.uk/audits/national-comparative-audit/>

Where feasible, local audit tools are produced following each national audit. These tools, known as QuickAudit, are a series of instant audit tools. They have been developed specially for the audit programme. Clinical Audit works most effectively if the right information is collected, quickly analysed and quickly fed back to the healthcare professionals who have been audited. Local and particularly national audits can take some time to report, so healthcare practitioners may move on or the original impetus gained during the audit may be lost. A problem that many Transfusion Practitioners have is that they do not have the time, or the expertise with software, to enter data and create reports. QuickAudit provides the answer: it is an automated clinical audit reporting system.

So far there are QuickAudit tools available for auditing aspects of patient safety as they apply to blood transfusion. That is to say, QuickAudit can be used to locally audit the wearing of wristbands, the information those wristbands contain, observations of the patient before, during and after transfusion, and transfusion-associated paperwork. As each NCA reports in the future, a QuickAudit tool will be provided if it is considered helpful. The NCA team will also consider requests from hospitals to create specific QuickAudit tools as long as they can be provided and shared with others.

For more information about QuickAudit, or to request contact details for the National Comparative Audit Project Manager, please contact your local PBMP.

QuickAudit can be accessed through the NCA website
<https://www.nhsbtaudits.co.uk/>

AFFINITIE

AFFINITIE is a study aimed at understanding how clinical audit can be improved to change the practice of those who prescribe blood and blood components, to be more consistent with evidence based standards. The lessons from the research should also have implications for broader audit and feedback in other clinical settings. NHSBT is working in collaboration with specialists in behaviour change, implementation research, clinical trials and health economics at universities in Aberdeen, Leeds, London, Oxford and Ottawa to deliver a 5 year research programme funded with a £2m grant from the National Institute for Health Research. The AFFINITIE programme starts in April 2015. Potential enhancements to content and delivery of audits will be informed by the outputs of the first research work stream,

During the research programme the National Comparative Audit programme will offer 2 audits, both of which will be repeated. This is the outline timetable:

Audit topic 1 – National Comparative Audit of Patient Blood Management in Surgery

April 2015: Audit of Patient Blood Management in surgery starts
July 2015: Data entry closes and analysis begins
October 2015: Feedback begins
July 2016: Re-audit starts

Audit topic 2 – National Comparative Audit of the use of blood in Haematology

January 2016: Audit of use of blood in haematology starts
April 2016: Data entry closes and analysis begins
July 2016: Feedback begins
April 2017: Re-audit starts

The audit programme will be open to all NHS Trusts and independent hospitals in the UK. Different way of delivering feedback (interventions) will be tested by delivering different feedback to different Trusts. Researchers will then evaluate the impact of each intervention, so they can learn about the most effective way to feedback clinical audit results - the way that research will show is the most likely to stimulate the change and improvement.

National Surveys

National surveys have been carried out by the NBTC to provide an overview of implementation of the actions in the Better Blood Transfusion Health Service Circulars and to help direct the future work priorities for the NBTC and RTCs. The focus of attention is now moving towards Patient Blood Management and appropriate use of blood.

The surveys can be found at

Useful References

Clinical Audit Tools. A free resource of advice on audit and downloadable adaptable spreadsheets for use in audit projects. Done in conjunction with HQIP

<http://www.clinicalaudittools.com> (2012)

HQIP (Healthcare Quality Improvement Partnership) - promotes better health services by supporting those responsible for quality improvement work

<http://www.hqip.org.uk>

Jamtveldt G, Young JM, Kristoffersen DT, O'Brien MA, Oxman AD: *Audit and feedback: effects on professional practice and health care outcomes* : Cochrane Collaboration 2008

Morell, C (1999) *The Clinical Audit Handbook: improving the quality of healthcare*. London. Balliere Tindall

NHS England

<http://www.england.nhs.uk/ourwork/qual-clin-lead/clinaudit/>

NHS Evidence. NICE's evidence portal

<https://www.evidence.nhs.uk/>

NHS Research and Development Forum. Guidance on defining research within the Research Governance Framework for Health and Social Care

<http://www.rdforum.nhs.uk>

NICE (2008) *Principles for best practice in clinical audit*. Radcliffe Medical Press Ltd ISBN: 1-85775-976-1. To order a copy, contact Radcliffe Medical Press on 01235 528820

Sale, D (1996) *Quality Assurance. For Nurses and other members of the Health Care Team*. Basingstoke, Macmillan Press

14. Patient Information Leaflets

The following patient information leaflets are produced by NHSBT.

Leaflet	Order code	Order quantity	Ordering details
Will I need a blood transfusion?	BLC607P	Packs of 25	<p>**Leaflets can be ordered via the on-line ordering system: https://hospital.nhsbtleaflets.co.uk/</p> <p>** If you do not have access to the internet, copies of all leaflets can be ordered by calling the Customer Services Office on 01865 381010.</p>
Information for patients needing irradiated blood	BLC608P		
Fresh Frozen Plasma (FFP) and Cryoprecipitate	BLC719P		
Will your child need a plasma transfusion?	BLC612P		
Children receiving a blood transfusion (includes a parents' guide and two children's booklets – 'Amazing You' for younger children and 'Voyages of Microsub Discovery' for older children)	BLC610P		
Will my baby need a blood transfusion?	BLC611P		
Blood group and red cell antibodies in pregnancy	BLC613P		
Information for patients who have received an unexpected blood transfusion	BLC699P		
Will I need a platelet transfusion?	BLC658P		
Iron in your diet	BLC609P		
Patient Blood Management	BLC715P		
Protecting women and babies with anti-D Immunoglobulin	BLC723P		
Blood Transfusion and Sickle Cell Disease	BLC725P		
Anaemia	BLC718P		

15. Professional Organisations, Networks and Agencies

15.1 Professional Organisations

British Blood Transfusion Society (BBTS) <http://www.bbts.org.uk>

BBTS is the professional body for health care staff working in all areas of blood transfusion, encompassing both hospitals and blood services. It has members worldwide, and seeks to promote knowledge and advance the understanding of all aspects of transfusion medicine for the public benefit. There is a Professional Affairs and Education Committee (PAEC), numerous Special Interest Groups (SIGs) including one for Transfusion Practitioners and BBTS has its own Continuing Professional Development (CPD) scheme.

BBTS, Enterprise House, Manchester Science Park, Lloyd Street North, Manchester M15 6SE
Tel: 0161 232 7999

British Society for Haematology (BSH) <http://www.b-s-h.org.uk>

This is the main haematology society in the UK. The BCSH is a sub-committee of the British Society for Haematology. The primary purpose of the BCSH is to provide haematologists with up-to-date advice on the diagnosis and treatment of haematological disease by the production of evidence based guidelines.

British Society for Haematology, 100 White Lion Street, London, N1 9PF Tel: 020 7713 0990

Health Professions Council (HPC) <http://www.hpc-uk.org/>

The Health Professions Council (HPC) is a regulatory body, set up to protect the public. It currently regulates 219,000 registrants from 16 health professions: arts therapists, biomedical scientists, chiropodists/podiatrists, clinical scientists, dieticians, hearing aid dispensers, occupational therapists, operating department practitioners, orthoptists, paramedics, physiotherapists, practitioner psychologists, prosthetists/orthotists, radiographers, social workers in England and speech and language therapists. It keeps a register (<http://www.hpc-uk.org/aboutregistration/theregister/>) of health professionals who meet HPC standards (<http://www.hpc-uk.org/aboutregistration/standards/>) for their training, professional skills, behaviour and health.

Institute of Biomedical Science (IBMS) <http://www.ibms.org>

The Institute of Biomedical Science is the professional body for biomedical scientists in all fields of work, including laboratory scientists in the NHS and related services in the UK and Ireland. Its aims are to promote and develop biomedical science and its practitioners and to establish, improve and maintain professional standards. The institute was founded in 1912 and is registered as a charity. One of the most important functions of the Institute is to represent the profession to government departments and educational and scientific authorities. It should be noted that it is not a trade union; nor does it hold professional registration for Biomedical Scientists, who are State Registered with the HPC.

International Society of Blood Transfusion (ISBT) <http://www.isbt-web.org>

A scientific society bringing together almost 1,400 professionals involved in blood transfusion medicine in more than 100 countries. They organise events, publish journals and various technical and scientific documents.

Nursing and Midwifery Council (NMC) <http://www.nmc-uk.org>

The NMC was established by Parliament to ensure that nurses, midwives and health visitors provide high standards of care to their patients and clients. There are web pages for practitioners, the public, employers and overseas applicants. It holds the professional registration for all practising nurses, midwives and health visitors.

Royal College of Nursing (RCN) <http://www.rcn.org.uk>

The RCN represents nurses and nursing, promotes excellence in practice and shapes health policies.

Royal College of Midwives (RCM) <http://www.rcm.org.uk/>

The RCM offers support and education to midwives. It is the only professional organisation and trade union led by midwives for midwives.

Royal Colleges

Royal Colleges are professional bodies in the UK for ensuring quality of patient care, setting standards for practice and educating and informing professionals and the general public. Examples include:

Royal College of Pathologists: <http://www.rcpath.org>
Royal College of Anaesthetists: <http://www.rcoa.ac.uk>
Royal College of Physicians: <http://www.rcplondon.ac.uk>
Royal College of Surgeons: <http://www.rcseng.ac.uk>

The Advisory Committee on the Safety of Blood, Tissues, and Organs (SaBTO)

<http://www.dh.gov.uk/ab/SaBTO/index.htm>

SaBTO was established in 2007 following a review of its predecessor, the Advisory Committee on the Microbiological Safety of Blood, Tissues and Organs (MSBTO). SaBTO advises Ministers of the UK Government and the Devolved Administrations as well as UK Health Departments on the most appropriate ways to ensure the safety of blood, cells, tissues, and organs for transfusion/transplantation. Its remit includes providing independent advice on risk management and on the microbiological safety of gametes and stem cells. The Public Body Review of October 2010 recommended that SaBTO should be dissolved as a separate body, and be reconstituted as a Department of Health/Public Health Service committee of experts. Following the Public Bodies Act (2011) this change took place.

UK Blood Transfusion and Tissue Transplantation Guidelines

<http://www.transfusionguidelines.org.uk>

The Joint Professional Advisory Committee (JPAC) is made up of the Joint United Kingdom Blood Transfusion Services, National Institute of Biological Standards and Control Professional Advisory Committee. It has 2 distinct remits:

1. To prepare detailed service guidelines for the UK Blood Transfusion Services. These are published as the Guidelines for the Blood Transfusion Services in the United Kingdom 'Red Book'.
2. To be an advisory committee to the UK Blood Transfusion Services, normally by reporting to the Medical Directors of the individual services who are themselves individually accountable to the Chief Executives of the Services.

All of these guidelines have been brought together, (along with the Handbook of Transfusion Medicine, which deals with the use, rather than the collection, processing and issue of blood components) as content of a single website. This facilitates the process of keeping current guidelines up to date and of document control. The website also hosts information about systematic reviews, the BSQR, consultation documents and educational events. It is also the home of the various RTC websites.

15.2 Networks and Agencies

Care Quality Commission (CQC) <http://www.cqc.org.uk>

From April 2009 the Care Quality Commission became the independent regulator of both health and social care in England.

Care Quality Commission, 103-105 Bunhill Row, London EC1Y 8TG Tel: 0207448 9200

Department of Health (DH) <http://www.dh.gov.uk>

The DH is responsible for setting health and social care policy in England. The Department sets standards and drives modernisation across all areas of the NHS, social care and public health.

Jehovah's Witnesses <http://www.jw.org>

The religious group of Jehovah's Witnesses have established Hospital Liaison Committees (HLC) which can provide information to health care professionals and the public about alternatives to transfusion. They can assist with issues that may arise when their members refuse blood in hospitals.

IBSA House, The Ridgeway, London NW& 1RN Tel: 020 8906 2211

Medicines and Healthcare products Regulatory Agency (MHRA)

<http://www.mhra.gov.uk>

The MHRA is the Competent Authority for medical devices and for the BSQR 2005. It is also the licensing authority for pharmaceuticals. It replaced the Medical Devices Agency (MDA) and the Medicines Control Agency (MCA) in 2003. NHSBT is subject to the same rigorous inspections as pharmaceutical manufacturers and has to have a Special Licence granted by the MHRA following regular inspections at each site.

Information Centre, 10-2, MHRA, Market Towers, 1 Nine Elms Lane, London SW8 5NQ
Tel: 020 7084 2000

National Institute for Health and Clinical Excellence (NICE) <http://www.nice.org.uk>

NICE was formed on 1st April 2005. NICE took on the functions of the Health Development Agency to create a single 'excellence in practice' organisation responsible for providing national guidance on the promotion of good health and the prevention and treatment of ill health.

NICE, Midcity Place, 71 High Holborn, London WC1V 6NA Tel: 0845 003 7780

NHS England <http://www.england.nhs.uk/>

The main aim of NHS England is to improve the health outcomes for people in England. From June 2012 the key functions and expertise for patient safety developed by the National Patient Safety Agency (NPSA) transferred to NHS England. This ensures patient safety is at the heart of the NHS and builds on the learning and expertise developed by the NPSA, driving patient safety improvement.

From April 2013, NHS England has taken on many of the functions of the former primary care trusts (PCTs) with regard to the commissioning of primary care health services, as well as some nationally-based functions previously undertaken by the Department of Health.

Network for Advancement of Transfusion Alternatives (NATA) <http://www.nataonline.com>

NATA is an international network of medical practitioners, researchers, and opinion leaders from a wide variety of medical and scientific disciplines. They are dedicated to helping their peers learn more about recent advances in blood conservation and transfusion alternatives. It has an informative web site with up-to-date papers published daily.

NHS Litigation Authority (NHSLA) <http://www.nhsla.com>

The NHSLA is a Special Authority in the NHS. It indemnifies NHS bodies in respect of clinical negligence risks, and also manages claims and litigation. They previously developed risk management programmes involving standards against which NHS Trusts were assessed. These standards are no longer used by NHS Organisations. The CQC are now responsible for the monitoring and inspection of NHS Trusts and organisations.
NHSLA, Napier House, 24 High Holborn, London WC1V 6AZ Tel: 020 7430 8700

Serious Hazards of Transfusion (SHOT) <http://www.shotuk.org>

Collects data on serious sequelae of the transfusion of blood components. (See section 9.1)
SHOT, Manchester Blood Centre, Plymouth Grove, Manchester M13 9LL, Tel: 0161 251 4208

World Health Organisation (WHO) <http://www.who.int/en>

WHO is the United Nations Specialised Agency for Health. It was established in 1948 with headquarters in Switzerland. WHO's objective is the attainment by all peoples of the highest possible level of health. WHO is governed by 192 Member States through the World Health Assembly.

UK Blood Services

- National Blood Service (NBS) <http://www.blood.co.uk>

The NBS is a part of NHSBT that collects, processes, tests and issues blood components to hospitals across England and North Wales. The NBS also carries out research, provides specialist transfusion advice, education and support to hospitals. The NBS website for hospitals is: <http://hospital.blood.co.uk> and the Donor Helpline telephone number is 0300 123 23 23

- Scottish National Blood Transfusion Service (SNBTS) <http://www.scotblood.co.uk>

The SNBTS is a division of the Common Services Agency for the NHS in Scotland. The remit of the SNBTS is to safely collect and supply sufficient blood and related components to meet the needs of patients within Scotland.

- Northern Ireland Blood Transfusion Service (NIBTS) <http://www.nibts.org>

Established in 1946 as an independent Special Agency of the Health and Personal Social Services responsible for collection, testing and distribution of over 75,000 blood donations each year in Northern Ireland. The headquarters is in Belfast City Hospital.

- Welsh Blood Service (WBS) <http://www.welsh-blood.org.uk>
The WBS is a National Health Service unit (responsible to the Welsh Assembly Office) which collects blood, processes and stores it before delivery to hospitals in South, East, West and Mid Wales.

16. Training and Education Events

The table below lists some of the training events currently available to support personal development in transfusion.

Event Organiser	Details
<p>NHSBT</p> <ul style="list-style-type: none"> • Provides a monthly update of available courses in the monthly communication to hospitals • NHSBT Courses: Courses for UK hospital staff run by the NHSBT Learning Delivery team. • BSMS 	<ul style="list-style-type: none"> • http://hospital.blood.co.uk – click on the Training & Education section • Learning Delivery team: http://hospital.blood.co.uk/training/index.asp • http://www.bloodstocks.co.uk/index.asp
<p>Organisations who provide conferences and educational events:</p> <p>BBTS</p> <p>BSH</p> <p>ISBT</p> <p>JPAC – hosts an Educational Events Diary located within the Transfusion Practice toolkit section</p> <p>NATA</p> <p>RCN</p> <p>RTC educational days</p> <p>SHOT</p>	<ul style="list-style-type: none"> • http://www.bbts.org.uk • Special Interest Groups (SIGs) • Specialist Certificates • Conferences and educational events • http://www.b-s-h.org.uk • http://www.isbt-web.org • http://www.transfusionsguidelines.org.uk • http://www.nataonline.com • http://www.rcn.org.uk • Details available from PBMP or RTC Administrator, or websites at: http://www.transfusionsguidelines.org.uk • http://www.shotuk.org

This is not a comprehensive list, but a short guide to the most significant educational events. Details on forthcoming events and support groups for Hospital Transfusion Practitioners can be obtained from your regional PBMP.

17. Training Materials

This section provides a summary of some of the materials that are currently available to support local transfusion education and training. (FoC = Free of charge)

Material	Details	Cost	Contact
Audio Visual	The Strange Case of Penny Allison Educational CD ROM produced by the National Blood Service	£10	Order form can be downloaded from the Library on: http://hospital.blood.co.uk
	Jehovah's Witnesses videos: Transfusion - Alternative Strategies - Simple, Safe, Effective Transfusion - Alternative Healthcare - Meeting Patients Needs and Rights No Blood - Medicine Meets the Challenge	FoC	Local Jehovah's Witnesses hospital representative or contact Hospital Information Services for Jehovah's Witnesses Tel: 020 89062211 Website: http://www.watchtower.org
	West Midlands DVD "Safe in our hands"		Janine Beddow, TP, University Hospital Coventry & Warwickshire NHS Trust. Email: janine.beddow@uhcw.nhs.uk Tel: 02476 965470
	East Midlands DVD 'Criminal Transfusion Investigation'		PBMP
Educational Posters and Factsheets	NHSBT educational posters: <ul style="list-style-type: none"> • Will I need a blood transfusion? • Does your patient require irradiated blood? • NBTC Indication codes for transfusion • Taking a blood sample • No wristband, No transfusion • HLA matched platelets • Platelets - Don't use two ... when one will do • Irradiated Blood Components Factsheet • PBM Single Blood unit (A4 and A5) • PBM Size matters • Do You know who I am? • Right Patient, Right Blood. Have you checked your patient's ID? • Right Patient, Right Blood. Have you correctly ID'd your patient? • Right patient, Right Blood. Staff factsheet • Cryoprecipitate factsheet • HDN Awareness • FFP Factsheet • CMV negative Factsheet • Platelet Factsheet for doctors and senior nurses • BSMS Platelet Stockholding Algorithm • Transfusion of platelets across blood groups • Using the ISI in BSMS • Learnbloodtransfusion e-learning poster • Anti-D When and How Much • Anti-D Quick Facts 	FoC	Order via the on-line ordering system: https://hospital.nhsbtleaflets.co.uk/ Download from the Hospital & Science website: http://hospital.blood.co.uk/ <i>see Patient Services / Patient Blood Management then:</i> - Education - O D Negative Red Cell Toolkit - Platelet Resources

Material	Details	Cost	Contact
Slides and images	Updated training laminates: Blood components Deterioration/contamination of components Components with explanation of a label (also available on CD-ROM).	FoC	PBMP
	PBM Single unit PowerPoint slide / screensaver	FoC	Download from the Hospital & Science website: http://hospital.blood.co.uk/ see - Education
SHOT Tools	Current: <ul style="list-style-type: none"> • Full, & summary of, annual report • Figures from annual report (slide show) • Cases from annual report (slide show) • Recommendations from the annual report • Recommendations from the annual report - editable • Learning Points from annual report • SHOT Information and teaching slide set • Introduction to SHOT Toolkit • RCA Toolkit for Transfusion Practitioners • Lessons for laboratory staff • Lessons for clinical staff • Laboratory reporting guide • Definitions of Current SHOT Categories & What to Report. • Anti-D Administration checklist & poster • SHOT Anti-D poster • Transfusion checklist • SHOT laboratory flowchart • Cell salvage reporting resources • SHOT Participation Benchmarking Data Archive: <ul style="list-style-type: none"> • SHOT for Children • SHOT in Obstetrics 	FoC	PBMP http://www.shotuk.org
E Learning	Learnbloodtransfusion – online transfusion training and assessment for all staff involved in transfusion. Modules available include: <ul style="list-style-type: none"> • Safe Transfusion Practice • Safe Transfusion Practice for Paediatrics • Blood Components and Indications for Use • GMP for Hospital Blood Banks • Anti-D Clinical staff • Anti-D Laboratory • Learn Cell Salvage. • Transfusion Laboratory: safe practice • Consent for Transfusion 	FoC	For information: http://www.transfusionguidelines.org.uk/ It is available on three platforms: <ul style="list-style-type: none"> • LearnProNHS • National Learning Management System (part of ESR) • E-Learning for Healthcare (e-LfH) To access via LearnProNHS: http://www.learnbloodtransfusion.org.uk Tel: 01865 381010

Material	Details	Cost	Contact
	<ul style="list-style-type: none"> Safe Blood Sampling for Transfusion Acute transfusion Reactions 		
Newsletters	<p>Transfusion Matters</p> <p>Blood and Transplant Matters</p> <p>Regional newsletters</p> <p>PBMP Team Newsletter</p>	<p>FoC</p> <p>FoC</p> <p>FoC</p> <p>FoC</p>	<p>Order via the on-line ordering system: https://hospital.nhsbtleaflets.co.uk/</p> <p>Download from the Hospital & Science website: http://hospital.blood.co.uk/</p> <p>Chair of Regional TP group, RTC administrator or PBMP</p> <p>Download from the Hospital & Science website: http://hospital.blood.co.uk/</p>
Bookmarks	<ul style="list-style-type: none"> NBTC Indication Codes Bookmark PBM Bookmark 	FoC	Order via the on-line ordering system: https://hospital.nhsbtleaflets.co.uk/
Fridge magnets and stickers	To attach to ward and other non-blood fridges in hospitals, to remind staff not to store blood components in an uncontrolled environment.	FoC	Order via the on-line ordering system: https://hospital.nhsbtleaflets.co.uk/
UK Cell Salvage Action Group Educational Resources	<p>These include:</p> <ul style="list-style-type: none"> Intraoperative cell salvage education workbook Intraoperative cell salvage competency workbook Intraoperative cell salvage technical factsheets “About cell salvage” information sheet for patients. Frequently asked questions 	FoC	<p>IOCS education workbook can be ordered via the on-line ordering system: https://hospital.nhsbtleaflets.co.uk/</p> <p>Download at: http://www.transfusionguidelines.org.uk/index.aspx?Publication=BBT&Section=22&pageid=7507</p> <p>http://www.transfusionguidelines.org.uk/docs/pdfs/Cellsalvagefactsheet020309.pdf</p>
A Wealth of Knowledge & A Drop of Knowledge	Information for developing and experienced Transfusion Practitioners.	FoC	Order via the on-line ordering system: https://hospital.nhsbtleaflets.co.uk/
IAQs	A collection of Infrequently Asked Questions (IAQs) asked by TPs.	FoC	Customer Service Administration office Tel: 01865 381010 Email: NHSBT.customerservice@nhsbt.nhs.uk
APPs and Mobile sites	Platelet Transfusion Mobile Site	FoC	Download from the Hospital & Science website: http://hospital.blood.co.uk/patient-services/patient-blood-management/platelet-resources/how-to-access-the-platelet-transfusion-mobile-

Material	Details	Cost	Contact
	PBM England Twitter Account		site/ @PBM_NHS

For additional resources refer to the education section on the DH Toolkit: <http://www.transfusionguidelines.org.uk>

18. Acronym and Abbreviation Buster

This section provides details of commonly used acronyms and abbreviations in transfusion.

Acronym or Abbreviation	Represents	Brief Description
ADU	Avoidable, Delayed or Undertransfusion (formerly known as 'Inappropriate and Unnecessary')	Flawed, delayed, avoidable or inappropriate decision making in relation to transfusion; a SHOT reporting category.
ANH	Acute Normovolaemic Haemodilution	A blood conservation technique used during surgery which involves venesection immediately prior to surgery and volume replacement with IV crystalloid fluid, and subsequent post-operative replacement of the sequestered autologous blood as required. Not currently recommended.
ATD	Adult Therapeutic Dose	Most commonly used in reference to platelets: a pack of platelets produced from a single apheresis donation or by pooling four whole blood donation platelet concentrates, considered a sufficient dose for a single transfusion to an adult.
ATR	Acute Transfusion Reaction	A reaction (allergic, Hypotensive and Severe Febrile) occurring within 24 hours of a transfusion; a SHOT reporting category.
BATB	British Association for Tissue Banking	UK-wide professional and scientific society that brings together those who have an interest in tissue banking.
BBMR	British Bone Marrow Registry	A register of HLA typed blood donors who wish to be bone marrow donors, now managed by the Anthony Nolan Trust. The tissue types of NBS cord blood donations are also included in this registry.
BBTS	British Blood Transfusion Society	UK scientific society for healthcare professionals with an interest in blood transfusion.
BC	Buffy Coat	A layer of platelets and white blood cells which lies between red blood cells and plasma when whole blood is centrifuged, from which platelet concentrate is derived. Note: buffy coats made from routine blood donations do not contain white blood cells, as the whole blood is leucocyte depleted before centrifugation.
BCC	Blood Consultative Committee	Committee set up by the MHRA to act as an interface between the MHRA and the UK transfusion community.
BCSH	British Committee for Standards in Haematology	A group within the BSH that produces national guidelines which are regarded as the practice standard for transfusion practice.
BM	Bone Marrow	The tissue that fills the cavities of long bones, from which all types of blood cell develop.
BPL	Bio-Products Laboratory	Now a DH registered company (formerly a part of NHSBT) which manufactures fractionated plasma products, such as factor VIII, essential to the treatment of certain blood disorders and other medical conditions.
BSE	Bovine Spongiform Encephalopathy	Commonly known as mad-cow disease, BSE is a fatal, neurodegenerative disease in cattle, that causes a spongy degeneration in the brain and spinal cord.
BSH	British Society for Haematology	A professional membership body and registered charity. The objects for which the Society was established are: to advance the practice and study of haematology and to facilitate contact between persons interested in haematology.
BSMS	Blood Stocks Management Scheme	A partnership scheme operated by NHSBT involving NBS Centres and hospitals, to understand and improve blood inventory management, including wastage, across the blood supply chain.

BSQR	Blood Safety Quality Regulations	The regulations set standards for quality and safety for the collection, testing, processing, storage and distribution of human blood and blood components.
CMV	Cytomegalovirus	A herpes virus associated with white blood cells. A small select group of patients require CMV negative screened blood components.
CPA	Clinical Pathology Accreditation	An accreditation/assurance scheme for pathology and transfusion laboratories.
CSG	Customer Service Group (or Service Improvement Group)	A NHSBT forum attended by both NBS and hospital representatives, to improve service delivery. The name of the group may vary slightly between centres.
CSM	Customer Service Manager	A role within NHSBT responsible for developing and maintaining a relationship between NHSBT and the healthcare community, this primarily being the hospital transfusion laboratories, to ensure that NHSBT delivers a service to meet the customer's needs.
DAT	Direct Antiglobulin Test	A laboratory technique for the detection of antibodies or complement bound to red blood cells (also called Coombs test).
DDR	Diagnostics, Development and Research	NHSBT department responsible for the provision of diagnostic laboratory services and research and development programmes.
EBMA	Emergency Blood Management Arrangements	Actions in place for hospitals to ensure appropriate use and actions to be taken in the event of a blood shortage.
EBMP	Emergency Blood Management Plan	Actions in place for NHSBT and hospitals to manage a potential shortage of blood or platelets.
GMP (or GPMP)	Good Manufacturing Practice (or Good Pharmaceutical Manufacturing Practice)	Guidelines designed to ensure that blood components and pharmaceutical products are safe and effective. The UK guidelines are published in an orange covered book called 'Rules and Guidance for Pharmaceutical Manufacturers and Distributors 2007', which is also known as "The Orange Guide".
H&I	Histocompatibility and Immunogenetics	A specialist service of NHSBT. H&I supports haematopoietic stem cell transplant and solid organ transplant programmes in hospitals throughout England. The H&I laboratory at Filton provides platelet and granulocyte immunology services nationally.
HBc	Hepatitis B Core	The exclusion period for blood donors who have had body piercing, acupuncture etc. are given in the Donor Selection Guidelines. Certain categories may require donations to be tested for anti-HBc and negative results obtained prior to release of any blood component for clinical use. Tissue and stem cells donations have anti-HBc screening as a mandatory requirement.
HBsAg	Hepatitis B surface antigen	The presence / absence of this surface antigen is used to determine if blood is infected with Hepatitis B virus. HBsAg is one of the mandatory tests for blood, tissue and stem cell donations.
HDN/HDFN	Haemolytic Disease of the (Foetus and) New-born	A disease of the foetus/neonate due to antigen-antibody reaction arising from an incompatibility of foetal and maternal red blood cells (most commonly Rh D antigen).
HIV	Human Immunodeficiency Virus	HIV is a lentivirus (a member of the retrovirus family) that can lead to acquired immunodeficiency syndrome (AIDS). Anti-HIV 1 and 2 are mandatory tests for blood donations.
HLA	Human Leucocyte Antigen	Molecular level cell system which has an important role in determining the success or otherwise of transplantation procedures and can cause serious complications in blood transfusion.
HPA	Human Platelet Antigen	Molecular level cell system which is present on platelets

		and which can have an influence on the efficacy of a platelet transfusion.
HPC	Haemopoietic Progenitor Cell	A general term used to describe the precursor cells which give rise to all of the different types of blood cells. HPCs are found in bone marrow and cord blood, and can be 'mobilised' into the peripheral blood stream by treatment with growth factor.
HSE	Handling and Storage Errors	Errors in the handling and storage of components, where the component may have been rendered less safe as a result; a SHOT reporting category.
HTC	Hospital Transfusion Committee	A hospital committee made up of the HTT, and representatives from the clinical specialties, clinical governance and senior management, convened to guide safe and appropriate transfusion practice.
HTL	Hospital Transfusion Laboratory	Laboratory within a hospital dealing with blood component transfusion, usually a part of the pathology department.
HTLV	Human T-cell Lymphotropic Virus	A transfusion transmissible virus which can cause leukaemia. Anti-HTLV is one of the mandatory tests for blood donations.
HTR	Haemolytic Transfusion Reaction	A red cell antigen-antibody reaction due to transfusion of incompatible red blood cells; a SHOT reporting category.
HTT	Hospital Transfusion Team	The hospital based team with day to day responsibility for transfusion management and safety within hospitals. HTT includes a Haematology consultant with responsibility for blood transfusion, the TLM and the TP.
IBCT	Incorrect Blood Component Transfused	A SHOT reporting category.
IBGRL	International Blood Group Reference Laboratory	Part of NHSBT. A laboratory located at Filton to which complex blood grouping investigations are referred from all over the world.
IgG	Immunoglobulin G	The most abundant immunoglobulin, it is distributed equally between blood and interstitial fluid, and constitutes 75% of serum immunoglobulins in humans.
IOCS	Intra-operative Cell Salvage	A method of collecting, processing and preparing for reinfusion of blood (red cells) shed during surgery, done by machine under the control of an operator.
ISBT	International Society of Blood Transfusion	International scientific society for professionals in the field of blood transfusion.
ITS	Integrated Transfusion Service(s)	A programme of service developments led by NHSBT, to improve the way NHSBT work with hospitals. Involves 3 key elements – stock management, transfusion innovation (particularly RCI service), and NHSBT supply chain optimisation.
IUT	Intra-uterine Transfusion	A highly specialised procedure where a foetus is given a blood transfusion in utero via the umbilical cord to treat severe anaemia. The goal of this procedure is to prevent stillbirth due to anaemia, and prolong the pregnancy to a point where prematurity is no longer a significant risk.
JPAC	The Joint United Kingdom Blood Transfusion Services and National Institute of Biological Standards and Control (UKBTS/NIBSC) Professional Advisory Committee	Created in 1998 and formerly known as Joint UKBTS/NIBSC Executive Liaison Committee, but renamed in 2001. The committee provides advice and sets standards for the four UK Transfusion Services.
LD	Leucodepletion (or Leucodepleted)	The process of removing white cells from blood donations/components, by filtration, to a level below 5 million white cells per component pack.
MHRA	Medicines and Healthcare	A DH body responsible for the licensing of medical

	products Regulatory Agency	devices and pharmaceuticals. MHRA is the competent authority for the BSQR 2005.
M(S)BOS	Maximum (Surgical) Blood Order Schedule	A tariff agreed within a hospital/Trust for the standard number of units of blood requested for each type of surgical procedure.
NATA	Network for Advancement of Transfusion Alternatives	International network of transfusion professionals dedicated to helping their peers learn more about recent advances in blood conservation and transfusion alternatives.
NHSBT	NHS Blood and Transplant	An Arms length body of the NHS responsible for collecting, processing, storing and issuing blood components, and the transplantation of Tissues and Organs

19. Website Index

19.1 Transfusion

<http://www.aabb.org> - American Association of Blood Banks

<https://www.bbts.org.uk/> – British Blood Transfusion Society

<http://www.bcshguidelines.com> - British Committee for Standards in Haematology

<http://www.legislation.gov.uk/ukxi/2005/50/contents/made>- Blood Safety and Quality Regulations (BSQR)

<http://www.bloodstocks.co.uk> - Blood Stocks Management Scheme

http://nobelprize.org/educational_games/medicine/landsteiner/ - The Blood Typing Game on the Nobel Prize website:

<https://www.gov.uk/search?q=blood&tab=government-results> Department of Health issues on blood

<https://hospital.nhsbtleaflets.co.uk/>– Education materials and Patient Information Leaflets (ordering site)

<http://hospital.blood.co.uk> - Hospitals & Science Website, NHSBT

<http://www.isbt-web.org> – International Society of Blood Transfusion

<http://www.giveblood.ie/> - Irish Blood Transfusion Service

<http://www.transfusionsguidelines.org.uk/> - UK Blood Transfusion & Tissue Transplantation Guidelines (JPAC), including National Blood Transfusion Committee and Regional Transfusion Committees information, Transfusion Practice Toolkit, NPSA Safer Practice Notice 14 Toolkit

<http://www.learnbloodtransfusion.org.uk> – Learn Blood Transfusion on learnPro

<http://www.e-lfh.org.uk/projects/blood-transfusion/> - Learn Blood Transfusion on e-Learning for Healthcare

<http://www.mhra.gov.uk> - Medicines and Healthcare products Regulatory Agency

<http://www.nba.gov.au> – Nation Blood Authority Australia

<http://www.blood.co.uk> – NHS Blood and Transplant, NHSBT

<http://www.npsa.nhs.uk> - National Patient Safety Agency

<http://www.nataonline.com> - Network for Advancement of Transfusion Alternatives

<http://www.nhsla.com> - NHS Litigation Authority

<http://www.nibts.org/> - Northern Irish Blood Transfusion Service

<https://www.gov.uk/government/policy-advisory-groups/advisory-committee-on-the-safety-of-blood-tissues-and-organs>- Advisory Committee on the Safety of Blood, Tissues and Organs (SaBTO)

<http://www.scotblood.co.uk> - Scottish National Blood Transfusion Service (SNBTS)

<http://www.shotuk.org> - Serious Hazards of Transfusion

<http://www.welsh-blood.org.uk> – Welsh Blood Service

19.2 General

<http://www.aagbi.org> – The Association of Anaesthetists of Great Britain and Ireland

<http://www.b-s-h.org.uk> – British Society for Haematology

<http://www.cqc.org.uk/> - Care Quality Commission

<http://www.clinicalaudittools.com/> - Clinical Audit Support Centre

<http://www.cpa-uk.co.uk> - Clinical Pathology Accreditation (Ltd) UK

<http://www.dh.gov.uk> - Department of Health

<http://www.hpc-uk.org/> - Health and Care Professions Council

<http://www.hpa.org.uk> - Public Health England

<http://www.hqip.org.uk> - Healthcare Quality Improvement Partnership

<http://www.ibms.org> – Institute of Biomedical Scientists

<http://www.nice.org.uk> - National Institute for Health and Care Excellence

<http://www.nhs.uk> - NHS Choices website

<http://www.england.nhs.uk/> - NHS England

<https://www.evidence.nhs.uk/nhs-evidence-content/journals-and-databases> - NHS Health information Resources

<http://www.rdforum.nhs.uk> – NHS Research and Development Forum

<http://www.nmc-uk.org> – Nursing & Midwifery Council

<http://www.nrls.npsa.nhs.uk/> - Patient safety website

<http://www.pre-op.org> - The Preoperative Association

<http://www.ncbi.nlm.nih.gov/entrez> - Pub Med National Library of Medicine

<http://www.radcliffe-oxford.com/> - Radcliffe Medical Press

<http://www.rcn.org.uk> – Royal College of Nursing

<http://www.skillsforhealth.org.uk> - Skills for Health (competencies)

<http://www.transfusionevidencelibrary.com/> - Transfusion Evidence Library

<http://www.watchtower.org> - Jehovah's Witnesses site

<http://www.who.int/en> - World Health Organisation

20. Recommended Reading List

This reading list is not exhaustive.

Contreras M (Ed.) (2009) ABC of Transfusion, 4th Edition, John Wiley and Sons
ISBN 9781405156462

Craig J V and Smith R L (Eds.) (2011) The Evidence-Based Practice Manual for Nurses, 3rd Edition Elsevier Health Sciences
ISBN: 0702041939

Department of Health (2007) Better Blood Transfusion: Safe and Appropriate use of blood, Health Service Circular 2007/001

Gammon H M et al. (2011) Developing performance measures for patient blood management, Transfusion 2011 Vol 51 2500-25098

Ker K, et al (2012) Effect of tranexamic acid on surgical bleeding: systematic review and cumulative meta-analysis. Clinical Trials Unit, London School of Hygiene and Tropical Medicine. BMJ 2012; 344:e3054 1-13 available at: <http://www.bmj.com/content/344/bmj.e3054.pdf%2Bhtml>

Goodnough L et al (2013) Concepts of blood transfusion in adults. Lancet. May25;381:1845-54.

Learoyd P et al (2009) An Introduction to Blood Transfusion Science and Blood Bank Practice, 5th Edition, British Blood Transfusion Society
ISBN 978-0-9512691-5-2

McClelland DBL (Ed.) (2013) Handbook of Transfusion Medicine, 5th Edition, The Stationery Office
www.tsoshop.co.uk
ISBN: 9780117068469

Murphy MF and Pamphilon DH (Eds.) (2013) Practical Transfusion Medicine 4th Edition, Blackwell Science Ltd.
ISBN 978-0470670514

Murphy M et al (2013) Transfusing blood safely and appropriately. BMJ 2013;347:f4303 1-12

NBTC (2014) Patient Blood Management An evidence-based approach to patient care
<http://www.transfusionguidelines.org.uk/uk-transfusion-committees/national-blood-transfusion-committee/patient-blood-management>

SHOT (2014) Annual Report 2013, Serious Hazards of Transfusion Steering Group, ISBN 978-0-9558648-6-5
Report, Summary and Supplement 2013 - Serious Hazards of Transfusion

Thomas D, Thompson J and Ridler B (Eds) (2005) A Manual for Blood Conservation, tfm publishing
ISBN 1-903378-24-9