

**blood matters**  
*better safer transfusion program*

# Handbook for Transfusion Practitioners 2010



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This document is also available in PDF format on the Internet at [www.health.vic.gov.au/bloodmatters](http://www.health.vic.gov.au/bloodmatters)

Published by the Quality, Safety and Patient Experience Branch, Hospital and Health Service Performance Division, Victorian Government Department of Health, Melbourne, Victoria

February 2010

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Printed by Impact Digital, 306 Albert Street, Brunswick

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## Preface

The Blood Matters program (initially BeST – Better Safer Transfusion program) and its advisory committee aims to improve the outcomes in patients requiring blood product transfusion in Victorian hospitals, by enhancing the safety and appropriateness of blood and blood product use.

The Blood Matters program aims to:

- raise awareness and increase knowledge of transfusion practice
- monitor and evaluate current practice against guidelines for the prescribing and administering of blood products
- record and analyse data about incidents, including adverse events and near misses, to inform policy and procedure development.

Blood management and transfusion medicine has evolved into a complex practice supported by governing structures and transfusion specialists and although there is a great deal of information, the evidence base for much of transfusion practice still remains poor.

This handbook is meant to act as a guide for practitioners navigating the world of transfusion practice in Australia.

This first edition of the handbook has been developed for new and developing transfusion nurses, blood bank scientists and interested clinical staff in transfusion and blood management roles.

The information in this document was accurate at the time of printing and will be updated periodically.

## Acknowledgment

The handbook has been produced by the Blood Matters program secretariat, transfusion nurses of Victoria, Tasmania, Australian Capital Territory (ACT) and Northern Territory and the transfusion clinical governance working group. We would like to acknowledge the individuals who have assisted with this production.



## Abbreviations and acronyms

<b>The Blood Service</b>	Australian Red Cross Blood Service
<b>AABB</b>	American Association of Blood Banks
<b>ABO</b>	ABO blood group system
<b>ACHS</b>	Australian Council Healthcare Standards
<b>ACT</b>	Australian Capital Territory
<b>AHMAC</b>	Australian Health Ministers Advisory Council
<b>ANZSBT</b>	Australian and New Zealand Society of Blood Transfusion
<b>AS</b>	Australian Standard
<b>ATR</b>	Acute Transfusion Reaction
<b>AUS Spot</b>	Australian Specialist Practitioner of Transfusion
<b>BeST</b>	Better Safer Transfusion Program
<b>BMAC</b>	Blood Matters Advisory Committee
<b>CMV</b>	Cytomegalovirus
<b>DAT</b>	Direct Antiglobulin Test
<b>DHS</b>	Department of Human Services
<b>DTR</b>	Delayed Transfusion Reaction
<b>EQuIP</b>	Evaluation and Quality Improvement program
<b>FFP</b>	Fresh Frozen Plasma
<b>Hb</b>	Haemoglobin
<b>HTC</b>	Hospital Transfusion Committee
<b>HTR</b>	Haemolytic Transfusion Reaction
<b>IBCT</b>	Incorrect Blood Component Transfused
<b>IHI</b>	Institute for Healthcare Improvement
<b>ISBT</b>	International Society for Blood Transfusion
<b>IVIg</b>	Intravenous Immunoglobulin
<b>NATA</b>	National Association of Testing Authorities
<b>NBA</b>	National Blood Authority
<b>NBSCP</b>	National Blood Supply Contingency Plan
<b>NBTC</b>	National Blood Transfusion Committee
<b>NHMRC</b>	National Health and Medical Research Council
<b>NHTR</b>	Non-Haemolytic Febrile Transfusion Reaction
<b>PTP</b>	Post-Transfusion Purpura
<b>Rh</b>	Rhesus blood group
<b>SABM</b>	Society for the Advancement of Blood Management
<b>SHOT</b>	Serious Hazards of Transfusion (UK)

<b>STIR</b>	Serious Transfusion Incident Report
<b>TACO</b>	Transfusion-Associated Circulatory Overload
<b>TA-GVHD</b>	Transfusion-Associated Graft Versus Host Disease
<b>TGA</b>	Therapeutic Goods Administration
<b>TN</b>	Transfusion Nurse
<b>TRALI</b>	Transfusion-Related Acute Lung Injury
<b>TT</b>	Transfusion Team
<b>TTI</b>	Transfusion-Transmitted Infections
<b>TTP</b>	Thrombotic Thrombocytopenic Purpura
<b>VHIMS</b>	Victorian Health Incident Management System
<b>WBIT</b>	Wrong Blood In Tube

This list is a starting point for the abbreviations and acronyms used in transfusion, feel free to copy the list and add your own as you find them. You can then provide that information for the next revised edition of the handbook.

# Blood Matters program

## History

The Blood Matters project commenced in April 2002 with the formation of a consortium composed of the then Victorian Department of Human Services, Peter MacCallum Cancer Institute, The Royal Melbourne Hospital and The Australian Red Cross Blood (the Blood Service). This consortium developed and tested tools and processes to improve transfusion practice in hospitals.

The Blood Matters project was expanded in 2003 to include an additional 12 public hospitals in a Blood Matters Breakthrough Collaborative project; a project methodology developed by the Institute for Healthcare Improvement (IHI) in the United States. These hospitals further tested and developed transfusion interventions over an 18-month period.

The interventions included:

- improving clinician and patient awareness and knowledge of blood product use
- improving clinical decision making
- enhancing the blood administration process by making all successful practical improvement strategies available to other hospitals in Victoria and Tasmania.

As part of the Blood Matters project, the transfusion nurse role was established in hospitals. To support those in the role, The Blood Matters Consortium project developed a postgraduate Certificate in Transfusion Practice.

## Current

The Better Safer Transfusion program (BeST) was established in 2004 and changed its name back to the Blood Matters Program in 2007. A joint initiative of the Quality, Safety and Patient Experience Branch of the Department of Health, Victoria and The Blood Service, the quality improvement program is advised by a multidisciplinary departmental advisory committee. It is supported by a secretariat including a program manager, data and information manager, a transfusion nurse and an education coordinator. The program is structured so expert working parties focus on specific target areas, to determine strategies for improving transfusion practice.

Its aim is to improve the safety and appropriate use of blood and blood products in hospitals. Tasmania, the ACT and the Northern Territory are regular collaborators on this Victorian initiative.

## Postgraduate certificate in transfusion practice

This is an online course administered by The University of Melbourne School of Nursing, and is coordinated by the Melbourne Consulting and Custom Programs. The course is delivered under the auspice of the Blood Matters program and is currently offered part-time (two subjects per semester).

It consists of four subjects:

### Semester one

- Fundamentals in Transfusion Practice
- Quality within Transfusion Practice

### Semester two

- Advanced Concepts in Transfusion Practice
- Transfusion Specialty Practice (Clinical Practice Portfolio)

## Transfusion governance

Clinical governance is a vital leadership issue that is increasingly accepted as an approach to enhancing quality and safety in health care.

The Australian Council on Healthcare Standards (2004) states that clinical governance is ‘the system by which the governing body, managers, clinicians and staff share responsibility and accountability for the quality of care, continuously improving, minimising risks, and fostering an environment of excellence in care for consumers/patients/residents’.

*Transfusion governance is part of the overall approach to clinical governance in a health care organisation.*

‘Transfusion quality management should form part of a hospital’s quality framework and governance arrangements. The National Health and Medical Research Council and Australian and New Zealand Society of Blood Transfusion guidelines (2001) specifically mention the need for clinical review, whether this be through an existing committee or through the establishment of a specific clinical/management group. The ‘transfusion committees’ should be multidisciplinary (note that in larger organisations a separate committee may be formed, whereas in smaller organisations the work may be undertaken by a medical advisory group)<sup>1</sup>.

## Hospital transfusion committee (HTC)

A hospital transfusion committee helps, directs and approves work to be completed by the transfusion team and transfusion nurse and is vital to the effectiveness of the transfusion nurse.

Terms of reference for such a committee are available at: [www.health.vic.gov.au/best/news/policy.htm](http://www.health.vic.gov.au/best/news/policy.htm)

The transfusion committee should have:

- clear reporting requirements and processes
- influential multidisciplinary members who attend meetings
- be able to collect information on transfusion practice, analyse it and respond to this information.

Reporting by the transfusion committee should be:

- through the hospital/health services’ quality improvement, risk and/or clinical governance structure to the board
- back to the transfusion end users, including all staff involved in the transfusion process.

## Transfusion team

The ‘team’ expedites work determined by the committee and responds to transfusion issues that arise between committee meetings, and therefore needs to have membership with relevant expertise.

The team may include a transfusion nurse, transfusion scientist, transfusion registrar, medical champion and quality/risk representative.

<sup>1</sup> Botting, K 2010, ‘Clinical Governance’, Transfusion Practice Graduate Certificate course notes, University of Melbourne, p.2 and p.6.

- The medical champion may vary depending on the work areas of the transfusion team and committee, for example: a cardiac anaesthetist for cardiac-related work, an intensivist or a haematologist. Ideally the medical champion has a full-time role in the organisation for continuity.
- The quality/risk management representative may be the quality or risk management coordinator. They are a valued member because they have an understanding of systems in their organisation and how to achieve hospital-wide change in practice. This knowledge is important for transfusion improvement activities and to ensure the HTC is embedded and visible within the quality systems of the organisation.

The team should meet at regular intervals, however work should proceed between meetings and this may be more as a 'virtual' team; collaborating and communicating as a single entity on the directions set by the transfusion committee or on issues arising between committee meetings. The transfusion nurse may have a major coordination role for this team, if it is not taken up by a senior manager in the organisation.

### How does the HTC/TT/TN model work across health services of varying size and complexity?

1. Regional and large to medium-sized metropolitan health services are likely to have access to the expertise required for an effective HTC and TT and most have a TN; therefore the model of HTC/TT/TN described above applies.
2. Rural or small metropolitan health services may not have access to the expertise available in larger, metropolitan sites; therefore the model should be varied so that the outputs of the HTC/TT/TN still occur. Suggestions include:
  - in lieu of a HTC, hospital transfusion governance oversight may occur by adding transfusion as an agenda item on an existing clinical governance committee such as a clinical review, risk management or infection control committee. A TT should be formed, however it may only consist of two people with regular contact that ensures the direction and objectives set by the HTC or equivalent, are implemented.
  - Important individuals may be: educators or/and those in quality/risk roles.
  - Access to a transfusion nurse on site may be absent or limited. Other sources of specialist advice include:
    - Australian Red Cross Blood Service. The Transfusion Medicine Service at The Blood Service has scientific, medical and transfusion nurses available to provide education and advice on request and has an online library resource at [www.transfusion.com.au/home.aspx](http://www.transfusion.com.au/home.aspx)
    - Blood Matters program of the Department of Health. The website at [www.health.vic.gov.au/best/](http://www.health.vic.gov.au/best/) is an online library of resources such as examples of policy and procedures, reports, audits and other useful tools such as orientation educational materials.
  - the TN at larger metropolitan sites or regional sites.

## How to start a hospital transfusion committee:

The following sections 'How to start a hospital transfusion committee' and 'The National Blood Transfusion Committee' have been extracted from the Blood Service website<[www.transfusion.com.au/Transfusion-Committees.asp](http://www.transfusion.com.au/Transfusion-Committees.asp)> extracted March 2010.

### Multidisciplinary motivation is required, therefore:

- meet with the heads of surgery, medicine, anaesthetics, haematology, oncology, emergency/ICU, O&G, nursing and transfusion laboratory to motivate and recruit members
- report some examples of difficult cases to your hospital executive to gain their support and make them aware of risk management issues for the organisation
- set a date and have a clear initial agenda
- deal with a topical issue first.

### Define role and terms of reference – always ask: What do you want to achieve?

Primary role of the HTC is usually to:

- provide an active forum to facilitate communication between those involved with transfusion
- recommend or perform practice audits
- monitor transfusion practice compared to institutional, national or international benchmarks
- provide education to effect change in practice.

### Membership of the HTC should include:

Institutional representatives such as:

- clinicians: surgery, medicine, paediatrics, haematology, oncology, orthopaedics, O&G, anaesthesia, emergency, ICU
- executive management
- clinical risk management/quality assurance
- blood bank (scientist in charge)
- nursing
- other relevant departments such as pharmacy.

External representatives such as:

- Australian Red Cross Blood Service Transfusion Medicine member
- Invited or ad hoc members
- Health Department.

The initial chair is the most motivated member – You! Define ongoing chair at your first meeting.

**Activities of the HTC should involve:**

- goal setting and when setting these goals, always define achievable goals and break a big problem into smaller components before choosing where to start
- reporting and follow up of adverse reactions to transfusion
- disseminating and implementing national policies and guidelines
- developing and reviewing institutional transfusion policies and systems, for example: patient and sample identification
- identifying staff training requirements in clinical and laboratory transfusion practice
- developing local educational and training materials as required
- collecting and monitoring blood ordering practices, use and wastage statistics, errors and incidents
- practice audits OR implementing general education which will help raise the profile of the committee while providing an excellent service for the hospital
- having the above activities as regular agenda items for meetings

**Meeting frequency suggestions:**

- frequently enough to get things done, often quarterly
- pick the best time to suit the majority of the members

**Other tips:**

- executive commitment and active involvement is important
- short and informative presentations on topical issues help maintain interest and currency in transfusion practice
- HTC members have their own networks to assist information exchange - use them
- get secretarial support
- prompt turnaround of minutes helps motivation of members
- consider providing food - attendance is always better!
- enjoy it!

**National Blood Transfusion Committee (NBTC)**

The objectives of the NBTC are to:

- promote high-quality, safe and appropriate transfusion practices
- provide a forum whereby the clinical views on key transfusion issues can be voiced
- inform decision making within the blood sector as required
- provide feedback and recommendations in relation to The Blood Service's service delivery.

The NBTC meets on a bi-monthly basis, including an annual one day face-to-face meeting. To obtain further information regarding any of the issues discussed or to forward an issue to the committee for consideration, please contact your local state or territory representative or a member of The Blood Service Transfusion Medicine Services team in your local jurisdiction.



# The Blood Service

## Blood donation

The Australian Red Cross Blood Service (the Blood Service) collects over a million donations annually from around 500,000 donors. It attracts and retains donors through regular advertising and marketing campaigns. The Blood Service also provides advice, information and education about blood products and practices to clinicians and health professionals, through its transfusion medicine services (TMS). Further information is available at [www.transfusion.com.au](http://www.transfusion.com.au)

The Blood Service was established as a national organisation in 1996: but its history dates back to 1929 through various state and territory Red Cross transfusion services. Since 2005–06, The Blood Service has been fully funded by the governments of Australia, with the Australian Federal Government contributing 63 per cent of funding and the eight state/territory governments contributing the remaining 37 per cent on a proportional basis.

In Australia, blood and its components are collected at fixed and mobile collection centres in accordance with recommendations from the World Health Organization (WHO), the International Society of Blood Transfusion (ISBT) and the International Federation of Red Cross and Red Crescent Societies. Donations are made voluntarily and are non-remunerated.

The Blood Service works alongside Australian regulators, government departments and commercial and professional organisations, as well as international bodies, to constantly review and improve the safety and provision of blood and blood components in Australia.

## Donors and blood donation

Donors are required to be aged between 16 and 70 years, weigh more than 45 kg and be fit and healthy, and at the time of donation, not be suffering from any illness. Donors are asked to complete a donor questionnaire prior to donating. This confidential form asks about health and lifestyle and whether they are eligible to donate blood on that day. Donors are interviewed by a trained member of staff, with the short interview including a health check, a haemoglobin check and blood pressure. This discussion takes place each time the donor donates, to check recent health and that nothing has altered since their last visit.

Approximately 470 mL whole blood is donated. For the majority this is around 10 per cent of their total blood volume and can be donated safely every 12 weeks. Total time taken to give this amount in a whole blood donation is around 10 minutes. Donors can specifically donate plasma and/or platelets; this is through apheresis donation and can occur every two to three weeks. Donating this way takes approximately an hour. Donor information is available at [www.donateblood.com.au](http://www.donateblood.com.au)

## Testing

Each time blood is donated samples are taken for testing. The Blood Service tests the donation for ABO group, Rh groups and red cell antibodies. All donations are also tested for five transfusion-transmissible infectious diseases. These are:

- HIV/AIDS
- hepatitis B
- hepatitis C
- Human T-cell Lymphotropic Virus- HTLV
- Syphilis.

Specifically, blood donations are tested for the hepatitis B surface antigen, antibody to hepatitis C, antibody to both HIV-1 and HIV-2, antibody to HTLV types I and II and antibodies to syphilis.

All donations are tested for HIV-1 and hepatitis C RNA using Nucleic Acid Testing (NAT). This process is different from traditional testing because it looks for the actual presence of viruses, in this case HIV and HCV. Most other tests detect the presence of antibodies, which are the body's response to an infection and which take time to develop. NAT provides an opportunity to further improve the safety of the blood supply by reducing the 'window period', which is the time between exposure to a virus to the time current tests are able to detect antibodies to the virus. NAT for HBV is being introduced in mid-2010.

The Blood Service also performs a test for malaria on donations from donors who have reported residence in, or travel to, an area with malaria. Other tests such as CMV antibodies are performed on some donations.

## Test results

The Blood Service notifies its donors of any abnormal results on infectious disease and red cell antibody screening once testing is completed. The donor is advised about the health implications of the positive tests. As with all information held by the Australian Red Cross Blood Service, the information is confidential and released only to the donor and agencies, such as the Department of Health, as required by law.

## Transfusion facts

### Blood types

Blood type is jointly inherited from your parents. A combination of genes determines the presence or absence of substances called antigens, on the surface of all your red blood cells. These antigens are capable of stimulating an immune response.

In 1901, an Austrian scientist, Karl Landsteiner, found that reactions between these antigens and other substances in plasma, called antibodies, sometimes caused the red blood cells to clump together (agglutinate) resulting in adverse reactions in transfusion recipients. After further experiments, he found four blood groups based on the presence or absence of two specific antigens which we now know as A and B.

This discovery paved the way for a system of blood grouping called the ABO system.

In 1939 and 1940, research involving rhesus monkeys identified another grouping factor that is called the Rhesus factor: Rh factor or D antigen. People, regardless of their ABO blood group, who were found to have a D antigen present were grouped as Rh positive and those without the D antigen were grouped as Rh negative. The Rhesus group is indicated by a '+' (Rh positive) or '-' (Rh negative) after a person's ABO type; for example: A+ or O-. All these groups are genetically based. People who are Rh negative may develop an antibody (called anti-D) if they are exposed to the D antigen during pregnancy or a blood transfusion.

Further information on this topic can be found at the Blood Service website [www.transfusion.com.au](http://www.transfusion.com.au) or any of the recommended texts.

### Are they compatible?

For safe transfusion practice compatible blood must be given. When a transfusion is given, it is preferable that patients receive blood of the same ABO and Rh (D) group, however in an emergency, if the required red cell blood group is unavailable, a patient may be given other red cell groups as shown below. Rh D positive patients may safely receive Rh D negative blood. In exceptional circumstances Rh D negative patients may need to receive Rh D positive red cells. Further information on compatibility with plasma and platelets is available through the Blood Service website [www.transfusion.com.au](http://www.transfusion.com.au)

		Donor's Blood Type							
		O-	O+	B-	B+	A-	A+	AB-	AB+
Patient's Blood Type	AB+	✓	✓	✓	✓	✓	✓	✓	✓
	AB-	✓		✓		✓		✓	
	A+	✓	✓			✓	✓		
	A-	✓				✓			
	B+	✓	✓	✓	✓				
	B-	✓		✓					
	O+	✓	✓						
	O-	✓							

If incompatible red cells are transfused, these cells are attacked and destroyed by the antibodies in the patient's plasma. This causes intravascular haemolysis, which can cause acute renal failure and disseminated intravascular coagulation. This reaction can be fatal. Even a few millilitres of incompatible blood can result in a serious reaction.

## Blood products

### Fresh components

There are two very useful resources available that provide information on all fresh blood products and any modifications to these products:

1. Australian Red Cross Blood Service-Blood Component Information – an Australian Red Cross Blood Service (The Blood Service) document, which is updated annually and available at [www.transfusion.com.au/Resources.aspx](http://www.transfusion.com.au/Resources.aspx)
2. BloodSafe (South Australia) Flippin' Blood- another Blood Service flip chart document which is available at <http://www.health.sa.gov.au/bloodsafe/Portals/0/flippn'bloodchartSept06.pdf> or [www.transfusion.com.au/Resources.aspx](http://www.transfusion.com.au/Resources.aspx)

Check with your local Australian Red Cross Blood Service transfusion medicine team for hard copies of these references.

### Leucocyte depletion

In December 2008, Australia introduced 100 per cent pre-storage leucocyte depletion for both red cells and platelets at the time of component production. Prior to this, some jurisdictions already had routine leucocyte depletion of platelets, and in some states red cells also.

Advantages of pre-storage leucocyte depletion include:

- fewer filtration failures when performed in the laboratory setting as compared to leucocyte filtration performed at the bedside.
- An increased ease in performing quality checks and comprehensive quality assurance programs in the pre-storage setting.

### Fractionated plasma products

CSL Bioplasma has been Australia's national fractionator of plasma-derived therapeutics since 1952 and is regulated by the Therapeutic Goods Administration (TGA). Plasma is provided by the Blood service from voluntary Australian donations to produce high-quality plasma-derived therapeutics. These have been developed to treat serious medical conditions including: immunodeficiency disorders, a range of haematological and neurological disorders, haemophilia, haemolytic disease of the newborn and trauma. A range of products is also available to provide protection against infectious diseases including: hepatitis B, tetanus, chickenpox and cytomegalovirus.

Albumex® 4%	Used when the blood volume is low, during heart-lung bypass surgery and in plasma exchange
Albumex® 20%	Used when quantity of albumin in blood is low, for resuscitation in shock, in extensive burns, respiratory distress syndrome, blood purification and plasma exchange
Biostat®	Used for patients with haemophilia A, in which there are reduced levels of factor VIII and for von Willebrand disease
Intragam®P	Used to replace antibodies to help prevent infections and to treat some autoimmune disorders
Sandoglobulin® NF Liquid	Used to replace antibodies to help prevent infections and to treat some autoimmune disorders

Prothrombinex®-VF	Used for the prevention and treatment of bleeding in patients with reduced levels of factor IX, II or X.
MonoFIX®-VF	Used in patients with haemophilia B, in which there are reduced levels of Factor IX
Rh(D)Immunoglobulin-VF	Used to prevent haemolytic disease of the newborn
Hepatitis B Immunoglobulin-VF	Used to help prevent hepatitis B infection in a person who comes into contact with suspected infected material
CMV Immunoglobulin-VF	Used to help prevent cytomegalovirus infection in specific transplant patients
Normal Immunoglobulin-VF	Used to replace antibodies to help prevent infections
Tetanus Immunoglobulin-VF IM	Used to help prevent tetanus in a person who has not recently been immunised against tetanus
Tetanus Immunoglobulin-VF IV	Used to treat tetanus infection
Zoster Immunoglobulin-VF	Used to help prevent chickenpox and shingles
Thrombotrol®-VF	Used to treat patients with conditions relating to an inherited deficiency of antithrombin III

Further information on these products, including prescribing information and consumer information is available at: [www.csl.com.au/s1/cs/auhq/1182280826145/content/1182280826258/home.htm](http://www.csl.com.au/s1/cs/auhq/1182280826145/content/1182280826258/home.htm) [accessed 23/01/2009]

The growth in demand for IVIg requires it to be reserved for use in those with the greatest need. In 2008 new criteria for access to IVIg funded under the National Blood Agreement were developed and endorsed by the Australian Health Ministers Advisory Council for use by clinicians. Nationally there are two funded IVIg products currently available, CSL – Intragam P and Octapharma – Octagam, both approved by the TGA for therapeutic use. If a patient's condition is outside the current criteria it may be possible to access product using the Direct Order process. Information about IVIg products and funding arrangements is available at [www.nba.gov.au](http://www.nba.gov.au) and [www.transfusion.com.au](http://www.transfusion.com.au) and also at the websites of the pharmaceutical companies [www.csl.com.au](http://www.csl.com.au) and [www.octapharma.com](http://www.octapharma.com)

## Synthetic blood clotting factors

Synthetic blood clotting factors are also manufactured by Baxter Healthcare, Wyeth and NovoNordisk. Information for these companies is available at [http://www.novonordisk.com.au/documents/home\\_page/document/index.asp](http://www.novonordisk.com.au/documents/home_page/document/index.asp), <http://www.wyeth.com.au/> and <http://www.baxterhealthcare.com.au/>.

# Blood management

## Patient blood management

Patient blood management encompasses a holistic approach to the use of blood products for each individual patient; using the premise of 'why transfuse' rather than 'why not'. It focuses on the need to carefully balance benefits and potential harm. Transfusion avoidance or minimisation stems from the belief that blood and its components are biological products, the effects of which are not fully understood, and have the potential for unwanted consequences.

Patient blood management has the patient at its centre, with careful attention to detail and the aim of 'better treatment outcomes' for the patient. Care aims to maximise haemoglobin (pre-operatively, intra-operatively and post-operatively); minimise blood loss (including blood taking) and to use alternatives to blood transfusion where these are available and feasible.

## Cell salvage

Intraoperative cell salvage was introduced in the 1970s with widespread use in cardiac, trauma, vascular and orthopaedic surgery. Blood loss during surgery is collected and washed by a cell saver. Once processed, the blood is transfused back into the patient over a given period of time, which can be no greater than six hours.

Postoperative cell salvage involves the collection of blood from surgical drains followed by reinfusion with or without a wash cycle. There are several cell salvage devices available in Australia. Talk to your anaesthetic and/or orthopaedic departments to ascertain if they are using a postoperative cell salvage device.

The UK Better Blood Transfusion program has a cell salvage learning program, in which all of the above blood management processes are fully explained.

Visit [www.transfusionguidelines.org.uk/lcs/index.htm](http://www.transfusionguidelines.org.uk/lcs/index.htm)

### Other areas of blood management include:

- Informing and involving the patient is key to blood management. 'Blood Management - Every drop of blood counts' is available through the Blood Matters website transfusion tools section. <http://www.health.vic.gov.au/best/tools/management.htm>
- the use of haemostatic agents to reduce blood loss, for example: tranexamic acid
- The use of autologous blood can be very useful with patients with rare blood groups or multiple antibodies.
- agents to enhance blood production prior to surgery, for example: administration of iron infusions or erythropoietin
- anaesthetic techniques to reduce blood loss including acute normovolaemic dilution.



# Consent

## Introduction

Patients have a choice about whether or not to undergo a proposed procedure or treatment, including transfusion of blood and blood products. The purpose of the consent statement is to ensure: patients are provided with enough information about the transfusion care they may receive to enable them to make informed decisions; and that this approach is promoted and facilitated in Victorian health services.

This document is to be read in conjunction with the health service's consent policy which should cover general consent for medical treatments including processes for consent in competent, non-competent patients, patients from non-English speaking backgrounds, children and the role of medical and nursing staff

## Important points

- Prior to undertaking any non-emergency transfusion on any patient a valid and informed consent process is conducted and documented.
- Emergency procedures will be undertaken in compliance with the *Guardianship and Administration Act 1986*.
- Appropriate substitute consent will be taken when patients cannot consent for themselves.
- The treating medical practitioner is responsible for obtaining consent.
- In the case of a Jehovah's Witness or any other refusal of treatment, in either adults or children, refer to the health service's policy and procedures and seek Jehovah's Witness liaison support either from the hospital, the Australian Red Cross Blood Service or the Office of the Public Advocate.

## Important points to cover when obtaining informed consent

The following section 'Important points to cover when obtaining informed consent has been extracted from the Blood Service website<[www.transfusion.com.au/Consent-and-Risk.aspx](http://www.transfusion.com.au/Consent-and-Risk.aspx)> extracted 19/02/2010

### Explain:

- the cause/likelihood of bleeding or the low blood count for which transfusion is being considered
- the nature of the proposed transfusion therapy—what is involved
- the benefits expected
- the risks—including both common and rare but serious
- the alternatives including the risk of doing nothing.

### Ask:

- Is there anything else you would like to know?
- Is there anything you do not understand?

### Provide:

- an interpreter for non-English speaking patients
- written information.

**Document:**

- documentation is an essential part of the informed consent process. Consent should be documented either in the medical record (the amount of recording necessary depends on the circumstances of consent) or on a consent form.

### Consumer information on consent for transfusion

The following consumer brochures can be downloaded from the Blood Matters website: (printed copies of the two Blood Matters' brochures are available from the Blood Matters program secretariat)

- Blood Matters program – Blood Transfusion: Have all of your questions been answered? – August 2007
- Blood Matters program – Frequently asked questions by consumers regarding blood transfusion – April 2005
- NHMRC/ANZSBT Blood who needs it? English – (October 2001), also available in Arabic, Greek, Italian, Spanish, Turkish and Vietnamese

Blood Watch (NSW) has also produced consumer brochures in Chinese, Croatian, Korean, Farsi, Indonesian and Sinhalese, available at:

[www.transfusion.com.au/Consent-and-Risk/Consent-Checklist—Multicultural.aspx](http://www.transfusion.com.au/Consent-and-Risk/Consent-Checklist—Multicultural.aspx)

Bloodsafe (SA) has consumer information in regards to iron for anaemia and a quick reference guide for informed consent.

<http://www.health.sa.gov.au/bloodsafe/Default.aspx?tabid=70>

The Blood Service Transfusion Medicine Service has produced a comic and sticker book for children and information for parents available at:

[www.transfusion.com.au/Consent-and-Risk/Paediatric-Patient-Information.aspx](http://www.transfusion.com.au/Consent-and-Risk/Paediatric-Patient-Information.aspx)

### Other information sources

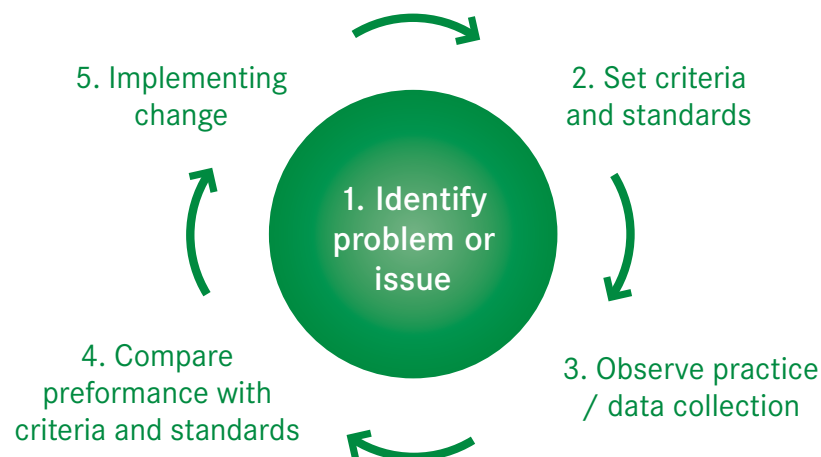
The National Health and Medical Research Council and Australian and New Zealand Society of Blood Transfusion 2001, *Clinical practice guidelines on the use of blood components*, NHMRC, Canberra, viewed 8 April 2008, <[www.nhmrc.gov.au/publications/synopses/cp77syn.htm](http://www.nhmrc.gov.au/publications/synopses/cp77syn.htm)>.

Department of Human Services 2003, *Final report on survey findings July 2003: Blood Matters Breakthrough Collaboration Consumer Study*, Department of Human Services, Victoria, Australia.

## Clinical audit

The clinical audit process seeks to: identify areas for practice improvement; develop and carry out action plans to rectify or improve care; and then re-audit to ensure that these changes have the desired effect. The clinical audits conducted by the Blood Matters program compare current transfusion practices with clinical best practice guidelines. If any areas for improvement are identified, practices are examined and modified where necessary.

### Clinical audit cycle



Source: RPD – Research and professional development <[www.rpd-research.org.uk/](http://www.rpd-research.org.uk/)> [accessed 23/01/2009]

The Blood Matters program works with hospitals to assess whether blood and blood products are used appropriately and effectively. Where clinically appropriate, alternative blood management strategies are implemented to limit the need for transfusion.

Clinical audits are a targeted area of the Blood matters program and the clinical area and time frame is set by a working group within the program. The audits will collect data on individual transfusion episodes and the de-identified information is entered electronically on the Blood Matters website. A report is produced and feedback is given to the participating hospitals. The reports provide each hospital with their own data, which is benchmarked against the data from other participating hospitals. The reports can be used to develop unique hospital improvement plans.

Past audits, including information sheets and audit tools, are available on the transfusion audit page on the Blood Matters website. The tools are available to use for individual audit programs through the website.

These audits are only one part of the clinical audits involving transfusion that are undertaken at your health service. It is expected that there will be an ongoing audit program led by the hospital transfusion or quality committee. For example: auditing nursing practice with transfusion can assist in improving blood administration practice and can give focus to nurse education programs. Re-auditing will evaluate whether the changes and education implemented have had an impact.

## Tips for auditing

Auditing takes time

1. Collect only the essential data
2. Maintain and ensure patient confidentiality
3. Have clear objectives and aims
4. Identify stakeholders that may be affected by your audit and involve them in discussion
5. If required employ a team of people
6. Analyse and compare your audit against standards or guidelines
7. Make recommendations and develop a plan to implement those recommendations
8. Re-audit, once recommendations are in place, to assess improvements
9. Talk to your quality/clinical governance department, as they may have already conducted audits similar to those you are considering.

# Haemovigilance

## Risk management and haemovigilance

Haemovigilance is a 'set of surveillance procedures covering the whole transfusion chain (from the collection of blood and its components to the follow-up of recipients), intended to collect and assess information on unexpected or undesirable effects resulting from the therapeutic use of labile blood products, and to prevent their occurrence or recurrence'<sup>2</sup>.

## The Blood Matters' Serious Transfusion Incidents Reporting (STIR) system

The Blood Matters' (STIR) system is a central reporting system for serious adverse events involving the transfusion of fresh blood or blood products including near-miss incidents. STIR currently collects data on the following serious incidents: (see STIR guide for entire definition)

- Acute transfusion reaction (ATR)
- Delayed transfusion reaction (DTR)
- Transfusion-related acute lung injury (TRALI)
- Bacterial/other infection
- Transfusion-associated graft versus host disease (TA-GVHD)
- Post-transfusion purpura (PTP)
- Post-transfusion viral infection
- Incorrect blood component transfused (IBCT)
- Wrong blood in tube (WBIT)
- Near miss

The STIR system was piloted between July and October 2006 and has been live since 2007. Public and private hospitals from Victoria, Tasmania, ACT and Northern Territory participate in STIR. Serious hospital transfusion incidents, including near misses, have been captured and data has been collated, analysed and recommendations made to improve transfusion safety. *The Serious transfusion incident report for 2006-7* is available at [www.health.vic.gov.au/best/downloads/stir.pdf](http://www.health.vic.gov.au/best/downloads/stir.pdf) and future reports will be available there.

Confidentiality of data is fundamental to the success of this system. Each hospital is uniquely coded and no patient identifiers are requested, other than age and sex.

Your hospital may already be reporting to STIR. The haematologist or quality manager may have further information. If not, a guide is available through the Blood Matters website. Please contact the Blood Matters secretariat for further information about joining STIR.

Victoria has recently developed a statewide clinical incident dataset, under the Victorian Health Incident Management System (VHIMS) and is being rolled out in Victoria in 2010. Definitions for STIR events have been included in this dataset. Contact your risk manager or quality manager for your responsibilities in relation to blood and blood product incident reporting.

Further information on VHIMS and the sentinel event program can be found at the Clinical Risk Management website of the Victorian department of Health. <http://www.health.vic.gov.au/clinrisk/>

<sup>2</sup> International Haemovigilance Network <[www.ihn-org.net/portal.asp](http://www.ihn-org.net/portal.asp)> accessed 23/02/2010

## National Blood Authority (NBA) – National Haemovigilance Project

This project is developing the reporting and governance frameworks for a voluntary haemovigilance program for Australia. It will report on serious transfusion-related adverse events relating to fresh components occurring in public and private hospitals.

The primary aim of an Australian haemovigilance program is to improve transfusion safety and quality by collecting, analysing, and disseminating information on a common set of adverse events surrounding the transfusion of blood products. Trends will be identified over time and recommendations to improve transfusion outcomes, based on the data, will be developed.

The initial *Australian haemovigilance report* was released in February 2008. The report provides limited data on the types of adverse transfusion events that have been reported in some healthcare reporting systems over the past three to five years in Australia. It will also be used to assist development of a framework for the future Australian haemovigilance program.

Copies of this report can be ordered through the NBA website: [www.nba.gov.au](http://www.nba.gov.au)

# NBSCP

## National Blood Supply Contingency Plan (NBSCP)

The following section 'National Blood Supply Contingency Plan' is extracted from the National Blood Authority website <[www.nba.gov.au](http://www.nba.gov.au)>extracted March 2010.

The NBSCP is a document that outlines the risk-management approach taken to assessing the possible problems, governance arrangements and the broad overarching strategies in place to mitigate a supply or demand crisis. The plan also aims to improve awareness and ensure appropriate planning is in place for dealing with the impact of a blood crisis in the health sector.

This document is supported by a range of response annexes to guide key stakeholders in responding to a supply or demand crisis.

- Annex A Red blood cell response plan
- Annex B Plasma-derived and recombinant product response plan

The overarching response involves three levels of accountability:

1. National: covers the roles of national government bodies such as the NBA and the TGA, in gathering and communicating information between governments and suppliers and is the link to broader government emergency management arrangements.
2. Operational: covers the role of suppliers in managing required operational activities around collection, manufacture, distribution and interface with the clinical community.
3. Clinical: covers the role of clinicians and pathology providers in good communication, managing clinical demand, and approaches to triage to ensure access to products for patients with greatest and most urgent clinical needs.

The response by the clinical community is a key and vital element of the plan. It is important that institutions have arrangements to support the clinical management of blood and blood products in a crisis and to assist clinicians in responding to patient requirements in the most effective manner. Information, including copies of the plan, is available from the NBA website.

If it becomes necessary to restrict transfusions, there is a classification system available to support clinicians and institutions with their decisions. Blood Access priority 1 lists the conditions that have the highest priority for red cells.

### Blood Access Priority 1

#### Resuscitation

- Resuscitation from life-threatening or ongoing blood loss from any cause, including major trauma and obstetric haemorrhage

#### Surgical support

- Emergency surgery (defined as patient likely to die within 24 hours without surgery), including cardiac and vascular procedures
- Urgent surgery (defined as patient likely to have major morbidity if surgery is not carried out)
- Organ transplantation that cannot be deferred

### Non-surgical anaemia

- Life-threatening anaemia, including patients requiring in utero support or in neonatal intensive care
- Support for stem cell transplantation or chemotherapy that cannot be delayed
- Patients with severe bone marrow failure, haemoglobinopathies or other conditions who cannot tolerate any delay in transfusion

## Blood Access Priority 2

### Surgery and obstetrics

- Semi-urgent surgery (defined as patient likely to have minor morbidity if surgery not carried out)
- Cancer surgery that cannot be deferred without risk to the patient
- Symptomatic, but not life-threatening, postoperative or postpartum anaemia

### Non-surgical anaemia

- Symptomatic, but not life-threatening, anaemia (including postoperative) of any cause that cannot be managed by other means

## Blood Access Priority 3

### Surgery

- Elective surgery requiring cross-matched red blood cell support of two or more units of homologous donor blood (refer to ANZSBT Maximum Blood Order Schedule)

### Non-surgical anaemia

- Other non-urgent medical indications for transfusion

## Notes for all priority levels

All priority levels must consider the following:

- Alternatives to transfusion (For example: erythropoietin, iron therapy, red cell salvage).
- A reduction in target post-transfusion haemoglobin.

## Resources

### Guidelines and hospital circulars

The following is a list of current Australian guidelines, standards and Victorian Department of Human Services and Health hospital circulars available to inform your practice. Full versions of the guidelines, standards and circulars can be found at the website links.

Title	Website	Year of publication
NHMRC–Clinical practice guidelines on the use of blood components	<a href="http://www.nhmrc.gov.au/guidelines/health_guidelines.htm">www.nhmrc.gov.au/guidelines/health_guidelines.htm</a>	2001
ANZSBT/RCNA–Guidelines for the Administration of blood components	<a href="http://www.anzsbt.org.au/">www.anzsbt.org.au/</a>	2004
ANZSBT–Pretransfusion laboratory practice	<a href="http://www.anzsbt.org.au/">www.anzsbt.org.au/</a>	2007
ANZSBT–Gamma irradiation of blood components	<a href="http://www.anzsbt.org.au/">www.anzsbt.org.au/</a>	2003
ANZSBT–Autologous blood collection	<a href="http://www.anzsbt.org.au/">www.anzsbt.org.au/</a>	2002
Australian Health Ministers Advisory Council (AHMAC)–Guidelines for the use of recombinant and plasma derived FVIII & FIX products	<a href="http://www.nba.gov.au/guidelines/index.html">www.nba.gov.au/guidelines/index.html</a>	2006
Criteria for the clinical use of intravenous immunoglobulin (IVIg) in Australia	<a href="http://www.nba.gov.au/guidelines/index.html">www.nba.gov.au/guidelines/index.html</a>	2008
Warfarin reversal: consensus guidelines, on behalf of the Australasian Society of Thrombosis and Haemostasis	<a href="http://www.mja.com.au/public/issues/181_09_011104/bak10441_fm.html">www.mja.com.au/public/issues/181_09_011104/bak10441_fm.html</a>	2004
Department of Human Services–Hospital circular on traceability of blood and blood products 32/2008	<a href="http://www.health.vic.gov.au/hospitalcirculars/index.htm">www.health.vic.gov.au/hospitalcirculars/index.htm</a>	2008
Department of Human Services–Hospital circular on hospital transfusion committees 07/2002	<a href="http://www.health.vic.gov.au/hospitalcirculars/index.htm">www.health.vic.gov.au/hospitalcirculars/index.htm</a>	2002
Australian Council of Healthcare standards (ACHS) EQUIP 4. Clinical standard 1.5.5 The system for prescription, sample collection, storage and transportation and administration of blood and blood components ensures safe and appropriate practice.	<a href="http://www.achs.org.au/EQUIP4">www.achs.org.au/EQUIP4</a>	2007
Australian Standard -AS 3864-1997 Medical refrigeration equipment – for the storage of blood and blood products.	<a href="http://infostore.saiglobal.com/store/">infostore.saiglobal.com/store/</a>	1997 amend 1998

International guidelines may also inform your practice. Guidelines produced by the British Committee for standards in haematology are available at [www.bcshguidelines.com/](http://www.bcshguidelines.com/)

### Education events and tools

Currently the Blood Matters website has a Transfusion Tools page and it is organised under each heading from the EQUIP 4 Blood Standard 1.5.5.

There are currently two annual Transfusion Nurse Forums. These forums are an opportunity to network with other transfusion nurses, to update on transfusion practice and the activities of the Blood Matters Program. Please contact the Blood Matters Team for further information.

## BloodSafe e-learning

Developed by BloodSafe, a collaborative transfusion improvement program between SA Health, Australian Red Cross Blood Service, South Australian hospitals and their transfusion service providers, this tool is a free, interactive guide to clinical transfusion practice.

Aimed at all staff members that are part of the transfusion chain, it covers:

- decision to transfuse
- steps involved in safe collection of blood specimens
- appropriate handling and transport
- administration of blood, including the recognition and management of transfusion reactions.

Further modules are currently being developed including post partum haemorrhage, iron deficiency anaemia and cold chain management.

The resource utilises a range of media, including video, interactive games and interviews with transfusion experts, to engage the user in the learning process. Participation and completion reports are available to assist hospitals to fulfil their accreditation requirements.

New users will need to register and provide some details of themselves and their workplace. Returning users can use their registered details to enter. BloodSafe provides you with a certificate when you have successfully completed all assessments. In order to use the program, staff will require an email address, a high speed internet connection and Adobe flash player version 8 (or higher) installed on the computer.

Login page at [www.bloodsafelearning.org.au/](http://www.bloodsafelearning.org.au/)

## Professional organisations

The following section 'Professional organisations' was extracted from the Australian & New Zealand Society of Blood Transfusion (ANZSBT) website <[www.anzsbt.org.au/about/index.cfm](http://www.anzsbt.org.au/about/index.cfm)>extracted March 2010

The *Australian & New Zealand Society of Blood Transfusion* (ANZSBT) comprises members from diverse scientific, technical and medical backgrounds working within the areas of blood transfusion and transfusion medicine within Australia and New Zealand.

The broad aims of the ANZSBT are the:

- advancement of knowledge in blood transfusion and transfusion medicine
- promotion of improved standards in the practice of blood transfusion
- collaboration with international and other regional societies interested in blood
- promotion of interest in research into blood transfusion and allied subjects
- formulation of guidelines in key areas of transfusion practice.

The ANZSBT is affiliated with the following societies:

- Haematology Society of Australia and New Zealand (HSANZ) <[www.hsanz.org.au](http://www.hsanz.org.au)>
- British Blood Transfusion Society (BBTS) <[www.bbts.org.uk](http://www.bbts.org.uk)>
- International Society of Blood Transfusion (ISBT) <[www.isbt-web.org](http://www.isbt-web.org)>
- Australian society of Medical Research (AMSR) <[www.asmr.org.au](http://www.asmr.org.au)>

ANZSBT membership offers benefits for members through networking, publications, eligibility to apply for awards and grants, members only access to transfusion journals and a discount to attend the annual scientific meeting (held in October).

Requirements to join the ANZSBT are available at [www.anzsb.org.au/join/index.cfm](http://www.anzsb.org.au/join/index.cfm)

Fees for 2009 were \$80.00 annually.

Currently there is not an accredited transfusion practitioners association, but it is hoped that this will be developed. There is an email network amongst the transfusion nurses and an online forum called the Transfusion Interest group (TIG). This forum is accessed through the Blood Matters website. If you are interested in becoming a member, contact the Blood Matters program secretariat on 9096 0476.

There may be other organisations, specific to your occupation, such as the Royal College of Nursing, Australia and the Australian Institute of Medical Scientists, which you may wish to consider.

### Suggested websites of value to access first:

Australian Red Cross Blood Service Transfusion Medicine Services  
[www.transfusion.com.au/home.aspx](http://www.transfusion.com.au/home.aspx)

Australian Red Cross Blood Service Donor information  
[www.donateblood.com.au/](http://www.donateblood.com.au/)

Australian and New Zealand Society of Blood Transfusion  
[www.anzsb.org.au/](http://www.anzsb.org.au/)

Australian Council on Healthcare Standards  
[www.achs.org.au/Home/](http://www.achs.org.au/Home/)

Blood Matters Program  
[www.health.vic.gov.au/best/](http://www.health.vic.gov.au/best/)

BloodSafe e Learning  
[www.bloodsafelearning.org.au/](http://www.bloodsafelearning.org.au/)

BloodSafe SA  
[www.health.sa.gov.au/bloodsafe/](http://www.health.sa.gov.au/bloodsafe/)

CSL Limited  
[www.csl.com.au/s1/cs/auhq/1182280826145/content/1182280826258/home.htm](http://www.csl.com.au/s1/cs/auhq/1182280826145/content/1182280826258/home.htm)

Hospital Circulars – Department of Human Services Victoria  
[www.health.vic.gov.au/hospitalcirculars/index.htm](http://www.health.vic.gov.au/hospitalcirculars/index.htm)

National Blood Authority Australia  
[www.nba.gov.au/](http://www.nba.gov.au/)

NHMRC/ANZSBT Transfusion Guidelines  
(Note these guidelines are currently in review and will be released starting 2010)  
[www.nhmrc.gov.au/guidelines/health\\_guidelines.htm](http://www.nhmrc.gov.au/guidelines/health_guidelines.htm)

### Other valuable websites:

Australian Commission on Safety and Quality in Healthcare

[www.safetyandquality.gov.au/internet/safety/publishing.nsf/Content/home](http://www.safetyandquality.gov.au/internet/safety/publishing.nsf/Content/home)

Better Blood Transfusion Programme – NHS Scotland

[www.betterblood.org.uk/](http://www.betterblood.org.uk/)

Blood Provision and Funding – Department of Human Services Victoria

[www.health.vic.gov.au/blood/](http://www.health.vic.gov.au/blood/)

Blood Watch – NSW Clinical Excellence Commission

[www.cec.health.nsw.gov.au/moreinfo/bloodwatch.html](http://www.cec.health.nsw.gov.au/moreinfo/bloodwatch.html)

British Committee for Standards in Haematology

[www.bcshguidelines.com/](http://www.bcshguidelines.com/)

British Society of Haematology

[www.b-s-h.org.uk/](http://www.b-s-h.org.uk/)

Canadian Society for Transfusion

[www.transfusion.ca/](http://www.transfusion.ca/)

Clinicians Health Channel

[www.health.vic.gov.au/clinicians/](http://www.health.vic.gov.au/clinicians/)

Haematology Society – Australia and New Zealand

[www.hsanz.org.au/index.cfm](http://www.hsanz.org.au/index.cfm)

Haemostasis Registry

[www.med.monash.edu.au/epidemiology/traumaepi/haemostasis.html](http://www.med.monash.edu.au/epidemiology/traumaepi/haemostasis.html)

Human Tissue Act- Victoria

[www.health.vic.gov.au/humantissue/htact.htm](http://www.health.vic.gov.au/humantissue/htact.htm)

International Society of Blood Transfusion

[www.isbt-web.org/](http://www.isbt-web.org/)

National Blood Service – UK

[www.blood.co.uk/](http://www.blood.co.uk/)

NZ Blood Service

[www.nzblood.co.nz/](http://www.nzblood.co.nz/)

Serious Hazards of Transfusion- UK haemovigilance

[www.shotuk.org/](http://www.shotuk.org/)

Society for the advancement of Blood Management.

[www.sabm.org/](http://www.sabm.org/)

Transfusion Outcomes Research Collaborative

[www.torc.org.au](http://www.torc.org.au)

Victorian Quality Council

[www.health.vic.gov.au./qualitycouncil/](http://www.health.vic.gov.au./qualitycouncil/)

World Health Organization Blood Safety

[www.who.int/bloodsafety/en/](http://www.who.int/bloodsafety/en/)

## Transfusion journals

1. Transfusion
2. Vox Sanguinis
3. Transfusion and apheresis science
4. Transfusion medicine
5. Transfusion medicine reviews
6. British journal of haematology
7. Hematology journal continued by Haematologica
8. Journal of thrombosis and haemostasis

This is not an exhaustive list. Talk with your hospital librarian to find out what transfusion/haematology journals are currently held or ask the library to help you access journals they currently don't stock, the Blood service has a library associated with it, your hospital library may be able to utilise it. Also check with your blood bank, they may have access to some of these journals.

## Transfusion texts

1. The World Health Organization 2001. *The clinical use of blood in medicine, obstetrics, paediatrics, surgery & anaesthesia, trauma & burns*, WHO, Geneva.
2. Murphy, M (ed.) and Pamphilon, D (ed.) 2009 *Practical Transfusion Medicine*, 3rd edition, Blackwell Publishing, Carlton.

The first text is the recommended text for the Graduate Certificate of Transfusion Practice available at [www.who.int/bloodsafety/clinical\\_use/en/Manual\\_EN.pdf](http://www.who.int/bloodsafety/clinical_use/en/Manual_EN.pdf)

## References

Australian Red Cross Blood Service website <[www.transfusion.com.au/home.aspx](http://www.transfusion.com.au/home.aspx)>

Dzik, WH, Corwin, H, & Goodnough LT et al 2003, 'Patient safety and blood transfusion: new solutions', *Transfus Med Reviews* 17(3) p.p.169–80.

Department of Human Services 2007, Final report on the evaluation of the hospital blood management program: *Transfusion nursing in Victoria 2003-2006*, prepared by Australian Healthcare Associates, DHS, Melbourne, [Available [www.health.vic.gov.au/best/news/reports.htm](http://www.health.vic.gov.au/best/news/reports.htm)].

Murphy, MF & Howell, National Blood Transfusion Committee in England 2005, 'Survey of the implementations of the recommendations in the Health Service Circular 2002/009 Better Blood Transfusion'. *Transfus Med* vol. 15, p.p. 453–60.

National Blood Authority website <[www.nba.gov.au/](http://www.nba.gov.au/)>





