TRANSFUSION OF BLOOD AND BLOOD COMPONENTS- PAEDIATRICS

PRACTICE GUIDELINE ©

KEY POINTS

All clinical staff must be aware of the safe and appropriate use of blood components as well as the process for informed consent and the transfusion verification procedure in accordance with NSW Health Policy Directives PD2018_042 and IB2020_010

- **Zero Tolerance:** If the request form or blood sample identification is incomplete or incorrect, the request for grouping or crossmatch will be refused by Blood Bank staff, with no exceptions allowed. A new order and blood sample will need to be sent for grouping or crossmatching and the incident will be logged as an IMS+.
- **Time Limit: 30 minute – 4 hour Rule**: There is an increased risk of bacterial contamination once blood products have been removed from the appropriate storage conditions. Blood and blood components should be transfused within the recommended time limits.
- **Red cells, FFP and cryoprecipitate** for transfusion must be commenced within **30 minutes** of removal from storage and must be complete within **4 hours** of the transfusion start time.
- **Platelet transfusions** must be commenced within **30 minutes** of removal from a platelet agitator because of the risk of the platelets clumping and becoming damaged. Once transfusion has commenced they should generally be infused within **1 hour**, although they may be infused over up to 4 hours where necessary.
- **Assessment and Observations**: The frequency and documentation of vital signs must be adjusted to the patient's individual clinical circumstances & recorded on BTF Observation Chart on the eMR (or local intensive care form). Minimum documentation requirements are:
  - As a baseline before the start of the transfusion.
  - Within 15 minutes after the start of the transfusion or with commencement of each new unit.
  - Hourly during the transfusion and
  - At the end of each blood component.
- Patients must be closely **observed** for the **first 15 -30 minutes** of the transfusion and should be instructed to report to staff if they experience any discomfort or unusual symptoms. If not able to visualise the patient it is recommended that the staff stay with the patient for the initial 15 minutes if possible.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1st July 2022	**Review Period**: 3 years
Team Leader:	Haematologist	**Area/Dept**: Haematology

CHANGE SUMMARY

- Major review & rewrite to include documented streamlined processes across the Network.

READ ACKNOWLEDGEMENT

- Training/Assessment Required as per SCHN Mandatory Training Policy:
  - Completion of BloodSafe module Clinical Transfusion Practice
- This policy applies to all staff involved in the transfusion process and all staff responsible for prescribing, administering, taking samples, transporting/storing and issuing of blood components including the following:
  - **Medical staff,** who assess patients, obtain consent, prescribe and order blood products
  - **Staff involved in the collection of blood samples from patients, transport, storage and handling of blood products**.
  - **Laboratory staff** who receive the orders and prepare blood products for issue ensuring they are compatible.
  - **Nursing staff** who are involved with performing the correct patient identity check procedures prior to administering blood products and who observe and monitor patients before, during and after the transfusion
- All clinical staff involved in the process of transfusing blood or blood products should read and sign-off after reading it to acknowledge they understand the contents of this document.
- Other hospital staff (e.g. laboratory staff) involved in transfusing blood or blood components are to read this document and adhere to the components applicable to their laboratory area.

Related Policies

- NSW MoH Policy Directive PD2018_042 Blood Management and;
- NSW MoH Policy Directive IB2020_010 Consent to Medical and Healthcare Treatment Manual.

Related Forms

- SCHN Consent for Treatment Form
- SCHN Blood Component Order Sheet

Patient Information Sheets

- The SCHN Internet site has a Blood transfusion patient/carer fact sheet and the
- **Clinical Excellence Commission** has other factsheets via the links below:
  - Blood Transfusion Guide: Information for Patients and Families
  - Children Receiving a Blood Transfusion: A Parents' Guide
  - Information for Children: Amazing You - Billy Blood Drop
  - Information for Children: My First Transfusion
  - Information for Children: Voyages Comic
- The Clinical Excellence Commission website has **factsheets available in other languages**. Click here to access them. Once the language is selected, click on the Download PDF.
- Further information about transfusions for patients is available to access via Australian Red Cross Lifeblood website page for patients
  - Babies receiving a Blood Transfusion
  - Children receiving a blood transfusion

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Glossary of Terms

Term	Definition
ABO	A term used to describe the principal types of blood groups.
ARCL	Australian Red Cross Lifeblood
ANZSBT	Australian & New Zealand Society of Blood Transfusion Inc.
Blood component	Any product derived from human whole blood or plasma donations. Including red cells, platelets, plasma, cryoprecipitate, coagulation factors, albumin, and immunoglobulins.
Blood product	See Blood component
BloodSTAR	The online system used to manage access to the supply of government funded immunoglobulin products.
BMT	Bone marrow transplant
Buffy coat	The granulocyte and platelet layer that forms between red cells and plasma when a pack of whole blood is centrifuged. Red cells supplied at CHW are buffy coat reduced
CHW	The Children's Hospital at Westmead
CMV	Cytomegalovirus
CRYO	Cryoprecipitate
ECMO	Extra-Corporeal Membrane Oxygenation
eMR	Electronic Medical Record
ELP	Extended life plasma
FFP	Fresh Frozen Plasma
G&H	Group and Hold
HLA	Human Leucocyte Antigen
ICU	Intensive Care Unit
IMS+	Incident Information Management System
Irradiated	Blood products are gamma irradiated to prevent TA-GVHD in susceptible recipients of blood transfusions.
IV	Intravenous
IVIG	Intravenous immunoglobulin
Leucodepletion	A type of filtering of blood components that is performed at the time of collection from a blood donor. This process removes the majority of white blood cells in the blood.
MRN	Medical Record Number
NBA	National Blood Authority
PBSC	Peripheral Blood Stem Cell
POWH	Prince of Wales Hospital
RCNA	Royal College of Nursing Australia

Rh D (Rhesus D)	The D antigen of the Rh Blood Group System
SCH	Sydney Children's Hospital
TA-GVHD	Transfusion associated graft versus host disease
TRALI	Transfusion related lung injury

1 Introduction

The Transfusion of Blood and Blood Components Policy and Procedure aims to provide guidance on the appropriate storage and collection of blood products, the safe administration and successful management of patients receiving transfusions of blood and blood components. Blood transfusion is an important component of health care; however, it does carry the risk of adverse reactions and transfusion transmitted infections.

The safety and effectiveness of a transfusion depends upon the appropriate use of blood and blood components.

This policy has been developed to reflect current national and international practice to promote safety and minimise the risks to patients associated with blood transfusion.

1.1 Why Transfuse?

The decision to transfuse, and the consideration of other blood management strategies, must be based on a thorough clinical assessment of the patient and his/her individual needs. **Every transfusion must be justified and should only be given when the expected benefits outweigh the risks.** The indication for transfusion, or other blood management strategies chosen, must be documented in the patient's medical/clinical record.

2 Consent

All Medical Officers must be aware of the following policies: NSW Health Policy Directives:

- NSW MoH Policy Directive PD2018_042 Blood Management and;
- NSW MoH Policy Directive IB2020_010 Consent to Medical and Healthcare Treatment Manual.

It is the responsibility of the prescribing medical officer to obtain valid consent.

Consent must be documented in writing for the administration of a blood transfusion or the administration of blood products, including red cells, white cells, platelets, albumin products, fresh frozen plasma, anti-D immunoglobulin, plasma-derived coagulation factors, autologous transfusions and any biologically derived products such as thrombin products. This can be documented on the SCHN Consent for Treatment Form.

The SCHN Internet site has a Blood transfusion patient/carer fact sheet and the

- **Clinical Excellence Commission** has other factsheets via the links below:
  - Blood Transfusion Guide: Information for Patients and Families
  - Children Receiving a Blood Transfusion: A Parents' Guide

  - Information for Children: Amazing You - Billy Blood Drop
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  - Children receiving a blood transfusion

2.1.1 Frequency of Consent

A single consent is valid for one admission episode, where multiple blood product transfusions are required.

Where treatment involves the administration of blood products over a period of time for the same clinical indication, it is not necessary to obtain consent for every transfusion episode. Initial consent should be obtained and documented as outlined in the Policy Directive. It should include the length of time blood products will be required, or the length of time the consent will remain valid for.

At SCHN, for patients with long term transfusion requirements for the same clinical indication, a new consent is to be obtained at a maximum of 2 yearly intervals [i.e. every two years or before]. The consent form must be sighted prior to commencing a transfusion.

A new consent should be obtained if:

- A new treatment is proposed which was not previously explained to the patient
- Where alternative treatments become available
- If new risks associated with the treatment are identified.

Refer to Appendix 1 for a guide on transfusion risks and how to provide informed consent.

2.1.2 Emergency Treatment

Pursuant to Section 174 of the Children and Young Persons (Care and Protection) Act 1998, consent is not required to treat a child or young person if treatment is required urgently to save the life or prevent serious damage to the health of the child or young person. This means that emergency medical treatment and emergency first aid treatment, including any procedure, operation or examination, may be provided without the consent of the minor or a parent/guardian. **In the event of blood or blood component administration being undertaken without prior consent, parents/guardians are to be informed as soon as possible and this conversation documented in the medical record by a medical officer**.

2.1.3 Non-Emergency Treatment

It is NSW Health policy that if the patient is under the age of 14 years, the consent of the parent or guardian is necessary. A child aged 14 years and above may consent to their own treatment provided they adequately understand and appreciate the nature and

consequences of the operation, procedure or treatment. However, where the child is 14 or 15 years of age, it is prudent to also obtain the consent of the parent or guardian, unless the patient objects.

See NSW Health Policy Directive PD2005_406 Consent to Medical Treatment - Patient Information for more information.

2.1.4 Refusal of Treatment

- In the event of refusal of treatment, refer to the NSW Health Policy Directive IB2020_010 Consent to Medical and Healthcare Treatment Manual.
- A competent patient and/or their parent/guardian has the right to refuse treatment, notwithstanding that the reasons for making the choice are rational, irrational, unknown or even non-existent.
- Some patients and/or their parents/guardians, for reasons of conviction, including medical and religious, have definite objections to the transfusion of blood and blood components; e.g., Jehovah's Witnesses.
  For many Jehovah Witnesses *some or all* of blood transfusion and/or blood components are forbidden. Individual wishes *must* not be assumed and consent must be confirmed in a confidential and thorough manner and documented clearly in the patient's medical records.
  The following should be clearly documented in the patient's clinical notes:
  - The patient refuses the use of blood components throughout surgery and/or treatment
  - List the specific blood components which are NOT acceptable, ensuring the blood components that are acceptable are also clearly listed
  - The patient is aware that the procedure may entail a higher risk in the event of bleeding complications and as there are no alternatives to transfusion, may result in death. Refer also to section 2.1.2 (above), which remains relevant in these situations
- Where treatment is non-urgent and consent is refused by either the parents/guardians of a minor, or a minor aged 14 or above:
  i. Establish that there is no suitable alternative treatment to which consent would be forthcoming
  ii. Obtain a second medical opinion and discuss this with the parents/guardians and/or patient
  iii. Attempt to reach agreement by counselling and mediation with the family. These efforts should be documented
  iv. If applicable, explain to the parents/guardians and patient that although the treatment is not urgent at this stage, if it is not provided in a timely manner, the situation may become urgent. Explain how the delay would affect the patient. Explain that in urgent circumstances, treatment can be provided without parental consent, or the consent of the patient, but that the preference is to provide the treatment now, with consent
  v. If the parents do not consent to treatment on behalf of their child, consider making a report to the Department of Family and Community Services (FACS) that the child is a child at risk. Parents should be informed of the intention to notify FACS before the notification is made. Once FACS receives a notification, it will appoint a case manager to investigate the situation. This may ultimately

lead to a guardian being appointed to consent to the treatment in place of the parents

vi. As a last resort, a court order can be sought from the Supreme Court of NSW authorising the treatment.

3 Prescription and Ordering

The **Medical Officer is responsible** for prescribing blood and blood components and ordering the required products from the local hospital Blood Bank.

For urgent samples only, telephone requests can be made when ordering blood products if the patient's blood group and Rh (D) status is known and documented in the Blood Bank computer system. An eMR form must then be completed and sent on to Blood Bank.

For routine requests, an eMR request form must be sent to Blood Bank.

3.1 Prescribing

The **prescription** constitutes the legal instruction to administer the blood product and will be retained as part of a patient's medical record.

- Blood and blood components must be prescribed on the Blood Component Order Sheet (SCN130.310).
- Small volume products given by intravenous 'push' (e.g. clotting factor concentrates), or given intramuscularly (e.g. Rh (D) immunoglobulin), should be prescribed on the Electronic Medical Record (eMR) as an unlisted medication, or a Medication Chart, if the eMR is unavailable.
- For patients in the Operating Theatre the prescription is to be recorded on the anaesthetic record.
- All prescriptions must be legible and contain the following details:
  - Surname and Given Name in full [*or Baby of…, if applicable*]
  - Date of Birth
  - Gender
  - Hospital Medical Record Number (MRN)
  - The type of blood or blood component to be administered and the route of administration
  - Date, and where required, time and urgency, of transfusion
  - The quantity in units or volume to be transfused recorded in millilitres (mL). The dose or transfusion volume of blood components for neonates, infants and small children should be carefully calculated and prescribed in mL (NOT in "units") with a specified transfusion rate
  - Any special requirements; e.g. phenotyped red cells, CMV negative, irradiated etc. Any special requirements must be notified to the Blood Bank laboratory so these can be confirmed as appropriate by the Haematologist/Staff Specialist and entered into the Pathology Information System. Any special requirements must be clearly documented each transfusion
  - Any special instructions e.g. use of blood warmer or if pre-medications are required.
  - The **duration and/or rate of the transfusion** (refer to Appendix II for rate details)

- **Exception for regularly transfused patients** on Turner Day Stay Ward, CHW whereby the rate of transfusion of red cells is determined by 2 Blood Transfusion accredited Registered Nurses using the following calculation:
  - Weight in kg x 5mL = rate of transfusion in mL/hour (to a maximum rate of 250mL/hour)
  - The rate of transfusion does not need to be prescribed by the Medical Officer for these patients ONLY.

3.2 Transfusion volumes

3.2.1 Red cells

The National Blood Authority (NBA) Patient Blood Management Guidelines: Module 6 – Neonatal and Paediatrics recommends:

- In calculating transfusion volume for **neonates, infants and small children** (i.e. < 20kg), the dose or transfusion volume of blood components for neonates, infants and children should be carefully calculated and prescribed in mL (*not in 'units'*), with a specified transfusion rate.
- For **older children** (>20kg) *NOT* under the care of Haematology or Oncology services, the transfusion volume should be rounded down to the nearest whole unit. Many children respond well to transfusion of only a single unit of red cells. A unit of red cells has a volume of around 250mL. A child assessed to need a transfusion volume of 400mL, for example, should be prescribed and transfused 1 unit of red cells initially. Assess response to transfusion before transfusing further units.

Transfusion volumes can be calculated using the following formulae:
For infants weighing <5kg:
Transfusion volume = 0.5 x weight of the child (kg) x (desired – actual) Hb (g/L)
For infants and children weighing ≥ 5kg:
Transfusion volume = 0.4 x weight of the child (kg) x (desired – actual) Hb (g/L)
In children, the typical blood transfusion dose is 10-20mL/kg and this estimation can be used in place of the above formulae. In general, a single blood transfusion should not exceed 20mL/kg unless the patient is bleeding uncontrollably. A transfusion of 10mL/kg is often sufficient and will increase Hb by approximately 20g/L.
See Appendix IV (Guidelines for Transfusion of Red Blood Cells in Children)

3.2.2 Platelets

When ordering platelets it is preferable that ABO and Rhesus compatible platelets are transfused. If unable to locate compatible platelets:

- **At CHW**, Blood Bank will determine the appropriate platelet unit for transfusion.
- **At SCH** seek permission to proceed from patient's consultant.

The volume of platelets to be transfused depends on the age and weight of the recipient. **In neonates and infants**, the usual volume is 15 mL/kg. **In the older child**, it is common practice to give the entire unit released by the Blood Bank, unless there are clinical

contraindications, e.g., a child with cardiac failure. If in doubt, seek advice from the Consultant in charge of the patient.

Very few patients require more than one unit of platelets to be transfused at a time.

- **At CHW**, if more than 1 platelet unit is required in a 24 hour period, approval will need to be sought from the Haematologist on call, unless being transfused as part of a Massive Transfusion.

See Appendix V (Guidelines for the Transfusion of Platelets in Children)

> **Platelets have a very short expiry date:** You should be certain that platelets are required prior to placing the order. If ultimately, the platelets are not required, please inform your local blood bank immediately so that the platelets can be released for use for a different patient.

3.2.3 Fresh Frozen Plasma (FFP) and Cryoprecipitate

The volume of FFP and cryoprecipitate for transfusion, and duration of transfusion, depends on the indication. **Note:** For immunosuppressed patients who require irradiated blood products, FFP does not need to be irradiated.

- Please discuss volumes of FFP required with the patient's Consultant in the first instance, particularly for patients in liver failure or post-liver transplant, and for cardiac surgery patients in the ICU. Note that ICU protocols exist for patients post-liver transplant or on ECMO.
- The usual recommended volume of FFP for transfusion is 10-15 mL/kg.
- The usual recommended volume of cryoprecipitate is 5-10 mL/kg
  - Where whole blood cryoprecipitate is used, the recommended volume is 1 unit/10kg body weight, for apheresis cryoprecipitate the recommended volume is 1 unit/20kg body weight)

> **Thawing Time:** Each unit of FFP requires at least 20-30 minutes to thaw. Cryoprecipitate requires at least 10 minutes to thaw.
>
> For any enquiries on prescription of Blood and Blood Components or transfusion volumes, please contact the Paediatric Haematologist on-call at your local hospital.

3.2.4 Neonatal Exchange Transfusions

For prescription, ordering and procedural instructions on Neonatal Exchange transfusion please refer to the following policy/protocol:

- Refer to the Jaundice in Neonatal Care Practice Guideline.

3.3 Pre-transfusion Testing

Group and Screen or Crossmatch requests can be made through the eMR system. Hard copy requests can also be used, particularly during an eMR system failure. Electronic requests are preferred. Please note that all sections of the request, whether electronic or hard copy, and the blood sample label, must be filled in accurately and legibly. The collector must verify the patient's details with the patient or against the hospital identification band and sign the collector declaration.

- Please note that these tubes must be hand-labelled. Any tubes received with patient identification stickers will not be accepted for crossmatching or group and screen testing.

A Zero Tolerance policy applies across the Network, and any errors on the request or blood sample label will lead to the sample being rejected by Blood Bank.

3.3.1 Group & Screen – see also section 4.2 for sample collection

- A group & screen is required for compatibility testing prior to the transfusion of blood and blood components.
- Each sample is tested to determine the ABO and Rh D (Rhesus D) grouping of the recipient and is confirmed with previous records of transfusion where available (not relevant for first received Blood Bank sample).
- A red cell antibody screen is performed to detect any red cell antibodies in the recipient.
  - Patients who have red cell antibodies detected require further laboratory investigations and complete serological crossmatching (see below). This may take up to several hours to process.
  - An extended red cell phenotypte should be requested on all patients where a chronic red cell transfusion regimen is anticipated, e.g., patients with thalassaemia major or sickle cell disease. This must be done prior to the first transfusion, or at least 3 months after the last blood transfusion.

3.3.2 Crossmatch– see also section 4.2 for sample collection

- A **crossmatch** is the final test which confirms the compatibility between the donor blood and the recipient blood.
- If a patient has a detectable red cell antibody, more time may be required to complete the crossmatch. Depending on the antibody, several hours may be required.
- Each crossmatched unit of blood will be held for 24 hours only after the stated time required.

3.3.3 Sample Validity

- Any sample provided for a patient who has been transfused or is/has been pregnant within the last 3 months expires 72 hours after the date and time of collection.
- Any sample provided for a patient who has NOT been transfused or pregnant within the last 3 months expires after 7 days from the original date and time of collection.
- Where Blood Bank personnel have been notified, any sample collected in advance of elective surgery, and where the patient's history clearly excludes a transfusion history or pregnancy, can remain valid for 1 month from the time of collection provided it has been separated into serum/plasma and frozen at or below -20°C.
- The date and time of sample expiry can be found in PowerChart or by phoning the Blood Bank.
- Any patient discharged from any hospital and transferred to CHW or SCH requires a new pre-transfusion sample. This is regardless of whether the patient was discharged from within the Westmead or POW campus hospitals e.g. babies transferred from The

Royal Hospital for Women and transferred to SCH as these patients are classified as 'discharged' from The Royal Hospital for Women.

3.4 Ordering blood and blood components

The **ordering** of blood or blood components involves the process of communicating to the local hospital Blood Bank to prepare and issue a product for administration.

Where there is a valid Group and Hold sample in the Blood Bank, a crossmatch can be requested to order a blood product.

- **At CHW**, this is done by phoning the Blood Bank and also ordered electronically as an "add on" pathology order via the eMR. Specify the number of packed cell units needed and the date the units are required.
- **At SCH**, a new request for the "Crossmatch (Add on)" needs to be made on the eMR, the form printed out and sent to POWH/SEALS Blood Bank either by a porter or in the Scud system.

ALL details requested on the blood transfusion request form and the Blood Bank sample must be completed accurately and legibly. A Zero Tolerance policy applies across the Network and the sample will be rejected if details are inaccurate or illegible.

If blood is needed urgently, the local hospital Blood Bank should be notified by telephone.

The person ordering the blood must be identifiable and provide the following information on the transfusion request form:

- Date of request
- Date and time when the product is needed
- Complete patient ID details (Surname, Given Name [*or Baby of…, if applicable*]
- Date of Birth, gender, MRN)
- Patient's weight
- Patient's Ward/Location
- Diagnosis & Indication for the transfusion
- The blood component required (e.g., packed red cells, FFP, cryoprecipitate, platelets). Indicate the number of units/volume requested
- Indicate any special requirements e.g. CMV negative, irradiated products
- State the urgency of the request. If urgent, verbally inform blood bank of urgency
- Indicate if a Group and Screen or Crossmatch is needed
- The name and signature of the person requesting the blood must be legible

In emergency situations where blood is required immediately, urgent samples will be crossmatched as a priority over non-urgent samples.

3.4.1 Ordering of Blood – Red Cells

With the exception of an emergency, a valid crossmatch is required when blood is requested for transfusion. Each transfusion episode requires a valid crossmatch (see section 3.3). When ordering red cells the following is required:

- Each transfusion episode requires an accurately completed electronic crossmatch order or paper Blood Transfusion Request form (during eMR downtime).
- If there is insufficient sample for a crossmatch, a new request and sample must be sent to Blood Bank.
- Refer to for further information Section 4 Pre-transfusion Sample Collection regarding the pre-transfusion sample.
- Any special requirements, e.g., CMV negative, irradiated, phenotyped, triple-washed, should be indicated on the request form.

3.4.2 Ordering Platelets

When ordering platelets the following is required:

- If the patient's blood group and Rh(D) status is documented in the Blood Bank computer system, an order for platelets can be made by telephoning the CHW Blood Bank.
- If there is no record of the patient's blood group and Rh(D) status, a Group and Screen with request for platelets will need to be sent to the Blood Bank.

3.4.3 Ordering Fresh Frozen Plasma & Cryoprecipitate

When ordering FFP or Cryoprecipitate the following is required:

- If the patient's blood group and Rh(D) status is documented in the Blood Bank computer system, an order for FFP or cryoprecipitate can be made by telephoning the CHW Blood Bank.
- If there is no record of the patient's blood group and Rh(D) status, a Group and Screen with request for FFP or cryoprecipitate will need to be sent to the Blood Bank.

Extended life plasma (ELP - FFP that has been thawed for storage beyond 24 hours and up to five days) is available at SCH. **This should NOT be used for neonates or children with congenital factor deficiencies.** Discuss with a haematologist before prescribing ELP.

Please note: When making a request to order the above products, please be certain that the product will be used prior to making the request. Thawed products can only be kept for a short amount of time and will be discarded if not transfused.

3.4.4 Ordering Albumin and Factor Concentrates

Albumin

- Both hospital Blood Banks keep a constant supply of albumin (Albumex 4% and Albumex 20%) in stock.
- When ordering albumin, a telephone request can be made to the local Blood Bank, who can also advise on stock availability.
- The concentration of albumin and volume to be infused should be discussed with the patient's Consultant.
- Please note, albumin CANNOT be send via the pneumatic tube system (PTS)

Factor Concentrates

- **At CHW**:
  - The Blood Bank keeps certain recombinant and/or plasma-derived factor concentrates in stock, including factor VIII, factor IX, von Willebrand factor, factor VIIa ("Novoseven") and antithrombin. These can only be ordered by or in consultation with the Haematology team. The Blood Bank will not issue these products without the prior approval of a Haematologist.
  - Small quantities of other factor concentrates (e.g., factor XIII, fibrinogen) may be kept in stock for patients with known, congenital factor deficiencies. These products will **not** be issued to other patients.
  - Queries regarding the use of factor concentrates can be directed to the Haematologist on Call or to the Haematology CNC.
- **At SCH**:
  - The Blood Bank keeps a supply of recombinant and/or plasma-derived factor VIII, factor IX, von Willebrand factor and antithrombin in stock. Some rarely used factor concentrates must be ordered in advance of their usage.
  - Recombinant factor VIIa ("Novoseven") is for use in haemophilia patients with an inhibitor or for emergency use in massive haemorrhage. Supply of Novoseven is kept in CICU for emergency use for massive haemorrhage. For patients outside of CICU, Novoseven can be sourced from the paediatric pharmacy and after hours from the emergency drug cupboard. This product must be ordered in in consultation with a Haematologist.
  - Queries regarding the use of factor concentrates can be directed to the Haematologist on Call or to the Haematology CNC.

3.4.5 Ordering Intravenous Immunoglobulin

For all patients who require intravenous immunoglobulin (IVIG) the following is required:

- For the initial dose, the requesting Medical Officer must carry out the following:
  i. Review the criteria for IVIG on the National Blood Authority (NBA) website.
  ii. Submit a New Initial Authorisation Request on BloodSTAR (Blood System for Tracking Authorisation and Reviews). The Medical Officer must be registered to make this request. Medical officers can gain provisional access to BloodSTAR if they have not previously registered and an emergency order is required.
- Where the patient has approval for IVIG, orders for any subsequent transfusion of immunoglobulins can be placed directly with the local hospital Blood Bank whilst the approval is current. . Approval lasts up to 6 months with renewal of approval required for ongoing supply of IVIG.
- If there is any change in the IVIG dose the medical officer must request this change or an additional dose via BloodSTAR.
  If the indication for IVIG is not eligible for NBA supply, IVIG products must be ordered through the local hospital Pharmacy. This may require the approval of the local hospital Drug Committee.
- Please note, albumin CANNOT be send via the pneumatic tube system (PTS)
- See also SCHN policy: Immunoglobulin Infusions for Replacement and Immunomodulation Practice Guideline.

3.4.6 Ordering of Non-Stock Blood Component Items

Non-stock items, e.g., zoster immunoglobulin, CMV immunoglobulin, can be ordered from the ARCL via the local hospital Blood Bank. Patient and requesting clinician details are required when ordering these products.

Details of items stocked by the ARCL can be found at:
https://www.transfusion.com.au/blood_products

For any enquiries related to the ordering of blood products contact your local Blood Bank

3.5 Special Blood Requirement Guidelines

Staff are to use the Blood Component Order Sheet. The reverse side of the form provides guidelines for those patients who have special requirements.

There is generic information here regarding special requirements. Alternatively, this link is embedded within the electronic crossmatch form ordering process.

3.5.1 Irradiated Blood Components

The irradiation of red cells and platelets is effective in the prevention of Transfusion Associated Graft versus Host Disease in susceptible patients.

- All platelet products received from ARCL are pre-irradiated. The Blood Bank should be notified of this requirement when red cells are ordered.

Irradiated red cells should be ordered for:

- Premature or very low birth weight infants (<1500g).
- Neonatal exchange transfusion, or a “top-up” transfusion after intrauterine transfusion, up to the age of 6 months.
- Neonates with necrotizing enterocolitis.
- Babies and children with known or suspected immunodeficiency (congenital or acquired), including Severe Combined Immunodeficiency (SCID), Wiskott-Aldrich syndrome, Velocardiofacial syndrome, Acquired Immune Deficiency Syndrome (AIDS)
- Patients receiving immunosuppressive therapy e.g., severe aplastic anaemia, post-liver or renal transplant
- Patients with leukaemia, lymphoma or solid organ malignancies
- Recipients of or candidates (includes potential) for autologous or allogeneic bone marrow/peripheral blood stem cell transplant
- Patients receiving alemtuzumab
- Patients requiring HLA-matched single donor platelets
- Patients receiving a directed donation from a first- or second-degree relative

3.5.2 CMV Negative – Cytomegalovirus Antibody Negative

The use of CMV negative blood components are available for patients who are considered at high risk of acquiring transfusion transmitted CMV infection.

Patients considered at high risk of CMV infection are:

- Neonates/ Infants weighing <1500 grams or who are immunosuppressed
    - **Note:** the POWH/SEALS Blood Bank provides CMV-negative products for ALL babies up to 4 months of age.

- Recipients of neonatal exchange transfusion
- CMV-negative recipients of stem cell or solid organ transplant
- CMV-negative recipients receiving highly immunosuppressive chemotherapy
- Other severely immunosuppressed patients

If CMV-negative units are not available, leucocyte-depleted units (see section 3.5.3 below) are considered 'CMV safe' and may be administered after discussion with the patient's Consultant. All blood and blood components are leucodepleted by the ARCL at the time of or soon after collection from the blood donor.

3.5.3 Leucodepleted products

Leucodepletion of red cells and platelets removes ≥ 99% of leucocytes which assists in reducing febrile non-haemolytic transfusion reactions as well as reducing the risk of CMV transmission during transfusion.

Red cells and platelets are leucodepleted at time of or soon after collection (pre-storage white cell filtration) at the ARCL.

3.5.4 Washed Red Cells

Washed red cells should be ordered only after consultation with a haematologist. They may be indicated for patients who have had previous severe allergic reactions to red cell transfusion. Due to the added preparation required, advance notification should be given to the local hospital Blood Bank and the ARCL where possible.

3.5.5 Extended Red Cell Phenotyping

Extended red cell phenotyping refers to matching red cells for blood groups in addition to the ABO and Rh (D) groups. Consultation with a Paediatric Haematologist is required prior to ordering phenotyped red cells. These are ordered for:

- Patients known to have red cell antibodies (e.g., anti-Kell, anti Jka)
- Patients scheduled to receive chronic blood transfusion therapy (e.g., thalassaemia major, aplastic anaemia).

3.5.6 HLA Matched Platelets

HLA matched platelets are ordered for patients who have developed an antibody to human leucocyte antigens (HLA). Testing for an HLA antibody is performed by the ARCL. Please contact the Blood Bank if this test is required. Testing takes several days. If a patient is found to have HLA antibodies, the ARCL can supply HLA-compatible platelets for the patient. This involves identifying HLA-compatible blood donors who are able to donate platelets to the patient.

HLA-matched platelets MUST NOT be ordered if no HLA antibody is demonstrated. If HLA-matched platelets are no longer required, the Blood Bank must be notified immediately.

3.6 Directed Donations

A directed donation is an allogeneic donation collected for a specified patient, from a selected donor known to the patient. The request usually occurs within family relationships, in particular for parents to children. All directed donations will be managed in accordance with ARCL policy and must be arranged in consultation with a Haematologist.

The following link can provide more information on directed donations:
http://www.transfusion.com.au/blood_basics/collection/directed_donation/requirements

4 Pre-transfusion Sample Collection

It is a mandatory requirement by the NSW Department of Health that all patients who may receive blood or blood components must be accurately identified at both the time of sample collection and transfusion.

Refer to NSW Health Policy Directive PD2018_042 Blood Management.

A zero tolerance policy applies across the SCHN. If the request form or blood sample identification is incomplete or incorrect, the request for grouping or crossmatch will be **refused** by Blood Bank staff **WITHOUT EXCEPTION**. A new sample will need to be obtained from the patient. Incident will be logged as an IMS+.

4.1 Request Forms

When a pathology order is made via the eMR for a group and hold or crossmatch:

- **At CHW**:
  - A Blood Transfusion Sheet (M34F) will be printed out along with the sticker. This must be completed and sent to the Blood Bank together with the blood sample (see section 4.2 below). Where a paper Pathology Request Form is used, a Blood Transfusion Sheet (M19A) must also be completed and sent with the request form and blood sample to the Blood Bank.
- **At SCH**:
  - A Blood Transfusion Sheet is printed. This must be completed and sent to the Blood Bank together with the blood sample (see Section 4.2 below)
- Any previous transfusion history should be clearly documented on the request form.
- The product required and the number of units required should be clearly stated and the date and time required should be indicated.
- Any urgent request should be phoned through to the local hospital Blood Bank and the degree of urgency should be stated.
- Special requirements such as ‘CMV negative’ or ‘irradiated’ should be indicated under the heading special requirements.
- The prescribing medical officer must print and sign their name as well as provide a contact number on the form.

4.2 Sample Collection Procedure and Patient Identity Check

- Samples collected for testing may be collected by a medical officer, a registered nurse, an accredited enrolled nurse or pathology collection staff.
- The staff member collecting the blood sample must be trained in collection procedures.
- The person collecting the sample must label the specimen tube BY HAND at the time the blood is collected from the patient. Only specimen tubes with hand-written labels will be accepted by Blood Bank. Specimen tubes labelled only with addressograph labels or other printed labels will be rejected and a new sample will have to be collected from the patient. Specimen tubes must not be labelled prior to sample collection, and should be labelled before leaving the patient's bedside.
- At the time of collection, two people, one of whom may be the patient (if of age and ability to consent) or parent/guardian, must check the name of the person from whom the sample was collected against the name written on the specimen tube to ensure that they are identical, in accordance with NSW Health policy.
- Wherever possible the patient should be asked to verbally state their name and date of birth (DOB) and the information given should be checked against the request form. If the patient is unconscious at the time of collection, the patient's ID band can be used to check their name and DOB.
- For each unit of red cells requested, 1mL of blood is required in a Crossmatch pink top specimen tube. Total volume of 5mL for multiple unit crossmatches.

Note: all sections of the label on the specimen tube **MUST be accurately completed by hand**. **The sample tube must not be pre-labelled. Incorrectly labelled tubes will be rejected by Blood Bank and a new sample will need to be collected from the patient**.

- The following details must be **hand-written** on the specimen tube label:
  - Given Name and Surname [or Baby of…, if applicable]
  - MRN
  - Date of Birth
  - Date and time of collection
  - Signature of the collector on the tube
- All samples sent to Blood Bank must be accompanied by a completed Blood Transfusion Request Form (when ordered through eMR, the form will print when the order is activated). The collector verifying the patient's identity is required to sign the collector's declaration on the form.

4.3 Maternal Samples

- Maternal samples should be collected for any patient under the age of 4 months requiring blood grouping or crossmatching. In circumstances where maternal blood is not available, the baby's blood is used.
- The procedure for collecting maternal samples should be followed in accordance with Section 4.2 and the sample must be labelled with the mothers and babies identification details.
- Maternal samples should be requested using the Blood Transfusion Request Form and the patient ID details on the form and sample must be those of the mother.

- At the top of the form or in the clinical notes section of the form it should indicate who the maternal sample is for e.g., “Alana Smith, Mother of John Smith” and include the baby’s MRN
- A Group and Hold should be requested.
- Maternal samples collected and sent from external hospitals will be accepted if there is a completely and accurately labelled blood sample tube and an external hospital request form. DO NOT transfer the details of the order form onto a local hospital Blood Transfusion Request Form. When the mother arrives at the local hospital, a new sample and request form should be sent to the Blood Bank.
- **NETS transfers to ICU or EDs requiring cross matches**: blood samples (maternal or cord) will come with a signed NETS crossmatch form. The samples and form will be accepted by Blood Bank when the following criteria are met:
  - Specimen and request form have a minimum of two points of identification.
    i. First name and surname (*or “baby of’ and surname*).
    ii. MRN or date of birth
  - Two points of identification on the sample and request form are identical.
  - The request form is signed by the person who collected the sample.

4.4 Unlabelled or Mislabelled Samples/Request Forms

- The SCHN Blood Banks have a zero tolerance policy in relation to errors in patient identification on the sample or request form.
- Zero tolerance means that:
  - **Samples** must be accurately **hand-labelled** with:
    - Patients given name and surname [*or Baby of…, if applicable*]
    - Medical record number and date of birth
    - Date and time of collection
    - Signature of collector
  - **Request forms** must have:
    - Name and signature of requestor
    - Surname and given name of patient [*or Baby of…, if applicable*]
    - MRN and date of birth
    - Signed collector declaration
- Addressograph labels are acceptable on the request form ONLY.
- If the patient has a name change a new form and sample will be required.
- In the event of an unknown patient arriving in ED/ICU, the tube and request form will be accepted with "Unknown (Fe)male" and MRN as the patient identifiers.
- **The details on the request form and the tube must be identical**.
- If there are any errors in the patient identification **on the sample or the form**, the **sample will be discarded** and the collector will be notified to recollect the sample.
- Samples labelled with printed labels will be discarded and the collector will be notified to recollect the sample.

If a sample meets the zero tolerance criteria, this will be logged as an incident in the IMS+ and information tracked by the Transfusion Review Committee. This information will be used to identify areas for education and follow up.

5 Storage and Transportation

The proper storage and transportation of blood and blood components is critical for safe transfusion. If stored incorrectly, blood carries the risk of bacterial contamination. Appropriate storage conditions must be maintained until immediately prior to dispensing and administration.

Blood and blood components (except platelets) must only be stored in designated monitored refrigerators. Platelets must be stored on an agitator until dispensed for patient use.

Blood and Blood Components **MUST NOT** be stored in ward refrigerators.

5.1 Collecting and Transporting Blood Products

It is vital to confirm that the right blood component is collected for the right patient to avoid "wrong blood to patient" episodes.

- **BEFORE** collection of blood or blood components for transfusion, both patient and staff must be adequately prepared to commence the transfusion without delay. This includes ensuring that the patient has valid consent for the transfusion, patent intravenous access securely in place, the prescription has been satisfactorily completed, and trained, competent staff members are available for the duration of the transfusion.
- Any person collecting blood MUST have complete patient identification details.
  - **At CHW:** acceptable forms of patient identification include:
    - A "Blood Bank Collection Slip", completed by a member of medical or nursing staff.
    - The prescription [Blood Component Order Sheet (SCN130.310)]
    - The Blood Component Issue Sheet (M19C) when collecting subsequent units of blood ONLY in the event of "Downtime"
  - **At SCH**:
    - Patient identification details must be recorded on an "*Authority to Issue Blood Products*" form (S1289). Blood Bank will not issue blood products without receiving this form.
- If medical or nursing staff request that ancillary staff pick blood up from the Blood Bank, they MUST ensure that ancillary staff are given the appropriate documentation and storage carrier prior to collection of the product.
- Ice/Cold packs MUST NOT be used in the carrier when transporting blood.
- The person collecting the product must supply the Blood Bank staff with their Hospital Staff Identification number for the product to be issued.
- "**30 minute rule**": Transfusion of all fresh blood and blood components must commence within 30 minutes of collection from Blood Bank. If transfusion cannot commence within that time frame, the product must be returned to Blood Bank for appropriate storage.
  - **At SCH,**
    - the "Authority to Issue Blood Products" (S1289) form must accompany the returned blood product.
- When a patient is haemodynamically stable, only one (1) unit of red cells/fresh product will normally be dispensed at a time, to avoid wastage.

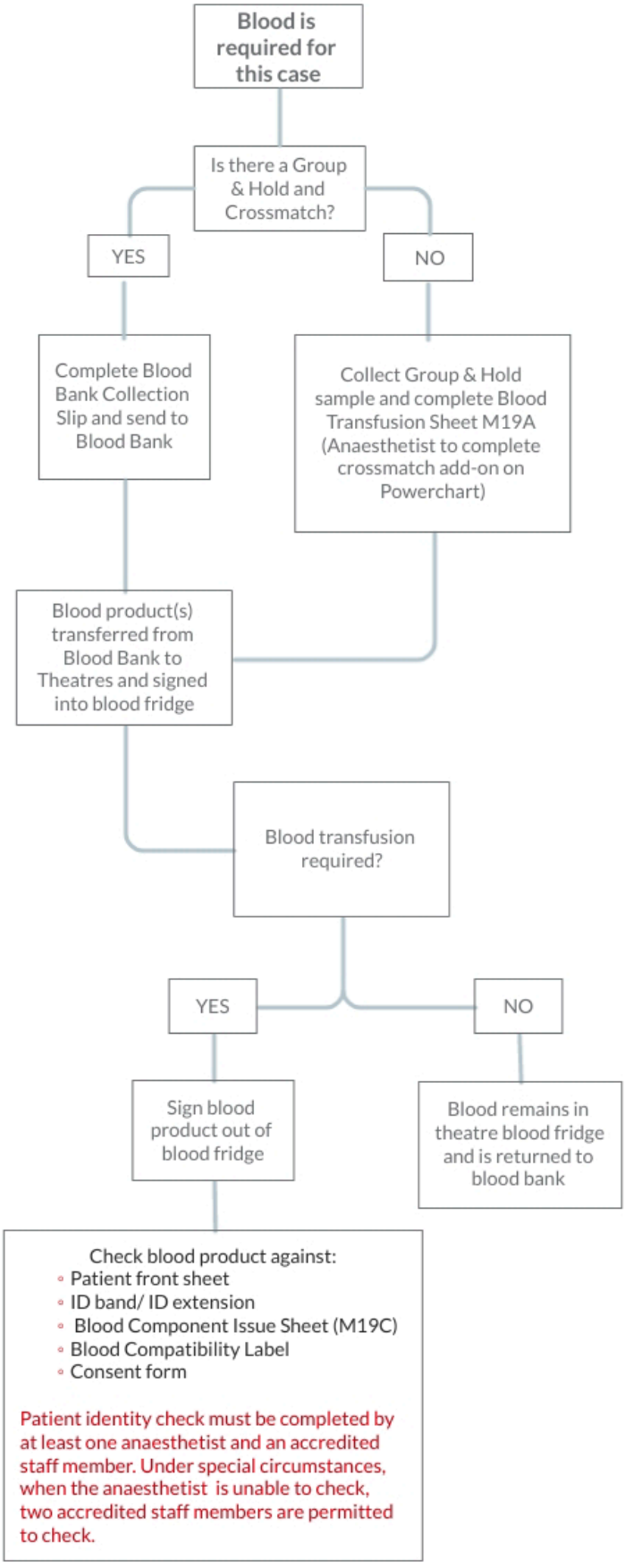
5.1.1 Downtime procedure

In the event of computer or printing issues the patient will be dispensed the product in a timely manner. The Blood Bank staff will give the person collecting the product the checking sheet in a handwritten format.

5.2 Blood required to be held in Operating Theatres and administration of Blood in Theatres/Recovery (CHW only)

The transfer of blood for elective surgery between the Blood Bank and the Operating Theatre (OT) will occur on weekday mornings.

- The Blood Bank will be informed of any patients booked for surgery requiring blood according to the Surgical Blood Order Schedule.
- Clinical Staff in the OT will provide the Operating Assistant with the appropriate documentation for the release of blood products from the Blood Bank.
- Any product required to be stored in the OT Blood Fridge will be issued by Blood Bank staff in accordance with Section 5.1: Collecting and Transporting of Blood Products.
- Only Packed Red Blood Cells and if necessary, Fresh Frozen Plasma can be stored in the OT blood fridge
- Once transported to OT, Nursing Staff will check each blood pack against the documentation for request and against the Blood Transfusion Form as it is stored in the blood fridge.
- Any unused blood products must be returned to the Blood Bank that evening by the Operating Assistant and Blood Bank staff will adjust computer records indicating the products return.
- Additional products required beyond what has been placed in the OT fridge for a patient can be collected from the Blood Bank using a Blood Bank collection slip.


Blood is required for this case
Is there a Group & Hold and Crossmatch?
YES
NO
Complete Blood Bank Collection Slip and send to Blood Bank
Collect Group & Hold sample and complete Blood Transfusion Sheet M19A (Anaesthetist to complete crossmatch add-on on Powerchart)
Blood product(s) transferred from Blood Bank to Theatres and signed into blood fridge
Blood transfusion required?
YES
NO
Sign blood product out of blood fridge
Blood remains in theatre blood fridge and is returned to blood bank
Check blood product against:
Patient front sheet
ID band/ ID extension
Blood Component Issue Sheet (M19C)
Blood Compatibility Label
Consent form
Patient identity check must be completed by at least one anaesthetist and an accredited staff member. Under special circumstances, when the anaesthetist is unable to check, two accredited staff members are permitted to check.

5.2.1 *TIMEOUT - Patient identification*

- A patient identification (ID) extension should be applied to all patients undergoing procedures which have anticipated blood loss, to allow for access under surgical drapes.
- Patient identification band extension must be checked against the ID band attached to the patient, the front sheet and consent form during surgical time out.

5.2.2 *Administration*

- In the operating theatre, the patient identity check must be completed by the Anaesthetist and a second staff member.
- Under special circumstances, when the anaesthetist is unable to check (e.g. during a trauma), two blood accredited staff members are allowed to check the blood products.
- Each blood pack must be checked against the compatibility label, patient's front sheet, consent form, ID band or ID band extension and blood component sheet (M19C).

5.2.3 *Continued Blood transfusions in the recovery unit*

- A Blood Component Order Sheet for blood products must be completed by an anaesthetist for blood products required to be continued in the recovery unit and for transfer to the ward.
- Administration and setup in the recovery unit - see section 6.2.

5.3 Sending Blood Products via Pneumatic Tube System (PTS)

At CHW:

- All blood products *EXCEPT* IVIg and Albumin can be sent in the PTS to the Emergency Department only.
- Products will only be sent once confirmation is received that the clinical team are ready to transfuse.
- Products are only sent to the ***CHW ED RESUS station (1110)***.
- Products must not be returned to Blood Bank in the pneumatic tube, they must be hand delivered to Blood Bank.
- Products should arrive sealed in a zip lock bag with a sticker "check for leaks before opening" placed over the seal

At SCH:

- The hospital Pneumatic Airtube System may be utilised to transport forms, blood samples and suitably sized blood products. All fresh blood products must be placed inside a zip lock plastic bag within the airtube container.
- A registered nurse or medical officer must be available to pick up the fresh blood product as soon as it arrives on the ward via the Pneumatic Airtube System or from a porter and act promptly to prepare the unit for its timely and correct administration
- Rare blood products (phenotyped red cells) or other blood product components in bottles (such as Albumin, IVIG, clotting factors) **MUST not be sent** through the Pneumatic Airtube system due to risk of damage or being misplaced. Such products must be ordered and collected in person from Blood Bank

5.4 Emergency Department (ED) blood esky (CHW only)

- Most children with major trauma do not require urgent blood transfusion, but for those that do urgent blood transfusions need to be able to be provided immediately.

- The Blood Esky enables us to provide O Rh(D) Negative blood at the time of arrival of the patient with major trauma (Trauma Attend) but minimise blood wastage by keeping the units in a refrigerated Esky that will be returned unopened to Blood Bank if the products are not used.
- The Blood Esky will be activated by the 'Trauma Attend' page between **8am and 11pm**
- Blood Esky use in Emergency Department – CHW (Procedure document)

6 Administration

- The most basic principle of patient care during a transfusion is to ensure patient safety.
- All clinical staff must be aware of the mandatory requirements for providing safe transfusion according to NSW Health Policy Directive PD2018_042 Blood Management.
- All staff involved in the decision for and administration of the transfusion should complete the "**BloodSafe: Clinical Transfusion Practice** " eLearning package as the minimum educational requirement. When completed, a certificate of completion is issued by BloodSafe and this can be forwarded to HETI to be recorded as part of your learning record. BloodSafe training must be completed every 5 years.

Before the Pre-Transfusion Check is commenced you will need to confirm that:

- Consent has been obtained. The staff checking and transfusing the blood component have the responsibility to ensure that there is a valid consent. If appropriate consent and/or documentation has not been identified then the transfusion should be delayed until informed consent has been obtained. Exceptions are in emergency situations (see Section 2 for consent processes).
- The prescription has been satisfactorily completed, including medications.
- Intravenous access is suitable and patency has been assessed PRIOR to collecting the blood component.
- Appropriately trained and competent staff are available for the duration of the transfusion, including two RNs or medical officer to complete the pre-transfusion check.

> The **bedside** check is a vital step in preventing transfusion error. All patients receiving blood or blood components must be positively identified at the bedside prior to commencement of the transfusion.

6.1 Pre-Transfusion Check

- **In the presence of the patient**, two appropriate staff members (i.e., Registered Nurses or Medical Officers) must independently identify the patient when the transfusion is being set up.
- The patient's identity must be checked against the patient's identification band.
- The patient or parent/guardian should be asked to verbally state the following if able to do so:
  - Surname, Given Name [*or Baby of…, if applicable*], DOB, and MRN
  - Address
- If a **patient is unconscious** or unable to state their correct name, a parent/guardian may state the patient identity. In the absence of carers, it is sufficient that the two

people completing the pre-transfusion check confirm the patient's identity by using the patient's ID band.

- In the operating theatre, the patient identity check must be completed by the Anaesthetist and a second staff member.
- The following details on the blood pack component label must be checked and must match exactly the details on the blood request form, the prescription order AND the patient's identification band:
  - Patients Surname, Given Name [*or Baby of…, if applicable*] and Date of Birth
  - Hospital Medical Record Number
  - Unique blood unit number
  - The ABO and Rh (D) group
  - The expiry date on the blood product
  - Any special requirements e.g. specific phenotypes, CMV negative, irradiated.
- In some instances, blood issued may be compatible but not identical to the patient's own ABO and Rh (D) group. Check for compatibility before commencing transfusion. Generic compatibility information is available here. If still concerned, contact the local hospital Blood Bank or Haematologist.
- **Check** that special requirements specified by the prescribing medical officer are met e.g.:
  - CMV negative or irradiated products
  - If a pre-medication or frusemide is required
  - The volume, rate and the duration of the transfusion
- The blood product should be visually inspected for any signs of deterioration or damage. If there is evidence of any leaks, clots or discolouration, the product should not be infused and should be returned to the Blood Bank immediately.
- Both staff members responsible for completing the pre-transfusion check must sign, date and time the blood component issue sheet.
- If a CVAD is in-situ, staff are to ascertain from a medical officer whether the line may be used for blood / blood component administration. **The viscosity of the blood / blood component can cause occlusions in some of these catheters.**
- If a multi-lumen CVAD is in-situ, staff are advised to attempt to utilise the largest-bore lumen for the administration of blood/blood components.

6.2 Administration and Set Up

All red cell, platelet, FFP and cryoprecipitate units require filtration via a standard 170-200 micron filter. These are integrated in all administration sets used to administer blood/blood components across SCHN.

Standard Precautions MUST be used:

- The unit/pack to be transfused should be mixed thoroughly by gentle inversion.
- A new, sterile infusion set is to be used for each component type to be transfused and with each new transfusion episode. For example platelets may not be transfused via the same infusion set as red cells .A maximum of 4 units (of the same blood component only) can be transfused through the same infusion set within one transfusion episode.
- Blood Administration sets must not be "piggy backed" to other lines. If vascular access is an issue the transfusion can be connected to an extension set ensuring that the other

lumens are clamped and/or have compatible fluids only being administered i.e. 0.9% sodium chloride. See Section 6.6 - Co-administration of IV Fluids and Medications. If an extension set is required then **YOU MUST** flush the device with 0.9% sodium chloride prior to and post transfusion.

- The infusion of crystalloid and Red Blood Cells at high flow rates has the potential to reduce flow rates when infused using certain NADs. Some patients who require administration of crystalloid and Red Blood Cells at high flow rates may experience difficulties when infusing through a NAD, and therefore removal of the NAD for the duration of the infusion should be considered.
- A burette should be attached to the infusion set and used to “spike” the blood pack using an aseptic technique.
- Ideally the blood infusion set should be primed **at the bedside** to ensure correct patient identification.
- Ensure that IV access is patent prior to connecting to the patient’s IV infusion set.
- Ensure the IV pump is suitable for the transfusion of blood/blood components. Pumps should have a biomedical tag for due date of next service.
- The infusion set should be changed every **12 hours** with fresh blood components, and no more than 4 units of blood are to be transfused per filter to avoid slow flow rates.
- Each staff member involved in the pre-transfusion check must determine the rate of transfusion independently of each other before commencing the transfusion.

> The only fluid compatible with all fresh blood and blood components is **0.9% Sodium Chloride**. You **MUST** flush pre and post Transfusion with 0.9% Sodium Chloride **ONLY** to ensure vascular access patency.

- Blood and blood products must not be administered concurrently with any other fluid, medication, parental nutrition or blood product.
- Medications MUST NOT be added to the blood pack to be transfused or to the Infusion Set. Refer to section 6.6 on Co-administration of IV Fluids and Medications.
- Glucose MUST NOT be used for priming or adding to the Infusion Set.
- 0.9% sodium chloride may be used to flush the line post-transfusion to ensure the required volume of blood product is administered, before discarding the line.

6.3 Use of a Syringe Driver to Administer Blood

- For infants and neonates or any patient on minimum fluid requirements, a syringe driver may be used to transfuse blood and blood components.
- The volume of blood required should be drawn into the syringe using an aseptic technique and administered via a “mini-line” and a 170-200 micron filter. **NB:** Filters are integrated in all administration sets use to administer blood/blood components.
- Each syringe and administration set used should be single-use only and discarded appropriately at the end of the transfusion.

6.4 Patient Observation and Monitoring

All patients receiving a transfusion must be monitored for any potential complications and adverse transfusion reactions. **The patient should be closely observed for the first 15-30 minutes** as severe and life-threatening reactions can occur after only a small amount of blood being transfused.

- Visual observation of the patient is the best way of assessing patients during transfusion.
- Transfusions should be given in areas where patients can be readily observed.
- Transportation of patients should be avoided whilst a transfusion is in progress. However, if a patient is required to leave the ward/ outpatient area for any reason, a staff member trained in transfusion administration must accompany the patient.
- It is advisable that an assessment of the patient is undertaken prior to the transfusion commencing. This will assist prompt recognition of a possible transfusion reaction, e.g. presence of a rash/fever pre-transfusion.
- Vital sign monitoring, including temperature, pulse, respiratory rate and blood pressure, should be performed before, during and after the transfusion and documented on the BTF Observation Chart on the eMR (or local intensive care form). Vital Signs should be checked and recorded:
  - As a **baseline** before the start of the transfusion.
  - Within **15 minutes after the start** of the transfusion or with commencement of each new unit.
  - **Hourly** during the transfusion and
  - **At the end** of each unit transfused
  - More frequent observations should be done when administering blood to a critically unwell patient or if the patient's condition deteriorates during an infusion.
- All patients must have the volume of blood they receive each hour recorded every hour during the transfusion.
- Patients should be closely observed for the first 15 -30 minutes of the transfusion and instructed to report to staff if they experience any discomfort or unusual symptoms.
- Signs and symptoms of acute reactions may present differently in paediatric patients and can include irritability, agitation and inconsolability by the parent or carer. These signs and symptoms may be present in the absence of, or before changes in vital signs.

Refer to Section 7 – Management of Adverse Transfusion Reactions if a patient displays or reports any signs and symptoms of an adverse event.

6.5 Time limit for blood and blood component administration: 30 minute – 4 hour Rule

Refer to Appendix II for more information

There is an increased risk of bacterial contamination once blood products have been removed from the appropriate storage conditions.

- **Red cells, FFP and cryoprecipitate**: transfusion must commence within **30 minutes** of removal from storage and must be completed within **4 hours** of the start of transfusion.

- **Platelets:** transfusions should commence within **30 minutes** of removal from a platelet agitator because of the risk of the platelets clumping and becoming damaged. Once transfusion has commenced platelets should generally be given within **1 hour**. Where required, e.g., a patient with cardiac failure, platelets can be transfused over up to 4 hours, although platelet clumping increases with longer transfusion times.

6.6 Co-administration of IV Fluids and Medications with blood or a blood component

Medications and IV fluids MUST NOT be added to any blood component pack or to the administration set.

As a general rule blood and blood products must not be administered concurrently with any other fluid, medication, parenteral nutrition or blood product. The exception is co-administering Furosemide with albumin.

In situations where alternate IV access is unobtainable or when it is absolutely necessary that medications are to be given during a blood transfusion, the following procedure should be followed:

- The blood transfusion should be stopped and the IV line should be flushed with normal saline before and after the administration of the medication.
- The medication must be administered through a separate IV administration set.
- The blood transfusion can then be recommenced ensuring that the transfusion is completed within 4 hours from the start of administration.
- 0.9% sodium chloride, 4% albumin and ABO compatible plasma are the ONLY fluids compatible for co-administration with a red cell transfusion. If co-administration of any one of these fluids is required, they must be infused via a separate IV administration set.
    - **Exception:** Co-administration of Morphine, Pethidine and/or Ketamine diluted ONLY in 0.9% sodium chloride has been shown not to adversely affect red cells. If these medications are required to be co-administered as a PCA infusion, they must be infused using a separate IV administration set via a continuous side line infusion at the connection closest to the patient. This should be done only AFTER discussion with the patient's Consultant.
- Platelets can be co-administered with normal saline ONLY.

6.7 Albumin Administration

Human Albumin is available for administration as Albumex® and comes in two concentrations, Albumex® 4% and Albumex® 20%. Caution should be taken to ensure the correct dose and concentration is given.
The following procedure should be followed in accordance with section 5.1 and section 6.1.
Standard Precautions must be used:

- A new standard IV administration set is to be used for the administration of Albumin concentrations. No filter is required. Do NOT agitate the solution.
- Administration from glass bottles requires a vented system. An airway needle is required for adequate flow.
- Medications are not to be added to the bottle or to the administration set.

- Patient observation and monitoring should be followed in accordance with section 6.4.
- Record the batch number of each bottle by removing the batch sticker and placing on the Blood Component Order Sheet (SCN130.310).
- Each bottle should only be accessed once and be used for a single patient only.
- The volume and rate of albumin infusion should be determined by the prescribing medical officer. If an albumin infusion is required to run for more than 4 hours, the albumin bottle should be replaced with a new bottle after 4 hours. Any albumin remaining in a bottle after 4 hours should be discarded.
- Further information about suggested Albumin dosages and administration can be found on the ARCL website or on the CSL website.
    - https://www.lifeblood.com.au/health-professionals/products/fractionated-plasma-products/albumin
    - https://www.cslbehring.com.au/products/products-list .

6.8 Coagulation Factor Administration

Several Coagulation Factor products are available from the local hospital Blood Bank.

- Informed consent must be taken and documented for all bleeding disorder patients receiving plasma derived coagulation products prior to their first dose of the coagulation factor. After which consent does not need to be repeated unless treatment options change. (See: PD2012_016.)
- The procedure for collecting Coagulation Factors from the Blood Bank should be followed in accordance with section 5.1.
- Reconstitution must be followed as per individual product information.
- The correct brand of coagulation factor MUST be administered as per the Haematologist's orders. If the prescribed brand is unavailable, please discuss with the Haematologist. Do NOT give an alternative brand of factor without prior discussion.
- **Record Batch numbers**:
    - If using a Paediatric Medication Chart, remove the peel off sticker and place on the medication chart, or on the Blood Component Order Sheet (SCN130.310)
    - If recording electronically, enter the number in the "Comments" box in the MAR when administrating the factor product.
- If you are having difficulty in reconstituting the Coagulation Factor please contact the Haematology CNC (during business hours) or Blood Bank (after hours) for assistance or read the product insert for instructions on how to reconstitute.
- Coagulation factors are generally ordered as an intravenous bolus. These are to be delivered neat and not further diluted and pushed as an IV bolus as per product information instructions.
- Vials that are broken or unable to be reconstituted must be returned to Blood Bank, NOT discarded.

6.9 Waste Management

- Standard precautions must be used when handling blood products required for clinical waste.

- If a severe transfusion reaction is suspected then the blood pack should be retained and sent to the local hospital Blood Bank for further testing. Refer to Section 7 on Management of Transfusion Reactions. Ensure all efforts to avoid further contamination of the bag.
- All waste should be discarded following hospital policy. Refer to Waste Management Policy.

6.10 Blood Warmers for Red Cells Only

- All blood warmers must be assessed by Biomedical Engineering to ensure that they meet the specifications of the manufacturer and are validated for the use of blood warming. A blood warmer maybe indicated for the use of:
  - Large volume rapid transfusions >15mL/kg/hour in children or >50mL/kg/hr in adults.
  - Exchange transfusions
  - Apheresis procedures.

Red cells should only be warmed as they are being administered to the patient. The thermometer should be visible at all times. The temperature of the blood warmer must be documented in the patient's clinical notes and must not exceed 40°C.
Never warm red cells using improvised methods including: microwaving, use of heated towels, radiator/heater or water baths. These methods can damage red cells and cause harm to the patient.

7 Management of Adverse Transfusion Reactions

Acute transfusion reactions can commonly present in complex clinical situations, when the diagnosis requires distinguishing between a reaction to the transfused blood product and a coincidental complication of the illness being treated that occurs during or immediately after a blood transfusion. As a consequence any suspected transfusion reactions require immediate recognition, laboratory investigation, and appropriate clinical management. Blood transfusion can be associated with various adverse effects. Some reactions are acute, others delayed. It is essential to monitor all patients closely to recognise the signs and symptoms of a transfusion reaction.

ALL transfusion reactions **MUST** be reported to the local hospital Blood Bank and recorded in the Incident Information Management System (IMS+), and as an alert in the patient's eMR. The Paediatric Haematologist on call at your local hospital can be contacted for advice.

7.1 Complications of Transfusion

- Febrile reactions
- Allergic reactions manifested as urticaria, wheezing, anaphylactoid reactions
- Alloimmunisation of the recipient of red blood cells, white blood cells, platelets and protein antigens
- Haemolytic transfusion reaction
- Circulatory overload
- Bacterial contamination
- Metabolic complications such as hypothermia, acidosis, hyperkalaemia, hypocalcaemia

- Clinically significant depletion of coagulation proteins and platelets (during a massive transfusion)
- Transmission of viral infectious disease
- Transfusion Associated Graft-versus-host (TA-GVH) disease
- Transfusion-related Acute Lung Injury (TRALI)
- Iron overload

7.2 Acute Complications of Transfusion

Acute transfusion reactions can occur during or shortly after the transfusion (within 24hours). They can be mild, moderately severe and even life-threatening with the most common reactions being fever, chills and a rash.

- The most common cause of mild reactions is hypersensitivity.
- Moderately severe reactions include febrile non-haemolytic transfusion reactions. During the early stages of a transfusion reaction it may be difficult to distinguish between a moderate severe reaction and a life-threatening reaction.
- Life-threatening reactions include shock, intravascular haemolysis, anaphylaxis and TRALI. Common causes are ABO incompatible transfusions and contaminated blood packs.

7.3 Delayed Complications of Transfusion

Delayed complications include transfusion transmitted infections and delayed haemolytic reactions that can occur days, months or even years after the transfusion.

Some examples of delayed transfusion reactions include:

- Cytomegalovirus, Epstein Barr Virus, Toxoplasmosis, Hepatitis B and C infection
- Delayed haemolytic transfusion reactions
- Post-transfusion purpura
- Graft versus host disease
- Immunosuppression
- Iron overload

Patients and parents/guardians should be instructed to report immediately if any of the below signs and symptoms are experienced as they could indicate a transfusion reaction.

7.4 Reaction Types and Signs and Symptoms

Type of Reaction	Signs and Symptoms
Mild Allergic	Localized urticaria, pruritis, rash
Severe Allergic	Flushing, wheezing, facial oedema, hypotension, anaphylaxis
Febrile	Unexpected fever > 38° C may be accompanied by rigors/chills
Acute Haemolytic	Rigors, fever, flank pain, tachycardia, dyspnoea, hypotension, haemoglobinuria, unexplained bleeding

Type of Reaction	Signs and Symptoms
Transfusion Related Acute Lung Injury (TRALI)	Dyspnoea, respiratory failure, pulmonary oedema, chills, fever
Septic reaction	Fever, chills, rigors, nausea/vomiting, hypotension

7.5 Immediate management of a suspected transfusion reaction

If a patient develops any of the above signs and symptoms:

1. **STOP** the transfusion and provide immediate care.
2. Perform a complete check of observations and document on the BTF Observation Chart on the eMR (or local intensive care form).
3. Check patient identity and confirm that the right blood product has been given to the right patient.
4. Call for a clinical review or rapid response by dialling 2222.
5. Maintain IV access with normal saline using a new IV giving set.
6. Contact the Paediatric Haematologist on-call and the local hospital Blood Bank for further investigations.
7. Document the reaction and the management in the patients' medical record.
8. Report the incident in IMS+ reporting system.

7.6 Wrong Product Administration

1. **STOP** the transfusion and provide immediate care.
2. Perform a complete check of observations and document these on the BTF Observation Chart on the eMR (or local intensive care form).
3. Check patient identity and what blood product has been administered. Check the details of the blood or blood component unit against the Blood Component Sheet.
4. Call for a clinical review or if necessary a rapid response by dialling 2222.
5. Maintain IV access with normal saline using a new IV administration set.
6. Contact the Paediatric Haematologist on-call and the local hospital Blood Bank for further investigations.
7. After notifying Blood Bank, ensure the unit and a copy of the Blood Component Sheet is returned to Blood Bank
8. Document the reaction and the management in the patient's medical record.
9. Report the incident in IMS+ reporting system

7.7 Investigation of a Transfusion Reaction

After the decision is made to discontinue the transfusion, send the following requests and blood samples to the local hospital Blood Bank in consultation with the Haematologist on call and Blood Bank lab staff:

- 1mL EDTA tube sample: **FBC and DAT**
- 5-10mL EDTA tube sample, hand labelled: **Group and Screen**
- 2mL Lithium Heparin tube sample: **EUC's**
- Blood cultures from the patient
- A 2nd Blood culture form - requesting blood culture of the "used unit of blood". This blood culture sample will be taken from the used unit of blood by the microbiologist in the laboratory.
- Urine sample (first voided sample after the reaction): Urinalysis (to check for blood)- if positive, send to Micro for MC&S
- Blood Pack (Placed in a sealed specimen bag. **Do not send** via pneumatic tube (CHW) / SCUD system (SCH). Do not send any sharp objects. Ensure blood pack is not contaminated further as this will impact on the investigation)

7.8 Incident Management System – IMS+.

The Incident Information Management System (IMS+) should be used to report any suspected transfusion reaction or any 'near miss' event that occurs related to the blood transfusion process. All Blood and Blood Component related incident reports are discussed and reviewed by the local hospital Transfusion Review Committee.

All staff should familiarise themselves with the Incident Management Policy and the Incident Management Procedure.

8 Documentation

Record ALL related blood incidents, including 'near misses' and 'wrong blood in tube episodes' using the Incident Management System - IMS+.

The complete documentation of transfusions allows adequate follow up investigation of any serious adverse event as well as aid the auditing process in transfusion practice.

Include the following into the documentation:

- The indication for the use of blood or blood components
- Documented Consent
- The outcome of the transfusion & whether or not it achieved the desired effect
- The date of the transfusion
- The time the transfusion commenced and completed
- The type and volume of the transfusion
- Compatibility label or report must be included in the clinical notes
- Complete documentation of nursing observations throughout the transfusion
- The management and outcome of any adverse event.

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Appendix I: Guide to Informed Consent

Provide information to the patient/parent/carer about:

1. **Nature of the proposed transfusion therapy** - what is involved
2. **Benefits of transfusion**
3. **Risks of transfusion** (common, rare and serious)
   [refer to Patient Blood Management Guidelines Module 6 Neonatal and Paediatrics Appendix C Transfusion Risks]
4. **Alternatives** - including the risk of not transfusing

Ask the patient/parent/carer

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

Document

- The consent process -as per hospital/health service policy

When obtaining consent, use:

- Written information or use diagrams where appropriate
- A competent interpreter when the patient is not fluent in English. The Interpreter Services should be contacted as a family member or staff member are not appropriate.

Note: the transfusion of autologous blood is not without risk (such as getting the wrong blood back & bacterial contamination of the unit). The same indications for transfusion of homologous blood apply

More Info?

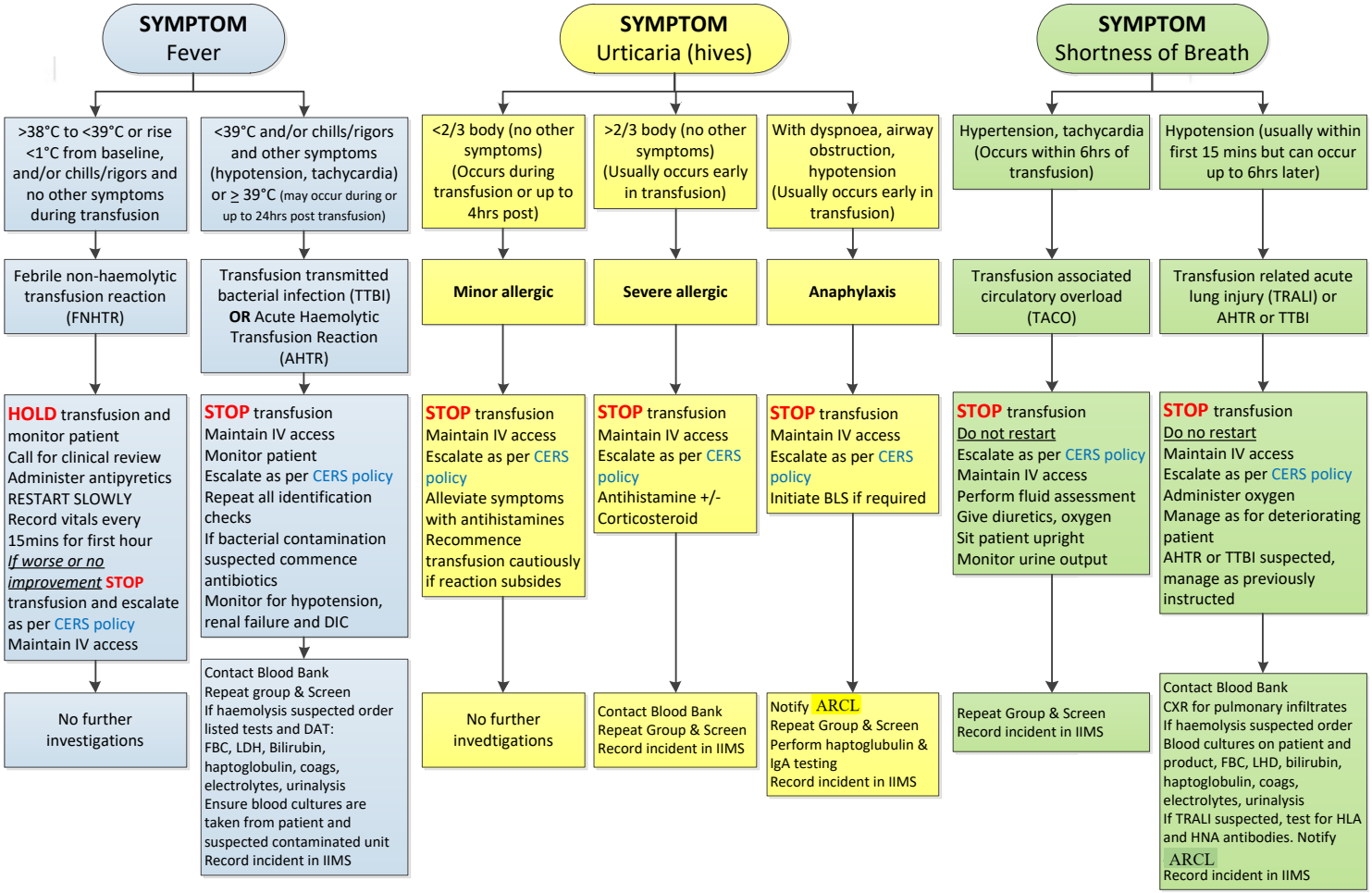
Ask your transfusion service provider or visit:

- Australian Red Cross Blood Lifeblood at: www.donateblood.com.au/
- The NHMRC web-site: http://www.nhmrc.gov.au/
- The Australian and New Zealand Society of Blood Transfusion Ltd: www.anzsbt.org.au

Appendix II: Time Limits for Transfusion Duration

Blood Component	Temperature range and conditions	Blood Giving set	Start Infusion	Complete infusion
Whole Blood/ Packed Red Cells	**2° to 6°C**	Yes	Within 30minutes	Within 4 hours or less of commencing transfusion
Platelet	**20° to 24°C**	Yes	Immediately within 30 minutes	Within 30 – 60 minutes; up to 4 hours if required
Frozen Plasma	**At or below -25°C** Once thawed, can be stored at 2-6°C for up 24 hours	Yes	Within 30minutes after thawing	Within 4 hours or less
Cryoprecipitate	**At or below -25°C** Once thawed, can be stored at 2-6°C for up 6 hours	Yes	Within 30minutes after thawing	Within 4 hours or less
Albumin	Below 30°C Must not be frozen	No	Use immediately after opening the bottle	Within 4 hours or less

Appendix III: Transfusion Reaction Guide - Flowchart



All transfusion reactions must be reported to Blood Bank and recorded in IMS+

Appendix IV:

Guidelines for the Transfusion of Red Blood Cells in Children

- These guidelines are intended to apply to the child who presents with anaemia with a sub-acute or chronic onset. They DO NOT apply to children on the chronic red cell transfusion programme (*e.g. thalassaemia and sickle cell anaemia*) and children with other co-existing clinical factors as described below e.g. patients who are bleeding acutely and those with acute intravascular haemolysis. Generally in these groups of children, the threshold for transfusion is higher than the threshold for a child who has a chronic anaemia.
- In children who present with anaemia, correctable factors should be tested for and treated e.g. iron, vitamin B12 and folate deficiencies.
- Co-existing clinical factors may influence the decision as to whether to transfuse the anaemic child and what level of Hb to transfuse them at, e.g.
  - Bleeding
  - Infection/septicaemia
  - Disseminated intravascular coagulation
  - Oxygen dependency/respiratory support
  - Recent or impending surgical procedures
  - Impending apheresis procedures
  - Bone marrow transplantation
  - Parvovirus induced aplastic crisis in a child with an underlying haemolytic anaemia
  - Presence or absence of a reticulocyte response
  - For an oncology patient on chemotherapy: the time elapsed from the start of the last cycle of chemotherapy needs to be considered.
    - If the child is in the recovery phase then the Hb may be expected to rise spontaneously.
    - If the patient is entering the pancytopenic phase and the blood count is falling, it is likely transfusion will be indicated, especially if the haemoglobin is below 70gm/L.
- In general terms, and bearing in mind the presence or absence of co-existing clinical factors
  - If the Hb is ≥ 80 gm/L, transfusion is unlikely to be indicated
  - If the Hb is 61-79 gm/L, the decision to transfuse will generally depend on the presence or absence of co-existing clinical factors and the clinical state of the patient
  - If the Hb is 40-60 gm/L, transfusion is highly likely to be indicated. If the decision is made not to transfuse, then the patient must be closely monitored, the Hb rechecked at a defined interval and the decision regularly reviewed.
  - If the Hb is ≤ 40 gm/L, transfusion is virtually always indicated because of the risk of tissue hypoxia.

- If the decision is made not to transfuse when the Hb is < 61, the case must be discussed with the consultant in charge of the patient and then the patient must be closely monitored, the Hb rechecked at a defined interval and the decision regularly reviewed.

- Every time a child is transfused with a human derived blood product, consideration must be given as to whether the child requires the product to be irradiated and/or cytomegalovirus (CMV) negative (see: Section 3.4)

Appendix V:

Guidelines for the Transfusion of Platelets in Children

- These guidelines are intended to apply to the child who presents with thrombocytopenia without bleeding.
- These guidelines DO NOT apply to:
  - babies with neonatal allo-immune thrombocytopenia
  - children with qualitative platelet defects
  - children with idiopathic thrombocytopenic purpura (ITP)
  - children with thrombocytopenia due to any other cause who are bleeding, because in this situation a platelet transfusion is highly likely to be indicated.
- In children who present with thrombocytopenia, the cause of the low platelet count should be determined so the correct treatment strategy can be used e.g. a child with acute ITP may be best managed with IVIG or steroids and usually does not warrant a platelet transfusion.
- Co-existing clinical factors may influence the decision as to whether to transfuse the thrombocytopenic child because their presence may increase the risk of bleeding, e.g.
  - Fever/infection/septicaemia
  - Coagulopathy e.g. disseminated intravascular coagulation
  - Liver failure; renal failure
  - Recent or impending surgical procedures including lumbar puncture
  - Intracranial haemorrhage/neurosurgery
  - Newly diagnosed leukaemia e.g. acute promyelocytic leukaemia
  - Bone marrow transplantation
  - Systemic hypertension
- In oncology patients on chemotherapy, the time elapsed from the start of the last cycle of chemotherapy needs to be considered.
  - If the child is in the recovery phase then the platelet count may be expected to rise spontaneously.
  - If the patient is entering the pancytopenic phase and the blood count is falling, it is likely transfusion will be indicated, especially if the platelet count is below 10 x 10^9/L (see below).
  - Bone marrow transplant patients who have not engrafted are routinely often transfused when the platelet count falls below 10 x 10^9/L.
- *The thresholds at which platelet transfusions are indicated in any given clinical situation are controversial*. In general terms, in the child who is not bleeding:
  - If the platelet count is ≥ 100 x 10^9/L, transfusion is not indicated. (unless the child has a qualitative platelet defect).
  - If the platelet count is ≥ 50-99 x 10^9/L, transfusion is usually not indicated and the decision to transfuse or not will generally depend on the presence or absence of co-existing clinical factors e.g. need for surgery.

- If the platelet count is ≥ 11-49 x 10^9/L, transfusion may be indicated, especially if other coexisting clinical factors are present and the child is judged to be at increased risk of bleeding without transfusion. e.g. newly diagnosed acute promyelocytic leukaemia.
- If the platelet count is ≤ 10 x 10^9/L, regardless of the presence or absence of co-existing clinical factors, in the oncology patient, transfusion is often indicated. Transfusion is highly likely to be indicated if any of the above coexisting clinical factors are present. If the decision is made not to transfuse, then the patient must be closely monitored, the platelet count rechecked at a defined interval and the decision reviewed regularly.
- If a child has a platelet count < 15 x10^9/L, the decision to transfuse or not must be discussed with the consultant in charge of the child and the haematologist on call.

- The child's previous response to platelet transfusions and the presence of anti-platelet antibodies may need to be taken into account e.g. in a patient undergoing surgery who has a known poor platelet increment with platelet transfusion, the platelets should be infused at the time of induction of anaesthesia in theatre.