FOREWORD

The Royal Perth Hospital Transfusion Medicine Unit (TMU) is situated on the second Level of North Block. It is the central point for distribution of all blood and blood products and all orders for these are channelled through the TMU.

The Transfusion Medicine Unit operates a 24-hour service

For transfusions at Royal Perth Shenton Park Campus, blood and blood products are held in the Laboratory. For after hours access contact the Nurse Manager on duty.

Direct enquiries to: Transfusion Medicine Unit
Extension 42409

Transfusion Haematologist
9421 2377

Principal Scientist
Extension 42044

Transfusion Nurse
Page 2407

5th edition:
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DISTRIBUTION

Previous editions of this Manual have been distributed to the following locations: Staff in these locations should replace previous hard copies with this edition if a hard copy is required in their location.

Emergency Department (4 copies) 7A RPRH Wards
ICUG 7B 1
ICUS 8A 2
HAD 9A 8
Theatre 9B 9
Recovery 9C 10
Radiology 10A 11
2K BMTU HDU
4A 4F/CCU Laboratory
4B Burns Unit Nurse Resource Office
5A IDU
5B Medical Oncology
5E Radiation Oncology
5F TMU
5G Haem. Registrars Office
5H Haem. HOD Office
6A Transfusion Haem. Office
6C Swan Health (2 copies)
6G Apheresis
6H Home Cancer Care Bentley Health Campus
REQUESTS FOR GROUP, SCREEN AND CROSSMATCH

The RPH Blood Grouping and Cross Matching Request Form is to be used.

**GROUP AND ANTIBODY SCREEN** comprises the establishment of the patient's blood group and testing for significant blood group antibodies. It is completed in 45 minutes. A crossmatch can be added by phoning the Transfusion Medicine Unit on 42409.

**CROSSMATCH** is the direct test between patient plasma and donor red cells for ABO compatibility. Once the group and screen is completed a crossmatch may be performed in 10 minutes, providing no antibodies are detected.

**VALIDITY OF SAMPLES**
For patients transfused in the last 3 months or those who are pregnant, samples are valid for 72 hours post collection. For those not transfused in the last 3 months, samples are valid for 1 month.

**IF REQUEST IS URGENT – PHONE** Transfusion Medicine Unit on 42409.
PATIENT IDENTIFICATION AND SAMPLE AND REQUEST FORM LABELLING REQUIREMENTS

REQUEST FORM

All request forms for group and screen and crossmatch must be written and signed by the requesting medical officer.

The following information is required:
- Patient surname, full given name(s) AND hospital record number
- Name and signature of requesting doctor
- Details of the request eg test required, type of product, number of units
- Date and time blood product required
- Clinical diagnosis and indication for transfusion, with supporting clinical and laboratory data
- Known red cell antibodies
- Current pregnancy
- Gender

PATIENT IDENTIFICATION

Ensure patient identity confirmed at time of sample collection by asking surname, full given name(s), date of birth AND checking the identification band attached to the patient.

SAMPLE

Ensure complete and accurate labelling of sample following collection and BEFORE leaving the patient with:
- Patient surname, full given name(s) AND hospital record number
- Signature and date/time
- The sample collector must also sign the statement on the request form to confirm the sample was taken from the patient named on the form (identity established by direct inquiry and/or wrist band inspection) and labelled immediately

NOTE:
SAMPLES WILL BE DISCARDED IF PATIENT INFORMATION IS NOT COMPLETE AND CONSISTENT ON REQUEST FORM AND SAMPLE.
VENOUS ACCESS AND EQUIPMENT FOR TRANSFUSION

TRANSFUSION GIVING SETS
A standard blood giving set incorporating a 170 - 200 micron filter is used to transfuse the following: Red cells, platelets, FFP, cryoprecipitate.
To minimise clogging of the filter, a maximum of 2 units of red cells should be transfused through a blood giving set.
Due to risk of bacterial contamination, administration sets must be changed on completion of blood product transfusion or every eight hours.

Note: Platelets must not be transfused through a giving set which has been used to transfuse red cells. Cellular debris in the filter will trap the platelets.

A standard IV infusion set is used to transfuse: Albumex, Intragam.

USE OF BLOOD MICROAGGREGATE FILTERS
There is insufficient evidence to recommend the routine use of microaggregate filters.

WHITE CELL (LEUCODEPLETION) FILTERS
See page 34 Leucocyte depleted blood products

GRASEBY PUMPS FOR TRANSFUSION
The Blood Transfusion Sub Committee does not support their use for this purpose.

TRANSFUSION OF BLOOD UNDER PRESSURE:
Transfuse blood under pressure only when rapid replacement is necessary. The most important factor influencing infusion rate is the size of the intravenous cannula and not the infusion pressure. The pressure gauge should not exceed 300mmHg, as excessive pressure may cause red cell haemolysis. Close observation should be maintained during transfusion of blood under pressure, to avoid such possibilities as air embolism or extravasation.

Ideally, a size 18g or larger cannula should be used.

BLOOD WARMERS:
If a blood warmer is indicated, a specifically designed commercial device with a visible thermometer and audible warning is to be used. Blood components must not be warmed using improvisations such as putting the pack into hot water or in a microwave.
## CONCURRENT FLUIDS AND MEDICATIONS

### SOLUTIONS TO PRECEDE AND FOLLOW RED CELL TRANSFUSION
Isotonic saline (and not Dextrose solution) should be used before and after red cell administration. Dextrose solutions cause red cell swelling, and in some cases, intravascular haemolysis results.

### CALCIUM CONTAINING SOLUTIONS
These **MUST NOT** immediately precede, be transfused concurrently with, or follow blood transfusion, due to the risk of promoting coagulation of the transfused blood.

### MEDICATIONS
Medications must not be added to the blood product bag or transfusion line.
PRESCRIPTION OF BLOOD COMPONENT

MEDICAL STAFF RESPONSIBILITIES

To document

- Blood product to be transfused, including any special requirements eg irradiated, CMV antibody negative.

- The date and time transfusion is to take place.
  Note: Elective transfusions should not be administered between 2100hrs and 0700hrs.

- Indication for transfusion as per RPH guidelines (page 24 onwards).

- Duration of transfusion.
  Recommended transfusion times, unless otherwise clinically indicated:
  
  Red cells 1-2 hours,
  FFP 30mins – 1hr
  Platelets 30 minutes.
  Cryoprecipitate 30mins

- Any special instructions eg any medications required before or during the transfusion.
- Clinical outcome of transfusion: expected, adverse events.
- Patient information: see below

PATIENT INFORMATION

Written consent for blood and blood products is not required in Western Australia. However, the NHMRC/ANZSBT Clinical Practice Guidelines on the use of Blood Components, released in October 2001, recommends that patients be given clear explanation of the potential risks and benefits of blood component therapy in their situation. In addition, patients should be given a copy of the Royal Perth Hospital Patient Information Brochure on blood transfusion (available from the Supply Department).

For patients who refuse blood products eg Jehovah’s Witnesses please refer to the Refusal to Permit Blood Transfusion form (See Appendix 1).
ESTIMATED RISK OF TRANSFUSION-TRANSMITTED VIRAL INFECTION

The ARCBS estimates of transfusion-transmitted infection are based on the median value of three published models. The values in the table below have been recently updated and detail the risk for the period July 2000 to June 2003.

<table>
<thead>
<tr>
<th>Virus</th>
<th>Window Period (Days)</th>
<th>Point estimate of residual risk 'per unit'</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV</td>
<td>9</td>
<td>1 in 7,299,000</td>
</tr>
<tr>
<td>HCV</td>
<td>7</td>
<td>1 in 3,663,000</td>
</tr>
<tr>
<td>HBV</td>
<td>45</td>
<td>1 in 1,339,000</td>
</tr>
</tbody>
</table>

OTHER POTENTIAL HAZARDS OF TRANSFUSION

- ABO incompatibility remains one of the most common fatal complications of blood transfusion and most are due to avoidable errors (such as patient / sample identification errors).
COLLECTION OF BLOOD COMPONENTS FROM TMU

- Fluid Treatment Chart checked for product to be given according to RMO orders and collection of product from the Transfusion Medicine Unit (TMU) by a designated person immediately prior to the commencement of transfusion.
- Complete TMU product request form (see Appendix2) with full identification of patient.
- Blood should NOT be collected from the TMU until a patent IV line is in-situ and the patient is ready to be transfused.
- All blood and products are released by a Transfusion Medicine Unit scientist to a courier (not necessarily a registered nurse).
- For pneumatic system delivery request procedure see P13.
- If the scientist is absent from the TMU, a message will be given on the answer phone, and a note will be displayed at the window giving instructions as to how they can be contacted.
- Remember that except in an emergency, only one red cell unit per patient will be issued at a time. If multiple units are issued for an emergency, any unused units must be returned immediately to the TMU once the emergency requirement has been met.
- If the transfusion cannot be commenced within 30 minutes, blood should be immediately returned to the TMU.
- Domestic refrigerators in wards must NOT be used for the storage of blood. This is because the temperature of these refrigerators is not closely monitored and therefore its maintenance within the accepted temperature range cannot be guaranteed.
- Ensure blood products are never left on benches or stored in ward fridges.

BLOOD HANDLING & TRACKING IN THEATRES

Red cells, FFP and cryoprecipitate transferred from the TMU to theatres must be placed in the theatre blood fridges if not being immediately transfused to a patient.

The procedure for handling and tracking red cells in theatre is:

1) On receipt, place immediately in blood fridge.

2) REMOVE RED CELLS FROM THE FRIDGES ONLY WHEN REQUIRED FOR IMMINENT TRANSFUSION. Immediately before the red cells are to be transfused remove the yellow temperature tag for return to the TMU.

Unused red cells and FFP and cryoprecipitate should be returned to the Transfusion Medicine Unit as soon as possible after completion of surgery. They should NOT be transferred to ICU or ward areas with the patient unless being currently transfused.

NOTE: PLATELETS ARE NOT TO BE STORED IN THE FRIDGE
TRANSPORT OF BLOOD AND BLOOD PRODUCTS VIA THE PNEUMATIC TUBE SYSTEM

RPH Wellington St campus North block wards and other clinical areas linked to the pneumatic tube delivery system may receive blood and blood products using this system. The following protocol applies:

Requesting blood and blood products:

1. Send a completed “Pneumatic Delivery Request” form (appendix 2) with 2 pieces of foam in a canister to the Transfusion Medicine Unit Station 10. (NOTE: after 1700 weekdays and on weekends, phone 42409 prior to sending request).
2. Wait by station to receive blood product requested. If blood product has not been received within 5 mins ring the Transfusion Medicine Unit on extension 42409.
3. After receiving the units, immediately return the form, signed, to the Transfusion Medicine Unit (Station 10) in the empty canister to acknowledge receipt of the blood product.

NOTE:

*The blood transfusion must commence within 30 minutes of the bag leaving the Transfusion Medicine Unit. If unable to do so, return the blood product to the Transfusion Medicine Unit (for red cells in Main Theatre – to the East or West end blood fridges).*

Returning Unused Blood Products:

1. Place packs in canister (a limit of 2 per canister with foam packing at each end).
2. Phone the Transfusion Medicine Unit on extension 42409 to ensure that someone present to receive the blood (important in case blood products become lodged in the shute or a scientist is not present in the blood bank to receive the blood product).
3. Send to Station 10.
ADMINISTRATION OF BLOOD COMPONENTS

Prior to transfusion of blood components, refer to:
- Information in this manual for the blood component to be transfused.
- The Standards of Nursing Practice - Intravenous Therapy General.
- Inform the patient of pending procedure, and ensure they have a copy of the patient information brochure.
- Practice universal precautions when handling all blood products.

IDENTITY CHECK OF PATIENT AND COMPONENT

The bedside check is a vital step in preventing transfusion error, and there must be vigilance in checking to ensure that the right blood is given to the right patient.

2 staff members must carry out the identity check of the patient and the blood component at the patient’s bedside, one of whom must be a registered nurse or medical officer. The person spiking/hanging the component must be one of the 2 people who have undertaken the component and patient identity check.

Procedure:
- All inpatients having a blood transfusion must have an identification band attached.
- Patient shall be positively identified by asking them to state their surname, first name and date of birth (whenever possible).
- These details must be the same as on the patient’s identification band.
- If the patient is unable to state his/her name, verification of patient identity should be checked with carer (if present).
- Patient details on identification band (surname, first name, date of birth, unit record number) checked and identical with
  - patient identity on compatibility label attached to the blood product
  - patient label on Fluid Treatment Chart
- The following additional information checked between blood pack label and compatibility label:
  - Pack number
  - Blood group (patient and donor)
  - Compatibility statement on compatibility label
- Other information checked on blood pack:
  - Expiry date

If there is any discrepancy found during the bedside identity checking procedure, the blood component must not be transfused until the discrepancy is resolved.
ADMINISTRATION (CONT’D)

- Inspect the blood product for unusual discolouration, clots or turbidity. If present return to TMU.
- Peel off the detachable compatibility label and affix it to the Blood and Blood Products haematology form MR326.
- Ensure commencement time of product and any other relevant information (e.g., pre-med given, adverse event) is documented in the comments column of the observation chart.

NURSING OBSERVATIONS
Baseline TPR and BP must be taken prior to blood product transfusion.
Then, following commencement of the transfusion:
- Red Cells, Fresh Frozen Plasma, Cryoprecipitate:
  - TPR and BP after 15 mins,
  - hourly and/or on completion of each unit

- Platelets:
  - TPR after 15 mins and then on completion

Closely observe the patient for the first 15 minutes of the transfusion, as this is when severe reactions are most likely to occur.
Instruct patient to report immediately any adverse effects. In the event of an adverse reaction or suspected adverse reaction, please refer to page 16

- Record patient observations before, during and after completion of transfusion on the observation chart.
- Document all blood products transfused and the outcome of the transfusion in the patient progress notes.
- At the completion of the transfusion, dispose of all bags/bottles as per hospital policy for disposing clinical waste. Glass bottles are not suitable for recycling.
# Transfusion Reaction Chart

<table>
<thead>
<tr>
<th>REACTION</th>
<th>Symptoms and Signs</th>
<th>POSSIBLE CAUSE</th>
<th>IMMEDIATE MANAGEMENT</th>
</tr>
</thead>
</table>
| **FOR ALL SUSPECTED TRANSFUSION REACTIONS**
| 1. STOP TRANSFUSION
| 2. Keep IV line open with normal saline
| 3. Check blood pack label and patient identification labels are correct i.e. correct unit has been given to correct patient.
| 4. NOTIFY RMO AND TMU (EXT 42409)
| **Mild**
| • Increase in temperature of >1°C above baseline and NO other symptoms
| • Localised urticaria (hives or rash) and NO other symptoms
| • FNHTR (febrile non haemolytic transfusion reaction)
| • Mild allergic reaction
| **STEPS 1 - 4 ABOVE**
| **COMPLETE TRANSFUSION REACTION FORM ONLY (NO SAMPLES REQUIRED)**
| If no clinical improvement within 15 minutes, or symptoms and signs worsen, treat as moderate/severe
| **Moderate and Severe**
| • Fever of > 39 or fever ≤39° and other symptoms eg. rigors, hypotension
| • Extensive Urticaria (hives or rash)
| • Dyspnoea
| • Hypotension or Hypertension
| • Bacterial contamination
| • Acute haemolytic transfusion reaction
| • Severe Allergic
| • Anaphylaxis
| • Circulatory overload
| • TRALI (transfusion related acute lung injury)
| **STEPS 1 – 4 ABOVE**
| **5. DO NOT RESTART TRANSFUSION**
| **6. SEND BLOOD PRODUCT UNIT AND GIVING SET TO TMU**
| 7. Complete Transfusion Reaction Report Form
| 8. Collect samples as per reaction report form
| See ARCBS Circular of Information for further information (available from TMU or at: www.donateblood.com.au/clinical) and contact TMU/ Haematology registrar for advice regarding further investigations and management
HAEMOVIGILANCE PROGRAMME

A Haemovigilance programme is in place which aims to record and analyse adverse transfusion related events, from the point of crossmatch request generation, to the transfusion of the patient. The purpose of the programme is to identify areas of practice which may be improved, and therefore minimise errors which have the potential to adversely impact on the patient.

An important element of the programme is the anonymity of the data collected. Individuals reporting adverse events are not identified. This provision is made to encourage cooperation. The programme is also registered with the Quality Unit.

Stages involved in the transfusion process are:

**In the clinical areas:**
- a) Correct identification of patient.
- b) Completion of request form.
- c) Collection and labelling of samples.
- d) Delivery of samples to the laboratory.

**In the laboratory:**
- e) Registering and testing of samples.
- f) Correct recording of results and product labelling.
- g) Issue of correct product for correct patient.

**After leaving laboratory:**
- h) Delivery to clinical area.
- i) Handling of product in clinical area.
- j) Correct identification of patient.
- k) Correct administration of transfusion.
- l) Observations during and after transfusion.

Adverse events are reported on a red Haemovigilance report form. The reverse of this form is used to record clinical reactions to transfusion. (SEE APPENDIX 3)
PREOPERATIVE AUTOLOGOUS BLOOD COLLECTION

BACKGROUND:
Autologous blood can be an alternative to homologous blood for patients anticipating transfusion, and may be medically indicated in some circumstance such as a known rare blood group. While it is commonly perceived that autologous transfusion removes the risk of transfusion-transmissible infection, in Australia the overall safety of autologous blood transfusion is not significantly different to homologous transfusion.

Most of the risks associated with any blood transfusion remain. These include bacterial contamination, clerical error, the effects of leucocyte breakdown, and fluid overload. In addition, autologous blood collection exposes the patient to complications of venesection such as vasovagal syncope and haematoma, as well as increasing the likelihood that the patient will require blood transfusion.

ARRANGING AUTOLOGOUS BLOOD COLLECTION

If autologous blood collection is required, complete an Australian Red Cross Blood Service (ARCBS) Autologous Blood Request Form (available from the Transfusion Medicine Unit). Send the completed form to the Autologous Clerk at ARCBS. Fax: 9221 5732. Telephone enquiries: 9421 2857.

The patient should then phone the Autologous Clerk at ARCBS on Phone 9421 2857 to make appointments for blood collection. Patients will be venesected by ARCBS staff at an ARCBS collection centre. You will be informed if any difficulties are encountered, or if there is a need to abandon the autologous programme for an individual patient.
THERAPEUTIC VENESECTIONS

BACKGROUND:

The Australian Red Cross Blood Service (ARCBS) offers a therapeutic venesection service to patients with medical conditions where regular venesection is beneficial. This programme will most commonly be used for patients with haemochromatosis, although on specific consultation, patients with porphyria cutanea tarda, polycythaemia rubra vera, and other conditions such as secondary polycythaemia may also be eligible for this programme.

ARCBS Guidelines for Therapeutic Venesections.

Patients must
2. be free from transfusion transmissible disease.
3. Have a medical condition for which venesection is indicated.

The referring doctor is ultimately responsible for clinical management and will review the ongoing need for venesection every 12 months, or more often, if required.

A patient with a raised serum ferritin without a clinical/genetic diagnosis of haemochromatosis is not eligible to be enrolled into the ARCBS therapeutic venesection programme. If other causes of raised ferritin have been excluded, such as malignancy, liver disease, undiagnosed chronic systemic or autoimmune disease, the person may be eligible to become a normal whole blood donor giving blood at intervals of at least 10-12 weeks.

ARCBS is responsible for therapeutic collection and for ensuring patient safety during the procedure. ARCBS will liaise with the referring doctor about the venesection protocol where necessary; and will inform both the patient and the referring doctor if the patient is assessed as not meeting ARCBS criteria for therapeutic donor selection.

ARCBS reserves the right to refuse to venesect if there is concern for patient safety. The blood donation will be used in clinical or derivative products only if patients fully meet donor selection guidelines for clinical use. ARCBS will not accept responsibility if the patient does not attend for venesection.

HOW TO REFER A PATIENT FOR THERAPEUTIC COLLECTIONS

Complete an ARCBS Therapeutic Information and Request Form (available from the Transfusion Medicine Unit) and fax to Medical Officer ARCBS Fax: 9221 5732. Telephone enquiries: 9421 2866
SECTION 2

BLOOD PRODUCTS
THE FOLLOWING BLOOD PRODUCTS ARE AVAILABLE FROM THE TRANSFUSION MEDICINE UNIT (TMU)

BLOOD COMPONENTS
- Red cell components  page 24
- Platelets  page 27
- Fresh frozen plasma (FFP)  page 30
- Cryoprecipitate  page 32

BLOOD COMPONENTS WITH SPECIAL ATTRIBUTES
- Leucocyte depleted  page 34
- Irradiated  page 36
- CMV negative  page 37

BLOOD COMPONENTS WITH SPECIAL ATTRIBUTES – REQUIRING DISCUSSION WITH TMU PHONE 42409
- Fresh Unrefrigerated Whole Blood (FUWB)
- Washed red cells

PLASMA DERIVED BLOOD PRODUCTS
- Pro/anticoagulants
  Prothrombinex™HT  page 44
  Biostate  for administration information contact haemophilia nurse on ext/page 2937 during working hours.
  After hours: TMU ext 42409
  MonoFIX®-VF-  for administration information contact haemophilia nurse on ext/page 2937 during working hours.
  After hours: TMU ext 42409
  Thrombotrol  contact TMU for information
- Albumin
  Albumex® 4  page 41
  Albumex® 20  page 42
THE FOLLOWING BLOOD PRODUCTS ARE AVAILABLE FROM THE TRANSFUSION MEDICINE UNIT (CONT’D)

- **Immunoglobulins**
  - Intragram®p page 38
  - Rh (D) immunoglobulin page 46
  - Sandoglobulin contact TMU for information
  - CMV Immunoglobulin contact TMU for information
  - Zoster Immunoglobulin page 48

RECOMBINANT BLOOD PRODUCTS

- **Recombinate** contact haemophilia nurse on ext/page 2937 (working hours)
  After hours: TMU ext 42409

- **BeneFIX** contact haemophilia nurse on ext/page 2937 (working hours)
  After hours: TMU ext 42409

- **Recombinant Factor VIII (NovoSeven)** contact TMU ext 42409

THE FOLLOWING BLOOD PRODUCTS ARE ISSUED BY THE HOSPITAL PHARMACY

- Normal Immunoglobulin (Intramuscular)
- Hepatitis B Immunoglobulin
## BLOOD AND BLOOD PRODUCTS SUMMARY

<table>
<thead>
<tr>
<th>PRODUCT &amp; SPECIAL FEATURES</th>
<th>INDICATION</th>
<th>BLOOD GROUPS</th>
<th>STORAGE &amp; ADMINISTRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RED CELLS</strong></td>
<td></td>
<td><strong>PAT GP</strong></td>
<td><strong>PROD. GP</strong></td>
</tr>
<tr>
<td>· Whole blood minus plasma &amp; platelets (approx 250ml)</td>
<td>· Active bleeding</td>
<td>Same ABO/Rh Then:</td>
<td>· 4°C for 42 days</td>
</tr>
<tr>
<td>· Leucocyte depleted.</td>
<td>· Hb &lt;70g/L</td>
<td>AB</td>
<td>· Only dedicated blood fridges</td>
</tr>
<tr>
<td>· Irradiated</td>
<td>· Hb 70 – 100g/L and symptomatic anaemia, blood loss</td>
<td>A, B</td>
<td>· &lt;30mins at room temperature prior to transfusion</td>
</tr>
<tr>
<td>· CMV Neg</td>
<td></td>
<td>A, B, AB</td>
<td>· Blood administration set</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O</td>
<td>· 1-2 hrs (&lt;4hrs)</td>
</tr>
<tr>
<td><strong>PLATELETS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>· 1 Single donor platelet (apheresis) volume 200mL</td>
<td>· Bleeding due to thrombocytopenia</td>
<td>· Same ABO group is desirable Then:</td>
<td>· Room temperature</td>
</tr>
<tr>
<td>· 5 units Random Donor Platelets (each random volume 40-60mL)</td>
<td>· Prophylaxis bone marrow failure (&lt;10x10⁹/L or &lt;20x10⁹/L risk factors)</td>
<td>A</td>
<td>· Agitation</td>
</tr>
<tr>
<td>· Leucocyte depleted.</td>
<td>· Surgery/invasive procedure &lt;5x10⁹/L or &lt;100 high risk surgery – ocular, neurosurgery</td>
<td>B</td>
<td>· 5 days</td>
</tr>
<tr>
<td>· Irradiated</td>
<td>· Platelet dysfunction</td>
<td>O low titre or A</td>
<td>· Blood administration set</td>
</tr>
<tr>
<td>· CMV Neg</td>
<td></td>
<td>A or B</td>
<td>· Over 30 mins</td>
</tr>
<tr>
<td><strong>FFP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(250-300 mL)</td>
<td>· Correct coagulation factor deficiency</td>
<td>· Same ABO group Then:</td>
<td>· &lt; -25°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>· Thawed in TMU immediately prior to use</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>· Allow 20 - 30 minutes to thaw</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O</td>
<td>· Blood administration set</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>· 30mins – 1hr (&lt;2hrs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A, B, AB</td>
<td></td>
</tr>
<tr>
<td><strong>CRYOPRECIPITATE</strong></td>
<td>Fibrinogen deficiency (fibrinogen &lt;1g/L and bleeding.)</td>
<td>· Same ABO group then as for FFP</td>
<td>· &lt; -25°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Thawed in TMU immediately prior to use</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· allow 15mins to thaw</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Blood administration set</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· 30 mins (within 2hrs)</td>
</tr>
</tbody>
</table>
RED CELLS

BACKGROUND

Blood for transfusion is provided as the red cell component obtained by removing most of the plasma after centrifuging whole blood collected into anticoagulant. The red cells are then resuspended in additives to prolong storage. There is very little plasma present.

Haematocrit: 0.50-0.75; volume >240mL.

One unit of red cells is expected to increase the haemoglobin by 10g/L in an average sized adult.

INDICATIONS

For treatment of clinically significant anaemia with symptomatic deficit of oxygen carrying capacity, and for replacement of traumatic or surgical blood loss. The decision to transfuse red cells should be based on the clinical assessment of the patient, the patient’s haemoglobin level and their response to any previous transfusion.

From the NHMRC/ASBT Guidelines (available at: www.anzsbt.org.au)

Red blood cells

Hb* Considerations

<70g/L Lower thresholds may be acceptable in patients without symptoms and/or where specific therapy is available.

70-100g/L Likely to be appropriate during surgery associated with major blood loss or if there are signs or symptoms of impaired oxygen transport.

>80g/L May be appropriate to control anaemia-related symptoms in a patient on a chronic transfusion regimen or during marrow suppressive therapy.

>100g/L Not likely to be appropriate unless there are specific indications.

* Hb should not be the sole deciding factor. Consider also patient factors, signs and symptoms of hypoxia, ongoing blood loss and the risk to the patient of anaemia.

Clinical and laboratory indications for use should be documented.

SINGLE UNIT TRANSFUSION

It has been a longstanding principle in transfusion practice to regard single unit red cell transfusions as unjustifiable. This position has been based on the view that if transfusion is required, at least 2 units are necessary to provide clinical benefit. In recent years, re-evaluation of transfusion practices, an increased focus on transfusion risks and increasing pressure on donor eligibility has led to changes in prescribing practises and an increasing emphasis on avoiding unnecessary transfusion and minimising donor exposure. In this context a single unit transfusion may be considered to be good clinical practice if it is all that is required to relieve symptoms, eg for low body weight individuals and patients with compromised cardiopulmonary function etc for whom fluid volume management is important.
RED CELLS (CONT’D)

CONTRAINDICATIONS

- **DO NOT** use red cells if anaemia can be treated with specific medications such as iron, vitamin B12, or folic acid.
- **DO NOT** use red cells as a volume expander.

ORDERING

- Fully complete a pink Grouping and Crossmatch Request Card (see Section 1 page 6,7).
- For elective surgical patients: order in accordance with the Maximum Surgical Blood Order Schedule (MSBOS) produced annually by the hospital. (APPENDIX 4)
- If request is URGENT – PHONE TMU on 42409.
- If leucocyte depleted and/or irradiated blood is required, this must be stated on the request card.

SAMPLES

10mls blood in EDTA tube.

SPECIAL CONSIDERATIONS

- Leucocyte depleted/filtered – see p 34
- Irradiation – see p 36
- CMV-negative red cells – see p 37
ADMINISTRATION

- See p 14.
- For the first 15 minutes, the rate should be no more than 5mls /min, unless otherwise clinically indicated.
- Transfuse over 1-2hrs (unless otherwise clinically indicated.)
- Transfusion must be completed within 4 hrs of the product leaving the Transfusion Medicine Unit.
- Red cell concentrates, being more viscous than normal intravenous fluids may cause problems during infusion if flow rates are too slow or inappropriate cannulas are used. The following guidelines are provided to minimise administration problems with red cell transfusion.
- An 18-gauge cannula is recommended.
- Transfusion should be completed within 2 hours unless the clinical condition of the patient dictates otherwise.
- If it is necessary to transfuse over a period greater than 2 hours, then the procedure must be completed within 4 hours.
  Note: Transfusion over 4 hours may result in failure of line patency and incomplete transfusion of the blood unit.
- Discard blood remaining in the pack after 4 hrs.
- Change giving set after each 2 units transfused.

PATIENT OBSERVATIONS

- Pre-transfusion TPR and BP.
- Repeated 15 minutes after commencement of each unit.
- Then, hourly and on completion of each unit.

ADVERSE REACTIONS

- Observe patient for change in vital signs
- See page 16 and also ARCBS Circular of Information available at www.donateblood.com.au/clinical/ or from Transfusion Medicine Unit.
PLATELETS

BACKGROUND

In WA, 2 different platelet components are produced by ARCBS:

1) Apheresis Platelets (Single Donor Platelets: SDP)
This is an adult dose of platelets prepared suspended in plasma. Platelet count approximately $3 \times 10^{11}$/unit (300 $x10^9$/unit). Leucocyte depleted (WCC <1.0$\times 10^9$/unit). Volume approximately 200mL.

2) Random donor platelets (RDP)
Platelet count >60$\times 10^9$/unit
Leucocyte count <0.2$\times 10^9$/unit; volume 40-60mL
Usual adult dose is 5 units.

The usual product issued from ARCBS is a SDP. However, in times of shortage, RDPs may be issued. Both should give a platelet increment of approximately $30 \times 10^9$/L at 1 hour.

INDICATIONS

The use of platelets is indicated for the prevention and treatment of haemorrhage in patients with thrombocytopenia or platelet function defects.

Prophylaxis

1. Bone marrow failure: Platelet count <10$\times 10^9$/L in the absence of risk factors or <20$\times 10^9$/L in the presence of risk factors eg fever, antibiotics, evidence of systemic haemostatic failure.

2. Surgery/invasive procedure: to maintain platelet count at >50 $\times 10^9$/L.
For surgical procedures with high risk of bleeding (eg ocular or neurosurgery) it may be appropriate to maintain count at 100$\times 10^9$/L.

3. Platelet function disorders: May be appropriate in inherited or acquired disorders, depending on clinical features and setting. In this situation, platelet count is not a reliable indicator.

Treatment

1. Bleeding: May be appropriate in any patient in whom thrombocytopenia is considered a major contributory factor.

2. Massive haemorrhage/transfusion: Use should be confined to patients with thrombocytopenia and/or functional abnormalities who have significant bleeding from this cause. May be appropriate when the platelet count is < 50$\times 10^9$/L in the presence of diffuse microvascular bleeding. A higher target level of 100$\times 10^9$/L is recommended with multiple trauma or central nervous system injury.
PLATELETS (CONT’D)

CONTRAINDICATIONS

- Bleeding unrelated to decrease in platelet count or function.
- Do NOT use in patients with destruction of platelets such as in ITP, TTP or Heparin Induced Thrombocytopenia unless the patient has a life-threatening haemorrhage.

SAMPLES AND ORDERING

- ABO group needs to be known. For new patients, complete a pink crossmatch request card and forward to the TMU with 10mL blood in EDTA.
- For patients whose blood group has been previously performed in the TMU, phone requests can be made.
- Cross-matched platelets may be required if HLA or platelet specific antibodies are present.

SPECIAL CONSIDERATIONS

- Bedside leucocyte filtration:
  SDP are a leucocyte depleted product (<1x10⁶WC /unit) and do not require bedside white cell filtration
  If a leucocyte depleted product is required, then a SDP should be requested.
  If this is not available, then the RDPs can be filtered at the bedside. See p 34 Leucocyte depletion.
- Irradiation – see p 36
- CMV negative - see p 37
- 10 min-1 hour post-transfusion platelet count to assess post-transfusion platelet response/_increment.
- Platelets of the patient’s ABO group should be given if available.
- The volume of Rh (D) positive red cells in apheresis platelets is usually insufficient to cause immunisation if Rh (D) positive units are given to an Rh (D) negative recipient. However, consider administering anti D immunoglobulin to woman of child bearing potential. See p 46 Rh (D) immunoglobulin.
PLATELETS (CONT’D)

ADMINISTRATION

- DO NOT REFRIGERATE.
- Transfuse immediately.
- Transfuse through a standard blood giving set.
- A new giving set must be used.
- For the first 15 minutes the rate should be no more than 5mls /min, unless otherwise clinically indicated.
- Transfuse over 30mins, unless otherwise clinically indicated.
- Flush with saline at end of transfusion, EXCEPT when using leucocyte depletion filters.

PATIENT OBSERVATIONS

- The nurse must stay with the patient during the administration of platelets.
- Pre-transfusion TPR and BP.
- TPR 15 minutes after commencement.
- Then, on completion.

ADVERSE EFFECTS

- Observe patient for change in vital signs
- See page 16
- Also ARCBS Circular of Information available at www.donateblood.com.au/clinical/ or from Transfusion Medicine Unit.

POINTS TO NOTE

- Platelet antibody screens to be performed weekly on patients regularly receiving platelets (5ml EDTA and 10ml citrate samples).
- Patients may be refractory to platelet transfusions for immune or non-immune reasons. Discuss with Transfusion Medicine Unit if crossmatched or HLA matched platelets required. Advance notice of at least 24 hours will be required.
FRESH FROZEN PLASMA (FFP)

BACKGROUND

Fresh frozen plasma is obtained from whole blood donations. The plasma is removed following collection and rapidly frozen to preserve labile clotting factors. FFP is used as a source of coagulation factors. One unit of FFP is derived from one unit of blood. The volume of each unit of FFP is approximately 250 – 300ml.

INDICATIONS

FFP is indicated for the control of bleeding in patients with abnormal coagulation and where no specific therapy is available.
Abnormal coagulation is usually defined as greater than 1.5 times normal range.

Specific indications for FFP are:

- Single coagulation factor deficiency and bleeding or an invasive procedure is planned, and where no specific factor replacement is available.
- Multiple coagulation factor deficiencies and patient is actively bleeding or an invasive procedure is planned (e.g. liver disease; DIC).
- Reversal of the haemostatic defect in coagulopathy following massive transfusion or with coronary artery bypass graft surgery.
- Thrombotic Thrombocytopenic Purpura (TTP): replacement therapy for plasma exchange.
- Reversal of warfarin effect. FFP should only be used for reversal of warfarin anticoagulation in the presence of significant bleeding (or high risk of bleeding). Use of Prothrombinex™ should be considered – see page 44.

CONTRAINDICATIONS

- DO NOT use FFP when a coagulopathy can be corrected more effectively with specific therapy, such as vitamin K, cryoprecipitate, Biostate or other specific factor concentrates.
- DO NOT use FFP as a plasma volume expander.
- FFP generally not considered appropriate for plasma exchange procedures (apart from for TTP).
- DO NOT use FFP for reversal of warfarin anticoagulation when there is no evidence (or high risk) of bleeding.
FRESH FROZEN PLASMA (CONT’D)

ORDERING

• Usual therapeutic dose: 10-15mL/kg. Order in number of units.
• The INR result and diagnosis must be available when ordering FFP.
• Requests which do not comply with guidelines are to be discussed with the Haematology Registrar
• Normally, a maximum of 2 units of FFP will be released at one time.

ADMINISTRATION

• FFP should be ABO compatible with the recipient’s red cells.
• If the blood group is unknown, group AB FFP will be issued.
  Note: the presence of anti-A and anti-B antibodies in FFP from group O donors may cause haemolysis if transfused to Group A or Group B recipients.
• FFP is stored at -25°C in TMU and thawed immediately prior to use. Thawing takes up to 30 minutes.
• Transfuse through a standard blood giving set.
• For the first 15 minutes the rate should be no more than 5mls /min unless otherwise clinically indicated
• Transfuse each unit over 30mins to 1hr unless otherwise clinically indicated.

NOTE

• Clinical and laboratory assessment of the patient's coagulation status is important in monitoring the effect of FFP.

PATIENT OBSERVATIONS

• Baseline TPR and BP.
• Repeated 15 minutes after commencement.
• Then, on completion or hourly (whichever comes first).

ADVERSE EFFECTS

• Observe patient for change in vital signs
• See page 16
• Also ARCBS Circular of Information available at www.donateblood.com.au/clinical/ or from Transfusion Medicine Unit.
CRYOPRECIPITATE

BACKGROUND
Cryoprecipitate is prepared from fresh plasma and is rich in Factors VIII (>70 IU/Unit) and XIII, Von Willebrand Factor and fibrinogen (>140mg/unit). One unit of cryoprecipitate is derived from one unit of blood. The volume varies between 10-40mL.

INDICATIONS
Fibrinogen deficiency (Fibrinogen <1g/L) or dysfibrinogenaemia when there is:
- Clinical bleeding
- Invasive procedure planned
- Trauma
- Acute disseminated intravascular coagulation (DIC).

CONTRAINDICATIONS
Unless alternative therapies are unavailable, the use of cryoprecipitate is not generally considered appropriate in the treatment of Haemophilia, Von Willebrand's Disease or Factor XIII deficiency.

ORDERING AND DOSE
- Preferably ABO group compatible with recipient's red cells. Rh (D) matching is not required.
- If the blood group is unknown, then group AB cryoprecipitate will be issued (or A if AB is not available).
- The cryoprecipitate is packaged in boxes of 8 units.
- It is stored frozen at –25C in TMU and thawed on request, immediately prior to use. This takes 15-20 minutes.
- Dose: The usual dose is 8 units (1 box).
- However, the clinical and laboratory assessment of the patient's coagulation status is important in monitoring the effect of cryoprecipitate, and determining the need for further doses.

ADMINISTRATION
- Cryoprecipitate must be transfused immediately after thawing.
- Transfuse through a standard blood giving set.
- For the first 15 minutes the rate should be no more than 5mls/min, unless otherwise clinically indicated.
- Transfuse total dose (8 units) over 30mins, unless otherwise clinically indicated.
- Flush with saline at end of transfusion.
CRYOPRECIPITATE (CONT’D)

PATIENT OBSERVATIONS

- Pre-transfusion TPR and BP.
- Repeated 15 minutes after commencement of each unit.
- Then on completion.

ADVERSE EFFECTS

- Observe patient for change in vital signs
- See page 16
- Also ARCBS Circular of Information available at www.donateblood.com.au/clinical/ or from Transfusion Medicine Unit.
LEUCOCYTE DEPLETED BLOOD PRODUCTS

BACKGROUND
Leucocytes present in blood components can stimulate allo-antibody production. This can result in platelet refractoriness and cause transplant rejection. Leucocytes are also a vehicle for virus transmission (e.g. CMV, HTLV). Leucocyte depleted (filtered) blood products (i.e. red cells, platelets) are used to prevent sensitisation to white cell antigens in patients requiring recurrent transfusions or in transplantation (e.g. cardiac, bone marrow, renal).

Established benefits of leucocyte depletion are:

1. Reduces incidence of refractoriness to platelet transfusion by HLA alloimmunisation in patients requiring long-term platelet support.
2. Reduces incidence of HLA alloimmunisation in non-hepatic solid-organ transplant candidates.
3. Reduces the risk of CMV transmission.
4. Reduces incidence of recurrent febrile non-haemolytic transfusion reactions (FNHTR) in patients who have had one documented FNHTR.

Pre-storage leucocyte depletion by in-process collection or filtration soon after collection (at ARCBS) is more effective than bedside leucocyte depletion. Most of the requirements for leucocyte depleted red cells and platelets are met by leucocyte depletion at ARCBS, and the products are labelled as such.

Leucocyte depleted red cells and platelets contain <1x10^6 leucocytes.

INDICATIONS FOR LEUCOCYTE DEPLETED BLOOD PRODUCTS
The following patient groups:

- Red cell and/or platelet transfusion-dependent or those requiring regular transfusions: e.g. ß-thalassaemia major and chronic renal failure.
- Planned for transplantation or undergoing transplantation eg bone marrow/stem cell, heart, lung, kidney.
- Leukaemia, lymphoma and aplastic anaemia.
- Requiring CMV-seronegative red cells and platelets, when these are unavailable.
- Previous febrile non-haemolytic transfusion reaction.

BEDSIDE LEUCOCYTE DEPLETION FILTERS

- ONLY to be used where leucocyte depleted red cells or platelets have not been provided by ARCBS and patient requires leucocyte depleted product.
- Leucocyte depletion filters remove >99.99% or 4 logs of WBC from either RBC or platelets.
- Leucocyte depletion filters cannot protect against: Hepatitis, HIV or Graft Versus Host Disease.
- Leucocyte depletion filters must be used according to the manufacture’s instructions to ensure maximum efficiency of leucocyte removal. The binding characteristics of the filter material may be compromised by priming with solutions other than the blood product.
LEUCOCYTE DEPLETED BLOOD PRODUCTS (CONT’D)

ADMINISTRATION

Red Cells

- Filtered red cells provided by the Australian Red Cross Blood Service are given through a standard blood administration set.
- Red cells requiring bedside filtration are administered through a leucocyte depletion blood filter (filter provided by the Transfusion Medicine Unit with the red cells).

Platelets

- Single donor apheresis platelets are provided leucocyte depleted by the ARCBS, and are labelled as such. They do not require a bedside leucocyte depletion filter.
- Platelets requiring filtration are filtered at the bedside through a leucocyte depletion platelet filter.

- **Filters should not be flushed** on completion of the transfusion.

ADVERSE REACTIONS

- As for red cells and platelets
IRRADIATED CELLULAR BLOOD PRODUCTS

BACKGROUND
Cellular blood products contain immunocompetent lymphocytes. Administration of these to patients with impaired immunity may cause transfusion-associated graft-versus-host disease which is associated with a high mortality. Irradiation of cellular blood products with 25Gy of gamma radiation will inhibit lymphocyte proliferation and prevent transfusion-associated GVHD.

INDICATIONS
- Allogeneic and Autologous Bone marrow /stem cell recipients and patients planned for these.
- Acute leukaemia undergoing chemotherapy.
- Aplastic anaemia.
- Hodgkin lymphoma.
- Patients receiving nucleoside analogue therapy e.g. Cladribine, Fludarabine.
- Congenital Immunodeficiency disorders.
- Patients receiving directed blood donations from family members.
- Recipients of HLA-matched single donor platelets and granulocyte transfusions.

ORDERING
- Request "Irradiated" red cells or platelets.
- The packs are irradiated by the ARCBS.

SAMPLES
- As for Red Cells and Platelets.

ADMINISTRATION
- As for Red Cells and Platelets.

ADVERSE REACTIONS
- As for Red Cells and Platelets.
CYTOMEGALOVIRUS (CMV)-NEGATIVE BLOOD PRODUCTS

BACKGROUND

CMV is a leucocyte-associated virus and the transfusion of blood containing viable leucocytes can transmit CMV to immunosuppressed patients. About 60% of blood donors are CMV seropositive, indicating prior exposure to CMV, and the likelihood of latent CMV in donor leucocytes. If red cells or platelets from these donors are transfused into a CMV-negative recipient, CMV infection may result.

INDICATIONS

- CMV seronegative recipients of allogeneic or autologous stem cell, bone marrow or solid organ transplants.
- CMV seronegative recipients of highly immunosuppressive chemotherapy eg leukaemia, lymphoma.
- Pregnant women who require transfusion, regardless of CMV antibody status.

ORDERING

- "CMV negative" to be requested for red cells and platelets.

NOTE

- If CMV seronegative red cells or platelets are not available, then pre-storage leucocyte depleted products can be given. This markedly reduces the number of leucocytes carrying the latent CMV virus and is an effective method of preventing CMV transmission.
BACKGROUND

Intragam® P is made by chromatographic fractionation of large pools of human plasma obtained from voluntary blood donors. The manufacturing process contains specific steps to reduce possibility of virus transmission including pasteurisation (heating at 60°C for 10 hours and incubation at low pH.)

Intragam® P is a sterile, preservative-free solution containing 6 g of human protein and 10 g of maltose in each 100 mL. At least 98% of the protein is IgG, with distribution of IgG subclasses being on average 61% IgG1, 36% IgG2, 3% IgG3 and 1% IgG4. Intragam P contains only trace amounts of IgA (typically <18 mg/mL).

Intragam® P is available in 3 gm (50 mL) and 12 gm (200 mL) vials sizes.

INDICATIONS

To ensure demands can be met from the limited supply, Intragam P is issued in accordance with guidelines released in 2000 by a Working party of the Australian Health Ministers’ Advisory Council (AHMAC) Blood and Blood Products Committee (available at http://www.nba.gov.au/pubs.htm).

The categories of clinical indications are as follows:
Category 1: indications for which there is convincing evidence of benefit.
Category 2: indications for which currently there is inconclusive evidence of benefit.
Category 3: conditions for which there is convincing evidence that IVIG has no benefit.

Approval for use of Intragam must be obtained from an ARCBS Haematologist.

Category 1 indications will be approved, but may have additional prerequisites and review requirements. Depending on the available supply of Intragam, a number of Category 2 and 3 indications (as detailed in the AHMAC guidelines) may also be approved if medically indicated eg where the patient has failed other forms of therapy; condition is life-threatening/ extremely disabling and there is literature to support the benefit from use of intravenous immunoglobulin.
INTRAGAM®P (CONT’D)

ORDERING

The following patient requests require approval from an ARCBS Haematologist

- ALL new patients
- Any requests which deviate from what has previously been approved eg. dose or frequency changed
- There are some patients who have had Intragem previously, but where each dose requires approval. TMU have the list of these patients.

Approval needs to be obtained prior to ordering the Intragem from TMU.

To do this:

- Complete the Intragem Patient Information form (available from the Transfusion Medicine Unit). All sections must be completed.
- Fax the Information form to ARCBS (working hours: 9221 3031, after hours 9421 2847)
- You will be notified of approval, or a request for further information, by telephone.
- Complete Blood Product Request Form and send to TMU who will order Intragem from ARCBS Distribution Department.

For approvals after hours, the ARCBS Haematologist on-call can be contacted via ARCBS Caretaker Distribution staff on 9325 3030.

ADMINISTRATION

- Allow the bottles to reach room temperature before infusing into the patient.
- IntragemP must be used immediately after opening the bottle, and administered separately from other IV fluids or medications the patient is receiving.
- IntragemP is administered intravenously through an IV infusion pump.
- Dosage and administration depends on the indication.

Infusion rates:

Administration is started slowly, and increased steadily if no adverse events are noted.

<table>
<thead>
<tr>
<th>Rate/hour</th>
<th>Volume to be infused</th>
</tr>
</thead>
<tbody>
<tr>
<td>1mL/min for 15 minutes</td>
<td>60mL 15mL</td>
</tr>
<tr>
<td>2mL/min for 15 minutes</td>
<td>120mL 30mL</td>
</tr>
<tr>
<td>4mL/min until infusion complete</td>
<td>240mL until complete</td>
</tr>
</tbody>
</table>

Note: Consideration should be given to reducing the rate of infusion in elderly patients and in patients with pre-existing renal disease.

Flush with saline after completion.
INTRAGAM®P (CONT’D)

PATIENT OBSERVATIONS

- Baseline TPR and BP
- Repeated 15 minutes post commencement
- Then hourly and on completion

ADVERSE REACTIONS

- Generalised reactions
  - Immediate Mild allergic and febrile reactions are common, and are usually related to the infusion rate. Generalised systemic reactions include: headache, facial flushing, pallor, nausea, vomiting, abdominal pain, chest tightness, myalgia, fever, chills, dyspnoea, non-urticarial skin rash, itching.
  - Delayed Some patients may develop: adverse reaction after the infusion has stopped, but usually within 24 hours e.g. nausea, vomiting, chest pain, rigors, myalgia, arthralgia.
- Anaphylaxis True hypersensitivity reactions such as urticaria, angioedema, bronchospasm or hypotension are rare.
- Neurological Headache is the most common immediate adverse reaction. Aseptic meningitis syndrome: occurs infrequently with intravenous immunoglobulin treatment; occurring within several hours to 2 days following treatment.

SPECIFIC PRECAUTIONS

Interference with glucose estimations The maltose in Intragam®P may result in falsely elevated capillary blood glucose levels with some types of glucometers. If this measurement is used to guide treatment, hypoglycaemia may occur. When monitoring glucose levels in patients receiving Intragam®P, consult the current product information and/or manufacturer of the glucose meter and test strips to ensure that maltose does not interfere with the blood glucose reading.

Renal dysfunction and acute renal failure has been reported, mainly with sucrose containing preparations. Intragam®P does not contain sucrose. However, patients at increased increase of renal dysfunction are those with pre-existing renal insufficiency, diabetes mellitus, age greater than 65 years, volume depletion, sepsis, paraproteinaemia, and those taking nephrotoxic drugs.

Positive direct antiglobulin tests and red cell haemolysis have been reported following high dose infusion of intravenous immunoglobulin due to presence of anti-A, anti-B, and occasionally antiD or other erythrocyte antibodies in the product.

Thromboembolic events: Susceptible patients include elderly, those with cardiovascular risk factors and those with hyperviscosity. High infusion rates and high dose of Intragam are potential risk factors.
**ALBUMEX®4 (4% ALBUMIN)**

**BACKGROUND**

Albumex®4 is a 4% protein solution prepared from pooled human plasma by a combination of the Cohn cold-ethanol fractionation process and chromatographic techniques. It is iso-osmotic with human serum. Albumex® 4 has been heat treated at 60°C for 10 hours and incubated at low pH to inactivate viruses.

The composition of Albumex®4 is as follows:
- Human albumin 40g/L,
- Sodium 140mmol/l, Chloride 128 mmol/l, Octanoate 6.4 mmol/L

Albumex®4 is available as 20 g of human albumin in 500mL of electrolyte solution.

**INDICATIONS**

- Hypovolaemic shock.
- Therapeutic plasma exchange—particularly when the volume exchanged exceeds 20 mL/kg body weight.
- Cardiopulmonary bypass for pump priming.

**CONTRAINDICATIONS**

- Must not be used if there is a history of allergy to Albumin.

**DOSE AND ADMINISTRATION**

- Administration through a standard IV infusion giving set.
- Refer to treating clinician for infusion rate required.

**ADVERSE REACTIONS**

- **Circulatory overload:** particularly in patients with cardiac failure, renal insufficiency, stabilised chronic anaemia or cardiopulmonary bypass.
- **Hypotension:** Hypotension has been reported in patients given Albumex®4 who are on ACE (angiotensin-converting enzyme) inhibitors. It is recommended that ACE inhibitors should be ceased for at least 24 hours before administration of Albumex®4.
- **Aluminium:** Albumex contains traces of aluminium (200 µ/L). Accumulation of aluminium in patients with chronic renal insufficiency has led to toxic manifestations such as hypercalcaemia, vitamin D-refractory osteodystrophy, anaemia and severe progressive encephalopathy. These risks should be considered when large volumes of Albumex are contemplated.
- **Allergic reactions:** rare.

**OBSERVATIONS**

Monitor patient for circulatory overload.
ALBUMEX® 20 (20% ALBUMIN)

BACKGROUND

Albumex® 20 is a 20% protein solution prepared from plasma by a combination of the Cohn cold-ethanol fractionation process and chromatographic techniques. It is heated at 60°C for 10 hours and incubated at low pH to inactivate viruses. It is hypo-osmotic with human serum, and the composition as follows:

- Human Albumin 200 g/L
- Sodium 48 to 100 mmol/L
- Octanoate 32 mmol/L

Albumex®20 is available as 20 g of human albumin in 100 mL of electrolyte solution.

INDICATIONS

- Hypoproteinaemia in the acutely ill patient when there are existing or anticipated clinical problems or complications from reduced oncotic pressure, and/or as an adjunct to diuretic therapy.
- Large volume paracentesis of ascites in patients with cirrhosis (>6L).
- Extensive burns.
- Adult Respiratory Distress Syndrome.
- Haemodialysis to assist with rapid removal of excess extravascular fluid and to maintain perfusion pressure.

CONTRAINDICATIONS

- The infusion of Albumex®20 is not justified in states associated with chronic cirrhosis, malabsorption, protein losing enteropathies, pancreatic insufficiency or undernutrition. In chronic nephrosis, infused albumin solution (20%) is promptly excreted by the kidneys with no relief of the chronic oedema.
- Albumex®20 is hyperoncotic and is therefore not indicated in the resuscitation of shocked patients.
- Albumex®20 is also not indicated for nutritional support.

ADMINISTRATION

- Dose and administration rate depends on the indication – refer to the product information available from TMU.
- Albumex®20 is given intravenously through a standard IV infusion set.
ADVERSE REACTIONS

- **Circulatory overload:** Albumex®20 is hyperoncotic. Circulatory overload can occur rapidly and unexpectedly. Constant vigilance is required. The colloid osmotic effect of Albumex®20 is approximately four times that of plasma. Therefore, patients should always be monitored carefully in order to guard against the possibility of circulatory overload.

- **Hypotension:** Hypotension has been reported in patients given Albumex®20 who are on ACE (angiotensin-converting enzyme) inhibitors. It is recommended that ACE inhibitors should be ceased for at least 24 hours before administration of Albumex®20.

- **Sodium load:** The sodium levels in this product are 48 – 100 mmol/L. This should be considered when the product is used in patients requiring sodium restriction.

- **Aluminium:** Albumex®20 contains trace elements of aluminium (200 µ/L). Accumulation of aluminium in patients with chronic renal insufficiency has led to toxic manifestations such as hypercalcaemia, vitamin D-refractory osteodystrophy, anaemia and severe progressive encephalopathy. These risks should be considered when large volumes of Albumex are contemplated.
**PROTHROMBINEX™ HT**

**BACKGROUND**

Prothrombinex™-HT is a freeze-dried concentrate of human blood coagulation factors II, IX and X. Each vial contains 500IU of factor II, IX and X. Each vial also contains 25IU of Antithrombin and 200IU of heparin. Note: there are only very low levels of Factor VII.

**INDICATIONS**

Reversal of warfarin overanticoagulation in following situations:

- Clinically significant bleeding where warfarin induced coagulopathy is considered a contributing factor.
- Elevated INR (>9), bleeding absent, but HIGH risk of bleeding.
- Relative or absolute contraindication to FFP (e.g. volume overloaded patients with cardiac or renal failure).

**CONTRAINDICATIONS**

- Patients showing clinical or laboratory signs of thrombosis or disseminated intravascular coagulation (DIC).

**RELATIVE CONTRAINDICATIONS:**

- At high risk of thromboembolic complications (e.g. recent venous thromboembolism, prosthetic cardiac valve, active malignancy)
- Coronary artery disease or cerebrovascular disease.

**DOSE:**

- Recommended dose for warfarin reversal: 25IU per kg up to a limit of 2 500 units (5 vials). Round up to nearest whole vial.

**Note.** 1. The adjunct use of FFP should be considered as a source of Factor VII eg 1 unit FFP, because of the low levels of Factor VII in Prothrombinex™-HT.

2. Vitamin K1 is also required to sustain the reversal achieved by Prothrombinex-HT and FFP.
PROTHROMBINEX™ HT (CONT’D)

ADMINISTRATION

• Prothrombinex™-HT is supplied as a freeze-dried powder, with 20mL ampoule of water for Injections BP (WFI) and one filter needle.
• Before reconstitution, allow the Prothrombinex™-HT and WFI to reach room temperature.
• Using an aseptic technique, and a suitable syringe and needle, draw up 20mL of WFI and inject into the vial of Prothrombinex™-HT. The WFI will be drawn into the vial by the vacuum.
• Dissolve the Prothrombinex™-HT by gentle agitation. To avoid frothing of the contents, do not shake.
• A clear or slightly opalescent solution is obtained within 10 minutes.
• If clots or a gel form, do not use the product and return it to TMU.
• Draw the solution from the vial into a suitable syringe through the filter needle. If necessary, use air filter needle to equalise pressure in vial before withdrawing solution.
• Infuse slowly intravenously approximately 3 mL/minute. Do not use filter needle to administer this product.

SPECIFIC PRECAUTIONS

• **Thromboembolism**: patients receiving Prothrombinex™-HT (especially at dose levels greater than 5,000 IU of factor IX, or repeated doses), may be predisposed to venous thrombosis, arterial thromboembolism, DIC or myocardial infarction.
• **Effect of heparin**: As each vial of Prothrombinex™ contains 200 IU of heparin, consideration should be given to the clinical effect of heparin if thrombocytopenia develops, if high doses of Prothrombinex-HT are required, or if used during pregnancy/lactation.
RH (D) IMMUNOGLOBULIN

BACKGROUND

Rh (D) Immunoglobulin contains high levels of antibodies (mainly IgG) directed against the D antigen of Rh (D) positive red cells.

Rh (D) immunoglobulin acts by suppressing the immune response in Rh (D) negative individuals to Rh (D) positive red cells. Such exposure follows transfusion of Rh (D) positive blood eg. Rh (D) positive red cell transfusion, transfusion of platelets contaminated by Rh (D) positive red cells, or from fetomaternal haemorrhage.

The Rh (D) immunoglobulin products available in Australia are:

a) Rh (D) Immunoglobulin 625 IU IM use only.
b) Rh (D) immunoglobulin 250 IU IM use only.
c) WinRho SDF™ 600IU for IV or IM use.

INDICATIONS

- Rh(D) negative women with no preformed antiD for:
  Sensitising events in pregnancy (unless the blood type of the foetus is confirmed to be Rh (D) negative)
  - 250IU after sensitising events in the first trimester of pregnancy and
  - 625IU after sensitising events beyond the first trimester.

Note:
If gestational age is not known with certainty, and possibility exists that gestational age is 13 weeks or more, 625IU should be given.
Twin and multiple pregnancies in first trimester: 625IU should be given.
Sensitising events include: miscarriage, termination of pregnancy, ectopic pregnancy, abdominal trauma considered sufficient to cause fetomaternal haemorrhage, genetic studies (chorionic villus sampling, amniocentesis and cordocentesis), antepartum haemorrhage

Prophylaxis
- Antenatal: 625IU at 28 and 34 weeks gestation
- Postnatal: 625IU or WinRho 600IU

- Transfusion of Rh (D) positive blood to an Rh (D) negative patient (especially females of child-bearing potential).
The recommended dose of Rh (D) immunoglobulin is 100IU per mL Rh (D) positive red cells.
If Rh (D) positive platelets are transfused to a Rh (D) negative woman of childbearing potential, consider giving antiD immunoglobulin (dose: 250IU).
RH (D) IMMUNOGLOBULIN (CONT’D)

CONTRAINDATIONS

AntiD immunoglobulin should not be given to

- Rh(D) positive person
- Rh(D) negative person sensitised to antiD
- Individual with history of anaphylactic or other severe systemic reaction to immunoglobulins.

ADMINISTRATION

- Administer within 72 hours of potentially sensitising event.
- Rh (D) Immunoglobulin **must not** be given intravenously as anaphylactic reactions can occur.
- WinRho may be administered intravenously or intramuscularly.
- For thrombocytopenic patients, care must be taken when administering Rh (D) immunoglobulin IM. Consider giving WinRho instead (intravenously).

ADVERSE REACTIONS

- Reactions are uncommon.
- Mild pyrexia, malaise and urticaria have been reported.
Zoster Immunoglobulin for intramuscular use is a pasteurised solution containing 160mg/mL human plasma proteins, with at least 98% being immunoglobulins (mainly IgG). It contains not less than 200 IU/vial varicella-zoster antibody. Zoster immunoglobulin is prepared by Cohn cold-ethanol fractionation of human plasma obtained from voluntary blood donors who have recently recovered from shingles or chickenpox. The manufacturing process includes pasteurisation at 60°C for 10 hours to reduce the possibility of virus transmission.

Available in a 200 IU varicella-zoster antibody vial.

INDICATIONS
The following indicators are based on recommendations from the Australian Immunisation Handbook.

- Zoster Immunoglobulin should be administered to the following patients who are exposed to varicella-zoster as defined below, regardless of a prior history of chickenpox:
  - bone marrow transplant recipients
  - Zoster Immunoglobulin should be administered for the prevention of varicella in the following high risk patients with exposure as defined below. Whenever possible, patients without a definite history of chickenpox should be screened for varicella-zoster antibody.
  - congenital or acquired immunodeficiency, eg AIDS
  - patients on immunosuppressive therapy with steroids or cytotoxic chemotherapy
  - patients with diseases associated with cellular deficiency, such as leukaemia and lymphoma
  - pregnant women – at least 85% of pregnant women without a definite history of chickenpox have detectable varicella-zoster antibody, and ideally immunity should be checked prior to administration of Zoster immunoglobulin. If exposure occurs before 20 weeks gestation, Zoster Immunoglobulin should be given as soon as possible after contact. Serological evidence of sero-conversion in the first 20 weeks of pregnancy carries a 2% risk of congenital Varicella infection. The risk of congenital Varicella infection with sero-conversion after 20 weeks gestation is significantly less, with isolated case reports only.

NOTE: Zoster Immunoglobulin should be given within 96 hours of exposure. After this time, any efficacy is uncertain. If a second exposure occurs after three (3) weeks has elapsed, a further dose is required.
ZOSTER IMMUNOGLOBULIN (CONT'D)

DEFINITION OF SIGNIFICANT EXPOSURE:
Defined as a household contact, play contact of longer than one (1) hour, classroom contact, hospital contact in a small ward or adjacent beds in a large ward, or other prolonged contact.

SPECIFIC PRECAUTIONS:

1. Zoster Immunoglobulin has not been shown to be effective in the management of established infection. High levels of circulating antibody do not prevent dissemination of infection.
2. There is no indication for the prophylactic use of Zoster Immunoglobulin in immunodeficient children or adults when there is a history of varicella, unless the patient’s immunosuppressed status is that which is associated with bone marrow transplantation.

DOSAGE AND ADMINISTRATION:
Zoster Immunoglobulin should be given slowly by intramuscular injection.
For adults dosage is 3 vials (600IU).

Approval for use must be obtained from the ARCBS Haematologist. During working hours Phone: 9421 2377; or fax 9221 3031.
For approvals after hours, the ARCBS Haematologist on-call can be contacted via ARCBS Caretaker Distribution staff on 9325 3030.
APPENDIX 1

ROYAL PERTH HOSPITAL

REFUSAL TO PERMIT BLOOD TRANSFUSION

(Based on format supplied by Lincoln School of Health Sciences, La Trobe University, Melbourne, in revised first edition 1982 of Consent to Treatment Forms for Hospitals)

(1) REFUSAL TO CONSENT

I, ......................................................................................................................., hereby expressly

given name  surname

withhold my consent to and forbid under any circumstances the administration of blood or its derivatives to me during this stay in hospital.

The possibilities of serious effects have been explained to me and I understand them.

I will, however, accept non-blood expanders.

I release the hospital, attending doctors, and hospital staff from any liability whatsoever to me for any damage or injury which may be caused to me in any way arising out of, or connected with, this my refusal to consent to receive blood or its derivatives.

Dated this.....................................................day of........................................19...........................

Signed..................................................................

Signature of Witness.....................................................................................................................

(2) CONFIRMATION

I, ...........................................................................................................................have described

Name of doctor

to the patient the nature and effect of the above refusal to receive blood or its derivatives. In my opinion, 

he/she understood this explanation.

Dated this.....................................................day of.........................................20.........................

Signature of Doctor.....................................................................................................................
## APPENDIX 2

### ROYAL PERTH HOSPITAL TRANSFUSION MEDICINE UNIT

#### PNEUMATIC DELIVERY REQUEST

DATE: ____________________

FOR

THEATRE/WARD

PLEASE SEND

<table>
<thead>
<tr>
<th>QUANTITY</th>
<th>PRODUCT</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Packed Cells</td>
<td>East End Blood Fridge</td>
</tr>
<tr>
<td></td>
<td>Platelets</td>
<td>West End Blood Fridge</td>
</tr>
<tr>
<td></td>
<td>F.F.P.</td>
<td>Esky to Theatre</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Direct to Theatre</td>
</tr>
</tbody>
</table>

REQUESTED BY:

Print Name ____________________ Signature ____________________

1. Out of hours, ring TMU on 2409 **before** sending container. Staff may be in other laboratories.
2. Remain by station to receive blood.
3. Wards and ICU must return blood if the transfusion is not to start within 30 minutes after being issued.

### TRANSFUSION MEDICINE UNIT

#### PRODUCT REQUEST FORM

USE STICKER IF AVAILABLE

<table>
<thead>
<tr>
<th>UMRN</th>
<th>SURNAME</th>
<th>FORENAME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PATIENT LOCATION</th>
<th>PRODUCT REQUIRED</th>
<th>AMOUNT REQUIRED</th>
</tr>
</thead>
</table>
APPENDIX 3

HAEMOVIGILANCE REPORT FORM

The Haemovigilance Report Form:

- A Red, Pre-printed Form
- Available:
  1. On all wards (Wards should order supplies through Supply Department)
  2. Transfusion Medicine Unit
  3. Included as a separate document filed in the physical manual
  4. Available on-line via the RPH Intranet (Servio Online) under the General Information tab.

Document Control Note:
An updated PDF format document must be obtained from the printer (currently the hospital print room in the Supply Department) and republished to the Intranet whenever changes are made to this form.
APPENDIX 4

MAXIMUM SURGICAL BLOOD ORDER SCHEDULE

The Maximum Surgical Blood Order Schedule:

- Published as a pale green, pocket sized folded card booklet.
  
  Available from:
  - Medical Administration
  - Transfusion Medicine Unit

MAXIMUM SURGICAL BLOOD ORDER SCHEDULE (MSBOS)
FOR ELECTIVE SURGERY

The MSBOS is a guideline for surgical procedures to eliminate unnecessary crossmatching and to increase the efficiency of blood usage. Orders for blood in excess of the MSBOS must be supported by a comment on the Request Card.

Blood orders in excess of the MSBOS will NOT be provided unless clinical justification is given.

For many surgical procedures a transfusion is unlikely and group and antibody screen (G & S) is adequate. If unexpected bleeding occurs, and the antibody screen is negative, crossmatched blood will be available from the Transfusion Medicine Unit in 10 minutes (Ph. 42409). If G & S has not been performed, it will take at least 45 mins. for crossmatched blood to be available.

10 mls of EDTA blood plus a transfusion request card indicating the time of the operation should arrive in TMU a full day before the operation. In particular, requests for morning lists must be received by 2pm on the previous working day.

Special considerations may apply to procedures not on this list which make G & S or crossmatching appropriate.

**MSBOS Schedule**

<table>
<thead>
<tr>
<th>GENERAL SURGERY</th>
<th>GYNAECOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdomino-perineal resection</td>
<td>3 Hysterectomy - abdominal, vaginal</td>
</tr>
<tr>
<td>Cholecystectomy</td>
<td>G &amp; S</td>
</tr>
<tr>
<td>Gastrectomy</td>
<td>2 Myomectomy</td>
</tr>
<tr>
<td>Hemicolecction, Small bowel resection</td>
<td>G &amp; S Ovarian Cystectomy</td>
</tr>
<tr>
<td>Hiatus hernia repair -abdominal</td>
<td>G &amp; S Termination, D&amp;C</td>
</tr>
<tr>
<td>-transthoracic</td>
<td>2 Vaginal Repair</td>
</tr>
<tr>
<td>Laparotomy</td>
<td>G &amp; S Vulvectomy</td>
</tr>
<tr>
<td>-Perforated viscus</td>
<td></td>
</tr>
<tr>
<td>Mastectomy</td>
<td>G &amp; S</td>
</tr>
<tr>
<td>Pancreatectomy</td>
<td>4 Cystectomy</td>
</tr>
<tr>
<td>Portocaval shunt</td>
<td>4 Nephrectomy</td>
</tr>
<tr>
<td>Splenectomy</td>
<td>2 Percutaneous nephrolithotomy</td>
</tr>
<tr>
<td><strong>GENERAL SURGERY CONT’D</strong></td>
<td><strong>GYNAECOLOGY</strong></td>
</tr>
<tr>
<td>Low anterior resection</td>
<td>2 Pyelolithotomy – simple</td>
</tr>
</tbody>
</table>

**UROLOGY**

<p>| Pancreatectomy                                      | 4 Cystectomy                    | 4     |
| Portocaval shunt                                    | 4 Nephrectomy                   | G &amp; S |
| Splenectomy                                         | 2 Percutaneous nephrolithotomy  | G &amp; S |
| <strong>GENERAL SURGERY CONT’D</strong>                          | <strong>UROLOGY CONT’D</strong>              |
| Low anterior resection                              | 2 Pyelolithotomy – simple       | G &amp; S |</p>
<table>
<thead>
<tr>
<th>Procedure</th>
<th>G &amp; S</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Vagotomy</td>
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<tr>
<td>Whipple's procedure</td>
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<tr>
<td>Pyelolithotomy – complicated or large calculus</td>
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<tr>
<td>Renal Transplant</td>
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<tr>
<td>Retropubic prostatectomy</td>
<td>2</td>
<td></td>
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<tr>
<td>CARDIOThorACIC</td>
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<tr>
<td>Aortic valve replacement</td>
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<tr>
<td>TUR prostate</td>
<td>G &amp; S</td>
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<td>Coronary artery bypass graft</td>
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<tr>
<td>Radical prostatectomy</td>
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<td>Mitral valve replacement</td>
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<tr>
<td>Cardiac transplantation</td>
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<tr>
<td>Craniotomy, Cerebral aneurysm</td>
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</tr>
<tr>
<td>Renal Transplant</td>
<td>2</td>
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<tr>
<td>Retropubic prostatectomy</td>
<td>2</td>
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<tr>
<td>NEUROSURGERY</td>
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<tr>
<td>Bronchoscopy and Mediastinotomy</td>
<td>G &amp; S</td>
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<tr>
<td>Thoracotomy, Lobectomy, Pneumonectomy</td>
<td>G &amp; S</td>
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<tr>
<td>Mandiblectomy</td>
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<td>G &amp; S</td>
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<td>- femoro-poplitean</td>
<td>G &amp; S</td>
<td></td>
</tr>
<tr>
<td>Endarterectomy - carotid, femoral</td>
<td>G &amp; S</td>
<td></td>
</tr>
<tr>
<td>Sympathectomy - lumbar</td>
<td>G &amp; S</td>
<td></td>
</tr>
<tr>
<td>- cervical</td>
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<tr>
<td>Amputation – above or below knee</td>
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<tr>
<td>Endarterectomy - carotid, femoral</td>
<td>G &amp; S</td>
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<tr>
<td>- cervical</td>
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<td>Amputation – above or below knee</td>
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<td>Laminectomy, spinal fusion</td>
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<td></td>
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<tr>
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<td>G &amp; S</td>
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<tr>
<td>Cardiac catheterisation</td>
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<td>Coronary angiogram</td>
<td>G &amp; S</td>
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<tr>
<td>Liver, renal biopsy</td>
<td>G &amp; S</td>
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<td>Pacemaker insertion</td>
<td>G &amp; S</td>
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<tr>
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<tr>
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Compiled by:
RPH Blood Transfusion Sub-Committee
April 2002
APPENDIX 5

AUSTRALIAN RED CROSS BLOOD SERVICE (ARCBS)
CIRCULAR OF INFORMATION BOOKLET

Incorporating

ADVERSE TRANSFUSION REACTIONS

CLINICAL PRACTICE GUIDELINES

BLOOD PRODUCT INFORMATION