

# Blood Product Administration Laboratory Reference

Better Safer Transfusion (BeST) Program  
December 2005

Information contained in this package is also found online at: <http://www.health.gov.au/best>  
Please refer to the 'Laboratory Reference' link on this website for updated information.

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## Introduction

This package has been designed to provide laboratory scientific staff with information to answer frequently asked questions (FAQs) from the clinical area. It contains information about administration of blood products/components and may be accessed where the scientist feels comfortable to pass on such information in response to a request from a clinical area. It is intended as a quick reference guide only and is based on the experience of the working group. Clinicians seeking advice are encouraged to refer to hospital policy and procedures on transfusion administration.

The FAQs that form the first section of this package have been sought from a range of scientific staff working in blood bank laboratories in Victoria. Information included is designed with primarily the Australian audience intended.

## Disclaimer

The members of the Better Safer Transfusion (BeST) program give no warranty that the information contained in this document and any online updates available on the website [www.health.vic.gov.au/best](http://www.health.vic.gov.au/best) is correct or complete. The blood product administration laboratory reference is necessarily general and not intended to be a substitute for a health professional's judgment in each case. The members of the the BeST program shall not be liable for any loss what so ever due to negligence or otherwise arising from the use or reliance on this document.

We hope you find this material helpful, it will be updated periodically. Any comments are most welcome, please forward these to:

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## Acknowledgements

Acknowledgements to the working party who developed this document: Mary Gaskell, Erica Wood, Janine Carnell and other working group members; Judy Forsyth, Karen Botting, Elizabeth Wilson and Nadine Gilby.

Thanks also to the blood bank laboratories at St Vincent's Hospital and the health services within Eastern Health for participating in the initial trial of this package.

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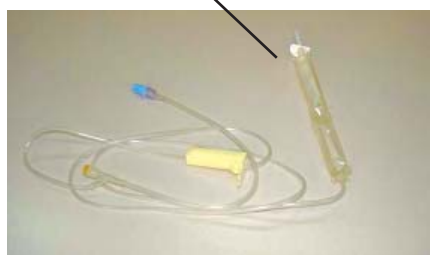
## Administration information

### Equipment

#### Giving sets and filters

All giving sets used for the administration of blood components/ products (red blood cells, platelets, fresh frozen plasma, cryoprecipitate, albumin, intravenous immunoglobulin) need to contain a standard in-line filter (170-260 micron) to remove blood clots and particles.

In-line filter  
170-260 micron



#### 1. Standard intravenous giving set

There are several brands of giving sets available for the administration of blood products and different hospitals use different brands. In addition, a variety of brands of giving sets are manufactured for use in intravenous infusion pumps. These must be compatible with the pump being used and must contain an inline filter (170-260 micron).

There are also giving sets available for use in rapid infusion pumps where large amounts of fluid can be rapidly infused into a compromised patient. These must also contain an inline filter (170-260 micron) and must be compatible with the pump used.

#### 2. Microaggregate filters

Microaggregate filters have a pore size of 20-40  $\mu$  and are designed for the transfusion of red cells.

There appears to be no benefit for the routine use of microaggregate blood filters for low volume transfusions (fewer than 10 units red cells transfused). In addition, there is limited evidence for their use in high volume transfusions, with modern methods of component preparation.

- These filters are not recommended for use in many health services.

#### 3. Leukocyte depletion by filtration.

Please also see appendix 1.

- Leukocyte depletion filters remove up to 99.9 per cent of white blood cells from cellular blood components.
- The filters are used in addition to a standard filter present in a blood giving set and do not take the place of these giving sets.
- Leukocyte depletion filters available for red cells and platelets are different. These two types of filters do not use the same technology for leukocyte removal and are therefore not interchangeable between products.





Guidelines for the use of leukodepleted blood components in Australia include to:

- Significantly decrease the risk of CMV transmission and CMV disease in the immunosuppressed patient.
- For patients who have experienced 2 or more febrile non-haemolytic transfusion reactions (FNHTRs)
- Reduce rate of alloimmunisation to leukocyte antigens, specifically in patients with haematologic malignant disease as a method to prevent platelet refractoriness
- Reduce rate of HLA alloimmunisation in non-hepatic solid organ transplant candidates.

*(Guidelines for the Administration of Blood Components ANZSBT/RCNA p 8).*

#### **Current Victorian practice for leukodepletion of platelets and red cells**

*All platelets collected in Victoria are leukodepleted at the Australian Red Cross Blood Service (ARCBS) processing site and therefore bedside leukocyte depletion filtration is not required for these platelets. Read the label if you are not sure!*

*There is currently no statewide standard practice for the leukodepletion of red cells therefore bedside leukocyte depletion filtration may be required.*



#### **Infusion Pumps**

- Infusion pumps are commonly used for the administration of all blood components/ blood products.
- An infusion set manufactured for use in the brand of infusion pump used is required for administration.
- Infusion pumps are commonly used for the administration of red blood cells, platelets, fresh frozen plasma, cryoprecipitate, intravenous immunoglobulin and albumin. Patients typically achieve expected increments post transfusion through these devices. There is evidence that the Gemini pump along with the IMED 980 do not cause clinically significant blood cell damage through infusion of blood products. (Doherty (2001), Berch et al (1991), Criss et al (1993), Snyder et al (1984), Norville et al (1994).
- An infusion pump is not necessary to deliver a transfusion but is useful in the regulation of flow rates. For this reason they are commonly used for the administration of intravenous immunoglobulin including; Intragam P and Sandoglobulin where incremented rates are recommended.



## Blood Warmers

- Use of a blood warmer is indicated for:
  - patients with significant cold agglutinins
  - adults receiving flow rates exceeding 50mL/kg/hour
  - children, if the flow rate is to exceed 15mL/kg/hour or for exchange transfusion in infants.

*Guidelines for the Administration of Blood Components ANZSBT/RCNA pp 8-9.*

- Blood/blood components should not be warmed above 41°C.
- Blood warmers are usually located in trauma areas where massive transfusion is more likely to be required, such as the emergency department or ICU. Haematology units are also likely to have blood warmers as are other units where blood warmers are used most frequently such as theatre.
- Individual instructions for the use of each brand of blood warmers are different. Specific instructions are found on the packaging of the giving sets. For more information please refer to the *Guidelines for the administration of Blood Components (ANZSBT/RCNA)*, pp. 8-9.

## Intravenous access requirements

- The size of the cannula chosen depends on the size and the integrity of the vein. Standard 18-gauge to 24-gauge ultra-thin needles and catheters are used, however the smaller the gauge, the slower the rate. *Guidelines for the Administration of Blood Components ANZSBT/RCNA p.7.*

## Administration of blood components in massive transfusion

- Where the patient is receiving a massive transfusion, all components may be infused as fast as is tolerated by the patient.
- Blood products may be delivered via an infusion pump capable of rapid transfusion. In this situation, the appropriate rapid infusion giving set should be used.
- Hospitals should have policies for administration of blood components in massive transfusion.

## Timeframes for the administrations of blood components

Blood Component	Timeframes for administration
Red Cells	<p>Must commence within 30 minutes of removal from a monitored blood bank refrigerator and collection from blood bank.</p> <p>Maximum administration time per unit is 4 hours once entered or 'spiked'.</p> <p>Usual time frame is 2-3 hours per unit, however this is dependant on the patient's clinical status.</p>
Platelets	<p>Platelets should be transfused as soon as possible (WHO (2001) Clinical Use of Blood p. 114). Usual timeframe is from stat to 30 minutes for equivalent of one pool or apheresis unit (approximately equivalent to 4 units of platelets), or as tolerated by the patient.</p>
Fresh Frozen Plasma (FFP)	<p>Ideally FFP should be infused within 30 minutes of thawing (WHO (2001) Clinical Use of Blood p.114). However, thawed FFP may be stored in a monitored refrigerator for up to 24 hrs at 4-6°C (ARCBS Circular of Information p. 31) or relabeled as 'thawed plasma' and stored for up to 5 days.</p> <p>Usual timeframe is stat to 30 minutes per unit depending on patient condition. (NB: Caution: circulatory overload needs to be considered in all patients especially if multiple units are being transfused).</p>
Cryoprecipitate	<p>Usual timeframe is stat-15 minutes per unit of cryoprecipitate. Shelf life is six hours post-thaw at 4-6°C (ARCBS, Circular of Information, p. 35).</p>
Intragam P	<p>Maximum administration time per bottle is 4 hours once opened. Administer per hospital policy. Commonly infused at incremented rates as tolerated by the patient. Maximum infusion rate is 240 mL/hr.</p>
Sandoglobulin	<p>Maximum administration time per bottle is 4 hours once opened. The product may be in one of two different strengths following reconstitution. Administer per hospital policy. Recommended infused at incremented rates as tolerated by the patient. Maximum infusion rate for all strengths is 150 mL/hr.</p>
Albumex	<p>Maximum administration time per bottle is 4 hours once opened.</p> <p>Albumex 4: commonly infused between 2-4 hours.</p> <p>Albumex 20: Rate should not exceed 2 mL/min in acutely ill patients with hypoproteinaemia.</p>

## Frequently Asked Questions

### How soon after transfusion should I repeat the Haemoglobin? Platelet count?

- It is common practice to check increment levels for haemoglobin (Hb) and platelet count between 15-60 minutes following the completion of the transfusion for the haemodynamically stable patient. For the patient having a massive transfusion, samples for blood counts including full blood examination and coagulation profiles should be taken throughout the resuscitation effort, however, due to the nature of the unstable patient and numerous clinical interventions required, information obtained from sampling may not reflect exact current status of the patient.
- For a stable patient, post-transfusion Hb and platelet count should be repeated prior to the prescription of further units of red cells or platelets being ordered.

### How soon after FFP/Prothrombinex-HT can I check the INR levels?

- It is common practice to take samples to recheck INR levels after the administration of fresh frozen plasma or prothrombinex HT as soon as 15- 60 minutes following the infusion completion.

### Can I use a central venous access devise (CVAD) or peripherally inserted central catheters (PICC) for transfusion?

- Blood components may be administered safely through most central venous access or peripherally implanted devices. Some peripherally inserted central catheters (PICC) with small tubing diameters may pose problems with slow flow rates and clogging (*Guidelines for the Administration of Blood Components ANZSBT/RCNA* p.7). Use of an intravenous infusion pump may help overcome this, however the smaller the gauge of the catheter the slower the rate will be.

### What medications and solutions can I run through at the same time as a blood component transfusion?

- With the exception of 0.9% saline, 4% albumin, plasma protein fractions or ABO compatible plasma, no medications or solutions should be run through the same intravenous access lumen as any blood component.
- In consideration of the above statement there have, however, been studies of the simultaneous administration of patient-controlled analgesia and transfusion of red blood cells. Hospital policy should state whether patient-controlled analgesia and blood transfusion can be co-administered through the same lumen. *Guidelines for the administration of blood components (ANZSBT/RCNA)* state that via a non-reflux valve patient-controlled analgesia of morphine, pethidine and/or ketamine diluted in 0.9% saline has not been shown to adversely affect red cells (p.11). Questions about specific compatibility may be discussed with the hospital pharmacy and haematologist.

**What medications and solutions can I run through a different lumen of a central venous access device (CVAD)?**

- It is recommended that transfusion of blood products have a dedicated lumen for administration at any one time.
- Note that in the case of massive transfusion, multi-trauma or a critically ill patient, it may be necessary to have several infusions running simultaneously and appropriate venous access will be required to accommodate this.

**How long can platelets be left off the agitator?**

- As per the Australian Red Cross Blood Service *Circular of Information 2005* 'Platelets must be agitated gently and continuously on a platelet shaker during storage in a single layer' (p. 21). It is recommended therefore that platelet transfusion should commence within 30 minutes of being dispensed from the agitator in the temperature controlled storage area/hospital blood bank.
- Any exception to this must be discussed with the haematologist in charge of the blood bank, or with ARCBS.

**What is the volume of a unit of red cells?**

- The specification for the volume of a unit of red cell is >230mL/unit. Please note the new labels from the Australian Red Cross Blood Service on the dispensed unit will specify the exact volume in mL for that unit.

**What is the volume of a unit of platelets?**

- The specification for the volume of a unit of pooled Platelets is >160mL/unit. Please note the new labels from the Australian Red Cross Blood Service on the dispensed unit will specify the exact volume in mL for that unit.

**What are the expected increments of red cell and platelet transfusion?**

- Red cells: each unit contains enough haemoglobin to raise the haemoglobin concentration in an average sized adult by approx 10g/L (*ARCBS Circular of Information 2005*, p. 16)
- Platelets: one unit of platelets would be expected to increase the platelet count of an average size adult by 5-10,000 $\mu$ L. One unit of platelets pooled is approximately equivalent to 4 units of platelets (*ARCBS Circular of Information 2005* p. 28).

**What happens on the ward when a patient experiences a transfusion reaction?**

- Stop the transfusion.
- Recheck the patient identity and the details on the unit.
- Maintain IV access.
- Monitor patient.
- Seek medical advice.
- Take samples for laboratory testing according to symptoms. Consider microbiological investigation of patient and product.
- See Appendix 2 for further information.

**What advice to provide clinical staff who report a patient transfusion reaction?**

If a call is taken from the clinical area to report a transfusion reaction:

- Encourage the caller to seek medical advice for the patient
  - If signs and symptoms indicate, advise the caller to:
    - collect blood samples (10mL clotted and 5mL EDTA) from the patient.
    - collect a urine sample.
    - return blood bag with remaining contents to blood bank for culturing.
- or, as per hospital policy.

**What are compatible ABO groups for plasma products?**

ABO Blood Groups		
Blood Group	Red cells have	Plasma contains
O	Neither A or B antigen	Both anti-A and anti-B antibody
A	A antigen	Anti-B antibody
B	B antigen	Anti-A antibody
AB	Both A and B antigens	Neither anti-A nor anti-B antibody

Selection of Compatible ABO Groups for Plasma Products	
Patient's ABO Blood Group	ABO Blood Group of Plasma for Transfusion
Unknown	AB (if required urgently)
O	O or A or B or AB
A	A or AB
B	B or AB
AB	AB (A if AB unobtainable)

Tables from the *Transfusion Medicine Manual (2003) Australian Red Cross Blood Service*  
p. 18

**What is the amount of FFP required to correct an elevated INR result?**

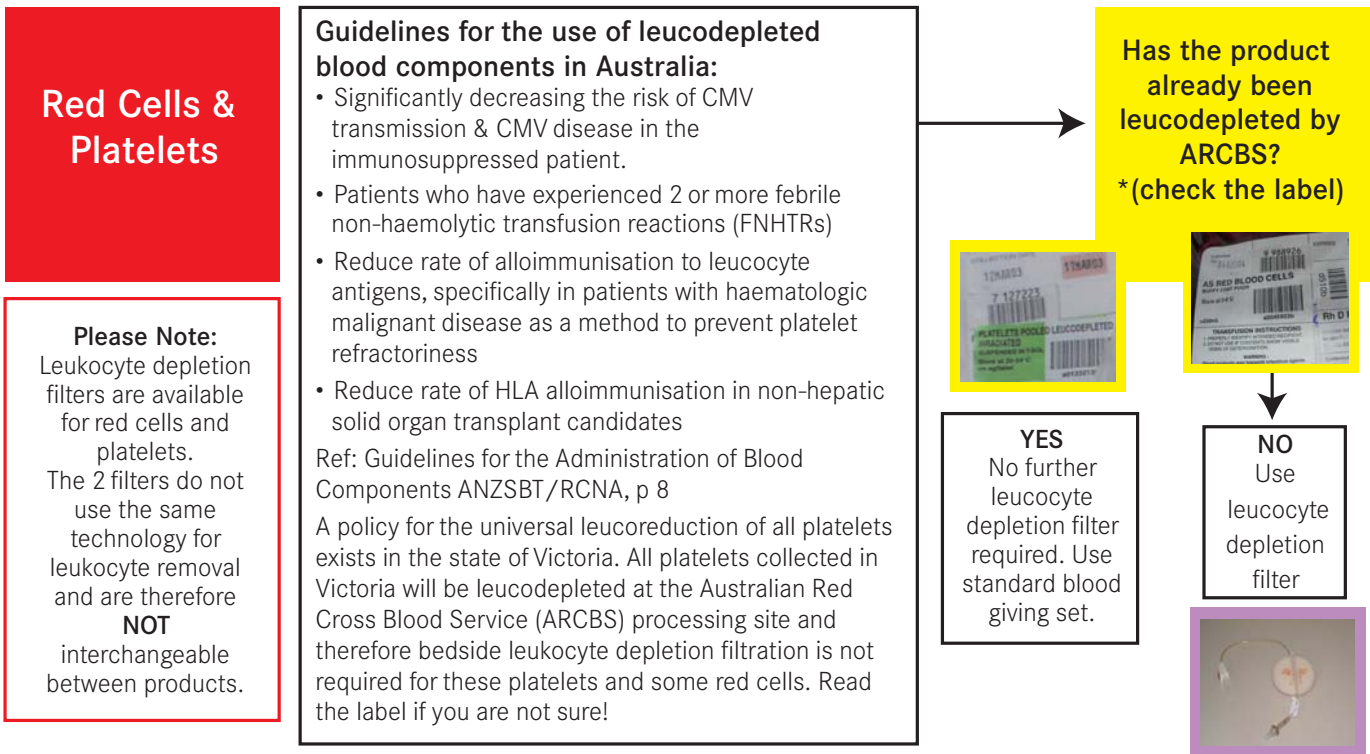
To reverse the effects of warfarin, Vitamin K1 can be given. Vitamin K1 is essential for sustaining the reversal achieved by a prothrombin complex concentrate (PCC; Prothrombinex-HT is the only one currently available in Australia) and fresh frozen plasma (FFP). Immediate reversal is achieved with a PCC and FFP. Refer to the *Warfarin reversal: consensus guidelines, MJA, 2004,181(9)Nov,pp. 492-497*

- The amount of FFP recommended for immediate warfarin reversal is dependant on the patient's INR level, presence of bleeding, and the use of additional recommended therapies including Vitamin K1 and Prothrombinex-HT. If used in combination with these agents 150-300 mL is a guideline recommendation.
- FFP is used to provide a source of Factor VII, which is present in very low (probably clinically insignificant amounts) in Prothrombinex-HT.
- For further information refer to the Warfarin reversal: consensus guidelines, on behalf of the Australasian Society of Thrombosis and Haemostasis. These were published in the Medical Journal of Australia in November 2004, and can be found at:

**[www.mja.com.au](http://www.mja.com.au) or [www.transfusion.com.au](http://www.transfusion.com.au)**

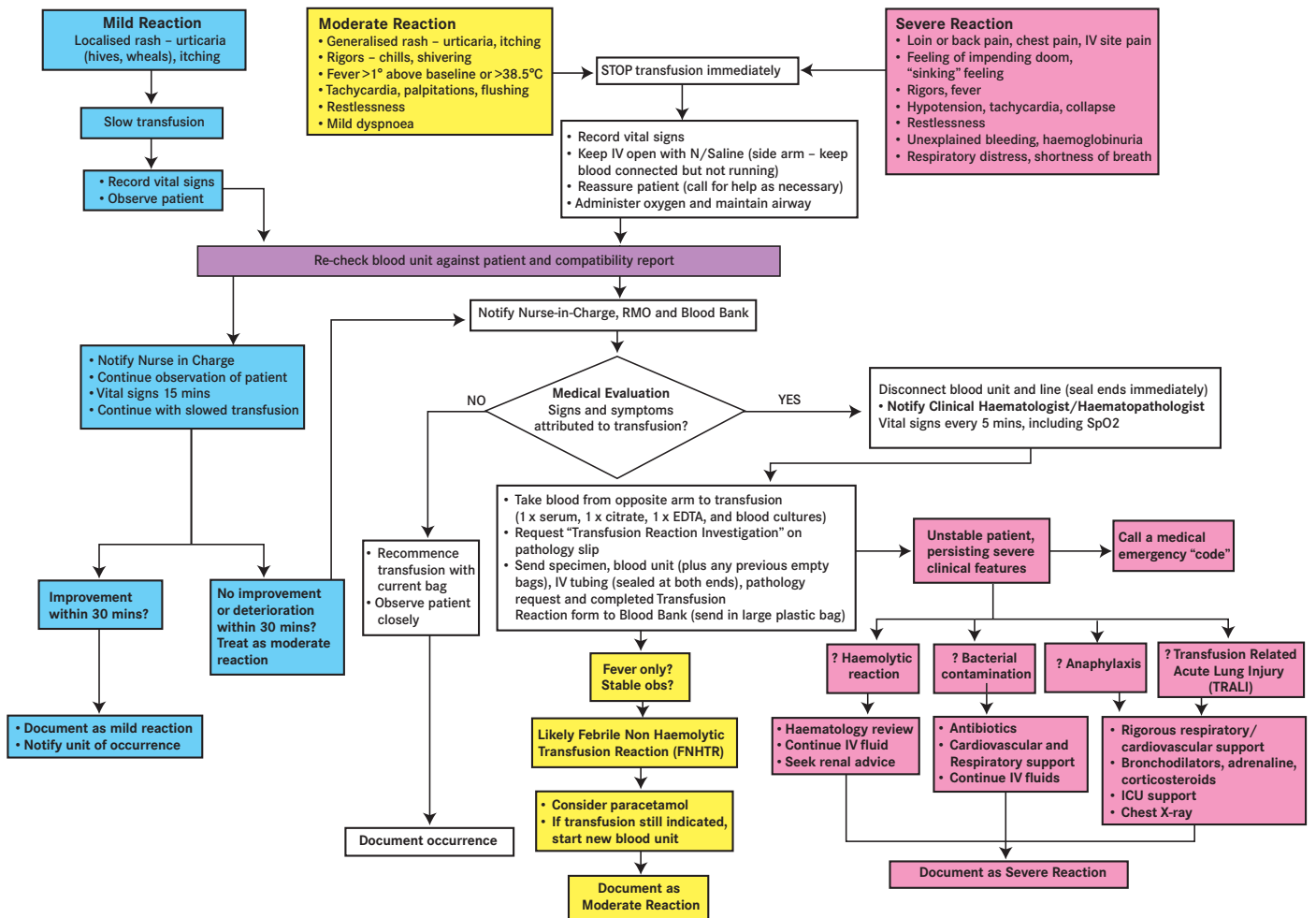
*Warfarin reversal: consensus guidelines, MJA, 2004,181(9) Nov, pp. 492-497.*

## Appendix 1: Blood transfusion-considering leukocyte depletion filtration



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## Appendix 2: What happens in the clinical area in the event of an acute transfusion reaction?



Signs and symptoms are not solely attributed to a transfusion reaction. Medical evaluation is required

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