The decision to transfuse a patient

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Summary

Advances in surgical techniques have reduced the need for blood transfusion and most anaemias can now be managed without transfusions. While the haemoglobin concentration assists the decision to transfuse a patient, there is no single threshold for transfusion. The need to give a blood component is also difficult to assess, but guidelines are available. Although Australian blood supplies have a high degree of safety, attention to details such as patient identification and compatibility will help to reduce adverse outcomes when a transfusion is indicated.

Key words: anaemia, blood, surgery.

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Introduction

The transfusion of blood or its components (plasma, platelets, cryoprecipitate) has an important role in modern medicine and surgery. However, in recent years this role has been reassessed, especially in anaemia and in the perioperative setting. The majority of anaemias can now be treated without the transfusion of homologous blood, and careful risk assessment and the use of blood conservation techniques have made 'bloodless' surgery possible for most elective procedures.

Indications for blood transfusion

Blood transfusion is indicated to control the effects of a haematological deficiency, or to prevent problems, until the injury or disease process can be corrected or resolves. The focus should be on the patient's specific clinical problem, with transfusion viewed as an option only when alternatives have been considered and optimally used when possible.

Assessing acute blood loss and when to start transfusion remains controversial. However, it is reasonable to say that volume resuscitation does not need blood in the first instance. The decision to use blood should be made in the context of the patient's cardiocirculatory and respiratory status and haemoglobin level after resuscitation with clear fluid. If blood loss is accurately assessed a better prediction as to when red cell transfusion may be needed can be made.

Homologous blood transfusion should not necessarily be regarded as the first line of therapy for patients with haemopoietic defects, and in patients having elective surgery it is often possible to minimise or eliminate the need for transfusion. Clearly, if homologous blood can be avoided its potential hazards need not be considered. Making a decision to use blood components can be difficult and much debate continues in relation to the indications for their use.

Before giving patients blood or a blood component it is useful to ask a series of questions.

- What is the haematological defect?
- What is the most appropriate therapy for the patient?
- Are there alternatives to homologous transfusion?
- Is a blood component indicated and where should it be obtained from?
- What are the potential hazards of transfusion/component therapy?
- Can the risk of adverse effects be avoided or minimised?
- How should the treatment be administered and monitored?
- What is the time frame of the decision-making process?
- What is the cost of the haemotherapy?
- Is the patient fully informed of the medical decisions?

The clinician in the perioperative setting is confronted with the following decisions.

- Is this patient a potential 'bleeder', what is the haemostatic defect and what therapy is available to minimise bleeding?
- In patients without a pre-existing haemostatic defect, to what point can I haemodilute the patient before requiring transfusion of specific blood components?
- Are there autologous techniques appropriate for this patient (what, when and how)?
- Do I need to give homologous red cells?
- At what point does attention to haemostasis as well as oxygen transport become a consideration?

Evidence-based transfusion medicine and clinical guidelines

As with all modern medical therapy, transfusion and blood component therapy presupposes an understanding of the natural history of untreated and treated disease. In many disorders the clinical problem is well understood and there is good evidence for the benefits of transfusion or non-transfusion. Transfusion medicine, especially in the perioperative setting, therefore lends itself to the appropriate use of clinical guidelines

Table 1

Summary of National Health and Medical Research Council guidelines for the transfusion of fresh blood products [1]

Red cell concentrates	Use of red blood cells is likely to be inappropriate when Hb>100 g/L unless there are specific indications. If red blood cells are given at this concentration, reasons should be well documented. Use of red blood cells may be appropriate when Hb is 70–100 g/L. In such cases, the decision to transfuse should be supported by the need to relieve clinical signs and symptoms and prevent significant morbidity and mortality. Use of red blood cells is likely to be appropriate when Hb<70 g/L. In some patients who are asymptomatic and/or where specific therapy is available, lower threshold levels may be acceptable. In the context of acute bleeding and hypovolaemia, the haemoglobin is only one consideration in determining the need for red blood cells. Additional factors to consider include the patient's cardiopulmonary reserve, total volume of blood loss, oxygen consumption and arterial disease.	
Platelet concentrates	Prophylaxis	Bone marrow failure when the platelet count is <10 x 10^9/L without risk factors or <20 x 10^9/L in the presence of additional risk factors (e.g. fever, antibiotics, evidence of systemic haemostatic failure). Maintaining the platelet count at >50 x 10^9/L in patients undergoing surgery or invasive procedures. Inherited or acquired qualitative platelet function disorders, depending on clinical features and setting. In these situations the platelet count is not a reliable indicator for transfusion.
	Haemorrhage	Use of platelets is likely to be appropriate in any patient who is bleeding when thrombocytopenia is considered a major contributory factor and when the platelet count is <50 x 10^9/L in the context of massive haemorrhage/transfusion and <100 x 10^9/L in the presence of diffuse microvascular bleeding.
Fresh frozen plasma	Replacement of single factor deficiencies where a specific or combined factor concentrate is not available. Immediate reversal of warfarin effect in the presence of potentially life-threatening bleeding when used in addition to vitamin K and possibly prothrombin complex concentrate (prothrombinex-HT). Treatment of the multiple coagulation deficiencies associated with acute disseminated intravascular coagulation. Treatment of inherited deficiencies of coagulation inhibitors in patients undergoing high-risk procedures where a specific factor concentrate is unavailable. In the presence of bleeding and abnormal coagulation parameters following massive transfusion or cardiac bypass surgery or in patients with liver disease.	
Cryoprecipitate	Use of cryoprecipitate may be considered appropriate in patients with fibrinogen deficiency where there is clinical bleeding, an invasive procedure, trauma or disseminated intravascular coagulation. The use of cryoprecipitate is not generally considered appropriate in the treatment of haemophilia, von Willebrand's disease, or deficiencies of factor XIII or fibronectin, unless alternative therapies are unavailable.	

Hb haemoglobin concentration

Table 2

Multimodality approach to perioperative blood management

	Tolerance of anaemia	Optimising red cell mass	Minimising blood loss
Preoperative	Transfusion guidelines	Haematological assessment	Haemostatic assessment and pre-emptive haemostasis planning
Intraoperative	Tolerating haemodilution and 'acceptance' of lower red cell mass ? Potential role for haemoglobin substitutes Minimising O_2 demand	Strict transfusion criteria	Anaesthetic techniques Surgical techniques Normovolaemic haemodilution Autologous haemostatic techniques Local haemostatic agents Red cell salvage
Postoperative	Minimising O_2 demand Education	Haematinics strategy – erythropoietin, iron, folate, vitamin B_{12}	Close clinical monitoring

(see Tables 1 and 2). If there is a reasonable probability of a patient requiring a red cell transfusion a sample of blood should be sent to the laboratory for 'type and screen'. Units of blood will only be released upon specific request by the clinician.

The clinician's responsibilities

The clinician requires a core knowledge of transfusion medicine focusing on the following:

1. Has the clinical problem (e.g. anaemia) been correctly diagnosed and can it be corrected in the short or long term by specific therapy?
2. Is there evidence that blood component therapy should improve the short- and long-term outcome for the patient?
3. What alternatives are available?
4. Have the specific clinical or laboratory criteria for transfusions been satisfied?
5. Have the risks been assessed and balanced against the predicted benefits of blood component therapy?
6. Has an appropriate blood component been selected?
7. Who will administer and monitor the blood component?
8. What end points will be measured to assess benefit?
9. Is the patient appropriately informed about the risks and benefits of transfusion or no transfusion?
10. Is the transfusion process being correctly documented and audited, from the decision to transfuse through to end points and complications?

Reference

1. National Health and Medical Research Council. Clinical practice guidelines on the use of blood components (red blood cells, platelets, fresh frozen plasma, cryoprecipitate). Canberra: NHMRC; 2002. http://www.nhmrc.gov.au/publications/synopses/cp77syn.htm [cited 2005 Mar 14]

Further reading

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Australian Red Cross Blood Service. Transfusion medicine. Manual 2003. Blood transfusion practice and clinical use of blood in Australia. Melbourne: ARCBS; 2003. http://www.transfuse.com.au/ResourceLibrary/Resource_Tmm.asp [cited 2005 Mar 14]

Professor Isbister is Chair of the Australian Red Cross Blood Service Advisory Council and a member of the Board.

Correction

Bowel preparation (Aust Prescr 2005;28:16)

In the box of examples of some of the products available for bowel preparation, Picoprep appeared to be listed as a magnesium preparation. Although it does contain magnesium oxide, it also contains sodium picosulfate and is therefore similar to Picolax which was listed as a diphenylmethane preparation.