Guidelines for the use of blood and blood components for ORH critical care units

Introduction

Haemorrhage, anaemia and coagulopathy are common problems in critically ill patients. The purpose of these guidelines is to provide a common framework within which individualised decisions about blood transfusion may be made.

Please note that these guidelines apply to the hospitals supported by the John Radcliffe blood bank (i.e. John Radcliffe, Churchill and Radcliffe Infirmary) and not the Horton Hospital. This is because the Horton Hospital blood bank has not yet implemented 'electronic issue' of blood which enables rapid issue of blood without further serological testing for patients known not to have red cell antibodies.

Objective

The aim was to develop practice guidelines for blood transfusion in critical care by drawing on the following:

- 1. British Committee for Standards in Haematology (BCSH) guidelines for the clinical use of red cell transfusion (2001); fresh frozen plasma and cryoprecipitate (2004), and platelet transfusions (2003). These guidelines are all available at www.bcshguidelines.org.
- 2. A randomised controlled trial on the use of red cell transfusions in critical care (Hebert et al, 1999).
- 3. Guidelines for the management of massive transfusion (Stainsby, 2000).
- 4. A compilation of comprehensive reviews published as a supplement to *Critical Care Medicine* (December 2003).
- 5. Established local practice.

There are well-known risks associated with the use of blood and blood products. There are concerns about the safety of blood transfusion, as highlighted by the Serious Hazards of Transfusion (**SHOT**) initiative. (<u>www.shot.org.uk/</u>), and there are increasing concerns about the risk of transmission of variant Creutzfeldt-Jakob disease (vCJD).

Measures to reduce this risk include:

- 1. All blood components are leucocyte-depleted.
- 2. Plasma for blood products is sourced from the United States.
- 3. Neonates and children born after January 1st 1996 receive viral-inactivated FFP sourced from the United States.
- 4. Development and implementation of appropriate transfusion guidelines.

Clearly the best way to reduce the risks associated with transfusion is to avoid it, but the risk benefit ratio must be considered on a case-by-case basis.

Every transfusion episode is a clinical decision that must be justified and documented in the patient's records.

Additional information is provided about issues such as sample collection, requesting blood and blood products and the management of coagulopathy.

Group and screen

The patient's blood group is determined and an antibody screen is performed to see if red cell antibodies are present. In 92% of patients, the screen is negative and blood may subsequently be issued without a crossmatch being performed in the confidence that a clinically significant haemolytic transfusion reaction will not occur. If the screen is positive (8% of patients), cross matching needs to be performed to provide compatible blood. The antibody status of any patient can be determined by:

- Phoning the laboratory and asking the staff to check antibody status of the patient;
- Checking the laboratory result slip;
- On the Trust Intranet.

When a group and screen specimen is taken the request card **MUST** include a valid clinical indication for transfusion.

From February 1st 2004 the blood bank will operate a "zero-tolerance" policy and any inadequately labelled specimens will be rejected.

Repeat group and screen

If a patient has not been transfused and is wearing a red label, a repeat group and screen is not necessary. The group and screen does not need to be repeated unless the patient has been transfused since the previous sample was taken or the red label has been lost. A new group and screen is needed every 72 hours in patients receiving repeated transfusions. This is because new red cell antibodies may develop. If a wristband containing a red label impedes venous or arterial access, move the red label to a new wristband on the other wrist (or ankle). If it is unclear whether the patient needs to be grouped and screened, telephone the blood bank for advice.

For information on red labels please refer to the **ORH policy and procedures** on blood transfusion.

Avoidance of delays in obtaining blood

The best way to ensure the minimum delay in obtaining blood and blood products is to ensure that the blood bank have received a group and screen specimen which is valid. This can be checked as described in section 1.

Guidelines for the use of blood and blood components for ORH critical care units v1.2 February 2004

The group and screen is not valid if:

- 1. The patient is not wearing their correct red label wristband;
- 2. The patient has been transfused more than 72 hours ago.

If there is any doubt, contact the blood bank.

Timing of requests

Transfusions of FFP and/or platelets to treat bleeding or coagulopathy are performed whenever clinically appropriate. Issuing blood for the treatment of anaemia ("top-up" transfusions) is for patients who are by definition stable and therefore should be requested during office hours. Out-of-hours the laboratory is only staffed to deal with emergencies. Requests in anticipation of procedures should be performed in office hours where possible.

Contacting the blood bank

In office hours (0900-1700hrs) telephone extension (x20339). For urgent requests outside these hours contact the on-call haematology biomedical scientist (bleep 1719).

Requesting blood

For patients without significant antibodies, phone the laboratory with required number of units once the decision to transfuse has been made. It will only take 5 minutes to issue the blood, as no further testing is required. The number of units requested is a medical decision.

For patients with significant antibodies, a discussion with the blood bank is required about when blood can be made available - usually in 45 minutes. However, blood will occasionally need to be ordered from the National Blood Service, which may result in some delay while it is delivered. The number of units to be cross-matched will depend on the patient diagnosis, condition and the type of antibody present.

Transfusion decisions

Transfusion decisions fall into three broad categories

- Treatment of haemorrhage with or without coagulopathy
- Top-up transfusions to treat anaemia
- Correction of abnormal coagulation parameters prior to invasive procedures

Transfusion of blood

Red cell concentrates are transfused to treat haemorrhage or to correct anaemia. Standard blood bank practice is to issue packed red cells stored in optimal additive solution. These packed red cells only contain about 30ml of residual plasma.

Red cell transfusions

Transfuse red cells to maintain the haemoglobin >7.5 g/dl

For some patients (e.g. those with known or suspected coronary artery disease) the clinician may set a higher transfusion trigger [see Hebert, 1999, Critical Care Medicine 2003]. This is a prescription and should be documented appropriately.

Massive bleeding (see ORH guidelines on massive blood loss)

Definitions include:

- Replacement of the total circulating blood volume in less than 24 hours.
- 50% blood volume loss in 3 hours.
- Loss of 150 ml/minute.

Management of bleeding

Bleeding may be surgical or due to a coagulopathy or both. The patient may be cardiovascularly unstable. The first priority is to restore circulating volume. Arterial blood gas analysis provides an estimated haemoglobin concentration and haematocrit, which may be used to guide blood transfusion.

Primary goals are adequate resuscitation (including warming) and consideration of surgery. Fluids including blood components and volume expanders can be infused more rapidly through wide bore peripheral cannulae or PA catheter introducers.

Haemorrhage is frequently accompanied by coagulopathy.

• Transfuse red cells to maintain the haemoglobin > 7.5 g/dl

Coagulopathy

Laboratory investigations complement repeated clinical assessment. The following set of investigations – FBC (platelet count) prothrombin time (PT), activated partial thromboplastin time (APTT), fibrinogen and thromboelastogram (TEG®) should be repeated 4 hourly or after an intervention. TEG®, PT, APTT and fibrinogen can be measured as an infusion of FFP or cryoprecipitate finishes. Samples for a full blood count (platelet count) can be taken 10 minutes after an infusion of platelets has been completed. Continued bleeding in the presence of a normal TEG ® is a strong indication of a surgical cause of bleeding

Guidelines for the use of blood and blood components for ORH critical care units v1.2 February 2004

Correction of coagulopathy prior to invasive procedures

Investigations should be repeated, where possible to establish that there has been satisfactory correction of abnormal haemostasis (not necessarily full normalisation of results) before invasive treatment commences.

Requesting blood components

Telephone the blood transfusion laboratory (x20339) before 1700hrs or (bleep1719) outside these hours. **The laboratory will ask for the clinical indication.** Indications for platelet, FFP and cryoprecipitate use are provided below.

If the products are no longer required, please inform the laboratory and send the products back. In some cases they can be re-issued to another patient.

Normal laboratory values

РТ	10.5 - 13.5 seconds
APTT	24.0 - 34.0 seconds

Correction or further correction of the PT and APTT is recommended when the measured values exceed 1.5 times the control means. The control is the upper limit. These values are PT-20 seconds. APTT - 51 seconds. Fibrinogen should be maintained at > 1.0g/l

Platelets

Platelet transfusions are indicated for:

- patients with bleeding exacerbated by thrombocytopaenia (see below)
- stable patients with a platelet count of $< 10 \times 10^9/l$
- critically ill patients with a platelet count $< 20 \times 10^9/1$
- patients receiving activated protein C with a platelet count of $< 30 \times 10^9/1$

Published recommendations suggest that a platelet count of at least $50 \ge 10^9$ /l is safe for lumbar puncture, epidural anaesthesia, gastroscopy and biopsy, laparotomy and similar procedures. For ophthalmic or neurosurgery, a platelet count of at least $100 \ge 10^9$ /l is recommended. However, each case must be assessed on its individual merits and the indication for transfusion clearly documented in the medical records.

Avoidance of hypothermia

Forced air warming and a fluid warmer should be used when the core temperature is less than 36° C.

Algorithm for the Treatment of Bleeding complicated by Coagulopathy

TEG ® R VALUE >9 minutes and / or PT > 20 seconds and / or APTT > 51 seconds	4 units FFP (10-15 ml/kg)
TEG ® maximum amplitude (MA) <50mm and / or Platelets <50x10 ⁹ /1 and / or Aspirin or clopidogrel in last 7 days	1 adult dose of platelets
TEG ® maximum amplitude (MA)<42mm and / or Platelets<20x10 ⁹ /1 Fibrinogen < 1g/1	2 adult doses of platelets 4 units FFP
Fibrinogen < 0.5g/l	10 units cryoprecipitate

Advice

Seek advice from the duty ICU consultant, a surgeon or a haematologist as appropriate.

Other measures

DDAVP (0.3mcg/kg slow IV bolus repeated not less than 6 hourly up to a maximum of 3 administrations).

Guidelines for the use of blood and blood components for ORH critical care units v1.2 February 2004

Ionised calcium must be maintained above 0.9mmol/l with slow (2-3 minute) IV boluses of calcium chloride or gluconate.

For bleeding associated with warfarin overdose consider prothrombin complex concentrate (PCC). FFP contains low concentrations of factor IX. The use of PCC will need to be discussed with a Haematology SpR prior to issue.

Excessive fibrinolysis is indicated when the TEG® LY30 > 7.5% and consideration should be given to treatment with Tranexamic acid or Aprotinin.

In extreme cases, multifocal mucosal bleeding may be treated with fibrin glue.

References

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Version Control

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