Blood Product Support

CONTENTS

RED BLOOD CELLS

available in Fiji (mainly use family donors)

available in Tonga dependent on appropriate bags for fractionation

Samoa- whole blood

Transfusion threshold

The usual threshold for transfusion is:

Hb < 80g/l for patients < 10 years old

Hb <100g/l for patients ≥ 10 years old

However, there are situations when it is prudent to maintain Hb at a higher level:

ongoing bleeding

sepsis (patients recover sooner from febrile neutropenia with a higher Hb)

- patient is experiencing symptoms from anaemia – this is particularly true of teenagers who may respond to a higher Hb threshold

There are also situations when it is prudent not to transfuse at a particular Hb but rather wait until the patient is symptomatic from anaemia:

- aplastic anaemia
- other bone marrow failure syndromes
- chronic anaemia
- a newly presenting patient with leukaemia and white cell count > 100 x 10^9/litre *should not be transfused* even if mildly/moderately symptomatic from anaemia. Increased circulating red blood cells plus hyperleucocytosis increases risk of hyperviscosity with the potential for catastrophic consequences.

Transfusion volume

Order quantity by volume rather than units if possible:

Volume required = Anticipated rise in Hb in g/l x weight (kg) x 0.4

or 10-15mg/kg

Reactions to Packed Red Blood Cell Transfusions

Febrile non-haemolytic reactions

Fever and chills (sometimes rigors, headache, tachycardia, myalgia) occur when recipient antibodies are directed against white blood cell or HLA antigens. It is very unusual with the first transfusion but common in multiply transfused patients.

Approach:

Mild reaction (mild fever- up to 38) – interrupt transfusion, give paracetamol

Moderate/severe reaction (fever / rigors etc) – stop transfusion (do not restart), give paracetamol and hydrocortisone.

Premedicate future packed cell transfusions with paracetamol ± hydrocortisone given 1 hour beforehand (antihistamines are ineffective)

Allergic reactions

Acute anaphylaxis is rare and must be distinguished from acute haemolytic transfusion reaction – fever and haemoglobinuria occur with the latter.

Approach:

Mild reaction (urticaria, skin erythema and pruritis - temporarily stop transfusion, give intravenous antihistamine, then restart. Mild reactions are often idiosyncratic (due to infused blood proteins) and usually do not recur.

Moderate/severe reaction (anaphylaxis) - stop transfusion (do not restart), treat anaphylaxis as per usual. Premedicate future packed cell transfusions with antihistamine.

Haemolytic reactions

These may be acute or delayed. Acute haemolytic transfusion reactions are most often dude to ABO incompatibility as a result of clerical error. The presentation is with very sudden onset of fever, chills, pain, hypotension and haemoglobinuria. The Coombs test is positive.

Drug doses for transfusion reactions

Hydrocortisone - 3mg/kg intravenously

Promethazine - 0.25mg/kg intravenously

PLATELET SUPPORT

Platelets (availability country dependent)

available in Fiji (mainly use family donors)

available in Tonga dependent on appropriate bags for fractitionation

Samoa- whole blood

Dosage of platelets

On average, one unit of platelets/m^2 produces an increment of 10 x 10^9/l.

The usual platelet dose is 1 unit per 10 kg of body weight.

Indications for platelet support (British Journal of Haematology, 2003, **122**, 10-23)**:**

Bone marrow failure from leukaemia or chemotherapy/radiotherapy:

Patient is well – transfuse if <10 x 10^9/l

Patient is unwell:

febrile (temp >38^{0}C) transfuse if < 20 x 10^9/l

spontaneous bruising and petechiae transfuse if < 30 x 10^9/l

DIC: give twice daily platelets transfusing if < 50 x 10^9/l.

Surgical procedures – keep count > 50 x 10^9/l:

lumbar puncture

epidural anaesthesia

dental extractions

laparotomy

Surgery at critical sites – keep platelets > 100 x 10^9/litre during and for 48 hours after the procedure:

neurosurgery

eye surgery

It should not be assumed that the platelet count will rise just because a platelet transfusion is given – a preoperative platelet count should be done to ensure that the above thresholds are reached. It is crucial to check the platelet count frequently after surgery to ensure the count is maintained.

Adolescent female at risk of menorrhagia - keep platelets > 30 x 10^9/litre

Notes on Platelet support

- Check patients with severe thrombocytopenia (< 10 x 10^9/litre) for evidence of fundal haemorrhages
- Prophylactic platelet support is not indicated for patients with long-standing thrombocytopenia (eg.aplastic anaemia) unless the count drops below 5 x 10^9/litre. Patients with aplastic anaemia are at particular risk of platelet refractoriness
- Platelet support is not *routinely* indicated as part of palliative care unless it is perceived that quality of care can be improved with a transfusion. Do not replace purely according to platelet count but rather according to symptoms.
- All paediatric patients receive ABO compatible platelets to avoid the risk of haemolytic reactions.

A higher threshold level for transfusion might be required if there is a platelet functional defect such as in some cases of myelodysplasia, and uraemia

DO NOT give platelets to patients with ITP unless otherwise directed by a

consultant

There may be a higher platelet requirements when in the setting of;

(1) active haemorrhage

(2) sepsis

(3) splenomegaly

(4) consumptive coagulopathy

- If the platelet counts don't rise as expected record a 1 hour and 24 hour increment to detect early refractoriness.

Rhesus (D) Negative Recipients

Although platelets do not carry Rh antigens, the infusion may be "contaminated" with donor red blood cells that could sensitise Rh negative individuals. In immunocompromised patients the rate of Rh sensitisation is low. Rh (D) negative children should preferably receive Rh (D) negative platelets. If only Rh (D) positive platelets are available, then anti-D immunoglobulin should be given:

To both male and female children

Give the **IV** anti-D Ig product

Give immediately after the platelet infusion

Repeat every 4 weeks if further Rh positive platelets are given. It may be necessary to repeat more frequently (3-weekly) if substantial Rh positive platelet transfusion is required.

Platelet reactions

Reactions are much more common following platelet transfusions compared with packed cells; platelets are derived from multiple donors, are more likely to be contaminated with bacteria and the infusate contains cytokines. Reactions may be either febrile or allergic.

Febrile reactions

These occur as a result of patient antibodies directed against transfused white blood cells contaminating the platelet transfusion or cytokines released from white blood cells during storage.

Occasionally the febrile reactions are due to bacterial contamination or HLA or platelet specific antibodies. In the latter case platelet refractoriness is noted. Once leucodepletion at donation is standard practice, febrile reactions unresponsive to paracetemol or associated with platelet refractoriness should be dealt with as for platelet refractoriness.

Approach:

Mild reaction – interrupt transfusion, give paracetamol, resume

Moderate/severe reaction – stop transfusion (do not restart), send blood culture

on patient and platelet bag for culture. Ensure platelets are ABO compatible. Premedicate future platelet transfusions with paracetamol ± hydrocortisone (antihistamines are ineffective)

Allergic reactions

The reaction varies from mild (erythema, urticaria, pruritis) to severe (anaphylaxis). The reaction is against plasma protein in the platelet concentrate and cannot be mitigated by leucodepletion. Treat with an antihistamine. Occasionally the reaction is persistent.

Doses of drugs used for platelet transfusion reactions

Hydrocortisone - 3mg/kg intravenously

Promethazine - 0.25mg/kg intravenously

Fresh Frozen Plasma

Indications for use of FFP are:

- DIC
- massive transfusion requirements
- severe liver disease.

Always check a full coagulation profile, FDP and D-dimers. Do not use FFP as a plasma expander.

Dose: FFP comes in packs of 50 and ~200 - 250mls. Record volume infused for fluid balance.

- 10 - 15 mls/kg in DIC. Check clotting screen frequently.
- 1unit to 3 units of blood transfusion. Repeat clotting screen after initial dose to assess further treatment. Platelets may also be required so check platelet count.
- ABO compatible units if possible. If not you can give group O or A packs but avoid giving large volumes of group O FFP to group A, B, or AB patients.
- Use as soon as it is thawed
- No need for irradiation
- Rh (D) negative children should receive Rh (D) negative FFP whenever possible. If this is not possible, infuse Rh (D) positive FFP and give an intravenous preparation of anti-D immunoglobulin as soon as possible after the FFP and certainly within 72 hours – to males and females.

Cryoprecipitate

- Rich in fibrinogen and factor VIII
- Dose is 5-10 mls/kg in DIC. Check clotting frequently.
- Small volume, 25 mls of fluid in each pack so useful for DIC with fluid overload and hypofibrinogenaemia. Always check clotting screen.
- 1 unit has around 125 units of factor VIII.
- No need for ABO matching or irradiation.
- Use as soon as it is thawed
- Rh (D) negative children should receive Rh (D) negative cryoprecipitate whenever possible. If this is not possible, infuse Rh (D) positive cryoprecipitate and give an intravenous preparation of anti-D immunoglobulin as soon as possible after the cryoprecipitate and certainly within 72 hours – to females and males

L-asparaginase-induced coagulopathy

This tends to occur more frequently with E coli-derived preparations compared with Erwinia-derived L-asparaginase. Always check coagulation screen weekly on patients receiving L-asparaginase. Check more frequently if L-asparaginase-induced hepatitis is suspected. The impairment may produce either hypo- or hypercoagulability; however, most commonly no clinical coagulation problem is noted probably as a result of both pro- and anti-coagulation factors being equally affected. Hypofibrinogenaemia is common. Hypercoagulation may cause cerebral ischaemia, the so-called encephalopathy of ALL induction. Hypercoagulation may occur from decreased antithrombin III, protein S or C.

Only correct coagulation if there is an obvious *functional impairment:*

- APTT prolonged > 10 secs – give FFP
- Thrombin clotting time prolonged > 10 secs – give cryoprecipitate
- Shortened APTT – discuss with consultant; consider FFP
- Specific replacement may be appropriate (eg. antithrombin III – very expensive!!). In the first instance, it is best giving fresh frozen plasma and determining response.