SOUTHEND HOSPITAL

GUIDELINES

FOR THE USE OF PLATELET TRANSFUSION

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January 2005
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**INDICATIONS FOR PLATELET TRANSFUSION**

**SUMMARY**

**In bone marrow failure**

**P1** To prevent spontaneous bleeding when platelet count <10x10^9/l

To prevent spontaneous bleeding when the platelet count<20x10^9 /l in the presence of additional risk factors for bleeding such as sepsis or haemostatic abnormalities.

To prevent bleeding associated with invasive procedures. The platelet count should be raised to >50x10^9/l before lumbar puncture, epidural anaesthesia, insertion of intravascular lines, transbronchial and liver biopsy, and laparotomy, and to >100 x 10^9/l before surgery in critical sites such as the brain or eyes.

**In critical care \ surgery**

**P2** Massive blood transfusion, the platelet count can be anticipated to be <50x10^9/l after 1.5 – 2 x blood volume replacement. Aim to maintain platelet count >50 x 10^9/l. For patients with multiple trauma or central nervous system injury aim to maintain platelet count >100 x 10^9/l

**P3** DIC in the presence of bleeding and severe thrombocytopenia Aim to maintain platelet count >50 x 10^9/l

**Platelet support for surgical patients**

**P4** Where there is bleeding and the platelet count <100x10^9/l or patient has been on aspirin within 2 weeks prior to surgery.

**OR**

Patients on anti-platelet therapy up to 10 days prior to surgery regardless of platelet count. One standard dose of platelets can be ordered directly through the blood transfusion laboratory

**Platelet function disorder**

**P5**

a. Inherited platelet dysfunction e.g. Glanzmanns thrombocythaemia with bleeding or as prophylaxis before surgery.

b. acquired platelet dysfunction (e.g. patient on aspirin, NSAIDs, Clopidogel).

**For immune thrombocytopenia**

**P6** Autoimmune thrombocytopenia only in the presence of major haemorrhage.

Post- transfusion purpura only in the presence of major haemorrhage

Neonatal alloimmune thrombocytopenia, to treat bleeding or as prophylaxis to maintain platelet count >50x10^9/l.
INTRODUCTION

The use of platelet transfusion continues to increase. This undoubtedly made a major contribution to the development of intensive treatment regime for haematological and other malignancies. More than 215,000 adult doses are used in the UK every year.

Platelet transfusions are indicated for the prevention and treatment of haemorrhage in patients with thrombocytopenia or platelet function defects. Platelet transfusions are not indicated in all causes of thrombocytopenia and maybe contra-indicated in certain conditions. Hence, the cause of thrombocytopenia should be established before making a decision about platelet transfusion.

The risks versus benefits should be assessed before any platelet transfusion.

Risks

- Alloimmunisation
- Transmission of infection
- Allergic reactions
- Transfusion-related acute lung injury
PLATELET CONCENTRATE

Dose: 1 adult therapeutic dose (ATD) for an adult.

Volume: 150 – 300 ml for platelet concentrate (conc) prepared by apheresis.
         150 – 450 ml for platelet conc prepared from whole blood

Storage and Shelf Life

- In a closed system, current packs allow storage at 22ºC ± 2ºC with continual gentle agitation for up to 5 days.
- In an open system (after suspension in PSM or washing, the shelf life is reduced to 24 hours, but it should be used as soon as possible.

Giving sets – filters

- Platelet conc. should be transfused through a standard blood or platelet administration set.
- Platelet conc. should not be transfused through giving sets that have been used for blood.
**Administration**

**Inspection of the unit**
- Platelet concentrate should be inspected by Hospital Blood Bank staff prior to issue, with particular attention to the integrity of the bag and any evidence of unusual colour or turbidity which might suggest bacterial contamination.
- It is good practice for the staff administering the unit to check it in a similar way before administration and to return it to the hospital Blood Bank if any abnormalities are found.

**Duration of transfusion**

It is recommended that platelet concentrate is transfused over a 30 minute period in adults.

**Monitoring during the transfusion**
- The patient should be informed about possible complications of transfusion.
- Visual observation of the patient during transfusion.
- A baseline observation (pulse, temperature and blood pressure) should be made prior to commencing the transfusion and repeated every 15 minutes after the start of each transfusion and at the end of the transfusion.

**Note:** Monitoring of platelet response should be assessed first clinically. To measure the increment in the platelet count a sample should be taken from a different line.
INDICATIONS FOR PLATELET TRANSFUSIONS

P.1 Bone marrow failure (due to disease, cytotoxic therapy or irradiation)

- Patients with active bleeding associated with thrombocytopenia.
- To prevent spontaneous bleeding when the platelet count is < 10 x 10^9/l.
- To prevent spontaneous bleeding when the platelet count is < 20 x 10^9/l in the presence of additional risk factors for bleeding, such as sepsis or coagulation abnormalities.
- To prevent bleeding associated with invasive procedures:
  a) Platelet count should be raised to more than 50 x 10^9/l before lumbar puncture, epidural anaesthesia, insertion of intravascular lines, transbronchial and liver biopsy and laparotomy.
  b) For operation in critical sites such as the brain or eyes, the platelet count should be raised to 100 x 10^9/l.

Note: Pre-operative platelet count should be checked to ensure that the above thresholds have been reached.

P.2 Massive blood transfusion. The platelet count expected to be around 50 x 10^9/l after 1.5 – 2 x blood volume replacement. (Adult blood volume= 70 ml/kg BW.

- Aim to maintain platelet count > 50 x 10^9/l in patients with bleeding.
- A higher level of 100 x 10^9/l for patients with multiple trauma or central nervous system injury.

P3 Acute disseminated intravascular coagulation (DIC) in the presence of bleeding and severe thrombocytopenia, in addition to management of the underlying disorder and coagulation factor replacement.

- Frequent platelets and coagulation screen testing should be carried out.
- Aim to maintain platelet count of more than 50 x 10^9/l.
- In chronic DIC, or in the absence of bleeding, platelet transfusion should not be given to correct a low platelet count.
P.4 Platelet support for surgical patients

This applies to patients with a bleeding problem (not surgically correctable) and a platelet count < $100 \times 10^9/l$.

OR

Patients on anti-platelet agent [e.g. Aspirin, Clopidogrel, non-steroidal anti-inflammatory drugs (NSAID)] up to 10 days prior to surgery regardless of platelets count.

One standard adult dose of platelets can be ordered directly through Blood Transfusion Department without prior arrangement with the Haematologists.

- It is essential to monitor further requirements for transfusion by clinical assessment, repeating full blood count and clotting screen.
- Further advice can be obtained by contacting the Haematology SpR or Consultant Haematologist.

P.5 Platelet function disorder

a. Inherited platelet dysfunction e.g. Glanzmans thrombocythaemia, storage pool disease etc.

b. Acquired platelets dysfunction (e.g. patient on Aspirin, Clopidogrel, NSAIDs).

The following recommendation for the management of bleeding or for prophylaxis before invasive procedure for the above patients:

- Withdraw drugs known to have anti-platelets activity if clinically possible.

- Correct the haematocrit to more than 30 in patients with renal failure, either with the use of recombinant erythropoietin or red cell transfusion

- Consider use of DDAVP (Desmopressin) in patients with inherited dysfunctional defects such as storage pool disease

- Consider the use of DDAVP or cryoprecipitate in patients with uraemia

- Use platelets transfusion where the above methods are not appropriate or are ineffective
P.6 Immune thrombocytopenia

a. **Autoimmune thrombocytopenia**
   - Platelet transfusion should be reserved **only for life-threatening bleeding**.
   - A large number of platelet conc. may be required to achieve haemostasis as a result of reduced survival of the transfused platelets.
   - Intravenous immunoglobulin or Methyl Prednisolone should be given at the same time to maximise the chances of stopping the haemorrhage and raising the platelet count.

b. **Post-transfusion purpura** only in the presence of major haemorrhage in addition to high dose intravenous immunoglobulin

c. **Neonatal immune thrombocytopenia** (please see Neonatal Guidelines) to treat bleeding or as prophylaxis to maintain platelet count of more than $50 \times 10^9/l$

**Contraindications to platelet transfusions**

- **Thrombotic thrombocytopenic purpura (TTP)**. Platelets transfusion are contraindicated unless there is life-threatening haemorrhage, as they have been temporarily associated with exacerbation of TTP.

- **Heparin-induced thrombocytopenia (HIT)**. HIT is usually associated with severe thrombosis. Platelet transfusion should not be given as it can result in acute arterial thrombosis.
Platelet Selection

1. **ABO compatibility**

   - First choice is identical ABO group as the patient if possible.
   - ABO non–identical platelets is acceptable transfusion practice, in particular when platelets concentration are in short supply, or when HLA match platelets are required and the best match is not ABO compatible.
   - ABO non–identical platelet transfusion may have lower platelet count increments, but this not usually clinically significant.
   - Group O platelets should be used only for Group O patients, unless other blood group patients have been tested and labelled negative for high titre anti-A and anti-B.
   - The transfusion of ABO non–identical platelets concentrate may be a cause for unexplained platelet refractiveness.

2. **RhD compatibility**

   - RhD–negative platelets concentrate should be given where possible, to RhD negative patients, particularly to women of child-bearing age.
   - If RhD–positive platelets are transfused to RhD–negative women of child-bearing potential, it is recommended that anti-D should be given.
     
     A dose of 250 IU anti-D cover 5 adult therapeutic doses of RhD–positive platelets within a 6 week period. It should be given subcutaneously in thrombocytopenic patients.
   - It is not necessary to administer anti-D to RhD negative men or women without child-bearing potential who have haematological disorders and receive platelet concentrate from donors who are RhD positive.
3. Gamma irradiation

Graft-versus-host disease (TA-GVHD) is the most frequent cause of transfusion-associated death (SHOT 2002). Patients at risk of TA-GVHD should be given gamma irradiated platelets according to our current guidelines. (Please refer to our current guidelines for irradiated blood and blood products)

- You need to order this in advance by informing the Blood Bank and filling in a special form.
- Platelet concentrates can be irradiated at any stage during their 5-day shelf life.
- Gamma – sensitive labels on the packs.
- Permanent record of all gamma – irradiated units must be kept.

4. CMV – Sero-negative platelets

Transfusion-transmitted CMV infection may cause significant morbidity and mortality in immune compromised CMV – sero-negative patients. The use of CMV sero-negative blood component has been shown to reduce the incidence of CMV infection in at-risk groups to 1-3%.

- It is recommended that CMV – sero-negative (and leukocyte-depleted) blood and platelets was indicated for CMV sero-negative pregnant women, intra-uterine transfusions, allogeneic haemopoietic stem cell transplant recipients and probably indicated for patients undergoing solid organ transplants and in patients with HIV infection.

Note: There is still controversy whether leukocyte depleted blood and blood products are sufficient to prevent CMV transmission compared to blood donated by CMV negative donors.
Platelet Refractiveness

It is a repeated failure to obtain satisfactory response to platelet transfusion. Some patients may have a poor response to one platelet transfusion and good responses to subsequent ones. Refractiveness diagnosed after a poor response to two or more platelet transfusions.

Causes of platelet refractiveness

a. Immune

- Alloimmune is mainly caused by HLA antibody which occurs mainly in women with a history of pregnancy, and has been reduced since the introduction of leukocyte depletion of blood components
- ABO incompatibility
- Platelet autoantibodies
- Drug-related platelet antibodies

b. Non-immune cause

- Shortened platelet survival due to infection (including treatment with antibiotics and anti-fungal drugs).
- DIC
- Splenomegaly

Investigation of refractiveness

- Clinical assessment to exclude non-immune platelet consumption
- If immune mechanism suspected, test for HLA antibodies.
Management of Platelet Refractiveness

- If HLA antibodies are positive, HLA-match platelet transfusion should be used.
- HLA-match platelet transfusion can also be justified, if there is no time to carry out serological tests, in particular when a patient has bleeding.
- Responses to HLA-match platelet transfusion should be carefully monitored, with post-transfusion platelet count both at one hour and 20 - 24-hours post transfusion.
- If no response to HLA-match platelet other causes should be checked.
- Check for non-immune causes
- Test for HPA antibodies.
- Check ABO incompatibility.
- Re-test for HLA antibodies.
- Make sure that you use ABO-identical platelets or HPA match platelets could be used if HPA antibodies identified.
- Platelet cross-matching may be helpful in some patients with non-specific HPA antibody.
- Please see summary diagram for management of patients refractory to platelet transfusion (next page).
Investigations and management of patients refractory to platelet transfusions

Responses to random donor platelets on two or more occasions in the presence of no obvious clinical factors likely to cause non-immune platelet consumption

Test for HLA antibodies using screening tests for both cytotoxic and non-cytotoxic HLA antibodies

- HLA antibodies present
  - HLA matched platelets (best available match)
  - Good responses
    - Continue with HLA matched platelets
  - Poor responses
    - Consider:
      1. HLA incompatibility
      2. Non-immune consumption
      3. HPA antibodies
      4. ABO antibodies
    - Retest for HLA Antibodies after 3 months

- HLA antibodies not present
  - Are non-immune cases of refractoriness present e.g. sepsis, DIC, splenomegaly
  - Yes
    - 1. treat cause
      2. Make decision about further platelet transfusions based on the clinical status of the patient e.g. increase dose of platelets or discontinue prophylactic platelet transfusions.
    - Test for HPA antibodies
  - NO
    - 1. If positive, identify specificity of HPA antibodies and attempt to provide HPA compatible platelets.
    - 2. If negative, consider trial of HLA matched platelets.

Guidelines for the use of platelet transfusion
REFERENCES


M.Murphy for the NBS Clinical Policy Group(09/01/2001). ABO and Rhesus compatibility in Relation to Platelet Transfusions.