TRANSFUSION GUIDELINES FOR CARDIOTHORACIC UNIT 2006

Summary of guidelines

RED CELLS (10-15ml/kg)

This applies to ward patients / icu patients who are stable. If unstable, or clinical judgement suggests a need, then transfusion outside these guidelines may be indicated.

NON CYANOTIC LESIONS
Infants over 4 months and children : maintain above 8g/dl.

Neonates, infants under 4 months: If unwell keep above 12g/dl
If well keep above 10g/dl

CYANOTIC LESIONS
Aim to keep above 12-14g/dl

PLATELETS (10ml/kg)

Post bypass

In bleeding patients we should aim to keep above 100 x10^9/L. Consider starting aprotonin.

Non bleeding consider transfusion below 50 x10^9/L.

ICU/ HDU

ECMO patients :
Respiratory ECMO, not bleeding – 80 x10^9/L.
Respiratory ECMO, neonate, keep at 100 x10^9/L for 48 hours, then if not bleeding, drop threshold to 80 x10^9/L.
All other ECMO patients keep at 100 x10^9/L (subject to review in 1 year).

Medical patients :
Follow guidelines for cardiology ward.

Cardiology ward
For stable medical patients, with no bleeding, then should not need to transfuse unless the **count is below 20 x10^9/L**. However, there may be times when transfusion at a higher threshold maybe desirable e.g. rapidly falling counts, neonates, sepsis. In this circumstance, discuss with on call haematologist.

FFP (10ml/kg)
Bleeding post cardiac surgery: Only useful if APTT elevated
Patients who are not bleeding should not have FFP, even if the coagulation screen is abnormal.

CRYOPRECIPITATE (5-10ML/KG)
Good source of factor VIII and fibrinogen.
Bleeding post cardiac surgery, ECMO:
Aim to keep fibrinogen above 1 g/L.

RED CELLS

1. Ward patients / icu patients who are *stable*:

Non cyanotic lesions

Infants over 4 months and children : maintain above 8g/dl.

Very little evidence currently exists for children with cardiac disease, or even for children requiring intensive care. Guidelines published in the British journal of haematology in 2004[1], covering children with haemoglobinopathy suggests triggers down to 7g/dl. Adult studies on ICU patients suggest that there is no additional morbidity associated with lower transfusion triggers. A retrospective study of PICU patients (non cyanotic)[2] showed increased morbidity in those transfused, even in patient groups where the Hb was down to 6.5g/dl..

Neonates, infants ander 4 months: If unwell keep above 12g/dl
If well keep above 10g/dl

There is relatively little evidence to base guidance on. Where protocols have been established in neonatal units, different transfusion triggers do not seem to affect outcome. The triggers suggested here are based on the guidelines published in the British journal of haematology in 2004[1]. Their suggestion is in fact to allow lower limits (7g/dl) for 'well babies'. As our population will either have cardiac failure, or be recovering from surgery, it would be reasonable to maintain slightly higher haemoglobin.

Cyanotic lesions

Aim to keep above 12g/dl

No evidence from studies is available on this group of patients. Current haematology guidelines do not cover this group. 'Best practise' guidelines vary, but common ranges appear to be around 12-14g/dl.

PLATELETS

There is lack of evidence to guide treatment to cover surgery. The following are adapted from guidelines from the British Committee for Standards in Haematology[3].

Post bypass

Neonates highly likely to suffer coagulopathy post bypass. We should consider having platelets and cryoprecipitate available for these patients. Should also consider use of TEG as 'bedside' test to direct therapy in both this high-risk group and in other patients post bypass.
In bleeding patients we should aim to keep above 100 x10^9/L.
Non bleeding consider transfusion below 50 x10^9/L.

ICU/ HDU

Post op patients :

In bleeding patients we should aim to keep above 100 x10^9/L. Additionally start aprotonin.

Non bleeding consider transfusion below 50 x10^9/L.

ECMO patients :

Respiratory ECMO, not bleeding – 80 x10^9/L.

Respiratory ECMO, neonate, keep at 100 x10^9/L for 48 hours, then if not bleeding, drop threshold to 80 x10^9/L.

All other ECMO patients keep at 100 x10^9/L (subject to review in 1 year).

Medical patients :

Follow guidelines for cardiology ward.

Cardiology ward

For patients undergoing surgery, aim to cease antiplatelet drugs, and have a level above 100 for surgery. If unable to stop antiplatelet drugs prior to surgery, consider prophylactic use of aprotonin post surgery.

For stable medical patients, with no bleeding, then should not need to transfuse unless the **count is below 20 x10^9/L**. However, there may be times when transfusion at a higher threshold maybe desirable e.g. rapidly falling counts, neonates, sepsis. In this circumstance, discuss with on call haematologist.

CLOTTING FACTORS

Fresh Frozen Plasma

Bleeding post cardiac surgery:
Bypass induces haemostatic compromise (platelet dysfunction, dilution of factors, activation of coagulation cascade and consumptions of factors).
However, due to the complex nature of the coagulation defect, there is no advantage in using FFP unless there is a proven deficit (prolonged PT, APTT).
Patients who are not bleeding should not have FFP, even if the coagulation screen is abnormal.

ECMO:
Follow current protocols. Clotting factors may be deficient due to ongoing activation and consumption with the circuit. This also is true for anti thrombin III, and FFP administration helps maintain anticoagulation with heparin.

Cryoprecipitate

Good source of factor VIII and fibrinogen.

Bleeding post cardiac surgery, ECMO:
Aim to keep fibrinogen above 1 g/L.

Neonates are more prone to coagulopathy post bypass, and more intensive monitoring e.g. TEG should be considered intra and post operatively.

Where bleeding is related to coagulopathy, vitamin K I.V. (0.3mg / kg) should be considered in order to ensure adequate factor synthesis by the liver (discuss with haematology if anticoagulation with warfarin may be necessary later e.g. Fontans)

As with FFP cryoprecipitate should only be used to treat if there is a coagulopathy with bleeding. Abnormal lab values alone should not be treated.

1. Transfusion guidelines for neonates and older children British journal of haematology 2004. 124, 433-453
2. Pediatric red blood cell transfusions increase resource use. Goodman AM, Pollack MM, Patel KM, Luban NLJ Pediatr. 2003 Feb;142(2):95-7.
3. Guidelines for the use of platelet transfusions.British Journal of Haematology, 2003, 122, 10–23.